



Urban Adaptation and Climate Resilient Infrastructure Final Report

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Conflicts of interest

There were no conflict of interests in the writing of this report.

Picture

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ACRONYMS

ACRONYM	Full name
ADB	Asian Development Bank
BAPPENAS	Badan Perencanaan Pembangunan Nasional (National Development Planning Agency)
BPD LH	Badan Pengelola Dana Lingkungan Hidup (Environmental Fund Management Agency)
BRT	Bus Rapid Transit
CDEL	Capital Departmental Expenditure Limits
DFAT	Australian Department for Foreign Affairs and Trade
DNPI	Dewan Nasional Perubahan Iklim (National Climate Change Council)
FCDO	Foreign, Commonwealth & Development Office
GBP	Great Britain Pound
GCF	Green Climate Fund
GDP	Gross Domestic Product
GESI	Gender dan Inklusi Sosial (Gender and Social Inclusion)
IDR	Indonesian Rupiah
IPCC	Intergovernmental Panel on Climate Change
KPBU	Kerja Sama antara Pemerintah dan Badan Usaha (Public Private and Partnership/PPP)
LVC	Land Value Capture
MEOF	Ministry of Environment and Forestry
MOF	Ministry of Finance
MOHA	Ministry of Home Affairs
MOPWH	Ministry of Public Works and Public Housing
NDA	Nationally Designated Authority
ODA	Official Development Assistance
RPJMN	Rencana Pembangunan Jangka Menengah Nasional (National Medium-Term Development Plan)
RPRKD	Rencana Pembangunan Rendah Karbon Daerah (Regional Low-Carbon Development Plans)
SDGS	Sustainable Development Goals
SIDIK	Sistem Informasi Data Indeks Kerentanan (Vulnerability Index Data Information System)
SNI	Standar Nasional Indonesia (Indonesian National Standard)
SUMP	Sustainable Urban Mobility Plan
UNFCCC	United Nations Framework Convention on Climate Change
UK	United Kingdom
UN	United Nations
US	United States
USD	United States Dollar
TA	Technical Assistance
TOD	Transit Oriented Development
UCCR	Urban Climate Change Resilience
WB	World Bank

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EXECUTIVE SUMMARY

Introduction

Indonesia is a rapidly urbanising country. According to a World Bank report, the proportion of Indonesia's urban population reached 57.9% in 2022 with an annual rate of urbanisation of 2.7% since 2010. Cities in Indonesia face unique challenges in the context of climate change because of the country's geographic characteristics, coupled with its rapid rate of urbanisation. Over 110 million people in approximately 60 Indonesian cities were exposed to the above negative impacts of climate change, with the country's urban poor being the most vulnerable. It is mainly due to the concentrated urban poor in city peripheries where the infrastructure supply is limited and low-quality. This situation reflects Indonesia's 'infrastructure gap', including in urban areas, resulting from limited infrastructure investments. The effects of climate change – such as rising sea-levels, droughts and floods – threaten to slow down or, in some cases, reverse recent gains in economic and social development. Building climate resilience will therefore be a crucial aspect of economic development in middle-income countries such as Indonesia.

Study Objective

International assistance is required to support Indonesia meet its climate ambition and incorporate best practices for inclusive and climate-friendly urban development. Recognising the nexus between urbanization and climate change, the Foreign, Commonwealth and Development Office (FCDO), Government of UK is developing a new ODA programme that will seek to support Indonesia to grow sustainably whilst adapting to the impacts of climate change in cities by investing in climate-resilient urban infrastructure.

A needs assessment exercise based on sectoral analysis and stakeholder engagement will inform the development of this programme and identify potential areas for UK intervention. The assessment will consider the local context, and seek to support the UK's broader strategic interests, including strengthening our relationships with the Government of Indonesia and supporting international climate commitments.

Summary of Recommendations

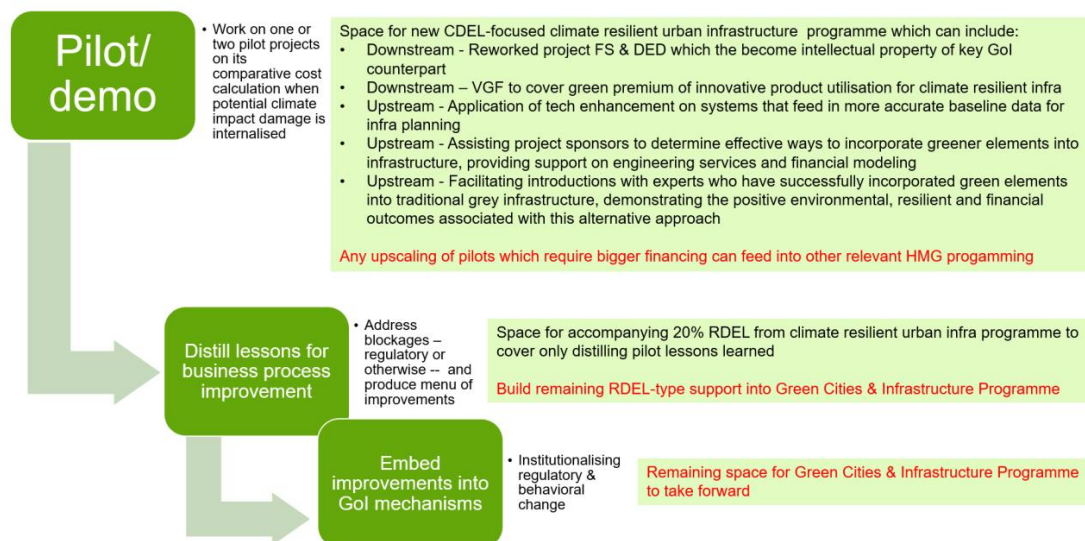
Based on the completed landscape mapping of urban adaptation and infrastructure planning and implementation in Indonesia, we provide the following set of recommendations (see section 5 for further details):

1. Approach for coherent programming to address adaptation and resilience in urban infrastructure;
2. Identification and prioritisation of government counterparts as appropriate entry-points and to expand opportunities for UK – Indonesia engagement;
3. Prioritisation for geographical focus of interventions, blending vulnerability assessment and matching them with priority cities for FCDO
4. A set of potential delivery mechanisms, focused on near-term investment options and potential partners.

Approach to coherent programming

The key takeaway from the landscape mapping is that climate-resilient urban infrastructure – termed otherwise as urban adaptation and resilience – is a relatively new concept to Indonesian stakeholders. In some institutions, the term adaptation and resilience in the development of urban infrastructure has been limitedly translated to large seawall constructions aimed only at responding to the impact of sea level rise in coastal cities. With this in mind, and with the understanding that there is opportunity for a deep-offer technical assistance for Indonesia available through broader BEJ Portfolio, including the global Green Cities & Infrastructure (GCI) programme, to work alongside a Future Cities CDEL bilateral support that this assessment proposes the below framework:

Greening the grey - folding all categories into coherent programming, systemic change



Proposed umbrella framework for HMG support for climate-resilient urban infrastructure in Indonesia

One of the ways to constructively inform and build awareness for climate-resilient urban is to demonstrate the benefits of 'greening the grey' or internalising potential losses due to climate impact (e.g. costs of flood, drought and other forms of climate hazard) at the beginning of infrastructure project planning and development. The proposed framework offers the broader thinking of how demonstration or pilot projects supported by the CDEL investment feeds into the process of trying to create building blocks for a more systemic change within Indonesian stakeholders, both at national and subnational levels.

A space for the Future Cities CDEL will be on the piloting of the 'greening the grey' concept. The final objective is to leverage available climate financing through covering the 'green premium' or marginal cost of planning and implementing infrastructure that is climate-proofed. Given that the existing baseline is business-as-usual project designs, the CDEL will need to explore ways to identify most impactful projects to 'green' and cover the 'green premium' marginal cost. We discuss the implication of this in terms of Indonesia government counterparts, potential partners and investment opportunities below.

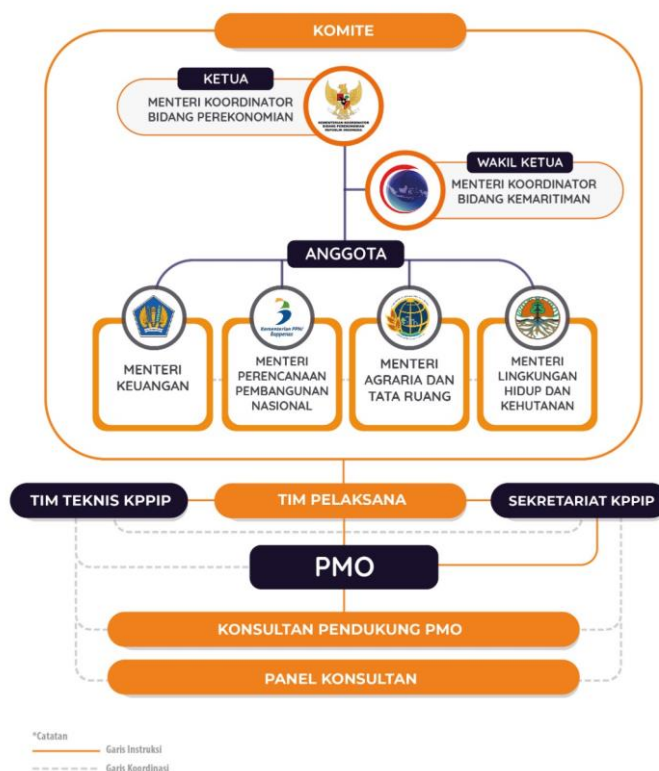
Identifying the right counterparts

The types of projects identified fall under the purview of Ministry of Public Works & Housing and Ministry of Transportation, with additional smaller but potentially impactful work falling under Indonesian Met Office BMKG and Disaster Management Agency. However, given the sectoral silos, FCDO may want to consider setting up a steering committee which also involve the Coordinating Ministries as part of the programme governance. The Coordinating Ministry for Maritime Affairs & Investment has the strongest mandate to oversee both climate issues and infrastructure development, including tapping into private sector. The UK Government already has an MoU with this Ministry which can be built upon. But there is also a level of risk taking in building the new programme under it as there are elections coming up.



Identified government institutions as potential counterparts

One interesting cross-ministerial committee under the Coordinating Ministry for Economic Affairs that would be worth exploring a collaboration with is the Committee for Acceleration of Priority Infrastructure Delivery (or KPPIP – *Komite Percepatan Penyediaan Infrastruktur Prioritas*). KPPIP is tasked with creating a top down – bottom up portfolio of planned projects, matchmaking financing for them, debottlenecking regulatory issues and putting in place service level agreements for agreed projects. KPPIP covers the majority of debottlenecking further implementation of TOD & LVC, but also works on other major sectors such as water, transport and energy. KPPIP has requested convening support to help the committee to better align the different international partner support it receives. FCDO may want to consider a response to this to replicate the successful initiation of a similar platform under the MENTARI FIRE Dialogue.



Structure of the Committee for Acceleration of Priority Infrastructure Delivery

Priority metropolitan areas based on climate risk and vulnerability¹

In selecting the geographical focus, we overlay GoI priority metropolitan areas with those already having certain level of vulnerability assessment and matching them with priority cities for FCDO – defined as cities where Embassy Second Cities team is working on. Based on this overlay, suggested priority areas include Greater Bandung, Greater Semarang, Greater Surabaya with additional areas to be considered in Greater Makassar and Greater Jakarta.

¹ For assessment methodology please see Annex 1

No	Metropolitan Area	Level of vulnerability based on Risk Class of IRBI 2022	LCDI priority (Bappenas - CRD), Water Sector	FCDO Second Cities priority
1	Medan Metropolitan (Medan, Binjai, Deli Serdang, Karo)	All Medium	All Top Priority	
2	Patung Raya Agung (Palembang City, Banyuasin Regency, Ogan Ilir Regency, Ogan Komering Ilir Regency).	All Medium, except Ogan Komering Ilir Regency, High	Low to Medium priority	
3	Jabodetabekpunjur (DKI Jakarta, Bogor Regency, Bogor City, Depok City, Tangerang Regency, Tangerang City, South Tangerang City, Bekasi Regency, Bekasi City, Cianjur Regency).	All Medium, except Cianjur High	Low to Medium priority	V
4	Cekungan Bandung (Bandung City, Bandung Regency, West Bandung Regency, Cimahi City, and part of Sumedang Regency	All Medium, except Bandung Regency High	All Top Priority, except West Bandung Regency, Priority	V
5	Kedung Sepur (Kendal Regerncy, Demak Regency, Semarang City, Semarang Regency, Salatiga City, and Purwodadi)	All Medium	All Top Priority, except Purwodadi, low to Medium priority	V
6	Gerbangkertosusila (Gresik Regency, Surabaya City, Sidoarjo Regency, Mojokerto Regency, Mojokerto City, Lamongan Regency, Bangkalan Regency).	All Medium	All Top Priority, except Surabaya & Bangkalan, Super Priority	V
7	Banjar Bakula (Banjarmasin City, Banjarbaru City, Banjar Regency, Barito Kuala Regency, Tanah Laut Regency).	All Medium except Banjar Regency & Tanah Laut, High	Low to Medium priority	
8	Sarbagita (Denpasar City, Badung Regency, Gianyar Regency, Tabanan Regency).	All Medium	All Top Priority, except Tabanan, Super Priority	V
9	Mamminasata (Makassar City, Maros City, Gowa Regency, Takalar Regency)	All Medium except Maros City High	Low to Medium priority	V
10	Bimindo (Manado City, Bitung City, North Minahasa Regency).	All Medium	Low to Medium priority	

Near-term investment opportunities

We have investigated partnering and routes to market that would allow for both near-term and longer term deployment funding. As described below, these options either work with partners to ensure that climate-resilient infrastructure investments are subject to enhanced assessments and are ready for implementation or build in an assessment phase for project selection in the case of Future City specific the Call for Proposals. Based on the current landscape mapping, opportunities identified include:

1. Blending first year committed budget into existing mechanisms with other institutions such as the World Bank, the Asian Development Bank, and PT SMI

Under its new leadership, the World Bank is actively pursuing opportunities to accelerate the flow of funds into climate-smart initiatives around the world. Building on the City Resilience Program, a multi-donor initiative aimed at increasing financing and planning for urban resilience including investments in climate adaptation, the World Bank in Indonesia is concentrating efforts on the best options to localise its approach.

In mid-2023, the World Bank/Indonesia launched an Expression of Interest and is now in the process of reviewing short-listed candidates to complete a study covering empirical evidence of leveraging financial resources for climate related projects, focusing on climate adaptation. The main objective is to provide an overview of funding and financing vehicles that could be available to Indonesian subnational jurisdictions (SNGs) for undertaking climate change-related capital investments and to assist PT SMI in identifying and expanding climate finance possibilities. This contributes to the sustainable development and climate resilience of Indonesian communities through the financing of water, renewable energy generation, transportation, and agriculture-related infrastructure projects.

Subject to further discussions and planning, BEJ can directly participate as a partner to the World Bank both in this study - which is proposed to include an overview of international tools and practices in climate financing, stock-taking of climate financing track record in Indonesia, a summary of climate financing options for Indonesian sub-national governments, and a practical guide for sub-national governments seeking access to climate finance - as well as direct engagement with cities using the tools from this study, leading directly to investment and capital flows, alongside PT SMI. While a separate funding platform, the implementation of this approach would be informed by BEJ's on-going experience with PT SMI through the Viability Gap Finance platform under Mentari. A similar approach can be taken with ADB, which is currently establishing an urban resilience trust fund also funded by the UK government amongst other donors.

The immediate next step to take into blending first year tranche (and potentially subsequent year investments) into this type of vehicle is further discussions with partners to identify mutually acceptable project assessment and funding arrangements.

2. Setting aside a portion of first year (and potentially subsequent years) investment into an Urban Resilience Innovation Fund

Currently, urban adaptation infrastructure projects are limited to the water, sanitation and hygiene sectors, with little to no effort identified in climate-proofing other sectoral infrastructure such as transport and the general urban planning or hydrometeorological hazard resilience. FCDO can look into convening, brokering and supporting relevant stakeholders into developing proof-of-concept projects that either:

- a. Test the scalability of innovative products or approaches such as nature-based solutions in urban areas

This type of pilot project will aim to utilise market-existing innovative products to be utilised in specific sites to showcase how such products can increase climate adaptive level of certain infrastructure such as surface road transport. The main objective is to calculate the green premium of using innovative products and seek replicability via further mass procurement projects. FCDO can leverage its existing partnership with the National Research and Innovation Agency (BRIN) to sift potential innovative products in the market.

Example of pilot project



What can be supported?

- Site selection & detailed engineering design
- Full cost of piloting, and/ or
- Green premium financing mechanism
- Monitoring project impact to site resiliency

b. Pilot bottom-up, inclusive climate adaptation projects at neighbourhood or community level

This type of pilot project can be considered a GEDSI-specific project with participatory approach at the heart of it. One approach worth replicating is GIZ IKI Cities Adapt programme currently working in Mexico and South Africa which collaboratively with local communities in urban areas select multi-functional sites that can benefit from enhanced climate-resilient design. A site it selected in Mexico combined nature-based solutions design and implementation into a local health clinic with a nearby school. It also builds awareness and critical mass on urban resiliency topic by conducting an open, competitive process on the final design to be implemented that includes local university students.

Given the market-driven nature of these solutions, we recommend a route to market through an Expression of Interest (followed by co-creation stage) or Call for Proposals. These can be developed relatively quickly drawing on other BEJ platforms, e.g. UK PACT. An initial set of funding criteria is provided below for selecting the projects through an EoI or CFP.

Funding principles and criteria	
Principle	
Ecologically sustainable development	Contributes to urban climate change resilience without negatively straining or degrading ecological systems or resulting in unsustainable practices
Do no harm	Contributes to urban climate change resilience without generating negative consequences that would yield determined impacts on poor and vulnerable populations.
Criteria	
Credibility	a. Contribution to building urban climate change resilience; b. Impact on lives of impoverished and vulnerable populations; c. Potential to integrate with other resilience-building measures; d. Scale of impact
Viability and sustainability	a. Technically and operationally viable; b. Financially viable and sustainable; c. Prospects for timely implementation; d. Local ownership

Leverage capacity	Ability to leverage other resources (financial, human technical)
Replicable and scalable	a. Prospects for replication in other places b. Ability to achieve scale c. Ability to contribute new urban climate change resilience knowledge and practice
Innovation	Potential and level of climate innovation as it relates to adaptation and resiliency
Portfolio balance	Contribution to a diverse and balanced set of projects and interventions

There were also some additional recommendations from a validation workshop with other international partners summarised below for consideration:

- **Systems approach at specific geographies** - Sectoral silos have been the most challenging issue in climate action planning and implementation, including in building resiliency. That said, having a geographical focus (ie working to support several strategic metropolitan areas as pilot) can provide the space to come up with a more systems approach to trial cross-sectoral solutions, including ecosystem-based or nature-based solutions.
- **Staggered approach to building climate resiliency in urban infrastructure** - Climate-resilient infrastructure reduces, but may not fully eliminate, the risk of climate-related disruptions. Risk management requires making trade-offs between risk minimisation and cost, where it becomes more expensive (e.g. DFAT calculation shows a 15% premium for the water sector) and increasingly technically challenging to prepare for events that are very unlikely to occur. The costs of protection need to be weighed against the consequences of damage or disruption. With the issue of affordability in mind, awareness building and analytical work in support of a more climate resilient urban infrastructure needs to be built with a staggered approach to initially achieve increased resilience to ultimately be at climate-proofed level. Some guidelines from HMG that can be introduced in this context include Defra's [Supplementary Green Book](#).
- **Upstream opportunity on strengthening climate data & modelling** - There is a large opportunity that could result in impactful outcome in supporting strengthening of upstream climate data & modelling by working with Indonesian Met Office BMKG. Connections need to be made between supply and demand of climate data and modelling in support of planning and implementation of climate resilient urban infrastructure at the subnational level as provincial and city governments are rarely aware of the need and availability of this type of data from BMKG.
- **Downstream opportunity on exploring work with insurance sector & CSR** - Although still a nascent subject, there is already initial discussion in working with insurance companies to deliver financial and fiscal resilience by addressing the residual risks associated with the impacts of shocks and stressors that go beyond a system's existing capacity to absorb those risks. USAID IUWASH Tangguh has started initial engagement for the water sector that could be further expanded into other sectors. Working with the private sector via its CSR mechanism is also worth exploring.
- **Managing a political year of 2024** - With general and subnational elections lining up in 2024, there will be a slowing down in both national and provincial level government's commitment to undertake new activities and projects. This includes a knock-on effect to a lower appetite from subnational governments to absorb climate financing until perhaps early 2025. With that in mind, 2024 is best to be dedicated to work with an existing mechanism or support planning and preparation of pilot projects that are slightly detached from APBN/ APBD cycles and only require endorsement from the public sector (technical ministries or local governments). Piloting in Surabaya seems feasible. From previous Future Cities engagement, it seems that the appetite for climate adaptation and resilience is high and UK has been supporting the city on this.

1. INTRODUCTION

1.1. Purpose, scope, and objective

Within the above context, the FCDO is planning a new ODA programme focusing on climate-resilient infrastructure and commissioned a needs-assessment for an urban development and adaptation programme in Indonesia. There are three main elements the needs assessment is expected to identify:

- a. Ways to unlock markets system to increase productivity and address climate risks;
- b. Space for coherent, effective and efficient UK Government support and;
- c. Specific options for coordinated interventions including modalities, geographical focus and partners.

The final product of this needs-assessment exercise is an evidence-based analysis that can inform the design of capital and technical assistance grant facility that will be based upon:

1. An evidence-based understanding of the current landscape of urban adaptation and infrastructure planning and implementation in Indonesia.
2. Recommendations for interventions that contribute to a coherent portfolio of UK assistance supporting Indonesia's low carbon, inclusive growth as set out in the Sustainable Development Goals and in line with UK International Development Strategy, as well as the UK-Indonesia Partnership Roadmap.
3. Recommendations for investments deploying funds within Capital Departmental Expenditure Limits (CDEL) based on robust analysis of compatibility with Indonesian public and private climate financing, accompanied by Resource Departmental Expenditure Limits (RDEL) to complement with technical assistance in areas most crucial to enable further CDEL funding.

1.2. Contents of the report

This preliminary report consists of:

- **Section 2** providing a comprehensive context mapping on urban adaptation initiatives setting out a review of the situation, trends, opportunities, constraints, and lessons learned that will feed into prioritisation analysis.
- **Section 3** providing a deeper dive on mainstreaming of climate adaptation into relevant strategic sectors in the urban context. Based on agreement during inception, this includes urban planning, transportation, water and sanitation – including flood resilience.
- **Section 4** providing an early scan into typologies, opportunities and challenges in financing climate-resilient infrastructure based on international experience, including examples of some applications. This will be further contextualised in the next stage of the report into Indonesian context.
- **Section 5** providing placeholders for the next stage of the report on analysis of intersections for priority sectors, geographies, potential key counterparts and proposed typologies of financing modalities based on the landscape mapping. In the next stage of the report and upon consultation with FCDO, this will be further overlaid with UK priorities – existing and upcoming.

2. LANDSCAPE MAPPING

Socio-economic context

Indonesia is the world's largest archipelagic state, its land area measures approximately 1.9 million hectares comprising more than 16,766 islands with over 81,000 kilometres of coastline. With a gross domestic product (GDP) in the second quarter of 2023 reaching IDR 5,226.7 trillion, Indonesia is one of the most dynamic economic growth powerhouses in the Southeast Asian region (The World Bank Group and ADB, 2021). This rapid pace of economic growth has also caused Indonesia to become one of the countries with the fastest urbanisation in the world. The country lists 10 urban agglomerations, almost half of which are in Java island.



Figure 1 Indonesia's largest urban agglomerations (Bappenas, 2022)

Bio-geophysical characteristics

The country's geographical location and geophysical conditions cause Indonesia's climate to be influenced by tropical monsoons affecting its rainy and dry seasons. According to the Agency of Meteorology Climatology and Geophysics (Meteorology, Climatology and Geophysics Agency/BMKG), Indonesia is classified into three climate regions: monsoon, equatorial, and local. The division of this region is based on the type of rainfall that occurs in the archipelagic state. In addition, the El-Nino Southern Oscillation (ENSO) also greatly affects Indonesia's climate, causing drier conditions during El-Nino and wet conditions during La-Nina. Extremes that frequently occur in Indonesia are high temperatures, low visibility, heavy rainfalls (> 50 mm/24 hours), cyclones, strong winds, and hailstorms.

The biophysical conditions and the rapid rate of urbanisation result in Indonesia experiencing a variety of hydrometeorological disasters mainly (but not limited to) extreme events such as floods and droughts, and long-term changes from sea level rise, shifts in rainfall patterns and increasing temperature. Climate change will continue to play a significant role in exacerbating these events in the future. This situation creates complex and distinctly urban patterns of risk and impact, to which cities and their populations need to respond.

2.1. Urban adaptation & resilience

- Indonesia's climate adaptation pathways are designed to achieve the goal of reducing the impact of climate change on national GDP loss by 3.5% in 2050, through increasing resilience in four basic necessities (food, water, energy, and environmental health), with three target areas of resilience (economy, social and livelihood, ecosystem and landscape).
- Within the urban context, significant strides have been made to measure vulnerabilities and understand implications of adaptation needs to physical infrastructure but there has been a challenge in addressing it comprehensively in urban planning and a gap in understanding impact of climate change to urban social systems.
- The mandate of planning and implementation of climate adaptation actions lies at least within a handful of line ministries creating a coordination challenge. In the urban context, there is a considerable additional challenge with the lack of capacity at subnational level. Local governments are essential for successfully implementing climate activities but currently play limited roles and receive limited climate finance. Work is urgently needed to understand how finance flows to local governments could be increased and delivered more effectively.
- In terms of financing adaptation actions, less than half of available budget is used for direct activities in the form of physical infrastructure development.

Indonesia's climate impact and vulnerabilities: urban area analysis

The Government of Indonesia (GoI) recognises climate change as one of humanity's most complex, multi-faceted, and dangerous threats. Following "the common but differentiated responsibilities and respective capabilities" principle of the United Nations Framework Convention on Climate Change (UNFCCC), it has developed a climate change adaptation pathway for all levels of government in Indonesia to build their adaptive capacity and resilience policies and activities.

In the last decade, there has been increased focus to forecast and understand climate induced impacts in Indonesian urban areas. In order to understand the GoI climate resilience perspective this report examined the two most important Indonesian climate adaptation strategy documents: The Indonesia Long-Term Strategy for Low Carbon and Climate Resilience 2050 and The Indonesia Climate Resilience Development Policy 2020 – 2045.

The Indonesia Long-Term Strategy for Low Carbon and Climate Resilience 2050 (LTS LCCR 2050) published in 2021, stated that the adaptation pathways set the goal to reduce the impact of climate change on national GDP loss by 3.5% in 2050, through increasing resilience in four basic necessities (food, water, energy, and environmental health), with three target areas of resilience (economy, social and livelihood, ecosystem and landscape). The preparation of this scenario is expected to reduce financial loss from the climate change impact in all four primary sectoral programs of IDR 58.3 trillion (down to about 50%).

The Indonesia Climate Resilience Development (CRD) Policy 2020 – 2045 highlights the need to frame climate resilience as a planned and/or spontaneous anticipatory action to reduce potential losses due to hazards, vulnerabilities, impacts, and risks of climate change on the communities' lives in the areas affected by climate change. There are four priority sectors identified to reduce national climate vulnerability, impact, and risk, climate resilience development planning as outlined in below graphics. These four sectors contribute significantly to GDP sector revenue.



Figure 2 Priority sectors for climate resilience (Bappenas, 2021)

A 2022 Asian Development Bank (ADB) publication on Advancing Inclusive and Resilient Urban Development Targeted at the Urban Poor integrates the four priority sectors in Indonesia's policy and identifies pro-poor climate resilience solutions along five priority policy areas: (i) adaptive and shock-responsive social protection; (ii) sustainable livelihoods; (iii) effective public health system; (iv) safe housing; and (v) robust community infrastructure, including recommendations and entry points for building resilience in the Indonesian context.

It is worth noting from LTS LCCR and CRD, that climate change adaptation is part of the country's effort to accumulate capital for economic growth and that the country's analysis of the climate change vulnerability it faces is intensely dominated by an analysis of losses to its national GDP due to the impact of climate change.

Indonesia's adaptation pathways are designed to achieve the goal of reducing the impact of climate change on national GDP loss by 3.5% in 2050, through increasing resilience in four basic necessities (food, water, energy, and environmental health), with three target areas of resilience (economy, social and livelihood, ecosystem and landscape). With this rationale in mind, the GoI's strategy towards climate resilience relies on strengthening investment, human resources capacity through transformation towards the availability of green jobs, and landscape and seascape management.

However, despite the robust and comprehensive policy & strategies mentioned, the implementation is challenging and progress has been very slow. The complexity of coordination and bureaucratic silos remains the main obstacle as level of ownership on implementing policies and strategies vary between ministries and institutions.

Even though the existing governance structure is well organised (see institutional sub-chapter below), there is still competition between the National Development Planning Agency (Bappenas) and the Ministry of Environment and Forestry (MoEF) to achieve recognition as the leading institution coordinating efforts on climate actions. Both ministerial-level institutions compete to conduct climate change programs and control domestic and international funding inflows for implementing climate change-related policies and programs. This competition can be seen from the differences between these two institutions in setting the net-zero emission target. Bappenas proposed an achievement target in 2045, while MoEF proposed 2070.

On the other hand, the promise and potential access to technical assistance and funding from the international community encouraged the line ministry to begin elaborating and implementing climate policies and programs. Problems arise when there is a lack of coordination and communication, which causes almost all ministries to try to establish their programs and exert and maintain exclusive control over them.

Government of Indonesia's Framework on Urban Climate Adaptation

In Indonesia case, vulnerability can be considered for a city, neighbourhood, sector, or a specific set of infrastructure for different population groups or institutions critical to managing climate change or climate-enhanced disasters. Also, vulnerability is not static but changes over time. A recent vulnerability mapping exercise conducted by the World Bank Group states that the western and eastern parts of the island of Java are considered hotspots for the impacts of multiple hazards. These natural hazards are either geological or hydro-meteorological, potentially putting 40% of the country's inhabitants at risk.

Using this vulnerability determination method, it can be concluded that the eastern and western portions of Indonesia's most densely populated island, Java, as well as the coastal regions of Sumatra, parts of western and northern Sulawesi, and south-eastern Papua islands are all highly vulnerable to multiple climate hazards, including drought, floods, landslides, and sea level rise. This identification overlaid with further mapping of existing development partner support will be considered in further analysis on geographical focus that could be strategic for FCDO.

The ADB Study suggested that Indonesia's urban resiliency strategy should include coping mechanisms (e.g., stockpiling food for flood seasons); incremental adaptation to accommodate changes (e.g., building higher health to protect from increased floods); and transformational adaptation by introducing fundamental systemic changes, which would reduce the root causes of vulnerability to climate change in the long term (e.g., land use changes that introduce nature-based solutions to manage flooding and involvement of local women in protecting such natural resources) (ADB, 2022; pp: 4-5).

In the context of Indonesian cities, sprawling is often unchecked, causing urban areas to expand beyond their borders. The spatial expansion and increasing interconnectivity of both megacities and secondary cities have resulted in the emergence of metropolitan areas that encompass other cities, towns, villages, and rural areas in the form of unplanned urban corridors.

This poses challenges to the management of many urban issues that transcend administrative boundaries and urban governance structures. Many climate-change related issues faced by urban areas in Indonesia are a case in point, where the impacts of actions often transcend municipal boundaries into neighbouring municipalities and rural areas. Meanwhile, the policy framework and climate governance structure in Indonesia does not allow for vertical and horizontal integration of policies and actions at the site level that cross administrative boundaries.

Institutional Structure

Since Indonesia signed the UNFCCC in its founding in 1992 and ratified it into legislation in 1994, the country's climate governance has undergone several changes. Until 2009, climate change remained an elitist issue dominated by entities active at the national level climate policy making arena (government, academics, and non-governmental organisations). It was not until 2012, this issue began to penetrate the sub-national level with the issuance of Presidential Regulation 61/2011 on the National Action Plan for Reducing Greenhouse Gas Emissions (RAN GRK). This started to require sub-national governments to prepare work plan documents to implement various activities that directly and indirectly reduce greenhouse gas emissions following regional development targets as a derivative of the national policy.

Thereafter, the key changes in climate governance is perhaps more apparent at the national level, initially by the establishment of the National Climate Change Council (DNPI) as a cross-ministerial and cross-institutional coordinating body, but also including responsibilities for international negotiations. This significantly changed in 2014 when their mandate was handed over to the Ministry of Environment and Forestry (MoEF) and several policy development functions were reassigned to the National Development Planning Agency (Bappenas). And again in 2021 with the stronger positioning of the Ministry of Home Affairs (MoHA) to oversee subnational climate actions.

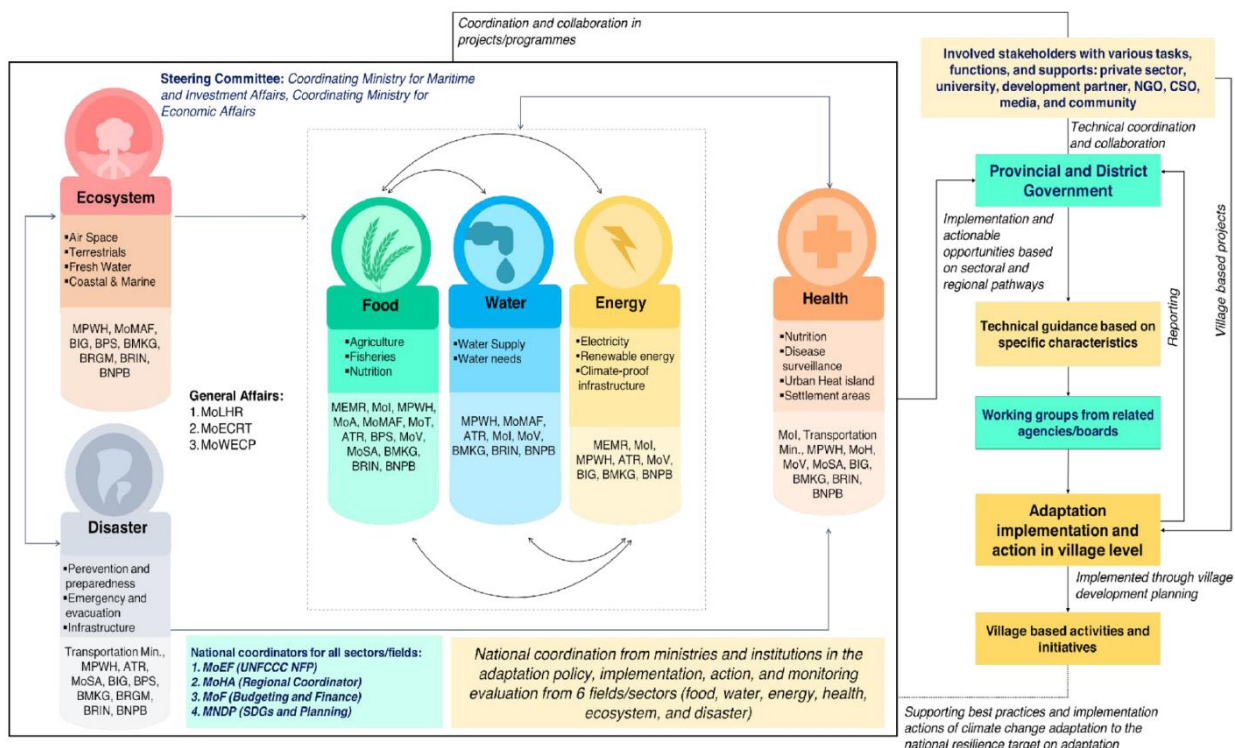


Figure 3 Line ministries involved in climate adaptation (MoEF, 2022)

However, the new institutional structure still needs to be considered more superficially to tackle climate change (Emmrich 2021, 4) effectively and efficiently. Three prominent ministerial-level institutions currently lead the effort to tackle climate change in Indonesia. First and foremost is MoEF, under its Directorate General of Climate Change (DGCC), the focal point to coordinate the climate change negotiation process. DGCC hosts the national GHG inventory system and the national registry system, a web-based data management system to register all climate actions. The system can be used for registering programs and projects, including those initiated by sub-national governments or the private sector.

The next prominent state institution in terms of capacity is Bappenas, which initially held a coordinating role and function in development planning and policy amongst ministries and provinces. The supervisory mandate of provincial level has, in 2021, been moved to MoHA which still lacks actual capacity in the issue.

Regarding financing, The Ministry of Finance (MoF) is the only nodal institution. MoF established the Center for Climate Change Financing and Multilateral Policy at the Fiscal Policy Agency (FPA). FPA performs functions such as formulating policy recommendations and monitoring climate change financing-related issues. Furthermore, FPA has been appointed as the Nationally Designated Authority (NDA) for the Green Climate Fund (GCF) since 2017. It is the focal point between Indonesia and the GCF and is critical in ensuring country ownership, the core principle of GCF's business model. MoF is also hosting the Indonesia Environment Fund (IEF), or in Indonesia the Environmental Fund Management Agency (BPDHLH). IEF was designed to become the "funding hub" for various funding mechanisms focusing on environmental protection and management in Indonesia, including climate change mitigation and adaptation efforts. It is the first public agency that can receive funds from international donors (Center for Climate Finance and Multilateral Policy 2021).

In carrying out its duties and functions, IEF funds beneficiaries through low-interest loans on forestry, energy, carbon trade, ecosystem services, transportation, agriculture, and marine and fisheries. Since 2021, IEF has worked with UNDP, the World Bank, and the Government of Norway to collect and distribute program funds. In the 2021 report, it was revealed that IEF had distributed (environmental) program funds to beneficiaries amounting to 8 billion Rupiah. Meanwhile, in terms of services, revolving funds are in the form of

IEF's performance of forestry business financing and environmental investment has not been optimal; of funds amounting to 2.01 trillion, only 6,248,818,788-rupiah (830 debtors) or 3.1% was realised as of December 31,

2021. This is because the COVID-19 pandemic means on-site monitoring and evaluating distribution requests from prospective debtors cannot be carried out. Then, the COVID-19 situation also disrupted the guarantee binding process and hampered the assessment process by the Public Appraisal Services Office. According to the 2021 annual report, during the COVID-19 pandemic, IEF could only distribute funds amounting to 56 million Rupiah to 5 debtors in April 2021. This was followed by the distribution of funds of 1.1 billion to 89 debtors in June 2021, and finally IDR 5,092,818,788 in November - December 2021.

Examining the IEF report, it can be concluded that IEF has distributed IDR 1,515,155,962,005 to 29,483 beneficiaries consisting of state-owned enterprises, regional-owned enterprises, village-owned enterprises, private enterprises, and cooperatives.

Meanwhile, implementing climate policies, strategies, and priorities involves the following line ministries: Ministry of Public Works and Housing, Ministry of Agriculture, Ministry of Energy and Mineral Resources, Ministry of Transportation, and Ministry of Industry. These ministries typically have specific mandates that deal with climate change in their respective sectors. Other non-structural institutions worth mentioning are the non-ministerial institutions: The Peatland Restoration Agency, who have a direct reporting line to the President. However, what is rarely exposed is the role of the two coordinating ministries led by the President's principal political and economic advisers, namely the Coordinating Ministry of Marine and Investment and the Coordinating Ministry of Economic Affairs. Both were appointed as members of the steering committee that holds enormous authority to coordinate policy formulation to oversight implementation of climate action at the sectorial ministerial level. This is what makes MoEF and Bappenas have limited influence on climate action and sectoral plans as line ministries often act independently and or under the guidance of the coordinating minister.

Even though there were not many changes in the sectoral plans on paper, in terms of coordination, the developments that occurred were quite significant; where the quality of climate governance at the national level seems on the right path to implement the country's ambitious target and have high confidence to develop a comprehensive climate policy.

However, sub-national government-level institutional developments have remained unchanged since the Suharto era. Sub-national climate change governance is managed only by a sub-section of the Environmental Agency, namely the climate change mitigation and adaptation section under the Environmental Management and Sanitation Division.

This gap in the development of policy frameworks and institutional structures ultimately becomes one of the most significant challenges to the development of climate change policies, institutional frameworks, and knowledge at the sub-national level, which in turn becomes one of the inhibiting factors in achieving the target of reducing greenhouse gas emissions at sub-national level.

Multi-Level Project Governance

Several experiences throughout 2013 - 2022 can be used as a reference for dealing with the state of the policy framework and climate governance in Indonesia, as explained above. For example, the Urban LEDS I program, which ran from 2013 to 2017, effectively worked in the Indonesian landscape.

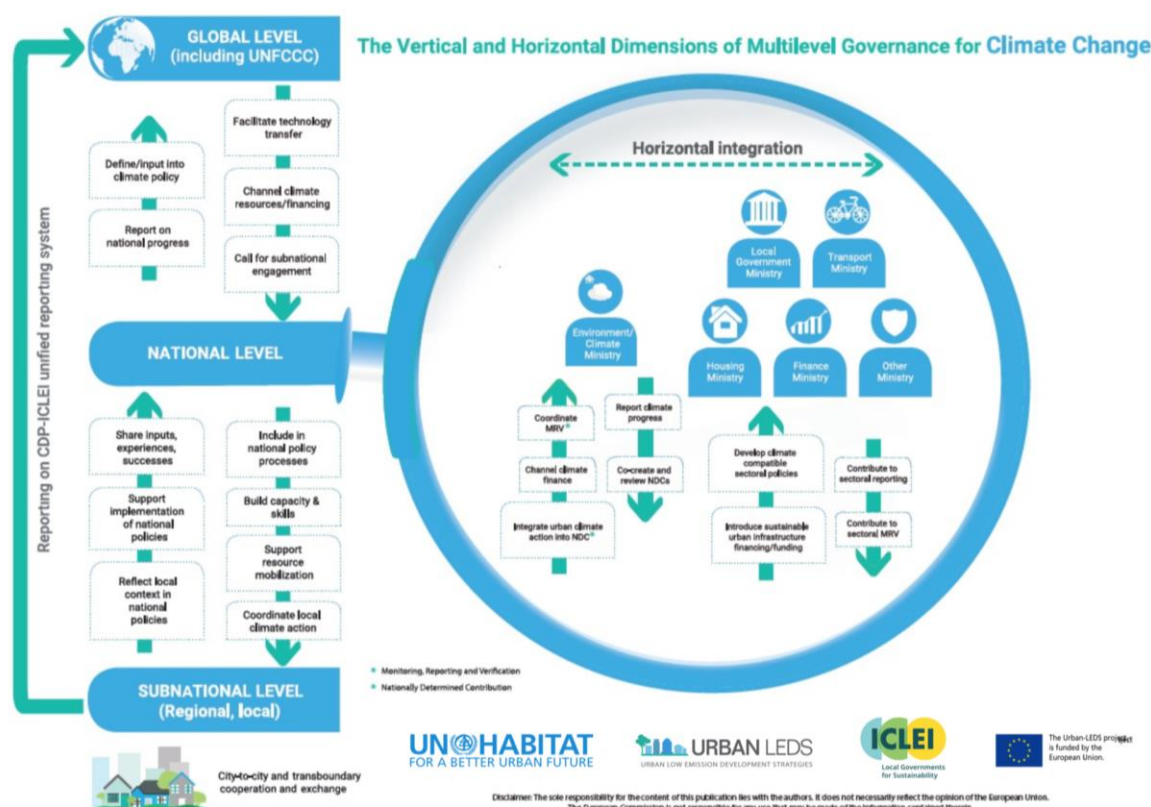


Figure 4 Multi-level governance approach implemented by Urban Low Emissions Development Strategy Programme (UNHABITAT, 2017)

This effectiveness can be achieved with a partnership management approach that successfully formulates clear project goals, ultimately producing city Low Emission Development strategies that become part of the Medium Term Development Plan (RPJMD) and Regional Revenue and Expenditure Budget (APBD). However, the most exciting feature of this program is that The Indonesia Project Advisory Group (PAG), consisting of ministerial-level officials, national environmental leaders, financial sector investors, national and international Non-Governmental Organisations (NGOs), and “green” advocates and entities, has coordinated institutions, shared project status and needs and identified interventions from PAG members that leverage additional resources for project initiatives. Support has also brought private sector lending institutions into the PAG and interested them in participating in the program.

Apart from PAG, it is recommended that a project related to climate change be managed through a Project Management Unit with a Multi-Level Governance style. From many experiences, multi-level governance can facilitate more effective vertical coordination among governments at various levels and with other stakeholders. Likewise, horizontal coordination within and between governments (and their departments)

at the same level and coordination with and among non-state actors. Crucially, horizontal integration between multiple government departments is critical to ensure that efforts achieve the project goals. It is highly inadvisable to use a siloed-in-one Ministry collaboration approach.

Local Government

Local governments are essential for successfully implementing climate activities but currently play limited roles and receive limited climate finance. Local governments are potential sources of climate finance and essential users of state budget flow to implement climate activities. In 2011, total local government expenditure across all sectors of the economy, at IDR 518 trillion (USD 59 billion), accounted for approximately a third of Indonesia's total budget expenditures. This increases to half if central government subsidies and interest payments are excluded from the calculation. Local demand for climate finance is increasing, and local governments have a growing responsibility to implement adaptation implementation plans.

In 2011, the principal instrument used to transfer money from the state budget was budget expenditures (IDR 5.975 billion or USD 678 million). This amount includes international money from the central government and is channeled directly into the state budget. These flows were disbursed mainly to central government ministries and agencies (97%), with expenditures to local governments making up a tiny proportion.

Since 2016, several regional governments have prepared regional development plans using a green budgeting approach. With this approach, public funds are needed to be allocated for activities that support climate change mitigation and adaptation in the regions.

Regional governments can identify what funding instruments can still be maximised according to the needs and characteristics of climate change issues in their regions. For example, currently, several regions can take advantage of several ecological-based financial assistance schemes, namely in the form of General Financial Assistance (BKU), Special Financial Assistance (BKK), or others, provided by the provincial government to districts/cities for activities that support achievement.

To ensure climate finance has direct impacts and reaches its intended uses, work is urgently needed to understand how finance flows to local governments could be increased and delivered more effectively. This includes examining how the above-mentioned instruments could be adapted to ensure money is transferred and spent effectively, considering whether new instruments are needed, and developing and implementing simplified and tailored systems to track and report finance flows.

Through the Low Carbon Development Initiative Phase 2, FCDO is already planning to support strengthening of national-subnational climate action planning, financing and implementation. This can be complemented by zooming into specific city-level projects to identify specific scope the different financing sources (APBN, APBD, international climate finance) can leverage each other to advance climate resiliency in urban infrastructure.

Indonesia already has several regulations and policies that address resilient infrastructure development. Firstly, standards related to infrastructure resilience, such as the construction quality of buildings which manifests in the Indonesian National Standard (*Standar Nasional Indonesia/SNI*), are already in place. In the last five years, updates on the standards have considerably taken place and include aspects of qualities adopted in developed countries. Both spatial planning has been carried out under the responsibility of the Ministry of Agrarian Affairs and Spatial Planning and its subordinate regional-level bodies. Indonesia's spatial planning, in practice, already includes considerations of potential disruption risks due to disasters in a given geographical area.

However, the adoption of the already existing infrastructure standards still needs to be improved due to the relative absence, to some degree, of policy incentives to enforce such standards. Implementing resilience standards to infrastructure projects produces cost increases, making developing resilient infrastructures less attractive financially from developers' perspectives, despite the potential savings from reduced damage in the long run. With many policy incentives for government-related infrastructure projects, including public-private partnership (PPP) schemes, policy incentives to apply the standards to projects that are independent and smaller in scale still need to be expanded. The lack of policy incentives to adopt resilient standards in infrastructure development leads to developers' hesitancy to adopt the standards as there are no means of offsetting the increasing financial cost implications.

Furthermore, challenges in mainstreaming resilient infrastructure regulations or policies also exist. Through decentralisation law in Indonesia, both central and regional governments contribute to developing infrastructures in the country. It is often the case that the development planning of the central government needs to align with regional development priorities. While the Government of Indonesia has planned the development of resilient infrastructures through NDC and PRK, not all regions have PRKD. Additionally, the emphasis on climate budget tagging is still only present at the national level, with only a few regions having climate action budget tags.

The next challenge is related to the current conduct of spatial planning, which has considerable key potential improvement areas. Although spatial planning in practice includes the risk of climate and disasters, spatial planning in Indonesia also needs to consider the possible environmental services – benefits that environmental spatial uses can provide – which may potentially protect infrastructure from climate and disaster risks. Additionally, as spatial planning is conducted in part by regional-level governments, the degree of how much

climate and disaster risks and environmental services influence spatial planning can differ between regional entities (provinces, districts, and cities). In parallel with awareness-building and capacity strengthening, a mechanism to ensure standardised assessments of these aspects is needed to institutionalise improved practices.

2.2. Opportunities

- In parallel with ongoing effort to strengthen planning and implementation of climate-resilient infrastructure, Indonesia has put in place several building blocks that will enable more collaborative and efficient development such as through PPP schemes with clearer frameworks on land rights and more recently widening it through land value capture.
- Infrastructure financing based on value capture provides a new way forward that triggers a virtuous value cycle of value creation and value funding to guarantee repayment and reinvestment of capital, thereby enabling further infrastructure development, including enabling further distribution to local governments via earmarked local taxes for adaptation actions.
- The Omnibus Law opens up opportunities to accelerate development of climate-resilient infrastructure through ease of doing business and investment opportunities between various levels of government and the private sector through the PPP mechanism but requires an assurance mechanism to ensure risk of maladaptation is mitigated.
- As these regulatory developments and their implementation have yet to include a climate-proofing lens into urban infrastructure development, this becomes an opportunity for future support to look into complementing the climate resiliency aspects.

Merging the UNFCCC definition of adaptation and resilience with the GoI perspective, this needs assessment defines the climate-resilient infrastructure space as the planning and implementing infrastructure development that is planned, designed, built, and operated in a way that anticipates, prepares for, and adapts to changing climate conditions. It can also withstand, respond to, and recover rapidly from disruptions caused by these climate conditions. Ensuring climate resilience is a continual process throughout the life of the asset. Efforts to achieve climate resilience can be mutually reinforcing with efforts to increase resilience to natural hazards (Mullan, 2018; pp:4).

How can urban adaptation and resilience measures contribute towards economic growth?

Rapid urbanisation has placed cities at the centre stage of Indonesia's development trajectory; however, returns from urbanisation have yet to reach their full potential. The infrastructure gap remains a significant barrier to enabling Indonesia's urban areas to increase their adaptive capacity while enhancing its inhabitants' prosperity.

Inadequate urban planning impacts undirected infrastructure investment. For example, urban growth often occurs in disaster-prone areas, such as flooding and land subsidence. The weakness of urban planning will result in asset losses due to land becoming less financially feasible. One of the GoI's strategies for overcoming this problem is the promulgation of Presidential Regulation 38 of 2015, and this regulation specifically regulates infrastructure financing schemes related to natural resource management between the Indonesian government and business entities. This PPP scheme is known as *Kerja Sama antara Pemerintah dan Badan Usaha* (KPBU) of which implementation has trickled down to the subnational level mainly in the water and solid waste sector.

Land Value Capture (LVC)

The ADB provided Technical Assistance (TA) on Innovative Infrastructure Financing Through Value Capture (LVC) in Indonesia. It uses the definition created by the Lincoln Institute of Land Policy of 'value capture' as "a policy-based approach that enables communities to recover and reinvest land-based value increases and incremental economic value that result from public investment and other government actions rooted in the notion that public action should generate public benefit."

Meanwhile, Transport for London uses the following definition for LVC - “a set of mechanisms used to monetise the increase in land values that arise in the catchment area of public infrastructure projects.” However, focusing only on increases in land values risks missing the broader economic uplift generated by urban and transit infrastructure.

Infrastructure financing based on value capture provides a new way forward that triggers a virtuous value cycle of value creation and value funding to guarantee repayment and reinvestment of capital, thereby enabling further infrastructure development.

A virtuous value cycle can close the infrastructure funding gap. It can provide a progressive whole-of-government and policy framework-based approach to creating value, capturing value, and engendering confidence that a share of the incremental economic uplift will be used to repay the up-front financing of the original investments.

The Coordinating Ministry for Economic Affairs (CMfEA) is currently leading the deliberation of a Presidential Regulation on Funding for Infrastructure Provision through Increased Value Capture. Supported by the World Bank and the Australian Department for Foreign Affairs and Trade (DFAT), the ministry developed demonstration projects to identify potential LVC scheme implementation in Jakarta, South Tangerang, Bandung, Semarang and Palembang.

One niche that can be complemented from the above support is in internalising quantification of climate proofing impact to infrastructure planned and developed under LVC mechanism.

The results of the analysis conducted argue that the Indonesian regulatory frameworks have provided a clear legal reference for the implementation of value capture schemes in infrastructure projects. In general, local governments have autonomy regarding the management of their budgets, with potential financial support from the national government. The existing tax and fee regime prohibits subnational levels of government from introducing new taxes. However, the partial earmarking of revenues from taxes and fees may potentially be assigned to funding for transport and health care within the current regulatory framework, opening the potential for the application of value capture in Indonesia.

However, the existing regulatory frameworks also highlighted restrictions on the government's ability to introduce new types of taxes or fees. However, the government of Indonesia can implement selected value-capture instruments through some existing tax and fee mechanisms.

There are at least several regulations that provide a legal basis for implementing value capture and land value capture in three aspects of Indonesian policy, namely:

- a. Public (national and local) financing,
- b. Development and spatial planning,
- c. Land management,
- d. Investment,
- e. Transit infrastructure.

The Indonesian government considers that its agrarian regulatory framework provides quite broad opportunities for the implementation of land value capture in Indonesia in terms of mechanisms for transfer of rights. We have started mapping these and will lay them out in more detail in the report, including a mapping of relevant existing enabling regulatory frameworks on land management, land use planning, zoning, and procurement.

Transfer Mechanism of Various Types of Land Rights

Types of rights	Period of Ownership	Rightholder	Transfer Mechanism	Condition of Rights Abolitions
Ownership rights	- No limitation regarding the land size. - No time limitation of ownership	- Indonesian citizen - Other legal entities (determined by GOI)	Rights can be transferred through a transaction, grant, inheritance, any transfer through a cultural inheritance, or by other transfers.	- The land was seized by the government due to a withdrawal of rights, voluntary surrender, or neglect of the land. - The land was lost due to a natural disaster.
Right to cultivate: right to cultivate and otherwise utilise land for agriculture, fishery, and/or farming.	- Minimum of 5 hectares, with plots larger than 25 hectares required to comply with additional requirements under other regulations. - Maximum of 25 years for ownership rights, which can be extended up to 35 years, depending on the type of business for which the land is used	- Indonesian citizen - Other legal entities (determined by GOI)	Rights must be granted by the government through a registration process, and the prospective rights owner needs to fulfil the requirements set by the government.	- The ownership period has ended. The rights have been pending for an indefinite period and/or abolished due to a failure to meet requirements. - The owners abolished their own rights before the ownership period had ended. - The rights were abolished for the sake of public use or interest. - The land has been abandoned. - The land has been lost due to natural disaster.
Right to build: right to construct and own buildings on a particular plot of land	- No limitations on the size of the land. - Maximum of 30 years for ownership rights, which can be extended up to 20 years, depending on the owner's needs and the condition of the building(s)	- Indonesian citizen - Other legal entities (determined by GOI)	Rights must be granted by the government through a registration process, and the prospective rights owner must fulfil the requirements set by the government. However, the rights can also be transferred to another owner, in compliance with the regulations on land ownership.	- The ownership period has ended. The rights have been pending for an indefinite period and/or abolished due to a failure to meet requirements. - The owners abolished their own rights before the ownership period had ended. - The rights were abolished for the sake of public use or interest. - The land has been abandoned. - The land has been lost due to natural disaster.
Right to use: right to utilise a piece of land, but not under a lease agreement between the landowner and the user	- No limitation on the size of the land - During a set period, or as long as the land is utilised for a certain purpose, and can be granted without charge, in exchange with any kind of payment or services	- Indonesian citizens and foreign citizens living in Indonesia. - Other national legal entities that are established under the law and are located in Indonesia - Other international legal entities	Rights to land must be granted by the government and permitted by an authorised official, if the land is owned by the government. Rights must be transferred to other parties through an agreement, if the land is owned by individuals.	There are no procedures for the abolition of rights.

		with a representative office in Indonesia		
Leasehold right: right to use other parties' land by paying a lease or other charge	1. No limitations on the size of the land 2. Valid as long as the rights owner pays the lease, whether through a one-time payment, regular payments, or payments before and after the land is used.	1. Indonesian citizens 2. Foreign citizens living in Indonesia. 3. Other national legal entities that are established under the law and are located in Indonesia 4. Other international legal entities with a representative office in Indonesia	Land rights must be transferred to other parties through an agreement, without any extortion.	There are no procedures for the abolition of rights.
Other rights: rights to carry out land clearance, to collect forest products, to use water, to cultivate and catch fish, and to use airspace	1. No limitations on the size of the land 2. The duration of land rights determined by the relevant government regulations	1. Indonesian citizen 2. Other legal entities (determined by GOI)	The transfer of rights is provided for in the relevant government regulations.	The process for the abolition of rights is provided for under the relevant government regulations.

Enabling Regulatory Frameworks: Value Creation in Indonesia	
Governmental Approach	
Legal references: 1. Law No. 28 of 2009 on Local Tax and Retribution 2. Government Regulation No. 12 of 2019 on Regional Financial Management 3. Law No. 26 of 2007 on Spatial Planning 4. MPWH Regulation No. 6 of 2007 on Building Blocks and Neighbourhoods Plan Guidelines 5. MOAASP/NLA Regulation No. 16 of 2017 on Guidelines for Transit-Oriented Development	• Creating new tax instruments will require significant amendments to the legislation on the Indonesian taxation system. City governments are restricted from innovating new taxation mechanisms. Taxes or fees other than those specified under the law are prohibited. For certain types of taxes (e.g., property taxes), the local government may increase the statutory base value to raise property taxes. • There is an inconsistency between the law regarding the regional tax and fee system and the regulations governing the spatial planning system, in terms of the local government's right to charge fees on development rights transfers. • Law 28/2009 does not recognise the trading of development rights as a permissible source of revenue for local governments. On the other hand, the spatial planning regulations allow local governments to engage in the transfer of development rights.
Innovative procurement and funding	Indonesia has recognised PPPs as a possible financing scheme for the provision of infrastructure. However, the regulations do not yet specify how

Legal reference: Presidential Regulation No. 38 of 2015 on Cooperation between Government and Business Entities in Procurement of Infrastructure	beneficiary-pays models will be able to support PPP repayment schemes directly (by improving the GCA's financial ability to repay under government-pays or availability-payments models) or provide viability gap funding to create more viable user-pays business models.
Long-term land use planning and regulatory frameworks	
1. Law No. 26 of 2007 on Spatial Planning • MOAASP/NLA Regulation No. 1 of 2018 on Guidelines for the Organisation of Spatial Planning for Province, Regency, and City • MOAASP/NLA Regulation No. 16 of 2018 on the Instruction Guide, Detailed Spatial Plan and Regency/City Zoning Regulation	• Indonesia's planning system takes into account a visionary master plan anchored in a long-term view (over 20 years) and updated every 5 years. The document has been developed based on development studies, environmental impact analyses, and infrastructure planning. The RTRW strategies have been translated into a detailed spatial plan, which is intended to guide development over 10–15 years. However, transport infrastructure planning usually occurs through ad hoc decisions at the political level, which may not align with the agreed-upon spatial plan. • There is a mismatch between the regional spatial plan and the government's regional long-term economic strategy. And short-term economic factors accounted for in the Regional Medium-Term Development Plan might not continue in the event of a change in political leadership. • Spatial plans are often out of date or non-existent, and sometimes there are gaps, for instance, when there is a provincial plan, but no regency or city plans. • Each regional government has based its planning regime on the administrative boundaries of the respective provinces and regions, in line with the government's policy of decentralisation, whereby each province or region has the autonomy to plan development in their respective areas. While this enables local governments to focus their planning on optimising local assets, often the potential economic uplift from activities along certain economic corridors crosses one or more administrative boundaries. • This gap is particularly observable during the planning of large-scale transit projects such as railways or roads, when the resulting economic impact around the transit economic corridors is not properly assessed or effectively captured due to planning coordination issues.
Flexible zoning 1. MOAASP/NLA 16/2018 2. MPWH 6/2007 3. DKI Jakarta Governor Regulation No. 67 of 2019.	Law 26/2007 and the related regulatory guidance strictly prevent the unsustainable conversion of land, especially land slated for conservation, preservation, and protection. However, there are still problems with enforcement. Flexible zoning in terms of the FAR aimed at achieving optimal land use intensity, as well as transfers of development rights, has been recognised in the Indonesian planning system. However, there is no guidance on implementing FAR trading mechanisms at the city level.
Sound system of land administration and management Legal reference: Presidential Regulation No. 9 of 2016 on the Acceleration of the Implementation of the One Map Policy	• Indonesia is currently transforming its land management system through its "One Map Policy," and digitising all land data into a single integrated system, updated annually. • However, the modernisation process requires more trained personnel on the ground and a greater budget commitment. • Indonesia's land management system recognises several types of land rights, for instance the, "right to use" and "right to lease." • A different land value capture strategy may apply, based on the type of landholding.

Omnibus Law

After a period of legal battle, GoI cemented some reforms through what is widely known as Omnibus Law. This regulation is undoubtedly one of the most potent enablers the Indonesian government has to ensure that investment for resilience infrastructure development floods into Indonesia. The articles in this specific regulation open opportunities to accelerate and improve the investment ecosystem through ease of doing business and investment opportunities between various levels of government and the private sector through the public private partnership mechanism in developing national strategic projects.

However, studies by several leading Law Faculties in Indonesia show that this regulation also opens the risk of encouraging the acceleration and expansion of investment and economic growth without considering aspects of sustainable development, particularly paying attention to human safety and preserving ecological functions. The analysis translates to the need to thread the implementation of Omnibus Law very carefully in terms managing risk for climate resilient infrastructure so as to avoid maladaptation.

2.3. Constraints

- Despite some regulatory building blocks, there is still a gap in specific regulations and detailed technical guidelines for resilient infrastructure.
- The triple challenge of gaps in political will, technical and fiscal capacities between national and subnational governments hinders effective coordination in planning and implementing climate-resilient infrastructure.
- These challenges and constraints provide opportunities to embed specific technical assistance support with potential impact in improving not only the capacity, but also the enabling environment for climate-resilient urban infrastructure in these areas:
 - mainstreaming the concept of climate-resilient infrastructure from national to sub-national level
 - applying additional and more robust resiliency standards considering climate and disaster risks into project development and preparation
 - debottlenecking challenges towards effective implementation of existing regulations and standards

Since the first period of Joko Widodo's administration (2015–2019), GoI has set a progressive plan for infrastructure development to improve interregional connectivity, boost economic growth, and enhance national competitiveness. The GoI spending on infrastructure rose significantly from IDR 154.6 trillion (USD13 billion) in 2014 to IDR 394.1 trillion (USD 27.2 billion) in 2019, or approximately multiplied by 254.9%. The budget size represents Indonesia's high ambition for infrastructure expansion which includes, among others: 3,432 km of national roads, 1,852 km of highways, 65 dams, 41.1 km of bridges, 38,431 hectares of urban slum revitalisation, 559,660 units of public housing equipped with a drinking water system, 27 seaports, and ten international airports (Qibthiyah, 2021; pp: 2).

The question arises whether the GoI (known for its plans for massive infrastructure projects) has planned and implemented it using a climate-resilient approach in the last ten years.

Indonesia internally still lacks the support system to climate proof its infrastructure development. It needs specific regulations and guidelines for resilient infrastructure development. Although climate change adaptation and mitigation have been incorporated in terms of national planning, the infrastructure in each sector still lacks well-defined specifications and standards in terms of resiliency to climate hazard. Until now, only several regulations have been created on this matter, such as green buildings (MoPWH Regulation no. 2/2015) and sustainable construction (President Regulation no. 5/2015) and other clarifications on technical specifications and climate adjustments for infrastructure development.

A 2022 ADB study recommends incorporating climate risk exposure and environmental social governance criteria into new infrastructure plans, including during PPP preparation. It also highlights the need to account

for future depreciation of assets due to change in precipitation patterns, temperature increases, and extreme weather events.

Second, mainstreaming the concept of climate-resilient infrastructure from national to sub-national level is still an issue in Indonesia. Due to sub-optimal political will and institutional capacity in local government, the implementation of infrastructure resilience is sometimes not achieved. Third, limited fiscal capacity at the national and sub-national level also poses an obstacle in financing the development of infrastructure in a climate-resilient manner adequately. Lastly, the fourth issue is the enforcement of resilient infrastructure. There have been limited official documents explaining the methods and outcomes used for enforcement.

Institutional Challenge and Technical Capacity

There are two main challenges in the aspect of institutional and technical capacities. The first issue is the limited supply of qualified human resources to support the development of resilient infrastructure. The issue is especially relevant to the case of regional governments and small and individual developers. There is currently limited supply of professionals to assist in the conduct of spatial planning, implement resiliency standards, and carry out construction can result in an unsuitable environment for developing resilient infrastructures.

The second issue concerns the capacity challenges in ensuring regulatory investment and transparent infrastructure project management. While regulations in the form of compulsory requirements of resiliency standards are in place, there are still issues in enforcing the regulations that render them ineffective. Many of the infrastructures already have permits but still need to meet the standards due to weak supervision.

A lack of standard fulfilment could happen because the legislation has yet to regulate the application of infrastructure standards explicitly. Sanctions do not bind buildings that have not implemented SNI. Supervision of standards for private infrastructure such as in the case of private housing development and its accompanying common facilities is also decentralised within local governments, so enforcement tends to vary according to local government capacities. Moreover, implementing infrastructure standards still needs to be optimal due to the lack of public awareness of the importance of resilient infrastructure. As a result, there is still no pressure from the community to implement resilient infrastructure development.

3. RESILIENCY MAINSTREAMING IN PRIORITY SECTORS

A better understanding of efforts in mainstreaming climate resilience within sectors is the next step in our mapping. We note current key sectors from an infrastructure perspective to include urban planning, transportation, sanitation, waste and energy. Given there is already sufficient FCDO support for the energy sector, we will not include it in this assessment.

Prior to delving into individual sector resiliency mainstreaming mapping, it is worth noting the need to also think about infrastructure interdependency in the urban context. A C40 Cities study on this highlighted that as modern urban infrastructure is increasingly interlinked with feedback and feedforward loops, climate hazard impact on one infrastructure will have a cascading impact on others which results in a ripple effect of disruptions.

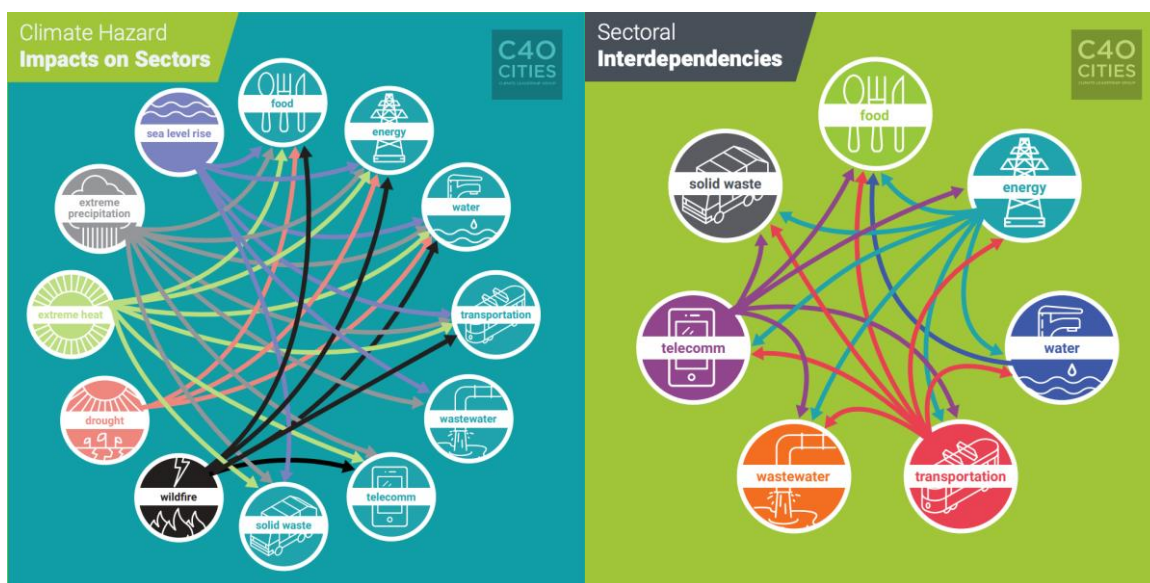


Figure 5 Interdependencies between different sectoral infrastructure (C40, 2019)

The most important element in considering interdependencies are:

1. Identification of critical failures within the interlinked infrastructure and the building of robust data and information in as well as between them.
2. Define proactive measures to protect infrastructure and use early warning systems to establish long term response plans.
3. Establish partnerships with the private sector to encourage their collaboration in an interdependency assessment, and in activities to address interdependencies and strengthen climate resilience.
4. Set up pilot projects or research and development programmes to help make the potential benefits of understanding interdependencies (such as future cost savings or loss avoidance) clear to utility providers.

We will further use the lens of interdependencies in the prioritisation analysis of potential sectoral interventions as it provides the potential for more effective and impactful support, both in terms of providing investment for physical infrastructure and the accompanying technical assistance.

3.1 Urban planning

- Urban planning and design are among the most effective tools in dealing with climate change, because they address both mitigation and adaptation. One of the adaptive strategies that can be employed is the integration of climate change considerations into spatial planning. Spatial planning can be the most effective instrument in providing guidance on spatial patterns and structures that are adaptable to future changes.
- In 2024, elected local government leaders (governors, mayors, and regents) will develop new Regional Medium Term Development Plan (RPJMD, *Rencana Pembangunan Jangka Menengah Daerah*). Offering technical assistance for climate-resilient urban planning and infrastructure within RPJMD, integrated with revision of Spatial Plans (RTRW, *Rencana Tata Ruang Wilayah*) will yield substantial advantages. This assistance may involve providing guidelines or implementing pilot projects in the most climate-vulnerable regions.
- Depending on available resources, the above assistance can be further enhanced by supporting:
 - Technology-enhanced detailed spatial plans in the form of higher density vulnerability mapping coupled with higher resolution climate and weather modelling to develop climate-proofed mid and long-term urban development scenarios
 - In-depth assessment of urban infrastructure interdependencies (see C40 reference in Figure 5)

Urban planning in Indonesia mainly is governed by legislation related to the National Spatial Plan (*Rencana Tata Ruang Wilayah Nasional* - RTRWN) and the National Long-Term Development Plan (*Rencana Pembangunan Jangka Panjang Nasional* - RPJPN), along with their respective implementing regulations.

The Spatial Planning Law mandates that RTRWN serves as a guideline for the preparation of the national long-term development plan, medium-term national development plans, spatial utilisation, determination of location and spatial functions for investments, spatial planning for national strategic areas, and spatial planning for provincial and district/city regions.

While not explicitly analysed in those planning documents, climate change concerns are addressed through considerations of environmental capacity, sustainable development mechanisms, and disaster preparedness. However, RPJMN 2020 - 2024 saw substantial progress in addressing climate change.

One of the adaptive strategies that can be employed is the integration of climate change considerations into spatial planning. Spatial planning can be the most effective instrument in providing guidance on spatial patterns and structures that are adaptable to future changes. Integrating climate change issues into spatial plans is a prudent step to reduce climate change vulnerabilities and enhance resilience, especially in urban areas (Kumar & Geneletti, 2015).

There is currently lack of detailed spatial planning that translates to the absence of identification of high vulnerability urban areas. There are not many cities that already have Detailed Spatial Planning (RDTR, *Rencana Detail Tata Ruang*). RDTR should be the reference for permits and controlling spatial utilisation and the absence of a basic map at a scale of 1:5,000 as the basis for the preparation of RDTR. Where vulnerability assessments have been done, they rarely incorporate robust, high-resolution climate and weather modelling data that can serve as the basis for mid and longer-term projections for urban development.

There are several external supports to integrate climate adaptation and resilience into city planning documents, most of which provides the basic capacity building of resiliency integration and have yet to include interventions that responds to the aforementioned challenge. The initiatives are:

- The Rockefeller Foundation, through the Asian Cities Climate Change Resilience Network (ACCCRN), supports several cities in Indonesia in creating City Resilience Strategy Plans based on vulnerability assessments.
- The United Cities and Local Governments Asia-Pacific (UCLG-ASPAC), through the Climate Resilient and Inclusive Cities (CRIC) program, and the Carbon Disclosure Project (CDP) - ICLEI conduct capacity-building programs for government officials on climate adaptation.

- The World Bank, through the National Urban Development Project (NUDP), improves the connection between urban planning and infrastructure development to make investments more efficient and reduce vulnerability to climate-related hazards by directing development to lower-risk areas.

Based on the government's plans and external support for climate change mitigation and adaptation-based city planning, there are several intervention opportunities, including:

- In 2024, elected local government leaders (governors, mayors, and regents) will develop Regional Medium-Term Development Plans (RPJMD, *Rencana Pembangunan Jangka Menengah Daerah*) in line with the National Medium-Term Development Plan (RPJPN, *Rencana Pembangunan Jangka Panjang Nasional*). Offering technical assistance for climate-resilient urban planning and infrastructure within RPJMD, integrated with the revision of Regional Spatial Plans (RTRW), will have a significant and sustainable impact.
- Deepening the integration of resilience into detailed spatial plans in the most vulnerable areas (coastal and riverbanks) with detailed GIS maps and topography analysis. The outputs produced can directly contribute to the design and detailed engineering design (DED) of physical projects in coastal and riverbank areas.

3.2 Urban transport

- Whilst urban mobility is key in ensuring productivity, the Ministry of Transportation who holds the mandate for planning and policy for this sector still lacks awareness of the need to integrate climate resiliency and adaptation. To date, the Ministry of Transportation has not formulated any policies and action plan for climate change adaptation and climate-resilient transportation infrastructure.
- The ongoing development of Sustainable Urban Mobility Plans for 10 priority metropolitan areas in Indonesia has yet to have a sufficient depth in understanding climate vulnerabilities and integrating adaptation aspect.
- There is an opportunity to strengthen capacity building for urban transport planner on urban transport adaptation strategy, refining detailed engineering designs of planned transport infrastructure such as in Bandung and Makassar with climate resilience aspect and implement a small-scale pilot project, climate-resilient urban transport infrastructure in the most climate-vulnerable areas.

Urban and transport infrastructure are key components of the achievement of the United Nations (UN) Sustainable Development Goals (SDGs), especially Goal 11: by 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons (linked with SDG 3.6, 5.1 and 7.a).

The UNDP Urban Strategy 2016 highlighted that transportation is one of the major development problems of any major city of the developing world and a major contributor to greenhouse gas emissions. Due to traffic congestion, a 1% increase in urbanisation in Indonesia only results in a 1.4% increase in GDP per capita (presented by Transportation Director – Bappenas in the Public Consultation Workshop on Air Pollution Impact from the Transportation Sector, July 2023).

Transportation infrastructure is a vital framework that supports economic and social activities of the community. Transportation serves as a means to ensure connectivity between different regions. The benefits of transportation include: movement of people, transfer of goods, maintaining price stability of goods, enhancing the economic value of a region/area, accelerating regional development. Furthermore, transportation infrastructure contributes to driving national economic growth. Given its substantial benefits and alignment with the concept of sustainable development, transportation infrastructure needs to be propelled towards sustainable development.

In the transportation sector, "mitigation" means reducing emissions, while "adaptation" focuses on making transport systems and infrastructure more resilient to current and future climate events. Adaptation and

mitigation efforts are interconnected. Adaptation is necessary to maintain the sustainability and functionality of transport infrastructure in a changing climate. Long-term mitigation actions, like designing an electric rail route, must also prioritise climate resilience throughout their lifespan.

The Ministry of Transportation (MoT) continues to synergise and remain committed to consistently implementing climate change mitigation actions in the transportation sector. This is stipulated in Ministerial Decree No. KM 8 of 2023 concerning the Determination of Climate Change Mitigation Actions in the Transportation Sector for Achieving Nationally Determined Contribution (NDC) Targets.

However, the MoT lacks policies for climate change adaptation and resilient transport infrastructure. In 2018, the National Action Plan for Climate Change Adaptation (RAN API) – Bappenas designated 16 ministries and institutions (K/L) to allocate budget for adaptation, including MoT. However, only 8 of them have allocated funds, but MoT was not among the 8 that allocated funds for this purpose.² To date, the Ministry of Transportation has not formulated any policies and action plan for climate change adaptation and climate-resilient transportation infrastructure.

Study data shows that only 33 percent of institutions have special unit responsible for climate change impact, and just 17 percent had a study or database related to climate change impacts on transportation. Some government and private institutions working on transport issues also did not understand the difference between climate change mitigation and adaptation. Consequently, they classified some efforts to reduce emissions as climate change adaptation (Kusumaningrum, 2016).

Adaptation in the transport sector does not only cover investments in infrastructure but also information provision and innovation. For example a study³ conducted by The Tool-supported policy development for regional adaptation (ToPDAd) found that the provision of weather-related travel information can reduce the costs of extreme events by helping users to avoid congestion through a combination of choosing alternative routes or rescheduling activities.

Extreme weather events, like droughts, heatwaves, floods, and storms, often devastate cities and their transport systems. Climate change is set to make these events more frequent and severe, hitting low-lying coastal and delta cities hardest and disproportionately affecting the poor and vulnerable. Transportation disruptions limit access to education, employment, markets, services, and goods, with profound and lasting impacts on the economy and society.

Severe weather events such as droughts, heatwaves, floods, and storms frequently cause extensive damage to urban areas and their transportation networks. Climate change has increased the frequency and intensity of these events. Interruptions in transportation hinder people's ability to access education, jobs, markets, services, and goods, leading to significant and enduring repercussions on both the economy and

There are several problems for land-based transportation as a result of a changing climate:

1. Higher temperatures make roads soften and expand, which creates rutting and potholes. Rail tracks, especially those made from metals, will stretch and buckle, while the joints of bridges will become increasingly worn out.
2. Heavy rainstorms and the ensuing flood can disrupt land travel. Frequent exposure to flooding weakens the railways and roads, resulting in a shorter life expectancy.
3. The extreme weathers led to more repairs and reconstructions, yet they limit building activities and exacerbate maintenance costs.

Finally, non-physical direct impacts on transportation modes and travel methods should be regarded as a climate change aftermath. Adverse weather conditions, such as heavy rain, extreme wind, will push

² (Public Funding for Controlling Climate Change in Indonesia 2016 – 2018, Fiscal Policy Agency – Ministry of Finance) <https://www.undp.org/sites/g/files/zskgke326/files/migration/id/INS-BAHASA-Full-Report-Pendanaan-Publik-untuk-Pengendalian-Perubahan-Iklim-Indonesia.pdf>.

³ <http://www.topdad.eu/news/brief-of-topdads-results>

individuals towards the use of automobiles. In turn, it increases travel time and reduces transport speed. The effect is particularly pronounced in peak travel periods, worsening the frequency, severity, and duration of traffic congestion across the system. Accidents are more likely to occur during adverse weather (Markolf et al., 2019).

Considering the GoI aims to encourage the infrastructure sector to improve inter-regional connectivity and networking, there are several challenges that must be identified and addressed in tackling the above mentioned problems.

First, several existing transportation modes and facilities are not prepared with the mechanisms required to cope with climate change. Most railway systems are built in the 1900s during the Dutch Colonialisation era, and are poorly maintained. Highways and roads were constructed in the 1970s in Soeharto's administration. Airports, harbors, trains, and ships confront similar issues. Many facilities are approaching their capacity limits. Almost no upgrades have been made to ensure they are suitable to last against disasters and unknown climate impacts (Diez, 2018).

Second, institutional efforts regarding climate change have only addressed issues to prevent losses or mitigation efforts, without any plans about how infrastructure responds to damage, i.e., adapting to climate change. The majority of Indonesian transportation institutions do not have a systematic roadmap related to climate change adaptation. Only 17% of them conducted any study on climate change impacts (Kusumaningrum, 2016).

In part, this is because the transportation sector has neither a commanding agency nor clear institutional direction (Sitanggang & Saribanon, 2017). The current authorities are limited by administrative boundaries or their specific mode of transport, which poses a challenge seeing that transport affairs are an integrated system encompassing multiple cities and modes (Farda & Lubis, 2018).

Filling the gap of transport connectivity in Indonesia is considered crucial to strengthen the resiliency from disasters. In times of disasters, a well-connected infrastructure could facilitate better first-response and damage control. Furthermore, good connectivity is critical in minimising the loss, both in terms of physical and economic damage from disasters.

Sustainable Urban Mobility Plan (SUMP)

A SUMP is a strategic plan designed to satisfy the mobility needs of people and businesses in cities and their surroundings for a better quality of life. It builds on existing planning practices and takes due consideration of integration, participation, and evaluation principles.

The 2020-2024 Midterm National Development Plan (*Rencana Pembangunan Jangka Menengah Nasional - RPJMN*) prioritises the development of Mass Transportation (Masstrans) program in 6 metropolitan areas including Jakarta, Bandung, Semarang, Surabaya, Medan and Makassar. The aim of Masstrans is to address increasing traffic congestion that negatively affects air quality, public health, city appeal, and economic value. This highlights the need to change current mobility schemes in urban areas to restore the functions of urban spaces. The policy variable stated in the SUMP is Avoid-Shift-Improve. The next 4 metropolitan areas (Palembang, Banjarmasin, Denpasar, and Manado) will get the mass transportation project in the next RPJMN (2025 – 2030).

Bappenas has prioritised the development of SUMP for the following 10 metropolitan areas which can be the potential geographic areas and subsector of interventions of climate-resilient urban infrastructures:

- 1) Mebidangro (Medan City, Binjai City, Deli Serdang Regency, and Karo Regency).
- 2) Patungraya Agung (Palembang City, Banyuasin Regency, Ogan Ilir Regency, Ogan Komering Ilir Regency).
- 3) Jabodetabekpunjur (DKI Jakarta, Bogor Regency, Bogor City, Depok City, Tangerang Regency, Tangerang City, South Tangerang City, Bekasi Regency, Bekasi City, Cianjur Regency).
- 4) Cekungan Bandung (Bandung City, Bandung Regency, West Bandung Regency, Cimahi City, and part of Sumedang Regency).
- 5) Kedungsepur (Kendal Regency, Demak Regency, Semarang City, Semarang Regency, Salatiga City, and Purwodadi),

- 6) Gerbangkertosusila (Gresik Regency, Surabaya City, Sidoarjo Regency, Mojokerto Regency, Mojokerto City, Lamongan Regency, Bangkalan Regency).
- 7) Banjar Bakula (Banjarmasin City, Banjarbaru City, Banjar Regency, Barito Kuala Regency, Tanah Laut Regency).
- 8) Sarbagita (Denpasar City, Badung Regency, Gianyar Regency, Tabanan Regency).
- 9) Mamminasata (Makassar City, Maros City, Gowa Regency, Takalar Regency)
- 10) Bimindo (Manado City, Bitung City, Norta Minahasa Regency).

Some of these documents have been completed and will become the basis for further analysis of resilience mainstreaming at the metropolitan level and a map to identify key transport infrastructure of salience in each geography. We have started to analyse the completed documents and will be consulting with relevant stakeholders on the status of ongoing versions.

The World Bank has also conducted a Disaster Risk Management, Resilient Mobility Diagnostic and Climate Change Adaptation for Mass Transit Systems in Indonesian Cities project. It highlights existing risks, vulnerability and threats from climate change given the geography of metropolitan areas. Including how the urban areas and related transport activities are subject to several natural threats including volcanic, landslide, earthquake and flood risks.

For the most significant risks in terms of infrastructure vulnerability, planning and design considerations are proposed. While for the less significant risks, key findings and recommendations for contingency planning and business continuity procedures are identified. The planning and design of each system as part of the SUMP Action Plan shall be done in consideration of natural risks and their own vulnerabilities. These include locating facilities in safe areas and using upgraded materials in civil works, along with upgraded solutions in systems.

Implementation of the SUMPs can be achieved through a series of action plans comprising packages of measures. To identify the most useful packages of measures, different ways of grouping them should be explored and tested. These will comprise of:

- Measures that are already planned or being implemented, based on sectoral transportation plans (e.g. on walking, cycling, public transport, road transport, parking, freight) as well as plans from other relevant policy areas (e.g. land use, energy, environment, economic development, social inclusion, health and safety); and
- New potential measures that support the objectives and vision, including new and innovative ideas.

Currently, there are SUMPs available for the metropolitan areas of Jakarta, Bandung, Semarang, Denpasar, Medan, and Makassar. These SUMPs focus on mitigation actions and have not integrated climate adaptation and resilience plans yet. Only the Medan Metropolitan are SUMP recommends that each part of the SUMP action plan shall consider natural risks and vulnerabilities, the facilities should be located in safe areas, using upgraded materials in civil works, implementing enhanced solutions in systems, and all designs must adhere to the applicable Indonesian standards issued by SNI.

The available SUMPs are supported by international development partners through collaboration with Bappenas. Bappenas plans to transfer the development of the SUMPs to local government with the aim of enhancing a sense of ownership. Therefore, there is a need to enhance the capacity of local government officials to ensure the production of high-quality SUMPs that integrate climate change adaptation and resilience.

Transit Oriented Development (TOD)

TOD is the concept of integrated urban places designed to bring people, activities, buildings, and public space together, with easy walking and cycling connection between them and near-excellent transit service to the rest of the city. It means inclusive access for all to local and citywide opportunities and resources by the most efficient and healthful combination of mobility modes, at the lowest financial and environmental cost, and with the highest resilience to disruptive events. Inclusive TOD is a necessary foundation for long-term sustainability, equity, shared prosperity, and civil peace in cities.

The features of TOD, as mentioned above, directly contribute to climate adaptation as experienced by some Asian cities (Hong Kong, Singapore, Seoul) and selected western cities (Copenhagen, Stockholm, Houston). Investments made into TOD are supporting overall socio-economic environmentally sustainable development,

which is an essential priority for developing Asian cities. Therefore, these are synergised investments, making it easier to address the funding challenge. Looking at TOD as a climate adaptation strategy may therefore be considered as a pragmatic and achievable model.

As an example, the FCDO provided support to the South African city of eThekweni (Durban) in its consideration of TOD as part of the technical assistance under the broader Future Cities programme. More specifically, with a modest amount of money, experts helped the city to complete an analysis of the impact of a more comprehensive TOD policy. The policy incentivised development along a priority BRT corridor, looking at the potential for increased densification in targeted areas and increased revenue from more valuable land in close proximity to public transportation. The outputs from this review helped to provide the necessary justification for the introduction and subsequent adoption of a more streamlined policy with transversal implications across the city, ultimately leading to a more efficient CBD with improved environmental and health outcomes.

The intervention areas that can be considered are as follows:

- 1) Offer additional climate resiliency analysis for the Feasibility Study (FS) or Detailed Engineering Design (DED) of prioritised transportation projects in Bappenas' Blue Book.
- 2) Enhance the detailed engineering designs of planned transportation infrastructure in cities like Bandung and Makassar by incorporating climate resilience considerations.
- 3) Incorporate climate resilience elements into tactical urbanism projects.
- 4) Provide climate innovation grants or Venture Grant Funding (VGF) to climate technology startups in areas such as porous pavements, accompanied by post-implementation impact assessments.
- 5) Conduct capacity-building programs focusing on strategies for urban transport climate adaptation and resilient:
 - a. Government officials of Ministry of Transport
 - b. Local government of relevant institutions

3.3 Water, sanitation & flood resilience

- Ministry of Public Works and Housing has policies in place to ensure climate mainstreaming in urban water security, encompassing efficient water usage, conservation, pollution prevention, and the development of an effective water distribution system to reduce leaks.
- The water, sanitation and hygiene sector is sufficiently supported by various international development partner at the policy level, as well as large infrastructure planning.
- Whilst support for backbone climate-resilient water, sanitation and hygiene infrastructure may require huge investment, there is opportunity to support the ministry in community participation in water resilience through initiatives piloting innovations, including through urban nature-based solutions.

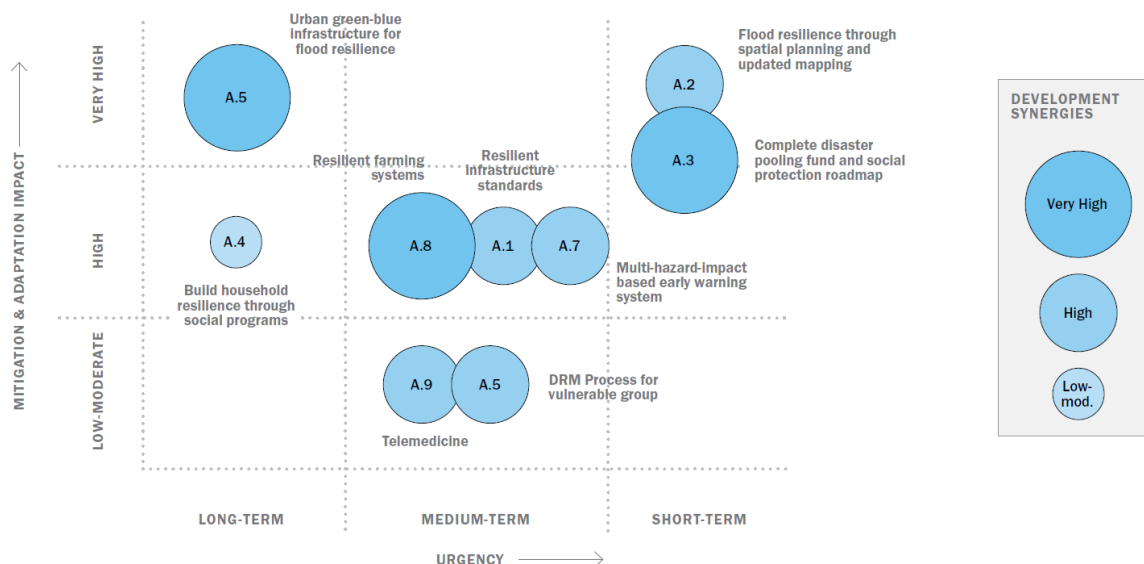


Figure 6 Timeframe and expected impact of adaptation measures (World Bank, 2023)

Water

As of 2019, the level of adequate drinking water service in urban areas reached only 51.5% including the coverage of piped water access, which was a mere 29.3% of target.

Based on RPJMN 2020 - 2024 and the Strategic Plan of the Directorate General of Human Settlements 2020 - 2024, the challenges in improving access to safe drinking water are as follows:

- Challenges in the availability of raw water, both in quantity and quality due to environmental degradation and global climate change. This affects the suboptimal performance of Drinking Water Supply Systems (SPAM, Sistem Penyediaan Air Minum).
- Suboptimal performance of SPAM operators and the limited commitment of local governments in SPAM administration. This results in a high idle capacity, amounting to 47,365 L/second (out of a capacity of 57,000 liters/second) in 2019, equivalent to the potential to serve approximately 18.9 million people.
- Limited utilisation of alternative sources of funding beyond government funds (APBN/APBD).
- Suboptimal guidance in the operation, maintenance, and asset management of SPAM.
- The need for a regional SPAM concept and technological innovations for specific areas due to uneven raw water availability among regions.

The management of groundwater and raw water in Indonesia faces several fundamental challenges: low levels of raw water supply service, issues of water quantity and quality (referred to as 3T: Too much, Too little, Too dirty), and problems in utilising technology to ensure sustainable, safe, and adequate raw water quantity and quality. Infrastructure service capacity for safe and adequate raw water supply in Indonesia covered only 30% of the total national raw water needs up to 2019. This has led to the widespread use of alternative raw water sources, which may not necessarily be safe and adequate in terms of quantity and quality.

Additional obstacles include:

- SPAM Operators categorised as healthy state-owned enterprises (BUMD) at only 59.8%.
- The absence of Full Cost Recovery (FCR) tariff implementation, which hinders setting water tariffs that can cover operational and service expansion needs.
- The current average Non-Revenue Water (NRW) rate or water loss remains high at 32.75%.
- The asset management capability of SPAM state-owned enterprises (BUMD) is still inadequate, making it challenging for them to develop their businesses.
- Government budget constraints in improving the performance of SPAM state-owned enterprises. Hence, alternative funding sources, including Public-Private Partnerships (PPP) schemes, must be intensified.

Priority projects support the provision of safe and sustainable drinking water access, which includes: the development, construction, and regulation of water supply and sanitation systems (SPAM); monitoring of drinking water quality; and piped water access (10 million household connections).

The RPJMN 2020-2024 target for the water sector is to achieve access to safe drinking water, increase from 87.75% (2018) to 100%, and access to clean drinking water, increase from 6.7% (2018) to 15%. This includes piped water access, which is set to increase from 20.14% (2018) to 30.35%.

Water Resilience

According to the [Asian Water Development Outlook 2016](#) (ADB), communities or societies experience water resilience when they can manage and use water for (a) household and sanitation needs, (b) supporting economic productivity for agriculture, industry, and energy, (c) comfortable urban and rural living conditions, (d) a healthy ecosystem, and (e) communities capable of facing changes. These five aspects can be described in five dimensions of resilience: (a) household resilience, (b) economic resilience, (c) urban resilience, (d) environmental resilience, and (e) resilience to water-related disasters.

Water sector disruptions include water scarcity, droughts, and floods. In 2018, with support from USAID, Bappenas conducted a reassessment of the National Action Plan for Climate Change Adaptation (RAN API) in the Water Sector. To comprehend forthcoming water sector disasters and disturbances, statistical rainfall data was utilised through modeling. Briefly, the results are as follows:

- Reduced water availability can disrupt household water security goals. Shifting rainfall patterns significantly increase the risk of water scarcity in various parts of Indonesia. Northern Sumatra, particularly Aceh, faces a substantial decline in water availability. While Papua experiences reduced rainfall from 2020 to 2034, its impact is primarily felt in coastal areas, especially in current residential zones.
- Drought potential looms across most of Indonesia due to three-month rainfall fluctuations. This drought risk threatens household water security by reducing water supply from public utilities (PDAM) and economic stability, possibly leading to water conflicts due to the needs of agriculture, industry, and energy. Analysing the driest three-month rainfall, like in East Nusa Tenggara, reveals that although the annual rainfall decrease is not significant (2%) for the 2020-2034 period, the stark contrast between wet and dry three-month periods hints at potential drought occurrences.
- Enhanced potential for monthly maximum rainfall is observed in nearly all Indonesian regions. This analysis considers data on the highest monthly rainfall for both the 2020-2034 and 2031-2045 projections. For instance, on Java Island, notable changes in extreme rainfall are seen from September to December in both projection periods. This implies that the likelihood of floods in Java will rise during these months, impacting urban water resilience and flood disasters in various river regions.

In 2021 the World Bank conducted a study on [Indonesia Toward Water Security, Vision 2045](#) for Bappenas. Vision 2045 aims to elevate Indonesia into a top-five global economy by its centenary in 2045. However, this ambition hinges on addressing water security. This study highlighting challenges and quantifying the potential impact of unaddressed water threats on GDP and socio-economic development. It proposes targeted actions to achieve water security and identifies opportunities for sector reform within the framework of the 2019 Water Law and Omnibus Law. This study is also stated that climate change adaptation in water infrastructure development and planning needs to be mainstreamed.

According to the Asian Development Bank's National Water Security (ADB, 2016), Indonesia's NSW Index is 2 out of 5, labelled as "ENGAGED," indicating that: over half the population has basic access to drinking water and sanitation; water services are improving and supporting economic activities; enhancing drinking water quality; and some measures have been taken to address water-related disasters.

Water resource management in Indonesia can be categorised into:

- Enhancing water availability for households and the economy (agriculture, industry, energy). For instance, the Ministry of Public Works and People's Housing has issued guidelines (NSPK) to develop drinking water supply systems. Due to limited local resources, central government assistance is needed for feasibility studies.
- Reducing climate-related disaster risks, both in urban areas (urban water security) and building community resilience to water-related hazards.
- Improving environmental quality through ecosystem service mechanisms (environmental water security).

Sanitation

Enhancing safe sanitation access is a top priority for Indonesia's government in achieving the 2030 Sustainable Development Goals. The SDGs targets have also been integrated with the national targets in the 2020-2024 RPJMN, specifically as the 6th National Priority (PN6). Within climate-resilient development, the focus is on two crucial sectors: drinking water and sanitation. We examine the following initiatives for the sector to better understand state of the art and identify opportunities in the sector.

In addition, there are regulations that mandate local governments to ensure the provision of sanitation services to their residents, encompassing the duty to secure funding for both the establishment and operation of sanitation systems. These regulations include compliance with the Minimum Service Standard outlined in Government Regulation No. 1 of 2018 and the implementation of local ordinances governing domestic wastewater management.

The RPJMN 2020-2024, outlines key policies for sanitation development, including:

- Enhancing institutional capacity by strengthening regulatory functions and empowering PDAM as service providers.
- Encouraging local government leaders to formalise their commitment to sanitation systems.
- Advancing infrastructure and services, including resource recovery, technology, and human resources.
- Promoting behavioural change for the adoption of safe sanitation practices.
- Facilitating cooperation and funding mechanisms, such as subsidies and innovative financing options.

A UNICEF study conducted for Bappenas in Bekasi, Makassar, Lombok, and Palu demonstrated that climate hazards affect the entire sanitation service chain, starting from household toilets to treatment facilities, including emptying, transportation, and treatment services, and also contaminate water supplies. Health risks rise due to damage and disruption across the sanitation service chain, from collection to treatment.

Flooding, high tides, and storm surges result in water entering toilet facilities and causing drain backups. While strong winds rarely impact sanitation facilities, they can lead to privacy concerns. Flooding, high sea levels, and wind damage can also limit access, leading to open defecation or the use of alternatives like neighbours' toilets or public facilities. Vulnerable regions, like low-lying coastal areas and water-scarce zones including women, girls, and households with disabled family members experience the greatest challenges during climate hazards, leading to higher levels of stress, discomfort, and anxiety when addressing their sanitation needs.

It highlights the need for a climate-resilient sanitation system which encompasses seven key elements: risk-informed planning, sustainable adaptation capacity, integrated water cycle actions, creative community engagement, robust infrastructure, responsive funding, clear institutional responsibilities, and flexible service system management and regulation.

Following up on the research recommendations, climate considerations are being incorporated into the national SDG-6 Plan and the various roadmaps under development. UNICEF is also assisting the Government of Indonesia in developing a national framework and guidelines for mainstreaming climate resilience in the water, sanitation and hygiene (WASH) sector. The framework is expected to build awareness and national capacities, and advance the sector thinking around WASH and climate change with the objective of providing sustainable and climate resilient WASH services.

The RPJMN 2020-2024 target is to achieve:

- Access to proper sanitation, increasing from 77.44% (2019) to 90% (2024), and access to safe sanitation, increasing from 7.5% (2019) to 15% (2024).
- The number of house connections served by Centralised Domestic Wastewater Management System (SPALD – T, Sistem Pengelolaan Air Limbah Domestik Terpusat) on a residential/city/regional (household) scale from 1.3 million (2015-2019) to 3 million.
- The number of households (RT, Rumah Tangga) served by fecal sludge treatment plants has reached 6.5 million RT.

USAID, through the Indonesia Urban Resilient Water, Sanitation, and Hygiene (IUWASH Tangguh) program, is a development partner actively involved in supporting the water supply and sanitation sector. This five-year project, initiated in early April 2022, aims to assist the Indonesian government in improving access to clean water and sanitation services. USAID IUWASH Tangguh is aligned with Indonesia's development goals to enhance access to safe drinking water, sanitation, and hygiene in vulnerable urban areas and bolster climate-resilient WASH services and water resource management (WRM). In collaboration with the Indonesian government, USAID IUWASH Tangguh backs Indonesia's efforts to achieve Sustainable Development Goal (SDG) targets, ensuring access to water and sanitation for all (Goal 6), and creating inclusive, safe, resilient, and sustainable cities and settlements (Goal 11).

The USAID IUWASH Tangguh utilises the Integrated Resilient IUWASH Systems (IRIS) approach, which synchronises actions and incentives across upstream and downstream actors, collaborating with key stakeholders through partnerships that facilitate supportive environments and critical factors like finance and data. The USAID IUWASH Tangguh team will provide technical assistance to the Indonesian government, private sector, and community stakeholders to achieve four main objectives:

- Strengthening governance and financing in the WASH and Water Resource Management (WRM) sector.
- Improving access to safe, climate-resilient, and inclusive drinking water and sanitation services for poor communities.
- Enhancing WRM to support resilient drinking water services.
- Increasing the adoption of behaviours and enhancing women's leadership roles contributing to improved WASH and WRM.

Some of the USAID IUWASH Tangguh programs include:

- Supporting the improvement of safe drinking water access for 1.5 million people and safe sanitation access for 1 million people. To achieve this goal, USAID IUWASH Tangguh will provide extensive technical support to Drinking Water Regional Public Enterprises (BUMD Air Minum) to enhance not only operational performance (technical, financial, and internal institutional aspects) but also related supporting factors, including water resource management and promoting climate-resilient safe drinking water access.
- Efforts to promote faecal sludge management in Local Domestic Wastewater Management Systems (SPALDS), connecting households to Central Domestic Wastewater Management Systems (SPALDT), enhancing the institutional capacity of domestic wastewater operators, and assisting the central government in institutional governance, financing, and sanitation management regulation.
- Supporting regional governments in meeting the minimum requirements for the Scheduled Faecal Sludge Services (LLTT). USAID IUWASH Tangguh will also assist regional governments in preparing criteria for sanitation grant programs, OPOR (Optimisation, Maintenance, Operation, Rehabilitation), and Special Allocation Fund (DAK) for sanitation.
- Partnering with relevant ministries to promote an environment that supports the achievement of the 2020-2024 National Medium-Term Development Plan (RPJMN) and the 2030 Sustainable Development Goals (SDGs) for safe drinking water and sanitation.
- Supportive factors such as gender inclusion, increased financing, and robust community engagement mechanisms.

Climate Change Responsive and Inclusive WASH Initiatives are supported by the Water for Women Research Award, funded by the Australian Department of Foreign Affairs and Trade (DFAT). Water for Women is Australia's flagship program in WASH that promotes improved health, equality, and well-being in communities

across Asia and the Pacific through socially inclusive and sustainable WASH projects. Water for Women is implementing 18 WASH projects in 15 countries along with 11 research projects over five years (2018-2022).

Intervention options to consider:

- Building small-scale sanitation infrastructure for urban slum areas or urban coastal areas that are adaptable and climate-resilient. This can be done in collaboration with other donors who already have a list of priority locations and complete sanitation facility planning includes technical aspects, institutional support, and innovative financing mechanisms.
- Planning and implementing community awareness and behavioural change programs to promote the adoption of safe sanitation practices.

Flood Control

Over the past two decades, floods have impacted more people in Indonesia than any other disaster, causing significant damage and disrupting local and regional economies. In January 2020, floods in the Greater Jakarta and West Java urban areas even resulted in 16 fatalities, displacing over 25,000 people and damaging more than 37,000 housing units, as well as numerous schools, places of worship, and public facilities (source: Kompas, 02/01/2020). The poor and vulnerable are often the primary victims of flood-related disasters, as they tend to reside in high-risk areas such as densely populated settlements situated below flood levels, coastal regions prone to inundation, and along riverbanks that frequently overflow. They lack access to basic services, fiscal support, and have limited financial resources and assets to cope with the aftermath of losses (source: The World Bank).

Urban flood management requires significant resource allocation for large-scale infrastructure development. However, addressing drainage within residential areas can optimise the outcomes of major infrastructure efforts and directly impact the community. Residential drainage is closely linked to the water, sanitation, and hygiene sector. We will explore residential drainage management to identify potential intervention opportunities.

Urban flooding in residential area in Indonesia is primarily caused by prolonged heavy rainfall with high intensity, inadequate stormwater drainage capacity, diminishing catchment areas, and obstructions in drainage channels or rivers due to waste or sedimentation. In urban areas near the sea, flooding can worsen when it occurs during high tides. River and drainage flows are impeded as they cannot discharge due to the high tide.

Residential drainage within the Ministry of Public Works and Housing (PUPR) falls under the Directorate General of Human Settlement (Cipta Karya), specifically the Directorate of Sanitation. Their objective is to increase the percentage of households served by drainage infrastructure. The target activities for the period 2020-2024 are detailed as outputs, with an indicator of serving 17,500 households (HH) through the environmental drainage management system.

The approach undertaken by the Directorate General of Cipta Karya in order to achieve RPJMN 2020 -2024 include:

- Ensuring close coordination among stakeholders to integrate environmental drainage systems seamlessly into urban drainage systems.
- Empowering communities to ensure that planning, design, and execution are as participatory as possible.
- Encouraging local governments and communities to uphold the sustainability of infrastructure management and development.
- Promoting a new paradigm in environmental drainage management, emphasising the retention and infiltration of standing water into the ground through methods like soak pits, retention ponds, and more. This is done to facilitate groundwater conservation and reuse.
- Raising awareness among local governments and communities to prevent sedimentation or clogging in drainage channels, blockages due to waste, or construction on waterways that could lead to flooding.

The strategy of the RPJMN 2020-2024 to support the integrated management of disaster-prone areas, especially flood risks in coastal regions, includes the development of early warning systems for flood and

landslides. As the implementing institution, BMKG (Meteorology, Climatology, and Geophysics Agency) has developed the 'Rob Flood Early Warning System', which provides information and analyses the potential for 'Rob events' based on meteorological and tidal data. The 'Rob Flood Early Warning' is valid for a maximum of 2 days ahead. An inclusive early warning system is needed to accommodate the vulnerable and disabled communities.

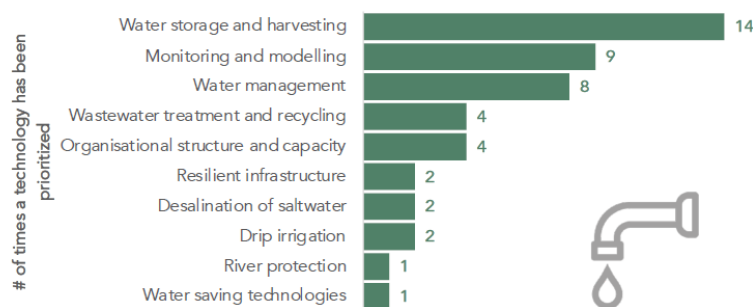
To deal with flood problems in Indonesia, there are several international organisations that also support, including:

- USAID through its Adaptasi Perubahan Iklim dan Ketangguhan (APIK) project works to integrate climate adaptation and disaster risk reduction in government planning, budgeting, and operations so that it can provide benefit to communities that live under the threats of climate impacts. In the process, USAID APIK has completed a series of climate risk and vulnerability assessments in East Java, Southeast Sulawesi, and Maluku Province from the landscape level down to the village level. These assessments serve as a tool for the government to formulate their development plans.
- DFAT programme SIAP-SIAGA leverage GoI investments in disaster management institutions and capacity in Indonesia since 2007 and focus on supporting improvement in the disaster management system as the sector shifts to reflect emerging challenges including climate change and public health crises. It focuses more on early warning systems and management, looking at climate risk more in the form of hydrometeorological hazard and building the capacity of national and provincial disaster management agencies to respond to them.
- At the subnational level, international NGO Mercy Corps has worked at the city level with Pekalongan – a smaller urban area in Central Java – to start mainstreaming an ecosystem-based landscape approach to minimise the risks and impacts of floods, including flash floods, tidal floods, and coastal inundation. Various flood and tidal flood control infrastructure developments, funded through collaboration between the central government budget, Provincial Financial Assistance (Bankeu), and the City Budget of Pekalongan, have achieved a 60 percent success rate. The City Government of Pekalongan is working on infrastructure development and coastal culture promotion to create an adaptive community. Efforts to combat tidal floods on the eastern side include building seawalls along the coast and rivers, as well as constructing pump houses. Additionally, movable dams are being built to collect rainwater. Due to the low water level, the collected water is pumped or released when the tide is not high. Communities are also encouraged to adapt to climate change. For example, swampy land can be used for floating houses.
- Since 2022, the Government of Indonesia, with funding from the World Bank, has been implementing the National Urban Flood Resilience Project (NUFReP). The project's primary objective is to reduce flood risk in selected Indonesian cities by enhancing national and city-level capacities and investments for comprehensive urban flood risk management. Initially, the project provide support to seven cities, namely Banjarmasin, Bima, Gorontalo, Manado, Medan, the New Capital City, and Semarang. The project components include flood risk analysis and planning, urban flood resilience measures, and program management and implementation support.

For the WASH sector, support at the policy level and in capacity building has been sufficient from various development partners. This is evidenced by the relatively good capacity at MoPW's relevant technical directorate and the prioritisation of WASH infrastructure development at both national and subnational levels. There is some space to refine the climate resiliency angle of WASH infrastructure projects currently under preparation through the PPP mechanisms⁴ and as a leverage to the long-term support from USAID. And while support for development and implementation of backbone infrastructure require heavy investment, there is opportunity for smaller scale interventions at community or pilot level to support adaptation efforts, including through nature-based solutions. Some examples are laid out in below figure.

⁴ A list of these infrastructure projects can be found here - <https://kpbu.kemenkeu.go.id/proyek/proyeklist?sektor=-1&prov=-1&kota=-1&status=-1>

Water Sector Solutions Priorities



+ Water storage and harvesting, and water monitoring and modelling are top priority climate adaptation solutions sought by developing countries to address climate-related risks in the water sector

Climate-related impact drivers ¹	Sector	Examples of projected climate change impacts	Examples of adaptation solutions	
			Climate Adaptation Intelligence	Climate Adaptation Products and Services
Extreme temperature Extreme precipitation Damaging cyclone Sea level	Agriculture	+ Reduced crop yields and quality resulting from higher temperatures and/or less precipitation + Reduced crop yields in irrigated agriculture due to reduced availability of irrigation water + Crops losses due to extreme weather events	+ Climate monitoring and forecasting + Temperature regulation technologies for livestock + Remote sensing-based drought monitoring tool + Crop data and analytics platform with mapping interface	+ Drought tolerant crops + High precision laser land leveling to reduce runoff + Pressurized irrigation technologies using sprinkler, drip, mini-sprinkler, or high-efficiency drip systems + Parametric insurance
	Coastal zones	+ Damage to assets from more intense and frequent extreme weather events + Flooding due to sea level rise and storm surges + Reduced of domestic, commercial, or industrial water due to saltwater intrusion + Erosion due to rising sea level	+ Early warning systems for extreme coastal weather events + Satellite imagery for monitoring and impact assessment + Sea-level processing software	+ Geosynthetics (e.g., geotextiles and geomembranes) + Constructed wetlands and artificial reefs
	Health	+ Changes in the geographic range, seasonality, and incidence of vector- and water-borne diseases + Reduced labor productivity due to heat stress + Increased respiratory illness due to heat stress	+ Disease surveillance systems + E-Health e.g. remote diagnostics, health and disease surveillance systems for outbreak detection	+ Long-lasting insecticidal nets + Rapid diagnostic tests
	Transport	+ Damage to road network / rail network / seaports due to extreme weather events + Interruption of transport networks due to extreme weather events + Flooding and inundation of transportation infrastructure due to rising sea levels	+ Intelligent transportation systems to e.g. monitor road conditions, address hazards in real time, moving traffic away from areas experiencing a natural disaster, point first responders to identify priority intervention areas	+ Extreme heat/cold resistant paving material + Active motion-dampening systems
	Water supply and mngt.	+ Reduced surface-water availability due to changes in precipitations + Reduced surface water quality due to e.g., saltwater intrusion + Increased flooding due to extreme weather events	+ Water monitoring and modelling (e.g. water resource mapping) + Hydrological forecasting system	+ Water storage and harvesting + Water saving technologies / water loss reduction technologies e.g., smart water meters, pressure control equipment

Figure 7 Adaptation solutions taxonomy (The Lightsmith Group, 2020)

A 2022 UNHABITAT study highlighted that IPCC has identified several core ways in which nature-based solutions (NBS) may provide climate adaptive functions for cities and urban settlements (IPCC, 2022d in UNHABITAT, 2022):

1. Urban NBS like green roofs and walls, trees, urban vegetation as well as lakes, ponds and streams can increase resilience to extreme temperatures and provide urban cooling through evapotranspiration and shading.
2. By absorbing air pollutants, affecting ground-level ozone concentrations and indirectly through reduced emissions from cooling and other functions, urban trees, vegetated buildings and green structures have the potential to improve air quality and reduce health risks.
3. Coastal ecosystems including coastal forests, coral and oyster reefs, salt marshes and coastal wetlands, seagrass dunes and more, can provide coastal flood protection through physical barriers, stormwater absorption and a reduction of wave energy.
4. NBS alongside rivers and floodplains are seen as measures for riverine flood impact reduction since they can reduce the volume of floodwater, take away river energy and flood speed, increase water storage and stabilise riverbanks, and minimise the potential for development for impermeable surfaces, thereby creating space for floodwater to expand, improving urban water quality and management, drought protection and overall water supply management.

Translation of these strategies into pilot projects could be a low-hanging fruit for future intervention and will potentially have immediate tangible benefits at the community level, especially if designed with a

comprehensive inclusivity lens such as for informal community. There is however a slight risk if local context is not well mapped that NBS approach could result in gentrification.

Proposed interventions for WASH and drainage:

While the sector of drinking water, sanitation and flood resilience has received international support, there are still opportunities for intervention, particularly in prioritising climate adaptation and resilience, an area that has been relatively underemphasised.

- Supplement current water sanitation priority projects in Bappenas Blue Book with climate adaptation workstreams (ie in MoPWH Livable Settlement & Waster Water projects)
- Tech enhancement of urban early warning systems in priority cities, working alongside provincial disaster management agencies (BPBD) and Indonesian Met Office (BMKG). Potential pilot can leverage on completed Future Cities intervention in Surabaya
- Working with PT SMI, assess feasibility of developing financing facility similar to USAID Climate Finance for Development's Coastal Resilience, Cabon & Conservation Finance programme
- Piloting & scaling up utilisation of combination of NBS and innovative zero run off technologies

Intervention options to consider:

- Building small-scale sanitation infrastructure for urban slum areas or urban coastal areas that are adaptable and climate-resilient. This can be done in collaboration with other donors who already have a list of priority locations and complete sanitation facility planning includes technical aspects, institutional support, and innovative financing mechanisms.
- Planning and implementing community awareness and behavioral change programs to promote the adoption of safe sanitation practices.

3.4. Cross-sectoral lens – Gender Equality & Social Inclusion

This section sets out the key GESI considerations for interventions in an urban development and adaptation programme and identifies how it can best both mainstream and design specific focus on GESI in its interventions. Based on our experience and recommendations from other recent programmes, we are recommending that our scoping and analysis take a two-pronged approach to GESI in programme interventions 1) Mainstream GESI approach through programme life cycle and also 2) Identify opportunities for (at least one) GESI-focused urban development and adaptation projects/interventions.

GESI context within urban development and adaptation

It is well-documented that climate change disproportionately affects certain socially vulnerable groups in urban populations, such as women, low-income households, people with disabilities, and the elderly. These groups are more likely to experience exclusion and vulnerability due to their levels of poverty, geographic location, dependency on natural resources for livelihoods, and limited capacity to respond to the impact of climate change. A study emphasised that the vulnerable groups who suffer the most severe impacts of climate change are those who have been experiencing multiple aspects of inequalities in their lives.

As the knowledge base and interest in GESI and climate change has grown significantly, commitments to address these gaps through climate change adaptation programme are also expanding. Global and national programmes are designed to improve the adaptive capabilities of different groups of people in facing climate change impact. However, some initiatives have often failed to tackle the issues of gender equality and social inclusion within urban development and climate change adaptation programme effectively. As a result, the capability of vulnerable groups in coping with the adverse impacts of climate change in urban areas remains a challenge.

GESI barriers for urban poor, women, and other vulnerable groups in facing climate change

To develop an inclusive programme, the programme needs to identify the existing gender and social gaps, as well as to understand the different levels of capabilities of each vulnerable group in adapting to the climate change impact. The below summarises the barriers often experienced by the vulnerable groups, under three key themes:

- a. Participation

The urban poor, women, and other vulnerable groups often face several challenges that prevent them from making important interventions that can contribute to climate adaptation initiatives and access benefits of programme or services, such as (1) women's role in securing household livelihoods during severe climate change events will limit their time to access training and education (Osman-Elasha, 2009); (2) the lack of knowledge and awareness of the economic benefits of climate change adaptation programme, which often makes them hesitate in participating in the programme and prefer to work to gain income.

b. Resources

The urban poor mostly resided in hazard-prone areas or at the front lines facing climate change impact such as flooding, extreme heat, and air pollution. Despite the understanding of the local climate issues in their areas, their capability to adapt and resilience can be weakened due to the resource's constraints, poor infrastructure, and substantial poverty. Such resources can include buildings, utilities, road access, transportation, health care services, and access to nutritious food. The struggles to access these resources will increase during and post extreme weather events.

c. Different levels of adaptive capacity

Severe climate change impacts might lead to harmful weather events and the effects are not always borne equally by each social group or individual. For example, women, children, the elderly, and people with disability are more likely less resilient and have lower capacity to respond to natural disaster due to the limitations in skills and mobility. This example indicates that the project can help support the urban communities, especially the vulnerable groups, by helping them to improve their knowledge and skill in responding and adapting to disasters and emergencies.

GESI barriers in urban adaptation and climate resilient programme

An urban adaptation and climate resilient programme should be designed to be equitable and responsive to the needs of women, men, and all groups in society, especially the vulnerable groups. A climate resilient programme that tends to be gender-neutral and not sufficiently consider the key GESI barriers as experienced by the vulnerable groups might exacerbating existing inequalities in urban regions. To narrow the gaps, the programme needs to identify GESI barriers in climate adaptation programme, such as:

- **Voices of urban poor, women, and other vulnerable groups often not heard in consultative processes.** The involvement of the urban poor and other vulnerable groups when designing and implementing climate change adaptation approaches and programmes is essential for the success of sustainable development processes. One of the most crucial issues concerns 'whose voices' are represented and accounted for in the development of climate change adaptation planning, knowledge product, adaptation measures, or project design. It is recognised that the voices of the vulnerable groups are often not represented in urban development and adaptation planning and implementation. Hence, the interventions could not achieve inclusive goals and might worsen the existing inequalities.
- **The role of urban poor, women, and other vulnerable groups tend to be underestimated in climate adaptation efforts.** In climate adaptation planning and related policy-making, there is a tendency to solely addressing the vulnerabilities of urban poor, women, and marginalised groups, but fail to include them as the agents of change. For example, the critical role of women and vulnerable groups at the front of everyday climate change impact are often neglected as the programme views them as passive beneficiaries of projects. This issue might lead to low programme and budgetary investments for capacity building and empowerment programme that can improve their adaptive capability to climate change impact. Further example in urban transport planning, there is no equal representation or critical mass of women in positions that planning process (ADB, 2013) and women's representation across jobs in the sector is very low, due amongst other reasons to socially constructed beliefs and socio-economic factors such as lower education levels.
- **The lack of capacity, coordination and clarity in integrating GESI lens within the related institutions as main stakeholders, especially at the provincial and local levels.** GESI strategy across sectors at local levels often remains unclear. Additionally, GESI-related tasks might be seen as an additional responsibility for staff, or the staff might have limited capacity integrating GESI in the project activities.

Mainstream GESI approach through programme life cycle

GESI mainstreaming considers the needs of different vulnerable groups into project outputs and outcomes, as well as to ensure that no harm is done, and that gender and social inequality is not worsened as a result of the programme. To ensure that GESI is an integral part of the programme, each project must take a deliberate and consistent approach to assess risks and opportunities in relation to GESI, and design actions and measures to support this across the lifecycle of the programme.

The figure below provides an overview of the key GESI considerations in each project cycle:

MARKET POSITIONING & PROJECT SELECTION	GRANT MANAGEMENT	DUE DILIGENCE & RISK	PROJECT MONITORING	LEARNING AND COMMUNICATIONS	PROGRAMME ADAPTATION
Embedding a GESI lens to the market positioning engagements and project selection	Ensuring all Grant documents include sections assessing GESI, including expected impacts	Ensuring the Due Diligence process for shortlisted grantees explores risks linked to GESI and that risk monitoring and mitigation are in place	Embedding GESI indicators in project reporting requirements	Developing case studies or communications products illustrating impact of projects and lessons learned regarding GESI	Ensuring GESI activities are included in the annual review process and feeding findings into recommendations for adaptation where possible

Figure 8 GESI considerations per project cycle

In the selection process, the selection panel needs to consider the key differences of capabilities and challenges of the vulnerable groups in adapting to the climate change impact and accessing the benefits of the climate resilient and adaptation programme. An insufficient focus of GESI considerations in projects that aim to improve infrastructure that can support climate resilient can inadvertently exclude or deepen the constrain access of some groups. For example, in urban transport planning, a sole focus on improving major transport corridors may be more beneficial for men than women, as more men tend to travel to key economic centres along the corridor whereas more women work in off-corridor locations (ADB, 2013).

Identification of at least 1 GESI-focused urban development and adaptation project intervention

During the scoping process, we identified that an urban development and adaptation project can directly addresses GESI through contributing to the following:

- Increased engagement of women, urban poor and other vulnerable groups in decision-making, public consultation, and participatory urban development and adaptation project planning; *for example, through participatory planning with marginalised groups to ensure the barriers are addressed and their needs feed into the project planning.*
- Increased capability of men, women, urban poor and other vulnerable groups living in the urban hazard prone areas in climate change adaptation and resilience. *For example, through improving infrastructure, road access, utilities, health care services, transportation, and access to nutritious food, especially during and post extreme weather events.*
- Increased adaptive capacity of men, women, urban poor and other vulnerable groups to respond to the natural disaster or harmful weather events. *For example, through trainings to help them improve their knowledge and skill in responding and adapting to disasters and emergencies.*

Potential projects from the shortlisted ideas are urban development and adaptation work that could have a specific GESI focus as its core. The outcome statement in the project design and monitoring framework should explicitly describe GESI and include a GESI-specific outcome statement or indicator. By having a GESI-focused project, it promotes and establishes equal access for different vulnerable groups to participate and benefit from the project activities and design processes.

4. FINANCING CLIMATE RESILIENT INFRASTRUCTURE

- Climate-resilient urban infrastructure is well-positioned to attract new forms of funding and financing, especially when framed as “green” for a targeted set of charitable foundations, aid agencies, and concessionary lenders.
- A universal approach to the financing of climate-resilient urban infrastructure (i.e., plug-and-play for immediate transferability of examples from global leaders) might not always work, especially given the general complexities of developing countries as a group and the specific idiosyncrasies of the Indonesian political economy.
- There is a need for significant technical assistance to support urban adaptation and resilience; upfront costs can make resilience investments challenging, even when they come with long-term financial co-benefits like lower energy costs and reduced future costs for reconstruction of damaged infrastructure.

Cities around the world often face challenges accessing capital and financing for climate resilience projects and justifying the upfront costs to taxpayers. Building resilience, a long-term need, competes for resources with other more immediate objectives, and determining and communicating long-term benefits is challenging. In many instances, municipal officials struggle to finance infrastructure needs because of constrained budgets and low tariffs. However, climate-resilient urban infrastructure can be positioned differently, packaged and marketed as “green investments” and eligible for grants/concessional loans because this class of infrastructure both improves services and supports broader environmental and social goals.

Traditional infrastructure systems worldwide rely on built solutions to support the smooth and safe functioning of societies. In the face of multiplying environmental threats, this approach alone can no longer provide the climate resiliency and level of services required in the 21st century. Natural systems such as forests, floodplains, and soils can contribute to clean, reliable water supply and protect against floods and drought. In many circumstances, combining this “green infrastructure” with traditional “gray infrastructure,” such as dams, levees, reservoirs, treatment systems, and pipes, can enhance system performance, boost resilience, lower costs, and better protect communities.

Despite initial successes in financing climate-resilient urban infrastructure, circumstances in developing countries are profoundly different from those in developed countries, and solutions in the United Kingdom might be hard to repeat in Indonesia. Fiscal instrument mechanisms that are commonplace or have proved successful in developed cities may not be easily replicated in cities with drastically different economic, financial, and political contexts.

These differentiating circumstances fundamentally affect what cities in developing countries can accomplish. Funding for adaptation measures, in particular, can be addressed only to the extent that fundamental aspects of city financing are fixed. Action in some areas may be more fruitful than in others. For example, in a developing country lacking an adequate municipal credit market a donor-funded economic fiscal transfer to improve climate resilience would be more feasible than developing a green or municipal catastrophe bond, as was demonstrated in research into the feasibility of a local green bond issuance by the World Bank/Indonesia team in 2022.

Donor activities in this sector are scattered and not well-coordinated, largely because there has been inconsistent attention paid to municipalities and only recently-emerging successes in climate-resilient infrastructure. Most bilateral aid agencies are struggling to identify the most relevant interventions, with German donors as the most progressed in their approach. This is through programmes like Cities Adapt Separately, multilaterals like GCF provide critical support on project development through their project preparation facility, but there has been limited uptake by cities and other sub-national players due to lack of capacity in good, viable project development.

The most significant successes have been in project preparation and development to a point of financial and technical sustainability. Unfortunately, many of these projects have not been executed due to a lack of available finance, which further underscores the need and opportunity for the UK to provide a meaningful

solution in the development of practices that can match projects (the demand side of funding) with funders (the supply side of funding).

Well-designed and appropriately contextualised technical assistance programs can be transformative in the design and execution of financial instruments that can transform climate resilience for urban infrastructure. As examples, the Cities Development Initiative in Asia and the World Bank's City Resilience Program are the largest technical assistance programs of their type, working in dozens of cities simultaneously to help government teams take raw ideas and refine them into project proposals capable of attracting support from the World Bank, other development finance institutions, global climate funds, and the private sector. These programs draw heavily on private sector expertise to help cities to structure financial transactions in ways that use own-source resources and development aid to maximise the amount of private investment in these projects.

For sub-national governments in Indonesia, the need for technical assistance in financial structuring is staggering; at both the provincial and city level, creative financing for climate-resilient infrastructure faces two problems: insufficient bandwidth to consider new initiatives given constrained staff and low levels of financial literacy.

There are a number of tools that can help municipal officials make smarter decisions about green infrastructure opportunities; however, many of these tools are not as user-friendly as might be anticipated and, despite best efforts, cities struggle to use them as intended. An illustrative list of these tools, compiled by the World Resources Institute⁵, follows below:

SERVICE	EXAMPLE OF LARGE-SCALE TECHNICAL ANALYSIS TOOLS
Water supply and hydropower	Global Forest Watch-Water ^a combines global data on water stress with near real time, high-resolution data on tree cover change, enabling users to view where ecosystem change may be having adverse impact on water resources. It helps users identify which of their sites are exposed to water risks because of loss and degradation of natural infrastructure.
Coastal flood management and erosion control	Coastal Resilience ^b is an approach and web-based mapping tool designed to help communities understand their vulnerability to coastal hazards, reduce their risk, and determine the value of green infrastructure. The tool's apps enable planners and decision-makers to visualize current and future risk and then identify a suite of infrastructure solutions that reduce social and economic risks, while maximizing the benefits and services provided by nature. Currently, the Coastal Resilience apps encompass 17 coastal states in the Caribbean, Mexico, and Central America.
River flood management	Aqueduct Global Flood Analyzer ^c provides users with an open-access online platform to quantify and monetize river flood risks worldwide. The tool estimates current and potential future effects on GDP, the affected population, and urban damage from river floods for every state, country, and major river basin in the world.
Urban stormwater management	Urban Water Blueprint Map ^d estimates the level of conservation of permeable areas needed to achieve a reduction in sediment and nutrients for more than 500 cities worldwide.
Drought management	Aqueduct Water Risk Atlas ^e is a global water risk mapping tool that helps companies, investors, governments, and other users understand where and how water risks and opportunities are emerging worldwide. It uses the best available data to create high-resolution, customizable global maps of water risk but does not evaluate options for green infrastructure.
Irrigation and drainage	Soil Moisture Active Passive (SMAP) ^f measures—and produces global maps of—soil moisture every two to three days over a three-year period. This soil moisture information is key to understanding the flows of water and heat energy between the surface and atmosphere and the potential role of green infrastructure in retaining soil moisture.

Figure 9 Green infrastructure opportunity technical analysis tools (WRI)

When considering the financing of climate-resilient urban infrastructure, it is important to recognise the costs to deliver green solutions when compared with traditional infrastructure, as shown below:

⁵ Integrating green and grey: Creating next-generation infrastructure, 32.

Cost Component	General Definition	Additional considerations when costing climate-resilient infrastructure
Preparation costs	Cost of planning, engineering, permitting, environmental & social assessments, etc	Higher: Costs associated with additional modelling to demonstrate climate resilience; additional financial models to justify extra costs for climate-resilience
Capital costs	Cost of civil works, equipment, land, and other upfront capital investment	Higher: Additional costs for construction to incorporate non-traditional elements
Financing costs	Service charges and interest payments associated with borrowed funds, etc	Lower: Lower costs driven by concessionary terms offered by climate-aligned funders and their programs
Operations and maintenance	Labor, fuel, equipment, and civil works maintenance	Lower: Designed for longer use and less replacement costs due to climate resilience

Urban transport

Urban transportation infrastructure (roads, bridges, railways and runways) is heavily exposed to climate impacts such as rising temperatures and more frequent and intense rainfall. Sustainable transportation systems are physically resilient to climate impacts, provide options in case one mode is disrupted by a climate shock and reduce greenhouse gas emissions. Increasing temperatures can soften asphalt, creating ruts and potholes, and place stress on railway and bridge joints. Heavy traffic flows will speed up this process, creating a greater financial burden on cities to maintain and improve infrastructure.

Across Indonesia, as internal migration continues to swell the density of urban areas, cities are rapidly expanding their transport networks, often unfortunately without consideration of climate resilience. With well-crafted climate-resilient plans, municipalities and other sub-national governments could access new forms of funding and financing for construction of new infrastructure. Further, they can also learn lessons from experiences from other cities in their use of creative financing techniques to unlock capital to battle the impacts of climate change.

Cities around the world are increasingly recognising that climate change can have detrimental impact on their physical assets. Following the damage from a devastating hurricane, New York City successfully raised US\$ 200 million in the first-ever storm surge-focused catastrophe bond to respond to climate shocks that drastically impact urban mobility and mass transit, with lessons that could be replicable for cities in developing countries around the world.

In 2012, the storm surge from Hurricane Sandy inflicted damage totalling nearly US\$5 billion on New York's Metropolitan Transportation Authority (MTA), the largest transportation network in North America. In preparation for more frequent and severer weather events, in 2013 the MTA raised the first-ever storm surge-focused catastrophe bond worth US\$200 million. The bond, named MetroCat Re Ltd., was issued by First Mutual Transportation Assurance Company (FMTAC), the MTA's traditional insurance provider. Bond payments are triggered on the basis of storm surge heights at two tidal gauges in New York Harbor, managed by the National Oceanic and Atmospheric Administration and the U.S. Geological Survey. In a pre-sale report, the rating agency Standard & Poor's demonstrated through modelling how the two tidal gauges selected by the MTA were those most closely correlated with the MTA's exposure at different subway and transit tunnels. The MetroCat was structured with no sliding scale of loss, so that FMTAC would receive 100 percent of the outstanding principal if a loss payment were triggered. Standard & Poor's rated the MetroCat bond at BB- and priced it with an interest rate of 4.5 percent. In May 2017, the MTA and FMTAC issued a second cat bond, structured by Swiss Re Capital Markets and Goldman Sachs, for US\$125 million. In addition to storm surge, bond payments will be triggered by parametric factors associated with earthquake risks over a three-year term. The bond was eventually priced with an interest rate of 3.7 percent.

Water, sanitation, and flood resilience

In a coastal country like Indonesia, both sea level rise and storm surge pose threats to physical infrastructure, especially in densely-populated areas. Floodwaters and storm surge can undermine the structural stability of roads, rail networks, and bridges. They also can damage vehicles, transmission poles, and underground substations, among other assets. Saltwater encroachment can contaminate surface and groundwater supply sources. Beyond the repair and replacement costs of damaged infrastructure as sea levels rise, cities may no longer be able to rely on gravity to discharge combined sewer overflow and wastewater effluent, increasing pumping costs. Energy assets in coastal areas may have to be replaced with saltwater-resistant alternatives or relocated to higher elevations to avoid sea level rise and storm surge. Transmission and distribution assets may also have to be hardened or placed underground to prevent damage during extreme weather events.

Recognising the importance of addressing these challenges, other bilateral development partners are launching programs aiming to unlock finance for coastal resilience. For example, USAID's Climate Finance for Development Accelerator is currently in the process of launching the Coastal Resilience, Carbon and Conservation Finance (C3F) program, a USD 250 million initiative designed to mobilise USD 2.5 billion in public and private climate investments by 2030 to fund a range of climate change mitigation and adaptation activities.

Tracking climate-related private sector financing in Indonesia

One of the challenges faced by the GoI in financing their adaptation activities is the lack of private sector involvement. Whereas the engagement of the private sector in mitigation actions is already comparatively advanced, its action in adaptation is lagging behind. One of the reasons is that adaptation is deemed a task of the government. However, reality shows that government's actions alone will not be enough, in terms of both financing and development as well as the implementation of appropriate adaptation measures (CCCMP, 2020).

In fact, since 2017, Indonesia has enacted various policies to support the financing of activities in mitigating emissions and adapting to climate change. One of the most important is Financial Services Authority Regulation #51/2017 on Sustainable Action Plan and Reporting to mobilise more private funding in sustainable projects and investment. The Regulation specifically enacted to facilitate private sector funds aggregation to mitigate and adapt to climate change.

This regulation requires the implementation of sustainable finance for financial service institutions, issuers, and public companies. This regulation explicitly requires public companies, especially those in the financial and financial services sector, to prepare a Sustainable Financial Action Plan (RAKB, *Rencana Kerja dan Anggaran Biaya*). This document contains an overview of business activity plans and short-term (one year) and long-term (five years) work programs that follow the principles used to implement Sustainable Finance, including strategies for realising these plans and work programs per the targets and time specified. They determined while still paying attention to the fulfilment of prudential provisions and the implementation of risk management. This regulation further regulates Social and Environmental Responsibility, hereinafter abbreviated as TJSL (*Tanggung Jawab Sosial Lingkungan*), which is a commitment to participate in sustainable economic development to improve the quality of life and a beneficial environment for the Company itself, the local community, and society.

Furthermore, through this regulation, GoI requires public companies and financial services to evaluate their RAKB achievements through strictly Sustainability Report. This document is reported to the OJK (Otoritas Jasa Keuangan) and announced to the public, which contains the economic, financial, social, and environmental performance of an LJK (Lembaga Jasa Keuangan), Issuer, and Public Company in running a sustainable business.

Priorities and Possible Engagement

No	Activities	Elucidation	Potential Interventions
1	Climate Adaptation and Resilience	Climate Change Adaptation is a process of strengthening and building strategies to anticipate the impacts of climate change and implement them to reduce negative impacts and take advantage of the positive benefits. (Law No. 32 of 2009)	- Financing the construction of abrasion-resistant houses on coasts experiencing rising sea levels; - Financing the development or production of plant variety seeds more tolerant to heat, drought, floods, and heavy rain; - Production financing and or procurement of equipment - forest and land fire prevention tools; - Financing for Protection and Conservation of coral reefs, mangroves, seaweed and seaside vegetation; - Financing for the development of new capture fisheries and aquaculture production technologies that are resistant to global climate change; - Financing for planting and rehabilitation of industrial forests and sustainable management of industrial forests

Priorities and Possible Engagement

Sector	GOI Priorities	Vulnerability	Potential lost analysis	Possibilities of Private Sector Engagement

Water	RPJMN 2020 – 2024	Water scarcity, floods, landslide, and drought. Risk levels caused by these hazards are projected to be high and/or very high especially in the most populated islands of Indonesia, i.e. Java, Bali, Sumatra, Nusa Tenggara, and Sulawesi.	IDR 27.92 Trillion or USD 1.99 Billion	- Public-Private Partnership (PPP) for construction of water treatment plants, management, and distribution of drinking water; - High potential for measures to increase resilience of own business operations (e.g. optimising water use and management in production).
Agriculture	RPJMN ICCCR RAN API	- Increased risk of loss of productive farm land, especially in Java, Bali, Sulawesi, Kalimantan, Sumatra, and Lombok; - Concentration of rainfall and intensification of dry seasons, increased temperature (plant respiration changes), extreme weather events.	IDR 77.9 Trillion or USD 5.56 Billion	- Business opportunities (e.g. new insurance products); - Measures to increase resilience of own business operations (e.g. plant management such as crop variation, pest control). - Climate-smart agriculture technology
Health	RPJMN ICCCR RAN API	Risk of increasing cases of morbidity and mortality due to extreme weather events and/or illnesses, infectious diseases, malnutrition from reduced food production.	IDR 31.29 Trillion or USD 2.24 Billion	- Provision of healthcare services); - Increase resilience of own business operations (e.g. awareness raising and medical programs to reduce risk of sickness of workforce).

Financial instrument and resource - Public Private Partnerships

In simple terms, PPPs are formalised and longer-term oriented cooperation between public and private sector actors, particularly in infrastructure development. Despite the difference in both definition and implementation practice, some elements or core components characterising all PPPs include:

1. The partnership formally defines the roles and responsibilities of the public and the private partners;
2. Risks are shared and allocated between the private and public sector actors along a range of different mechanisms according to suitability;
3. The private partner(s) are usually rewarded financially according to the risks and responsibilities they take over;
4. The private sector takes part in the supply of assets;
5. Services traditionally provided by the government, such as road and transport, energy, schools, and hospitals.

PPPs constitute a standard and proven approach to crowding in private investments, overcoming public financing gaps, driving innovation, and gaining efficiency and cost reliability. 12 They play a crucial role, especially in infrastructure development, and, as such, can be used as an instrument to increase private sector engagement toward a climate-resilient society.

The array of potential applications for PPPs in combating climate change is wide. Important thematic areas include resilient infrastructure, natural resource management, and climate innovation. PPPs offer the opportunity to leverage additional resources that may be necessary to mobilise investments into large-scale infrastructure development, to develop and open up new green markets, to showcase successful projects that deliver social and environmental benefits, or to stimulate green entrepreneurship. ¹³ Thus, PPPs can catalyse climate change adaptation, especially in the context of climate-resilient infrastructures and innovations that increase the adaptive capacity of the society at large. The following box provides some international good practices for PPP in climate change adaptation (Ibid, pp: 51).

However, many PPP initiatives have never reached the procurement stage or are commercially closed. For example, as of 2018, out of the 57 PPP projects listed in the pipeline, only two projects have reached the operational stage (Haqq and Gultom, 2021) based on a case of a 15-year-procurement delay in a waste-to-energy project in Indonesia highlight that high political and economic transaction costs have caused the project's lengthy delay.

Those high transaction costs are related to 1) the government's lack of knowledge about PPPs, which leads to the delay in conducting the contract and misalignment of regulations, 2) the problem of coordination among stakeholders due to a complex governance structure that involves central and local governments and leadership changes; 3) inadequate government support and guarantees that limit private participation in the face of high financial, economic and political risks in the project and 4) the lack of public trust leading to public opposition due to the lack of transparency and alleged conspiracy during the bidding process (Gultom, 2022; pp: 5). To handle the above problems, GOI established the Indonesia PPP Joint Office. The Joint Office serves as a coordination forum among PPP project stakeholders. Furthermore, the Indonesia PPP Joint Office also provides facilitation and capacity building where assistance can be provided from the planning stage to the operation stage. To strengthen the institutional coordination forum between PPP stakeholders, a Memorandum of Understanding on the Synergy of Ministries and Institutions in the Implementation of Infrastructure Provision with the Government/Regional Government Cooperation Scheme with Business Entities through Joint Offices by the seven Members of the Indonesia PPP Joint Office has been signed by the members on September, 18th 2020.

The functions of the PPP Joint Office are:

- a) Become a coordination forum for PPP stakeholders;
- b) A front office for the Government to serve business entities in obtaining information and knowledge related to PPP schemes;
- c) Give recommendations for PPP project implementation;
- d) To propose recommendations to related parties in harmonising PPP policies;
- e) To monitor the Government's planning and budgeting process in accommodating PPP projects;
- f) Synergise in providing Government support and facilities for projects in a sustainable and integrated manner;
- g) Recommends required guidelines for PPP implementation to the PPP Joint Office member based on their duties, function, and authorities;
- h) Implement effective management and communication between PPP stakeholders, including the exchange of data and information to strengthen data integration;
- i) Become an integrated PPP information center that is accessible to business entities and all PPP stakeholders.

The Member of Joint Office

1. Coordinating Ministry of Economic Affairs.
2. Coordinating Ministry of Maritime and Investment Affairs.
3. Ministry of Finance.
4. d. Ministry of Home Affairs.
e. The Ministry of National Development Planning/National Development Planning
5. Agency (Bappenas).
f. Ministry of Investment/Indonesia's Investment Coordinating Board (BKPM). g. National Public Procurement Agency (LKPP).

However, there is still much work to achieve effective PPP schemes in the context of climate change adaptation. At least several challenges need to be addressed and overcome. Although the scheme is well established and the GoI has prioritised projects that help achieve the SDGs, climate change has yet to reach the top of the PPP agenda. Accordingly, there needs to be more incentive for the private sector to develop PPP projects that specifically aim to address climate change adaptation. In contrast, on the government side, a pipeline for potential PPP projects explicitly aiming for increased climate resilience still needs to be included. It is necessary to develop and implement a systematic process for the integration of climate change adaptation into PPP planning and establish a dedicated project pipeline while at the same time making climate resilience a criterion in selecting and prioritising PPP projects.

Corporate Social and Environmental Responsibility (TSLH) and Partnership and Community Development Program (PKBL)

By its conceptual nature, the notion of CSR is often considered voluntary engagement beyond regulatory requirements. However, in Indonesia, CSR was made mandatory, initially for SOEs through Minister of SOEs Decree No. KEP-216/M-PBUMN/1999 and later enactment of Law No. 19/2003 and issuance of Regulation No. Per-05/MBU/2007. It stipulates that all SOEs must allocate 4% of their net profit to support SMEs and communities around the SOE. This contribution can come through low-interest loans in so-called partnership programs or programs focusing on environmental issues.³⁰ With Law No. 25 and Law No. 40 of 2007, CSR was also rendered mandatory for investments and Limited Liability Companies, not least because many MNCs thus far were perceived as neglecting their social and environmental responsibilities when operating in Indonesia.³¹ The law applies to all SOEs and private domestic or foreign-owned companies operating and or being related to natural resources.

Although there are already several binding legal regulations regarding CSR in Indonesia, until now, the concept of CSR remains vague regarding its scope when referring to the "environmental and societal interests of the communities in which the company operates." It needs to be clarified whether this captures the broader notion of CSR and sustainable development, which go way beyond the local context, given that environmental and social issues are of global concern. Furthermore, the law for SOEs suggests that CSR is instead a question of donations and community development. (CCMP, 2020; pp: 58). Broad empirical information on the current level and extent of application of CSR in Indonesia is scarce. A study by Ridho (2017) analysed the CSR performance of Indonesia's 200 most prominent businesses (based on their annual revenue). It found that the level of application is still way below the standard (Ibid).

Although CSR constitutes a valid instrument for the private sector in Indonesia to engage in climate change adaptation and resilience activities, it faces several limitations and challenges, which keep its potential limited, including:

- a) Legislation around CSR is ambiguous in terms of its scope and is usually implemented to engage with local communities in the vicinity of the company's operations;
- b) Although CSR can be a means to render the immediate local supply chain more resilient, it is geared more toward societal contributions, gains in reputation, and legitimisation of its activities, especially at the local level. Significant tangible investments, such as rendering internal processes more efficient or developing new products or services, are typically not subject to CSR policies and strategies of businesses;
- c) In order to be most effective, it ideally involves other organisations, such as NGOs, communities, etc. Mostly, there is no direct monetary return but intangible benefits. This instrument is suitable mainly for large businesses with sufficient finance and HR capacity.

Options and typologies of financing climate-resilient infrastructure in Indonesian context

Based on our understanding of options and typologies of climate financing, the below graph provides an overview of these are examples of modalities that can work in the Indonesian context:

Viability Gap Finance Grant Facility

A viability gap finance grant is a non-repayable grant, typically provided by an international aid agency or other donor, to support infrastructure projects that are economically justified but fall short of financial viability, bridging the gap between the cost of the project and available financial resources for project delivery. These

grants are common across developing countries, including Indonesia, and can be targeted at specific projects that comply with the FCDO's goals and objectives.

Credit enhancements

Private sector capital providers in developing countries often view sub-national governments as highly risky counterparties. To help to reduce this risk, development agencies have provided credit enhancements, typically in the form of guarantees. While a guarantee is not a direct participant in the capital stack of a project's finance, it can often serve as the catalyst to bring a project to financial close. In Indonesia, there is strong history of the use of guarantees as part of the structure to ensure successful project delivery. Although there are currently no guarantees at the sub-national level, the Indonesia Infrastructure Guarantee Fund (IIGF) from the World Bank, as well as nascent guarantee structures under design by the United States Millennium Challenge Corporation as part of their Compact 2 Financial Markets Development Project, can provide helpful examples for potential replication at the sub-national level. Further, Indonesia can look at guarantee structures in other developing countries, particularly in India, for inspiration on how best to expedite the delivery of financing at the sub-national level.

Climate resiliency innovation grants

Early-stage promising interventions, whether introduced by public or private sector stakeholders, often struggle to attract sufficient funding for critical research and development prior to project launch. The use of these grants by the FCDO can help to either innovate new approaches in Indonesia or contextualise concepts that have been successful in other jurisdictions.

Green investment project preparation

Although Indonesian municipalities are familiar with international best practices in traditional grey infrastructure, there is a knowledge gap in the familiarity with and application of new green approaches. A flexible support designed to conduct side-by-side comparative analysis of traditional and green/grey infrastructure on a project-by-project basis can help to demonstrate the financial and socioeconomic potential of non-traditional projects. This does not necessarily have to be a full-fledged project preparation facility, rather a ready mechanism to capture emerging opportunities of potential projects that can be improved in terms of its resiliency aspect.

5. PRELIMINARY OPTIONS MAPPING & PRIORITISATION

Based on the completed landscape mapping, this section elaborates further analysis on: 1. suggested **approach and implications** on government **counterparts** or potential partners, 2. potential **modalities**, 3. prioritisation for **geographical focus**.

The key takeaway from the landscape mapping is that climate-resilient urban infrastructure – termed otherwise as urban adaptation and resilience – is a relatively new concept to Indonesian stakeholders. The term adaptation and resilience in the development of urban infrastructure has been limitedly translated to large seawall constructions aimed only at responding to the impact of sea level rise in coastal cities. With this in mind, and with the understanding that there is opportunity for a deep-offer technical assistance for Indonesia available through the global Green Cities & Infrastructure (GCI) programme to work alongside a Future Cities CDEL bilateral support that this assessment proposes the below framework.

Greening the grey - folding all categories into coherent programming, systemic change

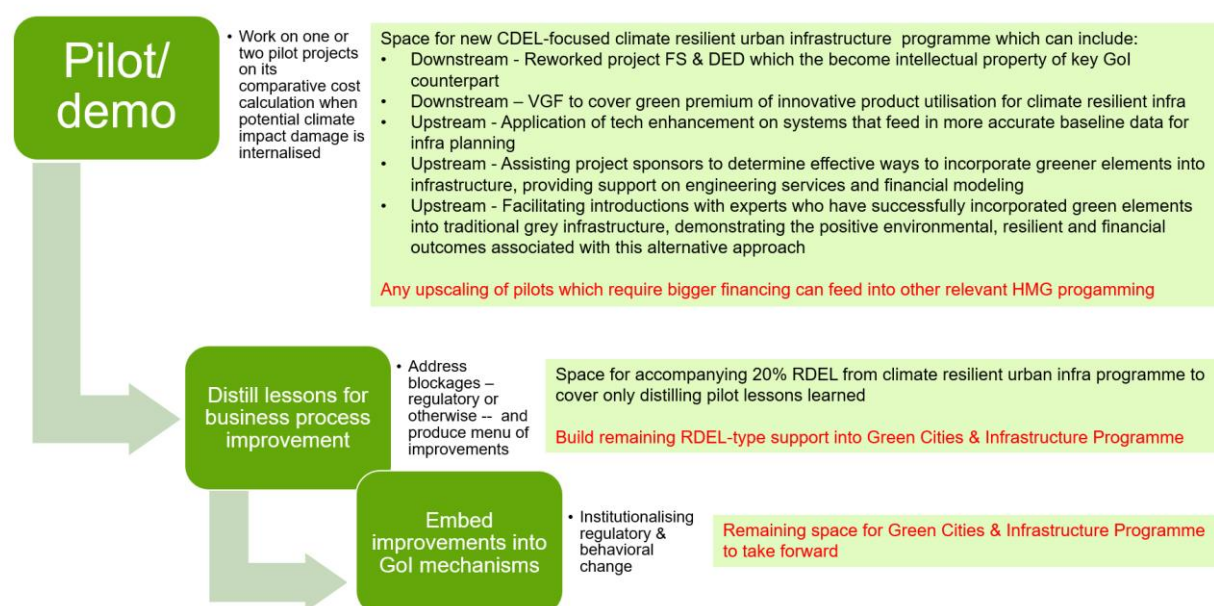


Figure 10 Proposed umbrella framework for HMG support for climate-resilient urban infrastructure in Indonesia

One of the ways to overcome the challenge of building awareness of what climate-resilient urban infrastructure looks like is to demonstrate the benefits of ‘greening the grey’ or internalising potential losses due to climate impact (flood, drought and other forms of climate hazard) at the beginning of infrastructure project planning and development. The proposed framework in Figure 8 offers the broader thinking of how demonstration or pilot projects supported by the CDEL investment feeds into the process of trying to create building blocks for a more systemic change within Indonesian stakeholders, both at national and subnational levels.

A simple theory of change on offer can take form as below:

IMPACT	OUTCOME	INTERMEDIATE OUTCOME	OUTPUT
Indonesian cities are increasingly more adaptive to climate hazard through implementation of climate-resilient infrastructure	Enhanced skills and capacity to plan and implement climate-resilient urban infrastructure	Enhanced skills and capacity of key institutions* to plan, implement and oversee performance of climate-resilient urban infrastructure	Green Cities & Infrastructure: - Tools development and implementation for key policy makers at national & subnational levels to climate-proof urban infrastructure - Policy recommendation & specific policy design input to relevant regulations (urban planning, procurement for infrastructure development, etc)
	Enhanced implementation of enabling policies and regulations for climate-resilient urban infrastructure	Enabling policies and regulations supporting development and implementation of climate-resilient urban infrastructure are in place	
	Increased utilisation of available climate financing for urban adaptation	Climate financing accessed or leveraged for climate-resilient urban infrastructure	Future Cities CDEL: - Existing project design refinement - Design, implementation & impact evaluation of innovative pilots

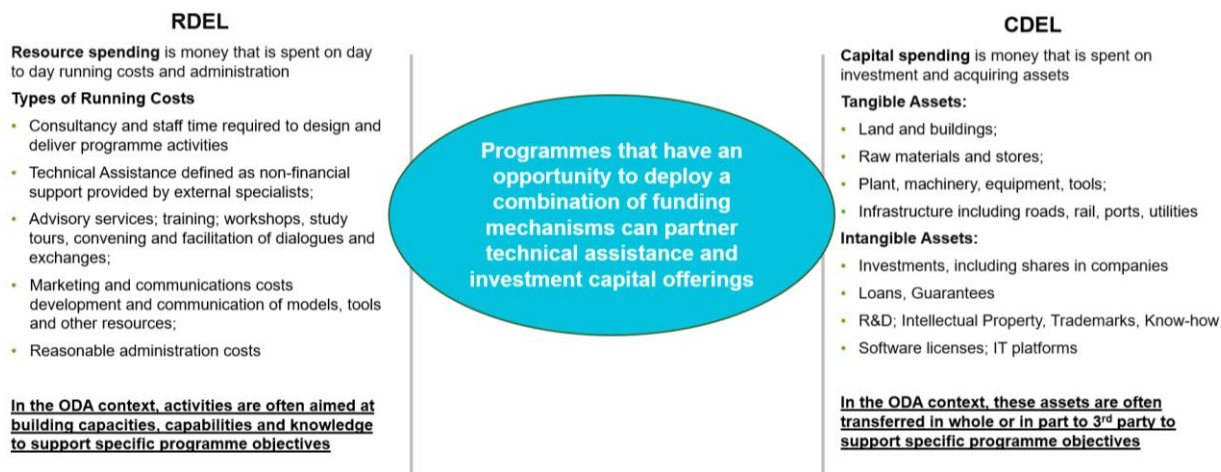
We took the analysis of space for potential interventions from the landscape mapping based on the sectors and the forms of activities feeding into the above theory of change can look like:

INTERMEDIATE OUTCOME	SECTOR 1 - URBAN PLANNING	SECTOR 2-URBAN TRANSPORT	SECTOR 3-WASH	CROSS CUTTING
Enhanced skills and capacity of key institutions* to plan, implement and oversee performance of climate-resilient urban infrastructure	Capacity building for subnational urban planners to embed improved process in developing more robust, details and evidence-based spatial plans.	Capacity-building focusing on strategies for urban transport climate adaptation and resilient for transport planners and policy makers at national and subnational levels.	<i>Sector has received sufficient level of support</i>	Capacity building on targeted application of five model business case for subnational governments. This can be a continuation of past Prosperity Fund support at national level. Development of further SNI standards and technical guidelines for climate resilient infrastructure Development of policy incentives to enforce climate resilient infrastructure standards Support inclusion of climate resilient tech and product into national procurement system

INTERMEDIATE OUTCOME	SECTOR 1 - URBAN PLANNING	SECTOR 2-URBAN TRANSPORT	SECTOR 3-WASH	CROSS CUTTING
Enabling policies and regulations supporting development and implementation of climate-resilient urban infrastructure are in place	Technical assistance for climate-resilient urban planning and infrastructure within RPJMD, integrated with revision of Spatial Plans (RTRW, <i>Rencana Tata Ruang Wilayah</i>), including guidelines or implementing pilot projects in the most climate-vulnerable regions. Technology-enhanced detailed spatial plans in the form of higher density vulnerability mapping coupled with higher resolution climate and weather modelling to develop climate-proofed mid and long-term urban development scenarios. In-depth assessment of urban infrastructure interdependencies (see C40 reference in Figure 5)	Technical assistance to develop National Urban Transport Climate Adaptation Plan and subsequent guideline to trickle this down to subnational transport plan.	<i>Sector has received sufficient level of support</i>	Development of further SNI standards and technical guidelines for climate resilient infrastructure Development of policy incentives to enforce climate resilient infrastructure standards Support inclusion of climate resilient tech and product into national procurement system

INTERMEDIATE OUTCOME	SECTOR 1 - URBAN PLANNING	SECTOR 2-URBAN TRANSPORT	SECTOR 3-WASH	CROSS CUTTING
Climate financing accessed or leveraged for climate-resilient urban infrastructure	CDEL - Deepening resilience mainstreaming in detailed spatial plan in most vulnerable areas (coastal & riverbanks) with detailed GIS maps & topography analysis. Outputs produced can directly feed in to FS/ DED of coastal & riverbanks physical projects.	CDEL - Offer additional climate resiliency analysis for the Feasibility Study (FS) or Detailed Engineering Design (DED) of prioritised transportation projects in Bappenas' Blue Book. Enhance the detailed engineering designs of planned transportation infrastructure in cities like Bandung and Makassar by incorporating climate resilience considerations Incorporate climate resilience elements into tactical urbanism projects. Provide climate innovation grants or Venture Grant Funding (VGF) to climate technology startups in areas such as porous pavements, accompanied by post-implementation impact assessments.	CDEL - Climate proofing and financing small-scale sanitation infrastructure for urban slum areas or urban coastal areas. that are adaptable and climate-resilient. This can be done in collaboration with USAID IUWASH Tangguh). Tech enhancement of urban early warning systems in priority cities, working alongside provincial disaster management agencies (BPBD) and Indonesian Met Office (BMKG). Potential pilot can leverage on completed Future Cities intervention in Surabaya. Piloting & scaling up utilisation of combination of NBS and innovative zero run off technologies.	n.a.

Current understanding of RDEL & CDEL utilisation



The space for the Future Cities CDEL will be on the piloting of the ‘greening the grey’ concept. The final objective is to leverage available climate financing through covering the ‘green premium’ or marginal cost of planning and implementing infrastructure that is climate-proofed. Given that the existing baseline is business-as-usual project designs, the CDEL will need to explore ways to identify most impactful projects to ‘green’ and cover the ‘green premium’ marginal cost of.

Immediate investment opportunities

With a set investment already committed for immediate deployment, we suggest to then take a very pragmatic approach of looking at how to get projects that are already developed the financing that they need to be delivered. These are climate adaptation or climate-resilient infrastructure projects that ideally have already passed a design stage and are ready for implementation. Based on the current landscape mapping, opportunities for this is currently limited via:

1. Blending first year committed budget into existing mechanisms with other institutions such as the World Bank, the Asian Development Bank, and PT SMI

Under its new leadership, the World Bank is actively pursuing opportunities to accelerate the flow of funds into climate-smart initiatives around the world. Building on the City Resilience Program, a multi-donor initiative aimed at increasing financing and planning for urban resilience including investments in climate adaptation, the World Bank in Indonesia is concentrating efforts on the best options to localise its approach.

In mid-2023, the World Bank/Indonesia launched an Expression of Interest and is now in the process of reviewing short-listed candidates to complete a study covering empirical evidence of leveraging financial resources for climate related projects, focusing on climate adaptation. The main objective is to provide an overview of funding and financing vehicles that could be available to Indonesian subnational jurisdictions (SNGs) for undertaking climate change-related capital investments and to assist PT SMI in identifying and expanding climate finance possibilities. This contributes to the sustainable development and climate resilience of Indonesian communities through the financing of water, renewable energy generation, transportation, and agriculture-related infrastructure projects.

Subject to further discussions and planning, BEJ can directly participate as a partner to the World Bank both in this study - which is proposed to include an overview of international tools and practices in climate financing, stock-taking of climate financing track record in Indonesia, a summary of climate financing options for Indonesian sub-national governments, and a practical guide for sub-national governments seeking access to climate finance - as well as direct engagement with cities using the tools from this study, leading directly to investment and capital flows, alongside PT SMI. While a separate funding platform, the implementation of this approach would be informed by BEJ's on-going experience with PT SMI through the

Viability Gap Finance platform under Mentari. A similar approach can be taken with ADB, which is currently establishing an urban resilience trust fund also funded by the UK government amongst other donors.

The immediate next step to take into blending first year tranche (and potentially subsequent year investments) into this type of vehicle is further discussions with partners to identify mutually acceptable project assessment and funding arrangements.

2. Setting aside a portion of first year (and potentially subsequent years) investment into an FCDO-managed Urban Resilience Innovation Fund

Currently, urban adaptation infrastructure projects are limited to the water, sanitation and hygiene sectors, with little to no effort identified in climate-proofing other sectoral infrastructure such as transport and the general urban planning or hydrometeorological hazard resilience. FCDO can look into convening, brokering and supporting relevant stakeholders into developing proof-of-concept projects that either:

- a. Test the scalability of innovative products or approaches such as nature based solutions in urban areas

This type of pilot project will aim to utilise market-existing innovative products to be utilised in specific sites to showcase how such products can increase climate adaptive level of certain infrastructure such as surface road transport. The main objective is to calculate the green premium of using innovative products and seek replicability via further mass procurement projects. FCDO can leverage its existing partnership with the National Research and Innovation Agency (BRIN) to sift potential innovative products in the market.

Example of pilot project



What can be supported?

- Site selection & detailed engineering design
- Full cost of piloting, and/ or
- Green premium financing mechanism
- Monitoring project impact to site resiliency

- b. Pilot real bottom-up, inclusive climate adaptation projects at neighbourhood or community level

This type of pilot project can be considered a GEDSI-specific project with participatory approach at the heart of it. One approach worth replicating is GIZ IKI Cities Adapt programme currently working in Mexico and South Africa which collaboratively with local communities in urban areas select multi-functional sites that can benefit from enhanced climate-resilient design. A site it selected in Mexico combined nature-based solutions design and implementation into a local health clinic with a nearby school. It also builds awareness and critical mass on urban resiliency topic by conducting an open, competitive process on the final design to be implemented that includes local university students.

It is worth noting that for both types of piloting, FCDO will need to set up the required team and mechanisms to build the pipeline of projects that would benefit from the CDEL support. Based on PACT experience, this process in itself will require at least 6 months before projects can proceed. A set of funding criteria below can be used in selecting the projects through a targeted call for proposals.

Funding principle and criteria	
Principle	
Ecologically sustainable development	Contributes to urban climate change resilience without negatively straining or degrading ecological systems or resulting in unsustainable practices
Do not harm	Contributes to urban climate change resilience without generating negative consequences that would yield determined impacts on poor and vulnerable populations.
Criteria	
Credibility	b. Contribution to building urban climate change resilience; c. Impact on lives of impoverished and vulnerable populations; d. Potential to integrate with other resilience-building measures; e. Scale of impact
Viability and sustainability	e. Technically and operationally viable; f. Financially viable and sustainable; g. Prospects for timely implementation; h. Local ownership
Leverage capacity	Ability to leverage other resources (financial, human technical)
Replicable and scalable	d. Prospects for replication in other places e. Ability to achieve scale f. Ability to contribute new urban climate change resilience knowledge and practice
Innovation	Innovative
Portfolio balance	Contribution to a diverse and balanced set of projects and interventions

Priority metropolitan areas based on climate risk and vulnerability⁶

In selecting the geographical focus, we overlay GoI priority metropolitan areas with those already having certain level of vulnerability assessment and matching them with priority cities for FCDO – defined as cities where Embassy Second Cities team is working on. Based on this overlay, suggested priority areas include Greater Bandung, Greater Semarang, Greater Surabaya with additional areas to be considered in Greater Makassar and Greater Jakarta.

⁶ For assessment methodology please see Annex 1

No	Metropolitan Area	Level of vulnerability based on Risk Class of IRBI 2022	LCDI priority (Bappenas - CRD), Water Sector	FCDO Second Cities priority
1	Medan Metropolitan (Medan, Binjai, Deli Serdang, Karo)	All Medium	All Top Priority	
2	Patung Raya Agung (Palembang City, Banyuasin Regency, Ogan Ilir Regency, Ogan Komering Ilir Regency).	All Medium, except Ogan Komering Ilir Regency, High	Low to Medium priority	
3	Jabodetabekpunjur (DKI Jakarta, Bogor Regency, Bogor City, Depok City, Tangerang Regency, Tangerang City, South Tangerang City, Bekasi Regency, Bekasi City, Cianjur Regency).	All Medium, except Cianjur High	Low to Medium priority	V
4	Cekungan Bandung (Bandung City, Bandung Regency, West Bandung Regency, Cimahi City, and part of Sumedang Regency	All Medium, except Bandung Regency High	All Top Priority, except West Bandung Regency, Priority	V
5	Kedung Sepur (Kendal Regency, Demak Regency, Semarang City, Semarang Regency, Salatiga City, and Purwodadi)	All Medium	All Top Priority, except Purwodadi, low to Medium priority	V
6	Gerbangkertosusila (Gresik Regency, Surabaya City, Sidoarjo Regency, Mojokerto Regency, Mojokerto City, Lamongan Regency, Bangkalan Regency).	All Medium	All Top Priority, except Surabaya & Bangkalan, Super Priority	V
7	Banjar Bakula (Banjarmasin City, Banjarbaru City, Banjar Regency, Barito Kuala Regency, Tanah Laut Regency).	All Medium except Banjar Regency & Tanah Laut, High	Low to Medium priority	
8	Sarbagita (Denpasar City, Badung Regency, Gianyar Regency, Tabanan Regency).	All Medium	All Top Priority, except Tabanan, Super Priority	V
9	Mamminasata (Makassar City, Maros City, Gowa Regency, Takalar Regency)	All Medium except Maros City High	Low to Medium priority	V
10	Bimindo (Manado City, Bitung City, North Minahasa Regency).	All Medium	Low to Medium priority	

Narrowing down potential counterparts

The types of projects identified fall under the purview of Ministry of Public Works & Housing and Ministry of Transportation, with additional smaller but potentially impactful work falling under Indonesian Met Office BMKG and Disaster Management Agency. However, given the sectoral silos, FCDO may want to consider setting up a steering committee which also involve the Coordinating Ministries as part of programme governance. Coordinating Ministry for Maritime Affairs & Investment has the strongest mandate to oversee both climate issues and infrastructure development, including tapping into private sector. UK Government already has an MoU with this Ministry which can be built upon. But there is also a level of risk taking in building the new programme under it as election is coming up.



Analysis on key stakeholders

	Level of influence & mandate on climate-resilient infrastructure	Existing capacity on planning & financing climate-resilient infrastructure	UK Government relationship
Coordinating Ministry for Maritime & Investment Affairs	High	Medium, mainly on pushing priority projects & linking with investment	Existing
Ministry of Public Works & Housing	High	Medium	New
Ministry of Transportation	Medium, limited to surface transport	Low	Existing
Ministry of Finance	Medium	High	Existing as secondary counterparts, also indirect via its arms length bodies such as PT SMI
Indonesian Met Office BMKG	Low	Medium, mainly feeding on planning	Existing, via research innovation
Coordinating Ministry for Economic Affairs	Low	Medium	New
Bappenas	Medium	High	Existing
KLHK	Low	Low	Existing, sensitive

One interesting cross-ministerial committee under the Coordinating Ministry for Economic Affairs that would be worth exploring a collaboration with is the Committee for Acceleration of Priority Infrastructure Delivery (or KPPIP – *Komite Percepatan Penyediaan Infrastruktur Prioritas*). KPPIP is tasked with creating a top down – bottom up portfolio of planned projects, matchmaking financing for them, debottlenecking regulatory issues and putting in place service level agreements for agreed projects. KPPIP covers the majority of debottlenecking further implementation of TOD & LVC, but also works on other major sectors such as water, transport and energy. KPPIP has requested convening support to help the committee to better align the different international partner support it receives. FCDO may want to consider a response to this to replicate the successful initiation of a similar platform under the MENTARI FIRE Dialogue.

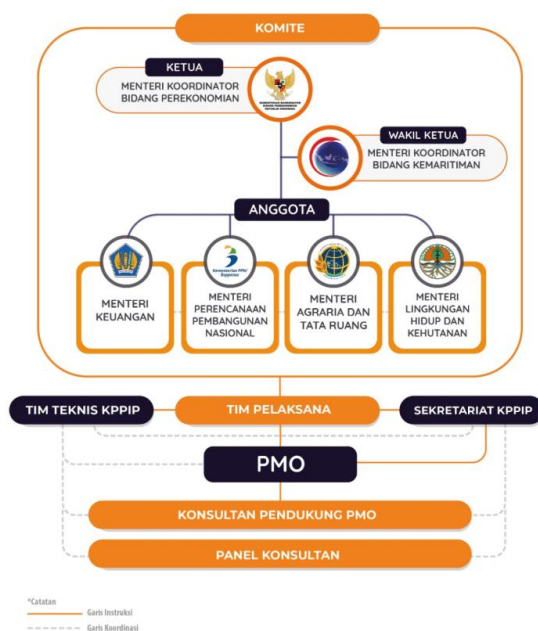


Figure 11 Structure of the Committee for Acceleration of Priority Infrastructure Delivery

More specifically on TOD/ LVC, KPPIP is leading the formulation of two umbrella regulations. UK PACT, through Buro Happold, has worked on informing deliberation of draft Presidential Regulation by bringing experience sharing from UK (King's Cross and Manchester). The same project has also worked on supporting implementation of TOD/LVC in Semarang.



Further to the convening support, KPPIP has identified the following needs:

1) Technical Assistance:

- The Presidential Regulation on Infrastructure Funding through Land Value Capture is in the signing process. There is a request to support development of derivative regulations and technical guidelines.
- Integrate vulnerability assessments for Land Value Capture and Transit-Oriented Development pilot programs under the CMEA.
- Develop planning tools for future infrastructure projects to be used as input for the National Medium-Term Development Plan (RPJMN) for the elected president.

2) Capacity building:

- Provide UK expertise on asset recycling as a financing instrument.
- Trickle down knowledge and know-how to sub-national government planners on Land Value Capture and Transit-Oriented Development.

- 3) Synergy in leveraging PwC's completed assessment for CMEA on viability of the different TOD/ LVC financing mechanism.
- 4) Implement 1-2 pilot projects (sandboxing) to validate and solidify conceptual frameworks or policies. Jakarta Provincial Government is the most mature in terms of implementation of TOD/ LVC. It is currently supported by JICA (until 2025) to develop DED in three sites.

The above list of required support can be expanded beyond just the TOD/ LVC topic where relevant. FCDO can also respond to the request using the same proposed framework of 'greening the grey' and allocating them to the appropriate HMG programming.

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ANNEX 1

Urban Area Priority Mapping (Adaptation & Climate Resilience)

1. Indonesian Disaster Risk Index (IRBI, Indeks Risiko Bencana Indonesia), 2022

<https://inarisk.bnpb.go.id/pdf/BUKU%20IRBI%202022.pdf>

- IRBI is created by the National Disaster Management Agency (BNPB, *Badan Nasional Penanggulangan Bencana*) and is updated annually.
- The Disaster Risk Assessment is conducted by calculating the components of hazards, vulnerabilities, and capacities in each of the 34 provinces and 514 districts/cities.
- Hazard components consist of natural phenomena that can lead to disasters, such as floods, earthquakes, tsunamis, volcanic eruptions, forest and land fires, landslides, extreme waves and abrasion, droughts, and extreme weather.
- Vulnerability components encompass physical, socio-cultural, economic, and environmental conditions that are susceptible to disaster exposure.
- Capacity components relate to the region's resilience elements, including policies and institutions, education and training, logistics, mitigation capacity, prevention, preparedness, emergency response, and recovery capacity.

2. Bappenas Book 1 List of Locations and Climate Resilience Action

https://lcdi-indonesia.id/wp-content/uploads/2021/04/Buku-1_Daftar-Lokasi_-Aksi-Ketahanan-Iklim.pdf

The criteria for priority climate resilience locations in the four priority sectors (Marine and Coastal, Water, Agriculture, and Health) are determined based on seven components, namely (i) Climate Projection, (ii) Hazard Potential, (iii) SIDIK, (iv) IRBI, (v) Potential Economic Loss, (vi) Proposal from relevant government agencies, and (vii) Field Validation.

The configuration among these components results in location categories as follows:

- Super Priority: Having high hazard potential and meeting at least one of the Regional Vulnerability criteria and having a high IRBI risk index.
- Top Priority: Having high hazard potential and meeting either one of the Regional Vulnerability criteria or having a high IRBI risk index.
- Priority: Having high hazard potential.

Details of the components for the **Water sector** are as follows:

- Climate Projection:
 - Atmospheric Climate Projection: Historical data on temperature and rainfall projected using ensemble models based on the RCP4.5 scenario.
 - Ocean Climate Projection: Historical data on sea surface height and sea surface temperature projected using multiple models based on the RCP4.5 scenario.
- Hazard Potential: High and very high levels of drought and reduced water availability.
- Vulnerability:
 - Forest and/or wetland coverage in districts/cities less than 20%, with a High Flood Vulnerability Index.
 - SIDIK (2018): Districts/cities are considered vulnerable if more than 5% of villages fall into SIDIK classes 4 and 5.
- IRBI: High and moderate.
- Potential Economic Loss (2020-2024): Additional information in determining priority locations, indicating the potential economic losses associated with achieving climate resilience targets in the National Medium-Term Development Plan (RPJMN) for 2020-2024.
- Proposals from Relevant Government Agencies: Research conducted by relevant government agencies strengthens the determination of priority locations with indicators related to other climate change hazards and vulnerabilities at the district/city level.
- Field Validation: Field validation is useful for verifying the results of desk studies. Local information is obtained from local governments and through direct location checks.

ANNEX 2

Additional Recommendation from Validation Workshop – 1 November 2023

- **Systems approach at specific geographies** – Sectoral silos have been the most challenging issue in climate action planning and implementation, including in building resiliency. That said, having geographical focus (ie working to support several strategic metropolitan areas as pilot) can provide the space to come up with a more systems approach to trial cross-sectoral solutions, including ecosystem-based or nature-based solutions.
- **Staggered approach to building climate resiliency in urban infrastructure** -- Climate-resilient infrastructure reduces, but may not fully eliminate, the risk of climate-related disruptions. Risk management requires making trade-offs between risk minimization and cost, where it becomes more expensive (eg DFAT calculation shows a 15% premium for the water sector) and increasingly technically challenging to prepare for events that are very unlikely to occur. The costs of protection need to be weighed against the consequences of damage or disruption. With the issue of affordability in mind, awareness building and analytical work in support of a more climate resilient urban infrastructure needs to be build with a staggered approach to initially achieve increased resilience to ultimately be at climate-proofed level. Some guidelines from HMG that can be introduced in this context include Defra's Supplementary Green Book.
- **Upstream opportunity on strengthening climate data & modelling** – Based on the experience of working on climate resilience in the water sector, there is wide opportunity that could result in impactful outcome in supporting strengthening of upstream climate data & modelling by working with Indonesian Met Office BMKG. Connections need to be made between supply and demand of climate data and modelling in support of planning and implementation of climate resilient urban infrastructure at the subnational level as provincial and city governments are rarely aware of the need and availability of this type of data from BMKG.
- **Downstream opportunity on exploring work with insurance sector & CSR** – Although still a nascent subject, there is already initial discussion in working with insurance companies to deliver financial and fiscal resilience by addressing the residual risks associated with the impacts of shocks and stressors that go beyond a system's existing capacity to absorb those risks. USAID IUWASH Tangguh has started initial engagement for the water sector that could be further expanded into other sectors. Working with the private sector via its CSR mechanism is also worth exploring.
- **Managing political year of 2024** – With general and subnational elections lining up in 2024, there will be a slowing down in both national and provincial level government's commitment to undertake new activities and projects. This includes a knock-on effect to a lower appetite from subnational governments to absorb climate financing until perhaps early 2025. With that in mind, 2024 is best to be dedicated to work with an existing mechanism or support planning and preparation of pilot projects that are slightly detached from APBN/ APBD cycles and only require endorsement from the public sector (technical ministries or local governments). Piloting in Surabaya seems feasible. From previous Future Cities engagement, it seems that the appetite for climate adaptation and resilience is high and UK has been supporting the city on this.

Summary Notes

- Development partners confirms the novelty of climate resilience lens at both national and subnational levels. This is new knowledge and has yet to be translated into the planning and implementation of urban infrastructure. Some specific comments and input:

DFAT & KIAT

- Climate resiliency will increase cost of infrastructure in the water sector by 15%. The figure is higher for other sector. The increase will not only be in terms of capital, but also operations and maintenance. There is not yet willingness to take this on additional cost at subnational government. The issue is not about budget availability, but budget prioritisation. There are also different cost implications between building climate resiliency and climate proofing.
- DFAT identifies a gap in a system to be working across sectors to deliver more impact. How do we accelerate the change and what kind of system GoI can pick up? Working on specific geographies might provide that opportunity.
- KIAT has been working for the last 5 years on a performance-based mechanism in the water sector that potentially FCDO can build upon. Under KIAT, there is also RISE - an interesting circular economy joint research in Makassar undertaken by Monash University and Universitas Hassanudin that might be relevant to look at and leverage upon.
- In terms of geographical alignment, DFAT relevant activities are currently working in Bandung, Semarang, Surabaya & Makassar. KIAT has also supported Palembang in developing wastewater infrastructure recently inaugurated by the President.

USAID IUWASH

- IUWASH has been working mainly with PUPR, KLHK and local water companies PDAMs. More recently work with Ministry of Health in charge of setting up the standards of potable water.
- IUWASH notes that it is important to accompany GoI along the journey of building resilience. This means that they need to be closely involved in every stage of the way. Subnational governments also need to be accompanied in developing projects as they have limited time and capacity. Have just started linking BMKG and subnational governments to access climate data and modelling for better understanding of projected vulnerability.
- Inviting private sector in the WASH sector financing has been a challenge as it does not offer sufficient level of return on investment. This is where international support and climate financing can come in, to increase profitability. Have started discussion with insurance to start integrating climate risk and building it into project risk cost.
- In terms of PT SMI financing, there is also reluctant take up from subnational governments who mostly do not want to commit to take 7–8-year long loan for infrastructure as their political term is only 4-5 years.

World Bank

- Have started working with PT SMI on guidelines to sift projects based on climate resiliency aspect. Found that project cost will have 80% premium with climate resiliency lens.
- Will be continuing work with PT SMI to create incentive for local governments to integrate this framework. Open for further discussion to collaborate with others.
- In terms of geographical alignment – Bandung & Jakarta.

Discussion objectives

As part of the needs-assessment exercise, FCDO and the scoping team seeks to validate the analysis from landscape mapping with other international partners who have worked in this space through their various programmes and initiatives. By the end of the validation process, we aim to be able to:

1. Confirm & refine key takeaways from the needs-assessment and where relevant and based on additional information refine final recommendations;
2. Confirm & refine space for collaboration with other international partners supporting climate-resilient urban infrastructure development in Indonesia;
3. Identify next steps for the upcoming FCDO programme where feasible.

In facilitating the achievement of above objectives, we would be grateful for input and insights from discussion participants on experience from delivering relevant initiatives in the water, sanitation, hygiene, transport, urban planning sectors alongside GoI counterparts at both national and subnational levels. This may include, but not limited to, key challenges and opportunities to leverage on existing work, identified bottlenecks to embed climate resiliency lens into urban infrastructure and non-technical aspects such as political context.

Time, venue & agenda

Wednesday, 1 November 2023, 10.00 – 12.00
 Room 10A
 XL Axiata Tower, 10th Floor
 Jl. H. R. Rasuna Said X5 Kav. 11-12
 Jakarta Selatan, DKI Jakarta 12950



Please show this QR code at front desk to check in.

TIME	AGENDA	
10.00 – 10.10	Introduction of participants & their relevant initiatives	Facilitated by : Anissa S. Febrina, Palladium
10.10 – 10.15	Opening remarks from FCDO	Harriet Cooney, FCDO
10.15 – 10.25	Assessment summary takeaways #1 – sectoral focus & types of interventions	Restiti Sekartini, Anissa S. Febrina
10.25 – 11.00	Discussion #1 – sectoral focus & types of interventions with emphasis on readily available pipeline of projects	Facilitated by : Anissa S. Febrina
11.00 – 11.10	Coffee break	
11.10 – 11.20	Assessment summary takeaways #2 – geographical focus & key GoI counterparts	Irvan Pulungan, Anissa S. Febrina
11.20 - 11.50	Discussion #2 – geographical focus & key GoI counterparts with emphasis on working with technical ministries and subnational governments	Facilitated by : Anissa S. Febrina
11.50 – 12.00	Summary & next steps	Anissa S. Febrina, Harriet Cooney

List of participants

USAID

1. Nur Endah Shofiani, Water & Sanitation Sector Specialist

IUWASH/ DAI

2. Benny Djumhana, Water & Sanitation Financing Advisor
3. Agus Hernadi, Water Supply Advisor

DFAT

4. Gerard Cheong, First Secretary – Infrastructure
5. Oksana Tkachenko, Climate Finance Advisor

KIAT/ DT Global

6. Paul Wright, Deputy Director – Strategic Planning & Performance

World Bank

7. Rendytio Pradipta, Urban Team

FCDO

8. Ianto Jones, Head of Low Carbon Energy & Infrastructure
9. Maria Herdanti, Transport Lead
10. Barikatul Hikmah, Future Cities Programme Manager

Assessment Team

11. Restiti Sekartini
12. Irvan Pulungan
13. Andi Poetri
14. Anissa S. Febrina

ANNEX 3

List of relevant initiatives

INSTITUTION / INITIATIVE	PROJECT PERIOD/ STATUS	SCOPE OF SUPPORT	LOCATIONS	KEY COUNTERPART(S)
URBAN RESILIENCE				
Rockefeller Foundation ACCCRN (Asian Cities Climate Change Resilience Network)	2009 – 2016 COMPLETED	Assisted cities to build CLIMATE resilience through the ACCCRN Program which were conducted in coordination with stakeholders.	17 Cities managed by Mercy Corps: Semarang, Bandar Lampung (Initial Cities). Palembang, Cirebon, Pekalongan, Blitar, Probolinggo, Tarakan (Replication Cities). Pangkal Pinang, Mataram, Tangerang, Tangerang Selatan, Manado, Banda Aceh, Pontianak, Banjarmasin, Bekasi (Light Touch Cities). 10 Cities managed by ICLEI Southeast Asia: Bogor, Tangerang Selatan, Jambi, Bekasi, Sukabumi, Balikpapan, Tanjung Pinang, Cimahi, Banda Aceh, and Bandung.	Bappenas, Ministry of Environment & Forestry, City/Regency Governments APEKSI (Asosiasi Pemerintah Kota Seluruh Indonesia or Association of Indonesia Municipalities)
UCLG ASPAC (Association of City/Regional Governments in the Asia Pacific) Climate Resilient and Inclusive Cities (CRIC) , funded by the European Union.	2020 – ON GOING	CRIC helps the city governments to increase their capacity and improve governance, realize inclusive development, and implement climate change adaptation and mitigation actions.	Cirebon, Bandar Lampung, Pangkal Pinang, Pekanbaru, Banjarmasin, Samarinda, Mataram, Kupang, Gorontalo, Ternate.	Same as above

INSTITUTION / INITIATIVE	PROJECT PERIOD/ STATUS	SCOPE OF SUPPORT	LOCATIONS	KEY COUNTERPART(S)
URBAN RESILIENCE				
CDP (Carbon Disclosure Project) – ICLEI	2021 - 2022 COMPLETED	Capacity building of city government officials in: - Understanding climate hazards, risks, and vulnerabilities at the city level. - Building the ability to conduct Climate Risk Vulnerability Assessments (CRVA) and report on them. - Increasing awareness of the importance of CRVA as part of broader city climate adaptation and resilience planning, action, and financing.	Bogor City, Tanjung Pinang, Tarakan	City Governments, APEKSI
URBAN PLANNING				
World Bank NUDP (National Urban Development Project)	(2020 – December 2024) ON GOING	World Bank loan in total amount of US\$ 49,6 million for accelerating the development of cities that have a sustainable, distinctive, livable, green and smart character. The project will improve the link between urban planning and infrastructure development, to make investment more efficient and reduce vulnerability to climate-related hazards. This is done by directing development to lower risk areas. NUDP includes preparing policies, institutions, finances, and information systems and planning.	Semarang City, Surakarta, Banjarmasin, Balikpapan, Denpasar, Bengkulu, Bandar Lampung, South Tangerang, Bogor City, Surabaya, Bitung, Ambon, and Jayapura.	Ministry of Finance, Ministry of Public Work & Housing, <u>Bappenas</u> , Ministry of Agrarian and Spatial Planning / National Land Agency. Ministry of Home Affairs, Ministry of Foreign Affairs

INSTITUTION / INITIATIVE	PROJECT PERIOD/ STATUS	SCOPE OF SUPPORT	LOCATIONS	KEY COUNTERPART(S)
URBAN TRANSPORT				
JICA (Japan International Cooperation Agency). JUTPI-3 (Jabodetabek Urban Transportation Policy Integration Project Phase 3)	April 2022 - Juni 2025	The collaborative project aims to enhance the capacity and coordination mechanisms of stakeholders involved in urban transportation development based on public transit systems or Transit-Oriented Development (TOD) in the Jabodetabek region.	Jakarta, Bogor Depok, Tangerang and Bekasi	Coordinating Minister for Economic Affairs, Ministry of Transportation, Ministry of Agrarian and Spatial Planning / National Land Agency, Bappenas, Ministry of PUPR, related regional governments and Business Entities.
Green Infrastructure Initiative (GII) A Partnership between Government of Indonesia and Germany KfW	2022 - 20	GII is an innovative way to accelerate and prioritize environment -and climate- relevant infrastructure project. GII focuses on water and wastewater, solid waste management, and also urban transport. Urban transport among others include: Electric Bus for Bandung BRT, Bandung LRT, Surabaya Regional Railways Line (SRRL), Surabaya BRT, Corridor Petanglong (Greater Pekalongan), Public Transport in Greater Solo.	Jakarta, Bandung, Semarang, Surabaya, Denpasar, Yogyakarta, Kupang	Coordinating Ministry for Maritime Affairs and Investment, national Development Planning Agency, Ministry of Finance, Coordinating Ministry for Economic Affairs, Ministry of Public Works and Housing, Ministry of Transport, related Regional Governments.
KIAT (Kemitraan Indonesia Australia untuk Infrastruktur)	2018 - 2026	- Road network development - Road Network Management - Support the development of Sustainable Urban Mobility Plan	National, Kedungsepur, Sarbagita, Mamminasata	Bappenas, MoT, Province Governments

INSTITUTION / INITIATIVE	PROJECT PERIOD/ STATUS	SCOPE OF SUPPORT	LOCATIONS	KEY COUNTERPART(S)
URBAN TRANSPORT				
ITDP (Institute for Transportation & Development Policy)		• Support “Buy the Services” bus operation • Sustainable Mobility to Accelerate City’s goal to Net Zero Emission • Etc.	National Jakarta, Semarang, Medan	Ministry of Transport Province Governments
GIZ (Deutsche Gesellschaft für Internationale Zusammenarbeit) in collaboration with SECO (Deutsche Gesellschaft für Internationale Zusammenarbeit)	2017 -	• SUTRI NAMA to support policies and development of urban transportation and mitigation of greenhouse gas emissions, while INDOBUS to assist pilot cities in developing BRT corridors and support management of BRT operations • Technical support for “Buy the Service” • Facilitating climate actions in mobility	National	Ministry of Transport
AFD (Agence française de Développement – AFD)	2020 - 2023	Development of Sustainable Urban Mobility Plan for Greater Medan & Greater Surabaya	North Sumatra Province East Java Province	Bappenas, MoT, Province Governments
World Bank	2022 - 2027	Indonesia Mass Rapid Transit Project	Greater Bandung Greater Medan	Bappenas, MoT, Province Governments

INSTITUTION / INITIATIVE	PROJECT PERIOD & STATUS	SCOPE OF SUPPORT	LOCATIONS	KEY COUNTERPART(S)
WATER, SANITATION & HYGENE (WASH)				
USAID – IUWASH PLUS (Indonesia Urban Water, Sanitation & Hygiene, Penyehatan Lingkungan untuk Semua)	October 2017 - February 2022 COMPLETED	Conducted a Climate Vulnerability Assessment and Action Plan (CVAAP). Facilitated the construction of infiltration ponds to recharge and recover local water sources for PDAM (Regional Water Company).	14 districts/cities with degrading spring as the water sources of public drinking water services: Medan City; Pematangsiantar City; Bogor District; Bogor City; Salatiga City; Magelang City; Magelang District; Malang City; Batu City; Probolinggo District; Lumajang District; Bantaeng District; Bulukumba District; and Ternate City	Coordinated by Bappenas Supporting institutions: Ministry of Public Works and Housing (PUPR), Ministry of Environment and Forestry (KLHK), Ministry of Home Affairs (Kemdagri), Ministry of Village, Development of Disadvantaged Regions, and Transmigration (Kemendes), Ministry of Health (Kemenkes).
USAID – IUWASH TANGGUH (as continuation of IUWASH PLUS)	2022 – 2027, ON GOING	1) Strengthened governance and financing in WASH and Water Resources Management (WRM). 2) Increased access to poor-inclusive, climate-resilient, and safe WASH services. 3) Improve WRM for resilient water services. 4) Promote behavior change and women's leadership in WASH and WRM.	38 districts and cities in 10 provinces, (North Sumatra, Banten, DKI Jakarta, West Java, Central Java, East Java, South Sulawesi, West Kalimantan, East Nusa Tenggara, and Papua).	POKJA PPAS (Kelompok Kerja Perumahan, Permukiman, Air Minum dan Sanitasi) PERPAMSI (Persatuan Perusahaan Air Minum Seluruh Indonesia) FORKALIM (Forum Komunikasi Air Limbah) AKKOPSI (Aliansi Kabupaten/Kota Peduli Sanitasi)

INSTITUTION / INITIATIVE	PROJECT PERIOD & Status	SCOPE OF SUPPORT	LOCATIONS	KEY COUNTERPART(S)
WATER, SANITATION & HYGENE (WASH)				
UNICEF, in collaboration with the University of Technology Sydney (UTS), and Universitas Indonesia (UI). Research on Climate Resilient Urban Sanitation in Indonesia: Hazards, impacts and responses in four cities	2020 – 2021 COMPLETED	UNICEF commissioned this research to better understand the vulnerabilities of sanitation systems, its impact on sanitation services and how communities and systems respond to past and current climate hazards.	Makassar City, Lombok Timur Regency, Palu City and Bekasi City	Bappenas Directorate of Housing and Settlement
UNICEF, Development of WASH Climate Resilience Framework	2023, ON GOING UNTIL END OF 2023	The framework guides climate-resilient WASH target setting, implementation, and monitoring. It emphasizes WASH system adaptability to climate stressors and shocks. Includes guidance for integrating climate resilience into WASH planning and budgeting. Climate resilience should be a core aspect of WASH strategies and plans. Recognize the challenge of limited resources for climate-resilient urban sanitation.	National level	Bappenas Directorate of Housing and Settlement

INSTITUTION / INITIATIVE	PROJECT PERIOD & Status	SCOPE OF SUPPORT	LOCATIONS	KEY COUNTERPART(S)
WATER, SANITATION & HYGENE (WASH)				
AusAid/DFAT (through KIAT, Kemitraan Indonesia Australia untuk Infrastruktur, Indonesia Australia Partnership for Infrastructure)	On going until end of 2026	- Urban Water Supply - Urban sanitation e.g. ; Around IDR 600 billion grant from Australian Government for building a Waste Water Management Installation in Palembang City, with a capacity of up to 100 thousand House Connections (SR). - The grant for city sanitation program (sAIIG)	Palembang City, South Sumatra Province.	Ministry of Public Works and Housing, South Sumatra Province, Palembang City
The Australia Indonesia Infrastructure Grant for Municipal Sanitation (sAIIG) program	Phase I, 2012 - 2017 Phase II, 2018 - 2020 COMPLETED	To improve local government (city/districts) sanitation services through the development of existing and new domestic neighbourhood Wastewater Treatment Plants (WWTP)	38 Cities/Regencies	Bappenas, Ministry of Finance, Ministry of Public Works and Housing, related Regional Governments.
Green Infrastructure Initiative (GII) A Partnership between Government of Indonesia and Germany	2022 – ON GOING	Scope of GII for WASH includes: - Southern West Java Integrated Water Supply and Wastewater Management, planning and construction of a Drinking Water Supply System (SPAM) and Domestic Wastewater Management System (SPALD) . - The construction of a comprehensive water supply system for East Java (Kediri, Nganjuk, and Jombang)	West Java & East Java Province	Coordinating Ministry for Maritime Affairs and Investment, Bappenas,, Ministry of Finance, Ministry of Public Works and Housing, related Regional Governments.

INSTITUTION / INITIATIVE	PROJECT PERIOD & STATUS	SCOPE OF SUPPORT	LOCATIONS	KEY COUNTERPART(S)
FLOOD CONTROL				
USAID Climate Change Adaptation and Resilience (Adaptasi Perubahan Iklim Dan Ketangguhan, APIK)	2015 – 2020	Assessed vulnerability, improved community resilience, and supported in addressing climate change impacts.	National level and in the provinces of East Java, Southeast Sulawesi and Maluku	
DFAT SIAP SIAGA	2019 – 2024 ON GOING	The SIAP SIAGA program is the Australia-Indonesia Partnership for Disaster Preparedness, aiming to enhance Indonesia's capabilities in disaster prevention, preparedness, response, and recovery while strengthening cooperation between Australia and Indonesia in humanitarian actions in the region. This five-year program aligns with Indonesia's Medium-Term Development Plan (RPJMN) 2020-2024, the Disaster Management Master Plan (2020-2024), and the Australian Government's Humanitarian Strategy (2016)	Bali, East Java, East Nusa Tenggara, West Nusa Tenggara	BNPB (Badan Nasional Penanggulangan Bencana, National Board for Disaster Management), Bappenas, Ministry of Home Affairs, Province Governments, etc
The National Urban Flood Resilience Project (NUFReP) World Bank	2022 - 2027	Flood risk analytics and planning, execution of priority flood resilience measures, and establishing the national urban flood resilience program	Banjarmasin, Bima, Manado, Medan, Semarang & New Capital City	Bappenas, MoHA, PUPR, Local Governments

INSTITUTION / INITIATIVE	PROJECT PERIOD & STATUS	SCOPE OF SUPPORT	LOCATIONS	KEY COUNTERPART(S)
GEDSI				
AusAid/DFAT (through KIAT, Kemitraan Indonesia Australia untuk Infrastruktur, Indonesia Australia Partnership for Infrastructure)	2022 - 2026	- Provides grants to local NGOs to strengthen their capacity to advocate GESI in Road Traffic and Transportation Forum (FLLAJ) - Implementation of Gender Equality, Disability and Social Inclusion (GEDSI) in Regional Drinking Water Enterprises	National	Bappenas, MoT
USAID Climate Change Adaptation and Resilience (Adaptasi Perubahan Iklim Dan Ketangguhan, APIK)	2015 – 2020	Assessed vulnerability, improved community resilience, and supported in addressing climate change impacts.	National level and in the provinces of East Java, Southeast Sulawesi and Maluku	
KOTA KITA	2021-2024	Action research, co-design, participatory data collection, strategic planning & visioning, civil education and empowerment, awareness-raising campaigns.	Surakarta (Solo), Banjarmasin, Karimunjawa, Surabaya, Makassar, Kupang, Manado, Pekalongan	Regional governments

NO.	INSTITUTION / INITIATIVE	TOPICS	NAME	EMAIL CONTACT
1	KOTA KITA	GESI in climate adaptation and resilience in urban areas	Nina Asterina	nina@kotakita.org
2	Partnering for Green Growth and the Glonal Goals (P4G Partnerships)	Insights on climate resilient infrastructure financing	Randy Rakhmadi	randy.rakhmadi@p4gpartnerships.org
3	Sekretaris Jenderal Forum Indonesia untuk Transparansi Anggaran (Seknas FITRA)	Climate resilient infrastructure financing	Misbah Hasan Gurnadi	misbah@seknasfitra.org gurnadi@seknasfitra.org
4	United Cities and Local Governments (UCLG)	Climate resilient programme	Rendy Primrizki Huzbullah Arief Hendra Adi Rona Ikram	rendy.primrizqi@uclg-aspac.org hizbullah.arief@uclg-aspac.org hendra.adi@uclg-aspac.org rona.ikram@uclg-aspac.org
5	USAID – IUWASH PLUS (Indonesia Urban Water, Sanitation & Hygiene, Penyehatan Lingkungan untuk Semua)	Climate resilient infrastructure financing	Brendan Gilmore	brendan.gilmore@planetpartnerships.org

6	KfW Green Infrastructure Initiative (GII)	- Financing pilot - climate-resilient urban infrastructure - Alignment between KfW GII work in transport and water with our PACT as well as scoping work in climate-resilient urban infrastructure	Eka Setiawan David Simon Ike Larasayu	Eka.Setiawan@kfw.de david.simon@kfw.de ike.larasayu@kfw.de
7	The National Research and Innovation Agency (BRIN)	BRIN climate tech startups	Wiwiek Joelijani	wiwi004@brin.go.id
8	The Kemitraan Indonesia Australia untuk Infrastruktur (KIAT)	Urban climate resilience infrastructure and transport	Steven Chaytor Shamas Bajwa Arlan Rahman	steven.chaytor@kiat.or.id shamas.bajwa@kiat.or.id arlan.rahman@kiat.or.id
9	World Bank	Urban climate resilience infra	Griya Rufianne Rendytio Pradipta	grufianne@worldbank.org rpradipta@worldbank.org
10	British International Investment (BII)	Support financing climate resilient urban infrastructure	Tarek Cheaib	tcheaib@bii.co.uk ctribacchi@bii.co.uk
11	USAID - The Indonesia Urban Resilient Water, Sanitation, and	Financing	Trigeany Linggoatmodjo	tlinggoatmodjo@usaid.gov

	Hygiene Activity (IUWASH) TANGGUH (as continuation of IUWASH PLUS)	Water and sanitation		mnewton@usaid.gov
12	PT . Sarana Multi Infrastruktur (SMI)	SMI pipeline on climate resilient urban infra	Puti Faraniza Yani Parasti Fakhrul	puti@ptsmi.co.id yani.parasti@ptsmi.co.id fakhrul@ptsmi.co.id
13	GIZ IKI Cities Adapt	Community-based urban resilience piloting	Amina-Laura Schild	amina-laura.schild@giz.de