



How to ensure water resources management supports climate-resilient development in Indonesia

ABOUT THIS BRIEF

Water is a ‘climate connector’ – impacts of climate change on water will flow through all sectors of the economy and across national borders. This brief explains why integrated approaches to water management are essential for climate-resilient development, how Indonesia has laid a solid foundation in that sense, and what needs to change if Indonesia is to meet its commitments under the Paris Agreement and achieve the Sustainable Development Goals (SDGs).

SDG target 6.5, on integrated water resources management (IWRM), can make that climate connection. This brief looks at all four dimensions of IWRM, namely the enabling environment, institutions and participation, management instruments, and financing.

RECOMMENDATIONS

Key stakeholder(s)	Recommendation
RAN-API Secretariat, Ministry of Environment and Forestry (KLHK), Ministry of Public Works and Housing (PUPR)	Key upcoming strategies and policies, including Vision 45, a successor to the RAN-API, and new water strategies arising from the 2019 Water Resources Law, could benefit from increasing focus on climate resilience from improved water resource management.
Ministry of Energy and Mineral Resources (ESDM)	1 Conduct a thorough assessment of the impact of climate change on water resources and incorporate the results into scenario planning, modelling, and strategy/policy development. This will need to be based on updated, science-based estimates for future water supply, demand, quality, and extremes.
National Agency for Meteorology, Climatology and Geophysics (BMKG)	

RECOMMENDATIONS CONTINUED...

Key stakeholder(s)	Recommendation
City (/district) governments	The capability of cities to respond to water resource challenges, both within and outside their boundaries, needs to be improved.
Ministry of National Development Planning (Bappenas)	<ol style="list-style-type: none"> Initiate a programme of city-level support and capacity development to strengthen basin- and watershed-based coordination forums.
Various other national ministries	<ol style="list-style-type: none"> Clarify the roles and responsibilities for disaster risk reduction (DRR) and climate change adaptation across biophysical and political boundaries to differentiate what can (and should) be done nationally from what can, and should, be done regionally.
Development partners	<p>Although the Sustainable Development Goals (SDGs) are increasingly integrated into national planning, they still need to be incorporated into regional development planning in a coherent way.</p> <ol style="list-style-type: none"> Utilise water as an important entry point for both vertical and horizontal policy coordination and integration on climate change challenges, given its cross-border and multisectoral importance and impacts.
BMKG	Evidence-based decision-making around water and climate needs to be improved.
KLHK	<ol style="list-style-type: none"> Undertake a stock-take of sources, portals, and uses of information on climate change impacts, and vulnerability.
PUPR	
ESDM	
Universities	
River basin organisations	
City /district governments	
Centre for Climate Finance and Multilateral Policy, within the Fiscal Policy Agency of the Ministry of Finance	The Indonesian climate finance landscape has multiple funds and institutional arrangements and includes both traditional forms and non-traditional forms of financing (i.e. innovative and blended financing schemes).
Bappenas	<ol style="list-style-type: none"> Develop a more precise, detailed, and attractive pipeline of water-focused climate investment opportunities, with a focus on improving the consideration and mitigation of climate risks, as a means of ensuring the effective and efficient use of finance to support climate resilience.
KLHK	
PUPR	<ol style="list-style-type: none"> Manage Indonesian climate finance as a coherent funding system to benefit from potential synergies, with integrated management and systematic oversight over <i>what</i> is funded, <i>why</i>, and <i>where</i>.

RECOMMENDATIONS CONTINUED...

Key stakeholder(s)

Recommendation

Funding constraints resulting from COVID-19 will place increasing pressure on climate change projects.

- 8 Continually highlight the value of adaptation projects going forward, especially in the immediate COVID-19 recovery period. The holistic framing of water-based climate projects and programmes in developmental terms (including, importantly, for enhanced hygiene to manage COVID-19 and other public health risks in the context of climate change), rather than solely in environmental terms, could assist with this, both at the national and subnational levels.

BMKG, PUPR, ESDM

Ministry of Agriculture

National Board for Disaster Management (BNPB)

National Water Council

To improve monitoring and information management for collecting climate data and communicate information, Law No 17/2019 on Water Resources mandated the National Water Council (Dewan SDA Nasional) to coordinate and supervise SIH-3 (Sistem Informasi Hydrology, Hydro-climatology, Hydrogeology).

- 9 This coordination body needs to be revitalised, strengthened, and provided with sufficient budget to carry out its mandated tasks.

- 10 Such efforts can be complemented by the use of hydro-informatics such as IT, drone, and Earth observations to strengthen its ability to collect hydrological information.

THE CHALLENGE

Climate change impacts on water threaten Indonesia's development.



Projected climate changes by 2050 include increases in temperature of **0.8–2.0°C**, with greater warming over Sumatra, Java, and Borneo.¹⁰

There is significant variability in precipitation due to natural climate processes, including the **El Niño Southern Oscillation**. Rainfall projections include increased **rainfall** during the wet season, increased **duration of dry spells** (+2 days), and increased **intensity** (2–7%) and **frequency** (3–23%) of heavy rainfall events.¹⁰



Indonesia is one of the world's most vulnerable countries to **sea-level rise (SLR)**, with over **81,000 km of coastline** and more than **40 million people** living on low-lying land less than 10 metres above sea level.²⁵

- Historical climate trends across Indonesia show **SLR** of 2–10 mm per year (1993–2012) and projected changes are 15–45 cm **SLR** (by 2056).¹⁰
- Saltwater intrusion is occurring where there is heavy groundwater abstraction (e.g. Jakarta) and will be accelerated with **SLR**.¹⁰



Indonesia already faces **significant impacts due to water-related disasters**. The rehabilitation costs following flood damage to infrastructure in 2016 reached **US\$275 million**. Climate change will worsen the risk of water-related disasters.

- Urban flooding caused by SLR, tides, waves, and land subsidence (the latter driven partly by groundwater abstraction) could affect 1.5 million people across the cities of Jakarta, Surabaya, and Semarang by 2050.
- These estimates do not include the impact of upstream changes on water flows and riverine urban flood risk – which is already significant.
- Fluvial flooding is expected to put 75% more Indonesians at risk by 2055, due to population growth combined with climate change.^{10, 15, 21}



Indonesia is the largest energy user by overall volume in South East Asia with one of the fastest rates of energy consumption growth in the world.

- Although energy intensity **decreased** between 2000 and 2017, the fossil fuel share of energy generation has **increased** (the share of coal in electricity production increased from 36% in 2000 to almost 56% in 2015; 89% of the total energy produced was from fossil fuels, as of 2015).
- A **Low Carbon Development Initiative** has been initiated; however, Indonesia is still planning to grow its coal generation capacity by **62%**. Indonesia's planned capacity increase accounted for 7.29% of globally planned expansion of coal power plants (as of 2019).
- Indonesia has vast exploitable **hydropower** potential (estimated at 477 TWh, equivalent to more than twice Indonesia's total energy consumption). However, only a fraction of this potential is socio-economically, environmentally, and technically feasible to exploit.^{15, 16}



Indonesia is undergoing **rapid urbanisation**. About half the population currently lives in urban areas, but this is projected to increase to **68% by 2025**. High urbanisation rates have led to **dense unplanned settlements** in low-lying coastal areas susceptible to flooding and landslides.^{25, 26}

Sustainable urban development in Indonesia faces several water-related challenges, including:

- **drought and flood risk** arising from higher peak flows in the wet season and lower base flows in the dry season associated with upstream land-use change (deforestation and drainage of wetlands)
- **over-exploitation of groundwater**, which also contributes to significant subsidence
- **considerable increases in pollution loads** and deterioration in quality associated with both urbanisation and industrialisation. Nationally, around 95% of faecal waste reaches the nearby environment.¹⁵

The interconnected nature of the water-related climate challenges in Indonesia

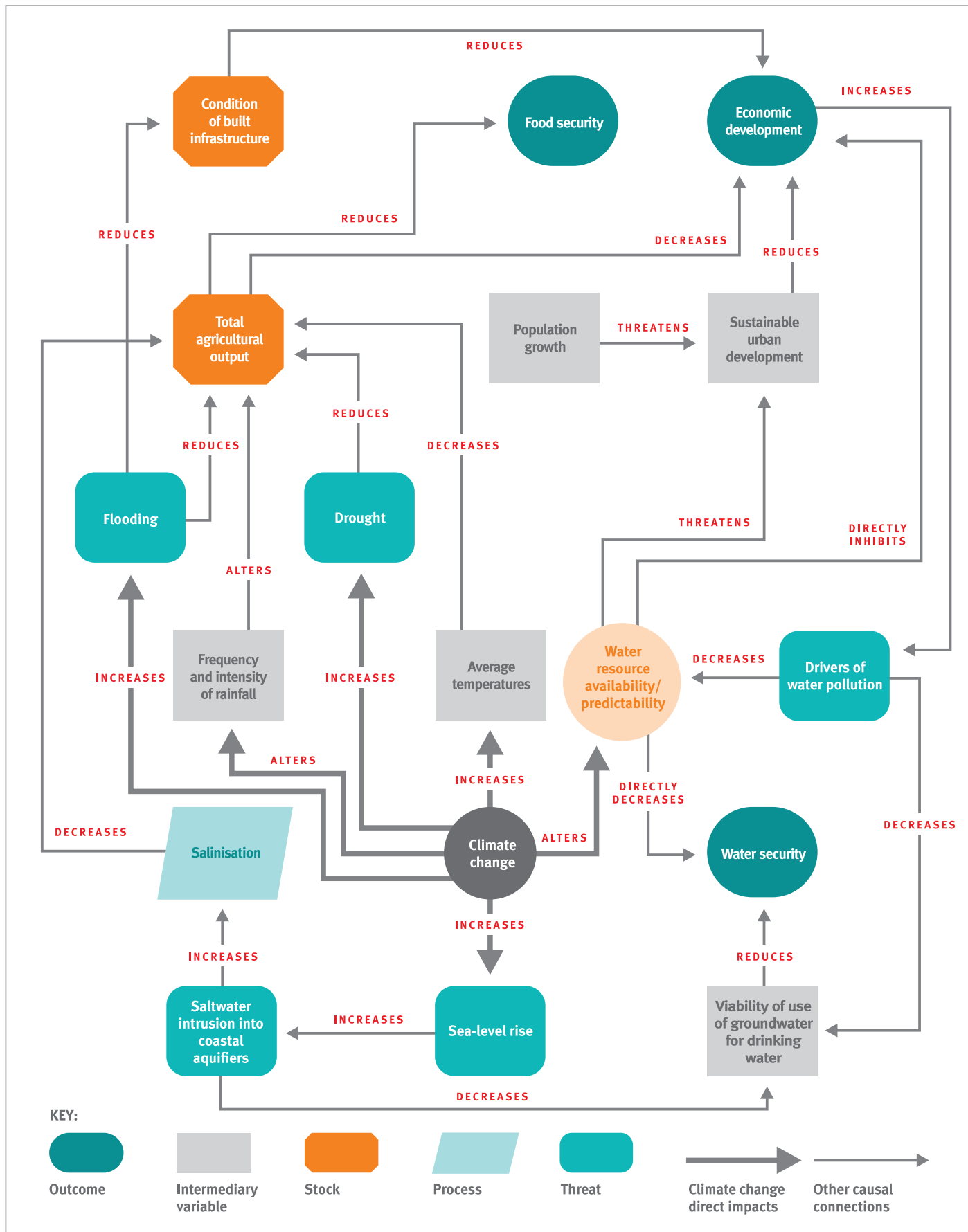
As with the water–energy–food nexus, climate resilience and sustainable development are interconnected. The diagram below maps the relationships between some of the key climate challenges that Indonesia faces, showing why coordinated, integrated, and cross-sectoral responses are required to adapt to the impacts of climate change.

At the centre of the diagram is water resource availability/predictability, which is impacted by climate change (as shown by the words written on the arrows between the variables). The complex relationship between climate change and water availability/predictability is not shown here for reasons of space. The word ‘alters’ is used to describe the fact that climate change can affect the timing and amount of water availability in multiple ways, including via shifting seasonality, changing frequency and intensity of rainfall events, increasing or decreasing average precipitation irrespective of intensity of rainfall events, and affecting water quality – all while increasing uncertainty in changes and shifts in the water cycle and thereby reducing our ability to use past hydro-meteorological guides as reliable predictors of water availability.

To illustrate the accurate reading of this diagram, two causal chains are described:

- **Causal chain 1:** Climate change is increasing sea-level rise, which increases the amount of saltwater intrusion into coastal aquifers. This is increasing soil salinisation, which reduces agricultural productivity and therefore the total agricultural output, reducing food security and threatening economic development. Saltwater intrusion into coastal aquifers also negatively impacts the viability of using groundwater for drinking water purposes, which decreases water security.
- **Causal chain 2:** Climate change is altering water resource availability/predictability in Indonesia in ways that threaten sustainable urban development, including via an increase in rainfall during the wet season and increased intensity and frequency of heavy rainfall events. Sustainable urban development is already under heavy pressure as a result of Indonesia’s population growth and urbanisation rates. The net effect of these multiple pressures is that constrained urban development is acting as a brake on economic development. Given that economic development is one of the drivers of water pollution, a decrease in economic development could reduce the degree to which water pollution impacts on Indonesia’s water resources.

THE INTERCONNECTED NATURE OF WATER-RELATED CLIMATE CHALLENGES IN INDONESIA



ENABLING ENVIRONMENT

What do key policy statements say about integration of water, climate, and other Sustainable Development Goal agendas?

Indonesia has been advancing the policy and strategy architecture for low-carbon, climate-resilient development and for water. However, success depends on how subnational (including city) governments incorporate and integrate these priorities. There has been progress in integrating climate change into national economic development planning, but this has so far tended to emphasise mitigation. Climate change adaptation and the role of natural capital, including water, in supporting economic development are comparatively less emphasised, and there are concerns about the underlying assumptions for water used in modelling for economic planning. Water resources management does appear to be receiving increasing attention in climate strategies, such as the forthcoming National Adaptation Plan (NAP). While cities are encouraged to undertake their own climate change adaptation planning, the results have been variable, and outcomes depend on the extent of integration into city-level development and spatial planning. The legal basis to support water resources management strategy and policy has improved recently, with approval of the new law on water resources – but it remains to be seen whether this will, in practice, provide a basis for managing water resources under the combined challenges of climate change, urbanisation, and poorly managed development.

Sustainable development

Indonesia declared the goal of integrating climate action into its development agenda in 2017. This gave rise to the **Low Carbon Development Initiative (LCDI)** launched by Indonesia's Ministry of National Development Planning (Bappenas). The LCDI has been integrated into the **National Medium-Term Development Plan (RPJMN) 2020–2024**, as well as its long-term development strategy, **Indonesia Vision 2045**. The primary focus of the LCDI is on climate change mitigation. However, it does recognise water security as one of several considerations to support a climate-resilient, low-carbon development transition. Natural capital, including water resources, is incorporated into the economic modelling underpinning Vision 2045, yet the LCDI report acknowledges that “total water demand growth coupled with potential

POLICY STATEMENTS

SECTOR	KEY POLICY STATEMENTS (INCLUDING LAWS, STRATEGIES, AND PLANS)
Cross-sectoral	<ul style="list-style-type: none"> ■ Low Carbon Development Initiative (LCDI) ■ National Medium-Term Development Plan (RPJMN) (2020–2024) ■ Indonesia Vision (2045) ■ Regional Medium-Term Development Plans (RPJMD) and city-level spatial plans (RTRW)
Climate change	<ul style="list-style-type: none"> ■ Nationally Determined Contribution (NDC) 2015; updated 2021 ■ Indonesia Climate Change Adaptation Action Plan (RAN-API, 2014) ■ National Adaptation Plan ■ Ministerial Decree (No. P33/2016) (legal basis for climate change adaptation)
Water	<ul style="list-style-type: none"> ■ Law on Water Resources (17/2019) ■ Directorate General of Water Resources Strategic Plan 2015–2019
Transboundary	<ul style="list-style-type: none"> ■ Article 10 and 11 of Law on Water Resources (17/2019)
Food & agriculture	<ul style="list-style-type: none"> ■ Government Annual Work Plan (2019 onwards)
Disaster risk reduction	<ul style="list-style-type: none"> ■ Law on Disaster Management (24/2007) ■ Law on Spatial Planning (26/2007)

declines in surface and groundwater supplies due to climate change—and thus implications for water scarcity—may be seriously underestimated in the SD [sustainable development] model”.⁸ It also implies that the modelling currently underestimates the benefits from green infrastructure, including mangroves, peatlands, catchments, and urban forests for flood management. From its main report, the LCDI appears not to have a strong urban focus, though urban land use and population are considered in the modelling.^{7, 8}

Climate

The **Nationally Determined Contribution (NDC) (2015)** recognises water security as an enabling condition for climate resilience and expresses, in very general terms, a need for enhanced action on integrated watershed management for economic resilience, as well as ecosystem and landscape resilience. In the country's updated **NDC (2021)**, water is primarily taken up in the context of the water–food–energy nexus.²⁹ The **Indonesia Climate Change Adaptation Action Plan (RAN-API, 2014)** includes various measures relating to water resources management. Since the RAN-API was developed, a dedicated RAN-API Secretariat within the government has conducted specific studies on water, although an up-to-date comprehensive assessment of the impact of climate change on water resources is still required (see **Recommendation 1**). It also appears to have prioritised water as one of four focal sectors in discussions for the development of the **RPJMN 2020–2024** as well as a **National Adaptation Plan**, expected shortly as an update to the RAN-API itself.^{11, 12, 20}

Urban

The previous **RPJMN (2015–2019)** prioritised building disaster-resilient and climate-resilient cities. Following decentralisation, districts, including urban districts, prepare their own **Regional Medium-Term Development Plans (RPJMD)** and **city-level spatial plans (RTRW)**.

- As of 2018, subnational governments are required to incorporate **strategic environmental assessments (SEAs)** into their RPJMDs (following **MR No.7** issued by the Minister of Home Affairs), which provides an additional framework for climate change adaptation to be incorporated into regional planning.
- While preparing RTRWs is a statutory requirement, guided by the law on **Local Government (23/2014)** and **Spatial Planning (26.2007)**, they generally do not provide a clear strategic development direction and are poorly integrated with sectoral plans at city level.^{8, 21, 27}

In 2016, the Ministry of Environment and Forestry issued a **Ministerial Decree (No. P33/2016)** as the legal basis to guide climate change adaptation, including at city level. Development partners, including the Asian Development Bank (ADB) and the Asian Cities Climate Change Resilience Network (ACCCRN), have also supported individual cities in this regard. ACCCRN supported eight cities to develop **resilience strategies**. A review of the initiative found instances where actions had been integrated into the RPJMDs. It also identified a need to undertake resilience planning across multiple scales, beyond administrative boundaries – a pertinent need for water resources, which invariably cross city boundaries (see **Recommendations 2, 3, and 4**).²

Water

Managing Indonesia's water resources is a complex endeavour given the country's many watersheds and

Indonesia's watersheds

Indonesia has almost **8,000** watersheds, which are managed in **131** river basins:

- **5** basins cross international boundaries (Malaysia, Timor-Leste, and Papua New Guinea).
- **29** basins cross provincial boundaries.
- **37** basins are considered to be of national strategic importance.⁴

basins (see text box). The annulment of the 2004 Water Law in 2015 as unconstitutional resulted in a regulatory and policy vacuum that was only filled in 2019, with the passing of a new **Law on Water Resources (17/2019)**. In the intervening period, the 1974 Water Law held sway; it did not consider climate change, integrated water resources management, or decentralised governance, including the role of cities. The 2019 law appears to address these aspects, at least in part:

- It (re)instates many IWRM principles including river basin-based management (e.g. Article 22) and accounting for environmental water needs (e.g. Article 8).
- It also seeks to clarify the roles and responsibilities of different levels of government (e.g. Chapter IV) – here, in addition to the challenging issue of management across administrative boundaries *within* Indonesia (e.g. between districts, including cities, and provinces), there are also provisions for transboundary water management (e.g. Articles 10 and 11).
- Climate change, however, appears to be mentioned only once as one of nine considerations for basin management (Article 22.2).

The 2019 law awaits promulgation. Its adequacy as a legal basis for a new policy and strategic direction on water resources management to tackle Indonesia's considerable water challenges still needs to be tested in the courts.¹⁷

Disaster risk management

Indonesia has put in place a strong enabling framework for disaster risk reduction (DRR) and management, including climate- and water-related disasters, which includes:

- a **Law on Disaster Management (24/2007)**
- a **Law on Spatial Planning (26/2007)**, which requires various DRR measures to be in place
- the mandating of a **National Disaster Management Agency (BNPB)**.

The government is currently developing a new regulatory framework to incorporate DRR into spatial plans, which is particularly relevant for urban areas.²⁸

Food

The **Government Annual Workplan** for 2019 onwards includes policy directives for tackling malnutrition and focusing on expanding the provision of food by strengthening food security. As noted in the systems diagram above, food security and total agricultural output will likely be impacted by multiple climate change vectors and will therefore require climate change adaptation to enhance climate resilience of the food and agriculture sector.⁸

Energy

As noted in the ‘Challenges’ section, Indonesia is the largest energy user in South East Asia and has one of the fastest growth rates of energy consumption globally. Almost 90% of the total energy produced by the country is from fossil fuels and despite the LCDI that has been initiated, Indonesia is still planning on increasing its coal generation capacity by over 60%. The contribution of hydropower to Indonesia’s renewable energy supply can increase. **The Master Plan Study for Hydropower Development in Indonesia (2011)** noted that, realistically, **8,040 MW** capacity could be added to the grid from hydropower development to provide a total of **12,738 MW** of hydropower (current capacity + planned capacity) (see **Recommendation 8**).¹⁶

INSTITUTIONS

Are Indonesia’s institutions ready to manage the impacts of climate change on water resources and on other water-related sectors in an integrated way?

Given the number of agencies and interests involved in climate, urban, and water issues, as well as Indonesia’s decentralised governance model and its geography (archipelago), there are significant challenges of institutional fragmentation, both vertical and horizontal. These appear to be only partially resolved through institutional coordination mechanisms. There are multistakeholder coordination platforms and forums for water resources management at national and subnational levels (including basin and city). The main coordination platform for climate change has been disbanded – it now relies on key ministries playing an active coordination role. At the city level, effective and integrated management across urban development, climate change adaptation, and water depends on the interest and leadership of mayors and their administrations, which face considerable capacity and resourcing constraints. Efforts to establish multistakeholder forums and plans for watershed management at the local level have not produced the desired results, in part due to a failure to integrate these into district development planning.

Leadership and coordination on climate and water issues

At the central level, the **Directorate General of Climate Change** within the **Ministry of Environment and Forestry (KLHK)** coordinates policies and international positions on climate change. The **Ministry of National Development Planning** (Bappenas) also plays an important role, mainstreaming climate change into national development planning through a Climate Change Sectoral Roadmap. A National Council on Climate Change was established in 2008, but was disbanded in 2015 on the grounds that the KLHK would take on the role of climate change management (see diagram of Indonesia’s institutions below). For climate change adaptation, specifically, the **RAN-API Secretariat** coordinates and monitors implementation, and has conducted various reviews since the RAN-API was developed. Additional coordination at a national level is provided by several additional structures:

- The **Supreme Audit Board (BPK)** monitors and audits Indonesia’s progress against the Sustainable Development Goals (SDGs) indicators and targets, supported by the **SDG National Coordination Team** and working with Bappenas to integrate the SDGs with national planning (see **Recommendation 4**).

- Climate Finance is overseen by the **Fiscal Policy Agency** under the Ministry of Finance, which contains a **Centre for Climate Finance and Multilateral Policy** (discussed further in the ‘Finances’ section below).^{3, 8, 25}

For **water**, the **Ministry of Public Works and Housing (PUPR)** – which includes the **Directorate General of Water Resources** – leads on water resources management and many other aspects of water, especially where infrastructure is concerned. However, other ministries play important roles, including the **Ministry of Energy and Mineral Resources** (groundwater management), **KLHK** (water quality management and watershed management), and the **Ministry of Foreign Affairs** (transboundary water management where foreign affairs are affected). For coordination, a **National Water Council** was established in 2009, with national, local, and non-government representatives. Its role is reaffirmed in Law 17/2019, which also specifies coordination mechanisms at provincial, district (including city), and river basin levels, though relevant structures (**Dewan SDAs and TKPSDAs**) had already been widely established under previous legislation.^{4, 17}

There is no single ministry for urban development in Indonesia, but a Bappenas vice-minister chairs an **Inter-Ministerial Steering Committee on Urban Development**. **Disaster Risk Reduction (DRR)** is overseen by the **National Disaster Management Agency (BNPB)**, which was established in 2008 with a mandate to improve the coordination of DRR between government, civil society, international partners, and other stakeholders. A **Provincial Disaster Management Agency**, nested under the BNPB, supports decentralised DRR at a regional level.^{21, 28}

Underlying barriers and enablers

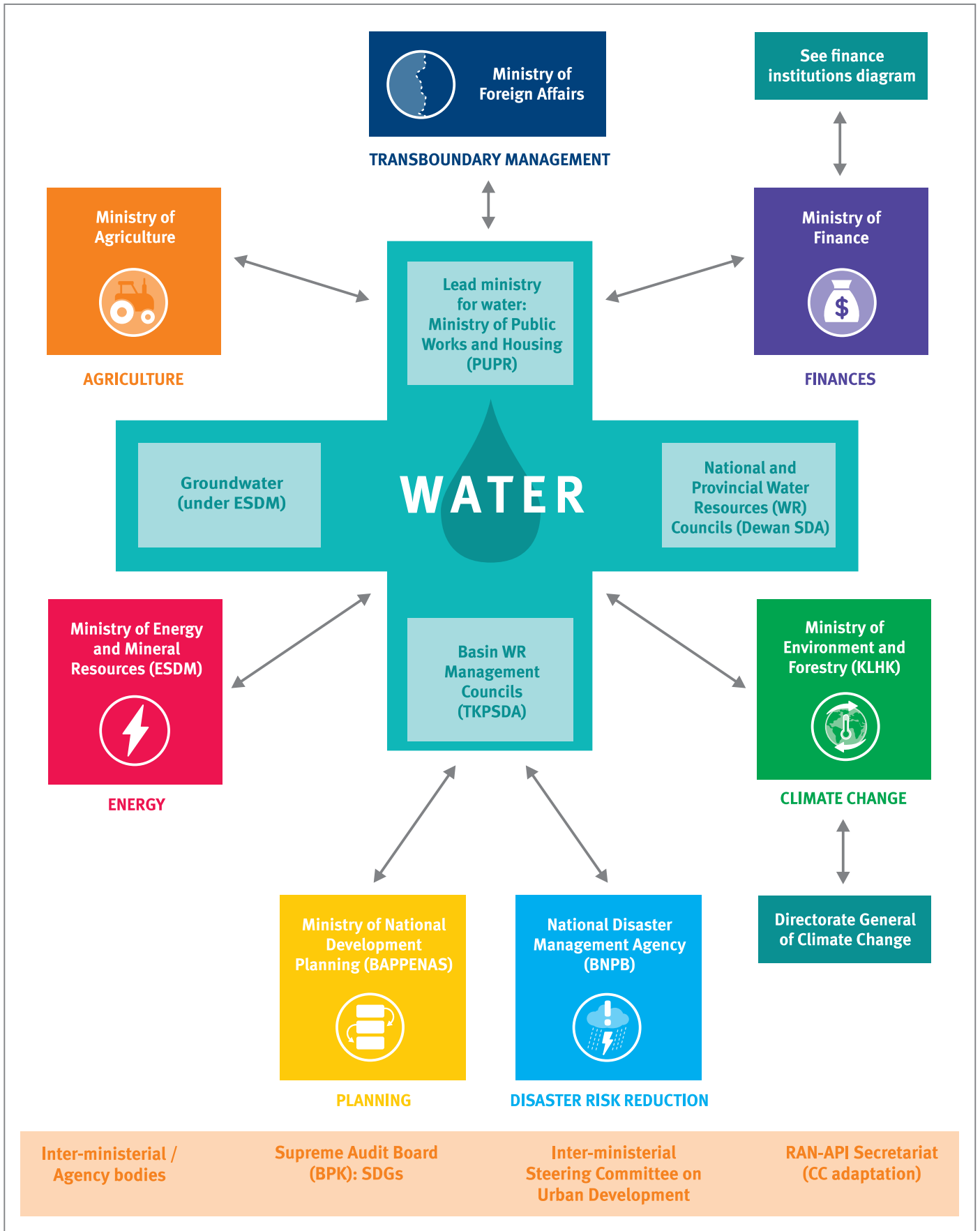
There are several features of Indonesia’s institutional architecture for water and climate change that ought to enable water to provide a foundation for climate-resilient and sustainable development. As well as the above-mentioned platforms, an important enabler at national level is the integration of climate change into Bappenas’ well-established coordination of the development planning

process – including through the LCDI – though as noted there is scope for greater attention to adaptation issues. At the city level, political decentralisation means that mayors possess considerable authority and, where they assume leadership on climate and water issues, they can drive coordination and integration. However, there are abundant **underlying barriers**, including the following:

1. **Vertical fragmentation** between central and subnational levels persists alongside horizontal fragmentation, both between government agencies working at the same level and between neighbouring jurisdictions – including those sharing water resources and infrastructure.
2. The **benefits of decentralisation are uneven**. Despite general progress in political decentralisation, fiscal decentralisation has been slower and cities are often dependent on transfers or direct investment by national government, including for water infrastructure.
3. Many **city governments face capacity constraints** for urban planning, management, and finances. Institutional attention to specific issues depends on the interest of individual city leaders and their bureaucracies.^{2, 21, 26}

Water could provide an important entry point for both vertical and horizontal policy coordination and integration on climate change challenges, given its cross-border and multisectoral importance and impacts (see **Recommendations 2 and 3**). City governments will need to engage with a wider set of stakeholders in the watersheds on which they depend, to tackle degradation of upstream catchments that increases exposure to inundation from floods, and groundwater abstraction, which contributes to subsidence. A recent review highlighted widespread progress in developing integrated watershed management plans (RPDAST) and multistakeholder watershed forums. Yet, it also found that the RPDASTs are generally ineffective, noting a perception that they are the responsibility of the national government, and a failure to integrate the plans into RPJMDs.¹⁷

INDONESIA'S INSTITUTIONS RELATED TO WATER AND CLIMATE CHANGE



MANAGEMENT INSTRUMENTS

Are management decisions on water and other Sustainable Development Goal issues being guided by evidence of climate change?

Indonesia has numerous agencies and initiatives to monitor climate and water issues, but these efforts are not yet effectively transferring into evidence-informed decision-making at different levels. Dispersion of monitoring and information management responsibilities on climate and water leads to gaps in data availability and use in analysis and planning. Some instruments and systems exist that could enable evidence on water and climate change to inform decisions, for example annual basin-level water allocation processes and city-level planning and building permitting regimes. However, they often appear not to be operationalised, or to lack sufficient consideration of climate risk. Progress on climate-informed disaster risk reduction instruments, e.g. early warning systems, has been made, but they still require strengthening, including in urban areas. The barriers to evidence-informed decision-making are considerable, including gaps in technical capacity and institutional siloes between responsible agencies – especially at the local level. However, enabling factors do exist, e.g. a strong legislative and policy basis for disaster risk reduction and successful examples of community-based initiatives in response to water-related extreme events.

Monitoring and information management

There are numerous systems, initiatives, and platforms that collect climate data and communicate information. Research and systematic observation is undertaken by several organisations, with the **National Agency for Meteorology, Climatology and Geophysics (BMKG)** playing a key role in climate information services. Climate research, data collection, and information provision are also undertaken by centres within the Ministries of Agriculture, Environment and Forestry, and Public Works and Housing, as well as various universities.^{9, 10}

Indonesia’s Third National Communication to the United Nations Framework Convention on Climate Change (UNFCCC) in 2018 identified a need to **improve climate monitoring stations** and to **enhance the use of ensemble climate projections** in climate change vulnerability, impact, and adaptation studies. While some of these studies are focused on water resources, coverage is uneven across the archipelago. Unsurprisingly, areas with higher populations and concentrations of infrastructure, economic activity, and assets have received more attention, for example in Java, which is home to about 58% of the population, while there are fewer studies in less populous eastern Indonesia. There are at least **ten portals for climate change information** (mitigation and adaptation) – though this abundance may not assist decision-makers to access the right information (see **Recommendation 5**).^{9, 10}

DIVISION OF WATER RESOURCE MONITORING RESPONSIBILITIES

AGENCY

MONITORING RESPONSIBILITY

River basin organisations

Rainfall, river flow, water levels

KLKH

Surface water quality

Research Centre on Water Resources

Water balance – supply/demand

Ministry of Energy and Mineral Resources

Groundwater quantity and quality

Responsibilities for water resources monitoring are spread across numerous agencies (see table above). Despite this, a 2017 study identified that the availability of hydrological information and data is limited, both temporally and spatially.^{3, 19}

In the Law of Water Resources (17/2019), the government mandated the National Water Council to collect and communicate climate data to improve monitoring and evaluation. The National Water Council has been mandated to coordinate and supervise SIH-3 (Sistem Informasi Hidrologi, Hydro-climatology, Hydrogeology), a coordination body led by BMKG with members that consist of BNPB, KLHK, PUPR, ESDM, and the Ministry of Agriculture. Although in place, SIH-3 needs to be revitalised, strengthened, and provided with sufficient budget to carry out its mandated tasks (see **Recommendation 9**). Given that Indonesia is an archipelago country with its territory stretched over vast distances, the utilisation of hydro-informatics such as IT, drone, and Earth observations to assist with collecting data, including watershed conditions and disaster risk reduction measures for precise and real-time water resources management data support, would improve the country's ability to manage its water resources (see **Recommendation 10**).

In terms of DRR, BNPB runs the Indonesian **National Disaster Data Information database**.²⁸

Management and decision-making

There appear to be **major gaps** in the tools, systems, and instruments that would support the use of evidence about climate change in decision-making. For example, in principle, mechanisms exist for adjusting water allocations annually, which is important to manage conflict and trade-offs in the face of climate variability and change. River basin organisations are responsible for preparing water allocation plans each year, but limited human resources mean that these are either not prepared or are not approved by the authorities. Cities, meanwhile, have not incorporated consideration of climate risk sufficiently in their planning and regulation mechanisms, i.e. urban design and building permit and compliance procedures (see **Recommendation 5**).^{4, 21}

DRR systems have seen greater progress, with all 34 provinces and 118 districts (30% of the total) developing DRR plans, which are reportedly used to inform RPJMDs. Given that much of Indonesia is exposed to a range of hazards including earthquakes, volcanic eruptions, and tsunamis as well as water-related disasters, multi-threat early warning systems have been installed in 58 locations. Nonetheless, the Third National Communication identified a continued need to strengthen early warning systems in urban areas, which was also affirmed by a 2019 review by the World Bank.^{8, 28}

Underlying barriers and enablers

The main **barriers** to implementation include:

- inadequate technical capacity, especially at more local levels
- limited provision and communication of decision-relevant information (Indonesia's Third National Communication noted a general lack of "climate change literacy")
- multiple institutional challenges: at the city level, for example, transparency and coordination between the different responsible agencies around information on disaster risk need to be improved.^{10, 28}

Despite these barriers, there are some positive **developments**:

- Community-based mechanisms for information sharing have been shown to support preparedness for water-related disasters, for example in evacuating Bima City ahead of flash floods in 2016, which caused 1 trillion rupiah in damage (circa US\$70 million).
- Supportive frameworks and institutional infrastructure for DRR now include:
 - an enabling framework for disaster risk reduction (consisting of the Law on Disaster Management and the Law on Spatial Planning, among others)
 - the establishment of the National Board for Disaster Management (BNPB) in 2008.²⁸

FINANCES

How ready is Indonesia to finance water-related climate action?

Indonesia has a track record of investing its development partners' and its own resources in climate action, though much of this has gone to mitigation. Indonesia is improving the coherence of climate finance through multiple initiatives that bridge traditional financing schemes (such as multilateral grants and government financing) and innovative financial mechanisms (such as the blended finance fund, SDG Indonesia One). As yet, comprehensive estimates of the water-related investments that are needed to meet low-carbon, climate-resilient development objectives have not been identified. The information on available finance from across the many different sources – public and private, national, and international – is also variable. Nonetheless, to improve its readiness to attract climate finance, Indonesia's government has launched initiatives to improve mapping and tracking of climate finance. A country programme developed for the Green Climate Fund also sets out a broad investment pipeline, including water-related projects, albeit at a high level. Cities play a vital role in investment and implementation and have a high degree of autonomy over what they spend money on. Encouraging them to finance water management for climate-resilient urban development is vital but will depend on local political processes.

Climate-related financing needs and commitments

This review was unable to identify the specific costs associated with water-related climate actions, or the trends in funding from different sources going to meet these costs. The information that is available, however, suggests that spending on water-focused climate activities is likely to be low compared to the need. The Third National Communication includes an estimate of total funding need for climate change adaptation of **US\$64 billion**, which is far higher than that for mitigation (**US\$17 billion**), although to this point, funding has predominantly gone towards mitigation efforts. Water-specific estimates were not identified, and in general much more information appears to be available for mitigation-related investment needs. The Third National Communication also notes that no data was identified on the specific costs to implement the RAN-API.¹⁰

Looking to availability of finance, the following table summarises **water-specific estimates** that can be made for international public climate finance (albeit for different time periods ranging from 2011 to 2019, reflecting the availability of verified data).

The government also makes a significant contribution from the public budget for climate finance: **US\$826 million** in 2018 with the majority going to mitigation, especially in railway infrastructure, but with a significant amount for dam construction, the number one expense on the adaptation side.⁶

With the 2015–2019 RPJMN, the Indonesian government acknowledged what the World Bank has referred to as a “**persistent infrastructure gap**” facing the country.⁽²⁷⁾ The government allocated over US\$15 billion from the national state budgets between 2015 and 2019 to be spent on water resources infrastructure (see text box). In the 2020–2024 RPJMN, these developments will continue, with a focus on coastal and flood protection infrastructure, including soil and water conservation measures, and additional multipurpose dams to meet irrigation and hydropower needs, among others.

City governments are also expected to make contributions – from transfers from the national government and from their own revenue – towards mitigation and adaptation, and towards some key water-related functions, especially drinking water supply. At both national and city levels, estimates of domestic spending on water-focused climate activities were not identified. A 2017 study found that for drinking water, spending by national, provincial, and district governments was generally rising in the decade to 2013. However, based on this trend it is insufficient to achieve the government's targets for universal access – and the estimated need is unlikely to include the cost of making water services climate resilient.²⁶

Planned water resources infrastructure (2015–2019):

- new irrigation schemes
- rehabilitation of existing irrigation schemes
- flood control infrastructure
- large multipurpose reservoirs
- wastewater treatment works
- small reservoirs.

INTERNATIONAL PUBLIC CLIMATE FINANCE

US\$651 million

Indonesia has received US\$651 million in climate finance from **multilateral climate funds**, as of February 2019, with the majority allocated to mitigation activities in the energy and forest sectors.

US\$186 million has been **disbursed**.

< 1% was allocated to **water**-focused activities (including water policy and water conservation, hydropower, agricultural water resources).⁵

US\$7.7 billion

Between 2012 and 2017, US\$7.7 billion was committed as **development finance** that was tagged by contributors as 'climate-related'.

\$1.1 billion

US\$1.1 billion, or **15%**, was earmarked for **water-focused activities**, the majority of which went to water resources infrastructure and management in agriculture.

Mitigation \$ = Adaptation \$ X 3

The financial contribution to **mitigation** activities increased significantly between 2011 and 2014, outstripping that for **adaptation** (which largely stayed level) **by a factor of three**.^{9,10}

Other sources include the private sector and households:

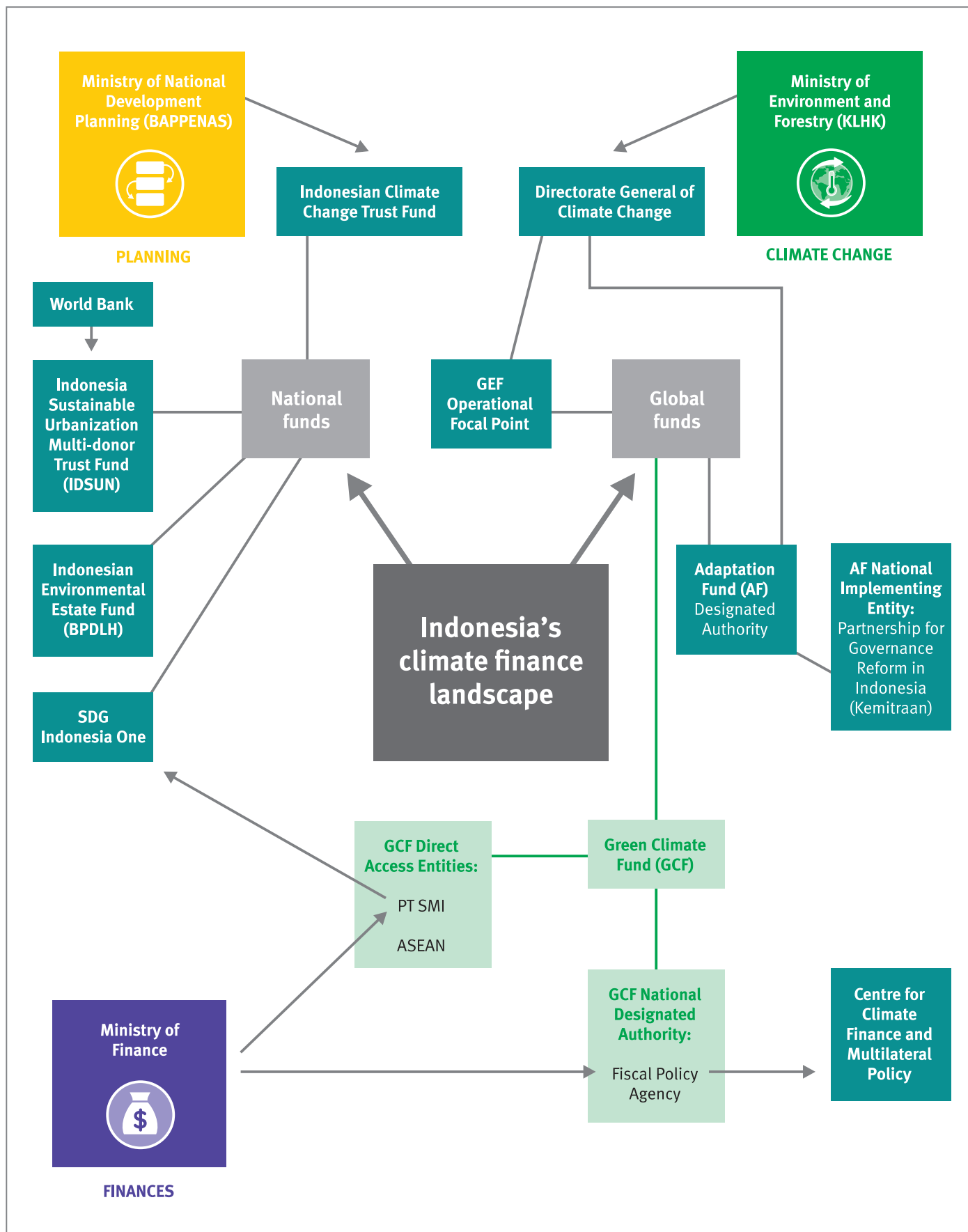
- The contribution of the private sector is unknown, but based on global estimates, it is more likely to go to mitigation activities such as renewable energy, where returns are higher.⁶
- Household out-of-pocket expenditure is estimated to be around a third of total expenditure on water supply, but most other water services (including irrigation, flood management, and conservation) are funded from public budgets.^{4,26}

The institutional framework for climate finance

Indonesia has a diverse climate finance landscape (see diagram below), with a range of national funds overseen by different stakeholders in addition to access to global funds, such as the Green Climate Fund (GCF), the Adaptation Fund, and the Global Environment Facility (GEF). The national focal points/designated authorities for these funds are

split between the Fiscal Policy Agency (under the Ministry of Finance) and the Directorate General of Climate Change (under KLHK), requiring interdepartmental coordination (see **Recommendation 7**). The GCF Direct Access Entities for Indonesia are limited to the Association of Southeast Asian Nations, at the regional level, and PT SMI, which is a state-owned enterprise mandated to accelerate infrastructure development and to support the implementation of public-private partnerships (PPPs).^{8,13}

INDONESIA'S FINANCE INSTITUTIONS RELATED TO WATER AND CLIMATE CHANGE



Underlying barriers and enablers

Indonesia has taken important steps to enable more effective and efficient spending on climate priorities:

- It established the Indonesia **Climate Change Trust Fund (ICCTF)** in 2009, anchored in Bappenas, as the first national trust fund to seek funding from multiple donors for climate change policies and programmes.¹⁴
- **Climate finance mapping and budget tracking and marking** has been initiated to help understand the diversity of finance sources and destinations.⁹
- On adaptation, **development of the RAN-API** coincided with inclusion of climate change as a top priority in the State Budget, reflecting its prioritisation in the 2014 development work plan, the 2010–2014 RPJMN, and the subsequent 2015–2019 RPJMN.²⁴

A further innovation is the **SDG Indonesia One** fund, which is a blended finance fund that aims to stimulate catalytic funding from the private sector as a means of mobilising funds for development. This fund combines public and private funds through blended finance schemes to be channelled into infrastructure projects related to the achievement of the SDGs. A key objective is to raise funding from investors, donors, and philanthropists to tackle sustainability issues in Indonesia, including climate change. The fund is implemented by PT SMI, with the support of the Ministry of Finance, and initial funding via the Green Climate Fund (GCF), among others.⁸

The prospect of securing significant international climate finance from the **GCF** saw the Fiscal Policy Agency of the Ministry of Finance set out a **GCF Country Programme**, which provides strategic direction to entities developing proposals for Indonesia to submit to the GCF, so that they align with Indonesia's strategic priorities. Water features strongly both *within* and *across* the four priority areas of the country programme: (1) adaptation; (2) livelihoods of people and communities; (3) infrastructure and built environment; (4) ecosystems.⁹

Water and wastewater management are also mentioned among examples of core activities for climate change mitigation in the forestry/peatland and waste sectors, respectively. A new agency, the **Indonesian Environmental Estate Fund (BPDH)**, was also launched in October 2019 to manage environmental funds from domestic and international sources and direct them to environmental (including climate-related) initiatives. It was unclear at the time of publishing this document whether BPDH has received or disbursed any funds.^{2,9}

Some of these efforts help address **the barriers and challenges identified for climate finance** in the Third National Communication, for example the lack of a country programme and project pipeline. Others are likely to persist, including:

- **limitations in the governance and coherence** of different climate funds
- the fact that **the costs of replacing or restoring public infrastructure and private housing**, most of which is uninsured, places a significant burden on public expenditure
- a lack of capacity for (1) developing projects and (2) managing data on climate finance to improve transparency (e.g. despite the budget tracking initiatives, data on private climate finance is lacking, and there are inconsistencies in how the climate marking is applied by different public entities) (see **Recommendations 6 and 7**).^{9, 10, 27}

The barriers also arise at the subnational level, where climate policy and investment still need to be implemented. A key concern is the lack of prioritisation and capacity for water-focused spending at the city level, for example on climate-resilient water supply or DRR (see **Recommendations 2, 3, and 4**). Most transfers to local governments are not earmarked, so it is important that mayors adequately grasp climate risks to be able to prioritise these issues. This is part of the rationale behind the **World Bank-funded National Urban Development Project**, which aims to support climate change adaptation by improving risk analysis, land-use planning, and infrastructure development, including at the local level, and which manages an additional fund, the Indonesia Sustainable Urbanization Multi-Donor Trust Fund (IDSUN).^{26, 27}

Finally, **COVID-19** is forcing governments to re-prioritise financing, often away from environmental spending. As of early 2021, Indonesian public funds allocated to renewable energy projects, for example, had decreased by over 40% relative to their 2018/2019 spending levels, while fossil fuel companies were benefiting from recovery-related subsidies. The value of water-based climate adaptation projects and programmes will, therefore, need to be continually reasserted going forward. Re-framing the importance of water resources for sustainable development in the context of climate change – including its integral role in enhanced hygiene practices to safeguard against COVID-19 – is necessary, to avoid limiting the value of water solely to environmental terms (see **Recommendation 8**).¹³

REFERENCES

- 1 Andoko, E., Sjöebloom, A. and Liu, W.-Y. (2020) Integrating Indonesian Agriculture in Sectoral and National Adaptation Planning to Combat Climate Change. *AFFTC Agricultural Policy Platform*, 1–10. Available at: <https://www.researchgate.net/publication/346033841>
- 2 Archer, D., Monteith, W. Scott, H. and Gawler, S. (2017) *Developing city resilience strategies: lessons from ICLEI and ACCCRN*. International Institute for Environment and Development. Available at: <https://pubs.iied.org/10816IIED/>
- 3 Asian Development Bank (2017) *Indonesia: Implementing Effective Climate Change Adaptation Policy*. Completion Report. ADB. Available at: <https://www.adb.org/sites/default/files/project-documents/45064/45064-001-tcr.pdf>
- 4 Asian Development Bank (2016) *Indonesia: Country Water Assessment*. ADB. Available at: <https://www.adb.org/sites/default/files/institutional-document/183339/ino-water-assessment.pdf>
- 5 Climate Funds Update (2019) Available at: www.climatefundsupdate.org
- 6 Government of Indonesia (2018) *Public Finance for Climate Change in Indonesia, 2016–2018*. Fiscal Policy Agency, Ministry of Finance.
- 7 Government of Indonesia (2019) *Low Carbon Development: A Paradigm Shift Towards a Green Economy in Indonesia*, p.133. Full Report. Ministry of National Development Planning (Bappenas). Available at: https://www.greengrowthknowledge.org/sites/default/files/downloads/policy-database/indonesia_lowcarbon_development_full%20report.pdf
- 8 Government of Indonesia (2019) *Voluntary National Reviews. Empowering People and Ensuring Inclusiveness and Equality*. Republic of Indonesia.
- 9 Government of Indonesia (2018) *Indonesia's Green Climate Fund Country Programme*. Fiscal Policy Agency, Ministry of Finance. Available at: https://www.greenclimate.fund/documents/20182/1688867/Indonesia_Country_Programme.pdf/8b30089d-d07a-02ff-394f-62bb1f1bde10
- 10 Government of Indonesia (2018) *Third National Communication under the United Nations Framework Convention on Climate Change*. Ministry of Environment and Forestry, Republic of Indonesia.
- 11 Government of Indonesia (2016) *First Nationally Determined Contribution*. Republic of Indonesia.
- 12 Government of Indonesia (2014) *Rencana Aksi Nasional Adaptasi Perubahan Iklim (RAN-API)*. Republic of Indonesia
- 13 Green Climate Fund (GCF) (2021) *ASEAN Catalytic Green Finance Facility (ACGF): Green Recovery Program*. Funding Proposal FP156. 6 April 2021.
- 14 Halimanjaya, A., Nakhoda, S. and Barnard, S. (2014) *The effectiveness of climate finance: a review of the Indonesia Climate Change Trust Fund*. The Overseas Development Institute. Available at: <https://odi.org/en/publications/the-effectiveness-of-climate-finance-a-review-of-the-indonesia-climate-change-trust-fund/>
- 15 Hutfilter, U., Zimmer, A., Saeed, F., Hare, B., Aboumahboub, T., Kelischek, I., Schleussner, C.-F., Parra, P.Y., Ancygier, A., Brecha, R., Granadillos, J., Ganti, G., Vyas, R. and Schaeffer, M. (2019) *Decarbonising South and South East Asia*. Available at: <https://climateanalytics.org/publications/2019/decarbonising-south-and-south-east-asia/>
- 16 Ministry of Energy and Mineral Resources (2011) *Project for the Master Plan Study of Hydropower Development in Indonesia: Final Report*. Available at: http://open_jicareport.jica.go.jp/pdf/12037610.pdf
- 17 Pambudi, A.S. (2019) Watershed Management in Indonesia: A Regulation, Institution, and Policy Review. *The Indonesian Journal of Development Planning*, **3**(2): 185–202.
- 18 PT SMI (Persero) (2020) Public-Private Solution Sandbox: SDG Indonesia One–Blended Finance Platform. Presentation by Fakhru Afua at AVPN Virtual Conference, June 2020. Available at: <https://avpn.asia/wp-content/uploads/2020/06/Public-Private-Solutions-Sandbox-PT-SMI-Presentation-Download.pdf>
- 19 Radhika, N., Hatmoko, W. and Firmansyah, R. (2017) Computation of Surface Water Availability in Indonesia Based on Satellite Data. *Jurnal Sumber Daya Air*, **13**(2): 115–130.
- 20 APIK Indonesia (2018) *Discussion on Policy and Strategy of Climate Change Adaptation National Action Plan for Mid-Term Development Plan (RPJMN) 2020–2024*. Website article, 26 June 2019.
- 21 Roberts, M., Sander, F.G. and Tiwari, S. (Eds) (2019) *Time to ACT: Realizing Indonesia's Urban Potential*. World Bank, Washington, DC. Available at: <https://doi.org/10.1596/978-1-4648-1389-4>
- 22 Sadoff, C. and Muller, M. (2009) *Water Management, Water Security and Climate Change Adaptation: Early Impacts and Essential Responses*. Global Water Partnership TEC Background Paper No. 14. Available at: <https://www.gwp.org/globalassets/global/toolbox/publications/background-papers/14-water-management-water-security-and-climate-change-adaptation-early-impacts-and-essential-responses-2009-english.pdf>

²³ The Jakarta Post (2021) “Still waiting: Indonesian environmental fund yet to receive or disburse money”, 9 February 2021. Available at: <https://www.thejakartapost.com/news/2021/02/09/still-waiting-indonesian-environmental-fund-yet-to-receive-or-disburse-money.html>

²⁴ UNFCCC Adaptation Committee (2014) *Institutional arrangements for national adaptation planning and implementation*. 2014 Thematic Report. United Nations Climate Change Secretariat. Available at: https://unfccc.int/files/adaptation/application/pdf/adaption_committee_publication_-_web_low.pdf

²⁵ USAID (2017) *Climate Risk Profile: Indonesia*. Adaptation Thought Leadership and Assessments (ATLAS), funded by United States Agency for International Development (USAID).

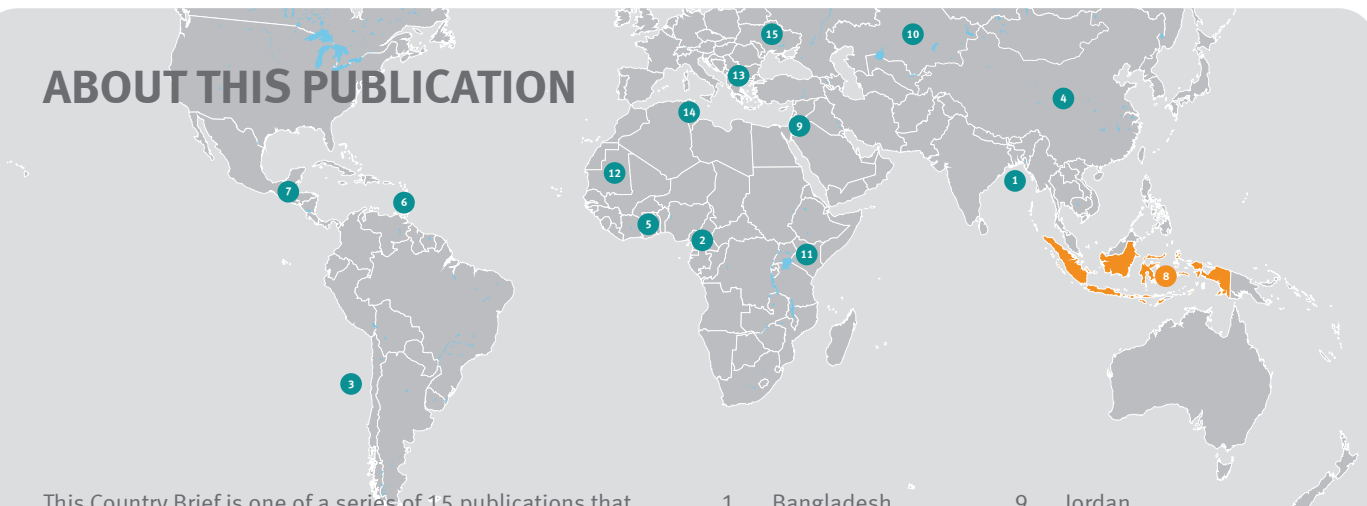
²⁶ World Bank (2017) *Improving Service Levels and Impact on the Poor: A Diagnostic of Water Supply, Sanitation, Hygiene, and Poverty in Indonesia*. WASH Poverty Diagnostic. World Bank. Available at: <https://openknowledge.worldbank.org/handle/10986/28505>

²⁷ World Bank (2019a) *Indonesia–National Urban Development Project*. World Bank Group. Available at: <http://documents.worldbank.org/curated/en/385841559235504323/Indonesia-National-Urban-Development-Project>

²⁸ World Bank (2019b) *Strengthening the Disaster Resilience of Indonesian Cities: A Policy Note*. Background Paper to the Urbanization Flagship Report (Time to ACT: Realizing Indonesia’s Urban Potential). World Bank Group, Washington, DC. Available at: <http://documents.worldbank.org/curated/en/748581569515561529/Strengthening-the-Disaster-Resilience-of-Indonesian-Cities-A-Policy-Note>

²⁹ Republic of Indonesia (2021) *Updated Nationally Determined Contribution*. Available at: <https://unfccc.int/sites/default/files/NDC/2022-06/Updated%20NDC%20Indonesia%202021%20-%20corrected%20version.pdf>

ABOUT THIS PUBLICATION



This Country Brief is one of a series of 15 publications that explores how integrated water resources management at a country level contributes to climate resilience and sustainable development, as well as meeting the commitments under the Paris Agreement and achieving the Sustainable Development Goals (SDGs).

The full synthesis report, *The Untold Story of Water in Climate Adaptation. Part II. 15 Countries Speak*, of the work undertaken in all 15 countries is available at www.gwp.org.

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