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R2019-0262/1

November 18, 2019

**Closing Date: Wednesday, November 27, 2019
at 6:00 p.m.**

FROM: Vice President and Corporate Secretary

Indonesia - Disaster Resilience Initiatives Project (IDRIP)

Project Appraisal Document

Attached is the Project Appraisal Document regarding a proposed loan to Indonesia for a Disaster Resilience Initiatives Project (IDRIP) (R2019-0262), which is being processed on an absence-of-objection basis.

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Report No: PAD3355

INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT

PROJECT APPRAISAL DOCUMENT

ON A

PROPOSED LOAN

IN THE AMOUNT OF US\$160 MILLION

TO THE

REPUBLIC OF INDONESIA

FOR THE

INDONESIA DISASTER RESILIENCE INITIATIVES PROJECT

November 18, 2019

Urban, Disaster Risk Management, Resilience and Land Global Practice
East Asia And Pacific Region

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CURRENCY EQUIVALENTS

Exchange Rate Effective October 31, 2019

Currency Unit = Indonesian Rupiah (IDR)

US\$1.00= IDR14,037

FISCAL YEAR

January 1 - December 31

Regional Vice President: Victoria Kwakwa

Country Director: Rodrigo Chaves

Regional Director: Benoit Bosquet

Practice Manager: Abhas Kumar Jha

Task Team Leaders: Jolanta Kryspin-Watson, Marcus Lee, Jian Vun

ACRONYMS

ADB	Asian Development Bank
ASEAN	Association of Southeast Asian Nations
BAPPENAS	<i>Badan Perencanaan Pembangunan Nasional</i> (Ministry of National Development Planning/National Development Planning Agency)
BAPPEDA	<i>Badan Perencanaan Pembangunan Daerah</i> (Subnational Development Planning Agency)
BG-EDSM	<i>Badan Geologi – Kementerian Energi dan Sumber Daya Mineral</i> (Geological Agency – Ministry of Energy and Mineral Resources)
BIG	<i>Badan Informasi Geospasial</i> (Geospatial Information Agency)
BMKG	<i>Badan Meteorologi, Klimatologi, dan Geofisika</i> (Indonesian Agency for Meteorology, Climatology, and Geophysics)
BNPB	<i>Badan Nasional Penanggulangan Bencana</i> (National Disaster Management Authority)
BPBD	<i>Badan Penanggulangan Bencana Daerah</i> (Subnational Disaster Management Agency)
BPK	<i>Badan Pemeriksa Keuangan</i> (The Audit Board of the Republic of Indonesia)
CBA	Cost-Benefit Analysis
CPF	Country Partnership Framework (World Bank)
CPMU	Central Project Management Unit
CSRRP	Central Sulawesi Rehabilitation and Reconstruction Project
DA	Designated Account
DAK	<i>Dana Alokasi Khusus</i> (Special Allocation Fund)
DALY	Disability Adjusted Life Years
DED	Detailed Engineering Design
DG	Directorate-General
DIPA	<i>Daftar Isian Pelaksanaan Anggaran</i> (Budget Implementation List)
DRM	Disaster Risk Management
EA	Executing Agency
EOC	Emergency Operations Center
ESCP	Environmental and Social Commitment Plan
ESF	Environmental and Social Framework
ESMF	Environmental and Social Management Framework
ESRS	Environmental and Social Review Summary
ESS	Environmental and Social Standard
FM	Financial Management
FMC	Financial Management Consultant
GBV	Gender-based Violence
GDP	Gross Domestic Product
GHG	Greenhouse Gas
Gol	Government of Indonesia
GRM	Grievance Redress Mechanism
IBRD	International Bank for Reconstruction and Development
ICR	Implementation Completion and Results Report
IDRAR	Indonesia Disaster Resilience and Reconstruction Program
IDRIP	Indonesia Disaster Resilience Initiatives Project
IFR	Interim unaudited Financial Reports
IPF	Investment Project Financing
IRR	Internal Rate of Return

NSUP	National Slum Upgrading Project
KPPN	<i>Kantor Pelayanan Perbendaharaan Negara</i> (State Treasury Office)
LG	Local Government
LKPP	<i>Lembaga Kebijakan Pengadaan Jasa Pemerintah</i> (National Public Procurement Agency)
LULUCF	Land Use, Land Use Change, and Forestry
M&E	Monitoring and Evaluation
MHEWS	Multi-Hazard Early Warning System
MOEC	Ministry of Education and Culture
MOF	Ministry of Finance
MOH	Ministry of Health
MTR	Mid-term Review
NDC	Nationally Determined Contributions
NGO	Non-Government Organization
NPV	Net Present Value
NTB	<i>Nusa Tenggara Barat</i> (West Nusa Tenggara)
OHS	Occupational Health and Safety
O&M	Operations and Maintenance
PAMSIMAS	<i>Penyediaan Air Minum dan Sanitasi Berbasis Masyarakat</i> (National Rural Water Supply and Sanitation Project)
PDO	Project Development Objective
PID	Project Information Document
PIUs	Project Implementation Units
POM	Project Operations Manual
PPK	<i>Pejabat Pembuat Komitmen</i> (Commitment-making Official)
PPSD	Project Procurement Strategy for Development
PUPR	<i>Kementerian Pekerjaan Umum dan Perumahan Rakyat</i> (Ministry of Public Works and Housing)
QCBS	Quality and Cost Based Selection
RGDP	Real Gross Domestic Product
RPJMD	<i>Rencana Pembangunan Jangka Menengah Daerah</i> (Subnational Medium-Term Development Plan)
RPJMN	<i>Rencana Pembangunan Jangka Menengah Nasional</i> (National Medium-Term Development Plan)
SEP	Stakeholder Engagement Plan
SLR	Sea level rise
SOPs	Standard Operating Procedures
SP2D	<i>Surat Perintah Pencairan Dana</i> (Payment Remittance Orders)
SPM	<i>Surat Perintah Membayar</i> (Payment Order)
SPP	<i>Surat Permintaan Pembayaran</i> (Payment Request)
SPSE	<i>Sistem Pengadaan Secara Elektronik</i> (GoI's e-procurement system)
STEP	Systematic Tracking of Exchanges in Procurement
UKPBJ	<i>Unit Kerja Pengadaan Barang/Jasa Pemerintah</i> (Government Goods / Services Procurement Unit)
UNDP	United Nations Development Program
UNFPA	United Nations Population Fund
VSL	Value of a Statistical Life



TABLE OF CONTENTS

DATASHEET	1
I. STRATEGIC CONTEXT	6
A. Country Context.....	6
B. Situations of Urgent Need of Assistance or Capacity Constraints.....	7
C. Sectoral and Institutional Context	9
D. Relevance to Higher Level Objectives	12
II. PROJECT DESCRIPTION.....	14
A. Project Development Objective	14
B. Project Components	14
C. Project Financing	17
D. Project Beneficiaries.....	18
E. Results Chain.....	18
G. Lessons Learned and Reflected in the Project Design.....	20
III. IMPLEMENTATION ARRANGEMENTS	21
A. Institutional and Implementation Arrangements	21
B. Results Monitoring and Evaluation Arrangements.....	22
C. Sustainability.....	22
IV. PROJECT APPRAISAL SUMMARY	22
A. Technical, Economic and Financial Analysis	22
B. Fiduciary.....	23
C. Legal Operational Policies.....	25
D. Environmental and Social.....	26
E. Gender	29
F. Climate Change	30
V. GRIEVANCE REDRESS SERVICES	30
VI. KEY RISKS	31
VII. RESULTS FRAMEWORK AND MONITORING	33
ANNEX 1: Implementation Arrangements and Support Plan	39
ANNEX 2: Detailed Project Description	46
ANNEX 3: Economic Analysis.....	53
ANNEX 4: Gender Analysis	58
ANNEX 5: Climate Change Analysis.....	61
ANNEX 6: Map	63



DATASHEET

BASIC INFORMATION

Country(ies)	Project Name		
Indonesia	Indonesia Disaster Resilience Initiatives Project		
Project ID	Financing Instrument	Environmental and Social Risk Classification	Process
P170874	Investment Project Financing	Moderate	Urgent Need or Capacity Constraints (FCC)

Financing & Implementation Modalities

☐ Multiphase Programmatic Approach (MPA)	☐ Contingent Emergency Response Component (CERC)
☐ Series of Projects (SOP)	☐ Fragile State(s)
☐ Disbursement-linked Indicators (DLIs)	☐ Small State(s)
☐ Financial Intermediaries (FI)	☐ Fragile within a non-fragile Country
☐ Project-Based Guarantee	☐ Conflict
☐ Deferred Drawdown	☒ Responding to Natural or Man-made Disaster
☐ Alternate Procurement Arrangements (APA)	

Expected Approval Date	Expected Closing Date
27-Nov-2019	31-Dec-2024
Bank/IFC Collaboration	
No	

Proposed Development Objective(s)

To improve the preparedness of the central government and selected local governments for natural hazards.

**Components**

Component Name	Cost (US\$, millions)
Component 1. Disaster preparedness and emergency management capacity	70.00
Component 2 Geophysical early warning services	85.00
Component 3 Project implementation support	5.00

Organizations

Borrower:	Republic of Indonesia
Implementing Agency:	National Disaster Management Authority Indonesian Agency for Meteorology, Climatology and Geophysics

PROJECT FINANCING DATA (US\$, Millions)**SUMMARY**

Total Project Cost	160.00
Total Financing	160.00
of which IBRD/IDA	160.00
Financing Gap	0.00

DETAILS**World Bank Group Financing**

International Bank for Reconstruction and Development (IBRD)	160.00
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Expected Disbursements (in US\$, Millions)

WB Fiscal Year	2019	2020	2021	2022	2023	2024	2025
Annual	0.00	3.50	10.00	20.00	35.00	55.00	36.50
Cumulative	0.00	3.50	13.50	33.50	68.50	123.50	160.00

**INSTITUTIONAL DATA****Practice Area (Lead)**

Urban, Disaster Risk Management, Resilience and Land Global Practice

Contributing Practice Areas**Climate Change and Disaster Screening**

This operation has been screened for short and long-term climate change and disaster risks

Gender Tag**Does the project plan to undertake any of the following?**

a. Analysis to identify Project-relevant gaps between males and females, especially in light of country gaps identified through SCD and CPF	Yes
b. Specific action(s) to address the gender gaps identified in (a) and/or to improve women or men's empowerment	Yes
c. Include Indicators in results framework to monitor outcomes from actions identified in (b)	Yes

SYSTEMATIC OPERATIONS RISK-RATING TOOL (SORT)

Risk Category	Rating
1. Political and Governance	Moderate
2. Macroeconomic	Low
3. Sector Strategies and Policies	Moderate
4. Technical Design of Project or Program	Substantial
5. Institutional Capacity for Implementation and Sustainability	Substantial
6. Fiduciary	Substantial
7. Environment and Social	Moderate
8. Stakeholders	Moderate
9. Other	
10. Overall	Substantial



COMPLIANCE

Policy

Does the project depart from the CPF in content or in other significant respects?

☐ Yes ☒ No

Does the project require any waivers of Bank policies?

☐ Yes ☒ No

Environmental and Social Standards Relevance Given its Context at the Time of Appraisal

E & S Standards	Relevance
Assessment and Management of Environmental and Social Risks and Impacts	Relevant
Stakeholder Engagement and Information Disclosure	Relevant
Labor and Working Conditions	Relevant
Resource Efficiency and Pollution Prevention and Management	Relevant
Community Health and Safety	Relevant
Land Acquisition, Restrictions on Land Use and Involuntary Resettlement	Relevant
Biodiversity Conservation and Sustainable Management of Living Natural Resources	Not Currently Relevant
Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities	Relevant
Cultural Heritage	Relevant
Financial Intermediaries	Not Currently Relevant

NOTE: For further information regarding the World Bank's due diligence assessment of the Project's potential environmental and social risks and impacts, please refer to the Project's Appraisal Environmental and Social Review Summary (ESRS).

Legal Covenants

Sections and Description



Schedule 2, Section I.A. 1(d) of the Loan Agreement

Not later than four months after Effective Date, establish and thereafter maintain the Technical Advisory Committee under the terms of reference acceptable to the Bank to be responsible for *inter alia* reviewing and advising on the Project's technical designs, outputs and findings.

Sections and Description

Schedule 2, Section II.1 of the Loan Agreement

The Borrower shall furnish to the Bank each Project Report not later than forty-five (45) days after the end of each calendar year, covering the calendar year.

Sections and Description

Schedule 2, Section II.2 of the Loan Agreement

No later than thirty (30) months after Effective Date, the Borrower shall, in conjunction with the Bank, carry out a mid-term review of the Project (the "Mid-term Review"), covering the progress achieved in the implementation of the Project.

Conditions

Type Effectiveness	Description Loan Agreement, Article IV, Section 4.01(a) The Borrower has adopted the Project Operations Manual in form and substance satisfactory to the Bank.
Type Effectiveness	Description Loan Agreement, Article IV, Section 4.01(b) The Borrower has established the Steering Committee with composition, terms of reference and resources satisfactory to the Bank.



I. STRATEGIC CONTEXT

A. Country Context

1. **Indonesia has seen impressive growth and a large reduction in poverty over the past two decades.** Since 1950, the average Gross Domestic Product (GDP) per capita has increased almost nine-fold in real terms.¹ The percentage of poor and vulnerable people in the population decreased from 54 percent in 2001 to 31 percent in 2017. The official poverty rate, based on the national poverty line, reduced to 9.8 percent in March 2018, or 26 million poor people in absolute terms.² Poverty reduction has been driven by strong and steady economic growth since the economic low of the Asian Financial Crisis from 1997 to 1998, along with solid job creation in cities as labor shifted from agriculture to services. Whilst growth is projected to be stable in coming years, with Indonesia continuing in its development path as a middle-income country, the pace of progress has been uneven across different regions, with rising inequalities. In addition, while poverty has declined, many Indonesians remain highly vulnerable to external shocks, living just above the poverty line. Though poverty is more prevalent in rural areas, the share of poverty in urban areas is increasing, reaching 38.1 percent in March 2018, linked to ongoing urbanization processes.³

2. **At the same time, Indonesia is one of the most disaster-prone countries in the world and exposed to a range of natural hazards that can hinder development outcomes, affecting its people and the economy.** Located in the Pacific Ring of Fire with 127 active volcanoes across the archipelago nation, Indonesia experiences frequent earthquakes and tsunamis, as well as floods. Disaster events have caused significant human and economic losses in the country. Just between 2007 and 2018, recorded disaster events caused the loss of 7,375 lives,⁴ with annual economic losses of approximately US\$2.2 to US\$3 billion.⁵ Earthquake risk is particularly high, with some 80 percent of the country located in earthquake-prone areas.⁶ It is expected that by 2055, approximately 64 percent of Indonesia's population will be living in earthquake hazard zones, up from 53 percent in 2016, with the largest increase in exposure across the Java island.⁷ Based on probabilistic loss models, there is a 2 percent chance each year of a significant earthquake event occurring that causes damages of approximately US\$1.3 billion.⁸ The poor and vulnerable often bear the brunt of disaster impacts as they tend to live in hazard areas, lack access to basic services, and have limited access to financial resources and assets to cope with aftermath losses.

3. **Indonesia's urbanization processes have been powerful drivers of economic growth and poverty reduction but can increase the vulnerability and exposure of its cities to natural hazards.**⁹ Greater mobility and connectivity across Indonesia has boosted the overall productive potential of the economy and created opportunities for greater prosperity. Urbanization trends indicate that urban populations will increase from almost 50 percent in 2010, to 66 percent in 2035, with some regions experiencing even faster growth rates. For example, in Central Sulawesi, the urban population is

¹ World Bank. 2019. *Urbanization Flagship Report: Time to Act – Realizing Indonesia's Urban Potential*.

² World Bank. 2018. *Indonesia Economic Quarterly. Urbanization For All*. September.

³ World Bank. 2018. *Indonesia Economic Quarterly. Urbanization For All*. September.

⁴ Based on EM-DAT 2018 and BNPB data.

⁵ National Disaster Management Authority, Head of Data and Information, 2018; and World Bank/GFDRR 2012. *Advancing disaster risk financing and insurance in ASEAN member states: Framework and options for implementation*. Among the ASEAN countries, Indonesia faces particularly high expected annual economic losses from floods and earthquakes.

⁶ National Disaster Management Authority, Director of Disaster Risk Reduction on Safe School Program, 2016.

⁷ World Bank. 2018. *Review and Analysis of Indonesian Cities' Exposure to Disaster Risk*.

⁸ World Bank. 2011. *Indonesia: Advancing a National Disaster Risk Financing Strategy – Options for Consideration*.

⁹ World Bank. 2018. *Indonesia Economic Quarterly. Urbanization For All*. September.



expected to grow from 24.3 percent in 2010 to an expected 43.1 percent in 2035.¹⁰ However, the concentration of people and assets can create disaster 'hotspots'. It is estimated that some 110 million people across 60 Indonesian cities, or 42 percent of the population, are exposed to natural hazards.¹¹ This number is expected to increase with continued urban population growth and associated transformation of the built and natural environment; observed increase of disaster events in the past 30 years; projected effects of climate change; and more widespread land subsidence. Where peak precipitation increases because of climate change and large-scale climate systems (such as El Niño), the risk of flooding is projected to be high or very high in several areas of the country including Sumatera, Java, Bali, Kalimantan, and Sulawesi.¹² Large-scale development, poor-quality infrastructure, lack of or insufficient risk-informed planning, projected sea level rise, changing precipitation patterns, and more intense storm events are expected to further increase urban disaster risk.

B. Situations of Urgent Need of Assistance or Capacity Constraints

4. **The natural disasters that Indonesia experienced in 2018 caused the most loss of life in over a decade, particularly as a result of three major catastrophic events.** First, in July and August 2018, West Nusa Tenggara (NTB) province suffered a series of major earthquakes, the most significant occurring on August 5, 2018 measuring magnitude (M)7.0, which affected the entire island's population of around 3.5 million, as well as thousands of tourists. The National Disaster Management Authority (BNPB) reported that the earthquakes caused 561 fatalities and displaced over 396,000 people,¹³ damaging almost 110,000 houses, 663 schools, 52 health facilities, 6 bridges, and many roads, causing approximately US\$854 million¹⁴ in damages and losses. Second, in September 2018, an (M)7.5 earthquake with an epicentre located 81 kilometres north of Palu City in Central Sulawesi caused strong ground shaking and tsunamis that damaged coastal settlements along Palu Bay. This disaster led to 4,402 fatalities¹⁵, approximately 170,000 displaced-people,¹⁶ and US\$1.3 billion¹⁷ in economic losses estimated at 13.7 percent of regional GDP.¹⁸ Third, in December 2018, the eruption and subsequent partial collapse of Anak Krakatau Volcano led to a tsunami that affected coastal settlements in Banten and Lampung provinces along Sunda Strait, causing 437 fatalities, and displacing almost 34,000 people.¹⁹ Major floods have also recently affected Indonesia including the 2019 floods in South Sulawesi, which caused an estimated 68 fatalities and displaced thousands; as well as the 2019 Jayapura flood and landslide, which caused an estimated 113 fatalities and displaced over 11,000 people.

5. **The series of catastrophic events in Central Sulawesi were cascading in nature, starting with the (M)7.5 main shock and followed by three near-field tsunamis.**²⁰ The strong ground shaking led to extensive ground deformation, liquefaction, and mudflows; as well as a submarine landslide which subsequently caused three near-field tsunamis with waves up to six meters height (amplified by the shallow bathymetry and narrowing gulf morphology). The first wave

¹⁰ United Nations Population Fund (UNFPA). 2014. *The 2010 – 2035 Indonesian Population Project – Understanding the Causes, Consequences and Policy Options for Population and Development*.

¹¹ Gunawan et al. 2015. *City Risk Diagnostic for Urban Resilience in Indonesia*.

¹² Government of Indonesia. 2013. *National Action Plan for Climate Change Adaptation (RAN API): Synthesis Report*.

¹³ Government of Indonesia. 2018. *NTB Rehabilitation and Reconstruction Action Plan. Executive Summary*.

¹⁴ Presentation of Coordination and Assistance Team for Post-Disaster Recovery and Redevelopment in Central Sulawesi and NTB.

¹⁵ United Nations Office for the Coordination of Humanitarian Affairs (UNOCHA). 2018. Update. December 20.

¹⁶ Central Sulawesi Center of Disaster Data and Information. 2019.

¹⁷ Government of Indonesia. 2018. *Master Plan for Central Sulawesi Rehabilitation and Reconstruction*, draft version 5.0.

¹⁸ Processed from estimated Central Sulawesi RGDP 2017 by National Statistical Bureau. 2018.

¹⁹ UNOCHA update, January 3, 2019. Tourism infrastructure sustained major damages include 92 hotels and 60 culinary stalls.

²⁰ A phenomenon following strong ground shaking from earthquakes in which the strength and stability of soil is reduced and causes significant ground deformations and mudflows. The phenomenon in Central Sulawesi was related to unconsolidated riverine deposits that built up as Palu City expanded southwards and towards the hills in the west and east. The Indonesian National Institute of Aeronautics and Space estimated that 1,045 buildings were destroyed in Balaroa; 2,050 buildings were destroyed in Petobo; and 366 buildings were destroyed in Jono Oge.



reached Palu City within six minutes of the earthquake. The severe ground shaking affected one city (*kota*) – Palu, and three regencies (*kabupaten*) – Donggala, Sigi, and Parigi Moutong; caused extensive damage to infrastructure, buildings, public assets, and agricultural land uses; and destroyed three residential neighbourhoods (Balaroa and Petobo in Palu, and Jono Oge in Sigi) due to the liquefaction processes. The severity of near-fault ground deformation and liquefaction was unprecedented on a global scale, and the loss of entire neighbourhoods and households has left profound impacts on the affected communities. The damages and losses associated with this disaster, along with the other two catastrophic events in NTB and Sunda Strait, 871 flood events, 614 landslides, and 35 earthquakes, have placed significant pressure on the Government's budgeting resources and emergency funds.

6. **Following the catastrophic events in 2018, the Government of Indonesia (GoI) requested a comprehensive package of support from the World Bank to address the urgent need for financial and technical assistance.** The package included: (i) technical assistance to support recovery activities and longer-term disaster resilience; (ii) immediate channelling of existing project financing to complement the Government's recovery program in housing, transport, water supply, and social protection sectors; and (iii) emergency recovery operations—to be prepared under accelerated procedures—to finance the rehabilitation, upgrading and reconstruction of critical public facilities and infrastructure in disaster-affected areas, as well as to strengthen disaster risk management systems across Indonesia. The two emergency operations are: (i) the Central Sulawesi Rehabilitation and Reconstruction Project (CSRRP, P169403) which will support targeted communities with reconstructed and strengthened housing and public facilities; and (ii) this Project, the Indonesia Disaster Resilience Initiatives Project (IDRIP, P170874). IDRIP will help restore damaged hazard monitoring and early warning equipment and improve the preparedness of the central government and selected local governments, including in the areas affected by the 2018 catastrophic events, for future natural hazards. These two projects will complement other rehabilitation and reconstruction efforts in Central Sulawesi, such as the recovery of public facilities, water resources infrastructure, solid waste management facilities, and transport infrastructure by other partners; permanent housing and livelihoods support activities by non-government organizations (NGOs) and other partners; and support to settlement infrastructure and roads rehabilitation through ongoing World Bank-financed investment projects.²¹ Beyond disaster-affected areas, the IDRIP will support resilience at the central-level, as well as identified high-risk areas.

7. **An inter-agency working group led by the Ministry of National Development Planning (Bappenas) developed the Central Sulawesi Earthquake and Tsunami Post-Disaster Recovery and Reconstruction Master Plan ("Master Plan") as a guiding document for the agreed policies and strategies for the recovery of disaster-affected areas.** The Master Plan highlights guidelines for spatial planning, infrastructure, housing, socioeconomic, and institutional recovery to be implemented as a gubernatorial regulation, guiding regional rehabilitation and reconstruction action plans. The CSRRP and IDRIP will support the reconstruction phase and will align with the Master Plan's vision to 'build back better' in affected areas of Central Sulawesi for better and safer livelihoods through: (i) resilient reconstruction of housing and settlement infrastructure; (ii) the reduction of future disaster risk through structural and non-structural strengthening of critical public facilities; and (iii) increasing community preparedness for future natural hazards, including the establishment of early warning systems. The design of public facilities would adhere to inclusive design principles outlined in the Master Plan, particularly through the incorporation of disability-inclusive, gender-sensitive, and climate-resilient design interventions. The Government's recovery program in Central Sulawesi involves various multilateral and bilateral development partners, NGOs, community organizations, and government line agencies.

²¹ In December 2018, the GoI requested the World Bank to trigger the contingency for disaster risk response component under the Western Indonesia National Road Improvement Project (WINRIP), allowing the rapid reallocation of project financing to support the rehabilitation and reconstruction of select damaged road sections in Palu and the regencies of Donggala and Sigi; as well as the contingent emergency response component under the National Slum Upgrading Project (NSUP/KOTAKU), allowing the rapid reallocation of project financing to support the construction of housing settlement infrastructure in new settlement areas and selected public facilities.



C. Sectoral and Institutional Context

8. Since the Indian Ocean earthquake and tsunami in 2004, the GoI has made considerable progress in improving laws and regulations, enhancing institutional capacity, and strengthening fiscal capacity related to its disaster risk management (DRM) systems. Law Number 24 of 2007 Concerning Disaster Management refined the roles and responsibilities of different line ministries, businesses, and international institutions related to DRM, shifting Indonesia's approach towards proactive disaster risk mitigation and preparedness. BNPB was established in 2008 through Presidential Regulation 8/2008 with a key goal to coordinate relevant line ministries and agencies responsible for activities at all stages of the DRM cycle: pre-disaster, during disaster, and post-disaster. Subnational local disaster management agencies (BPBDs) have been established in all 34 provinces and the majority of 514 cities and regencies (*kota* and *kabupaten*), in line with key principles outlined in the Sendai Framework for Disaster Risk Reduction²² to place ownership of DRM at the local level. In addition, Indonesia has made significant investments in its hydrometeorological and geophysical observation networks and early warning systems since 2004, becoming an Indian Ocean Tsunami Warning Services regional provider. The Ministry of Finance (MOF) also launched the National Disaster Risk Financing and Insurance Strategy in October 2018, complementing efforts that aim to mitigate the economic and fiscal impacts of disaster and climate-related shocks.²³

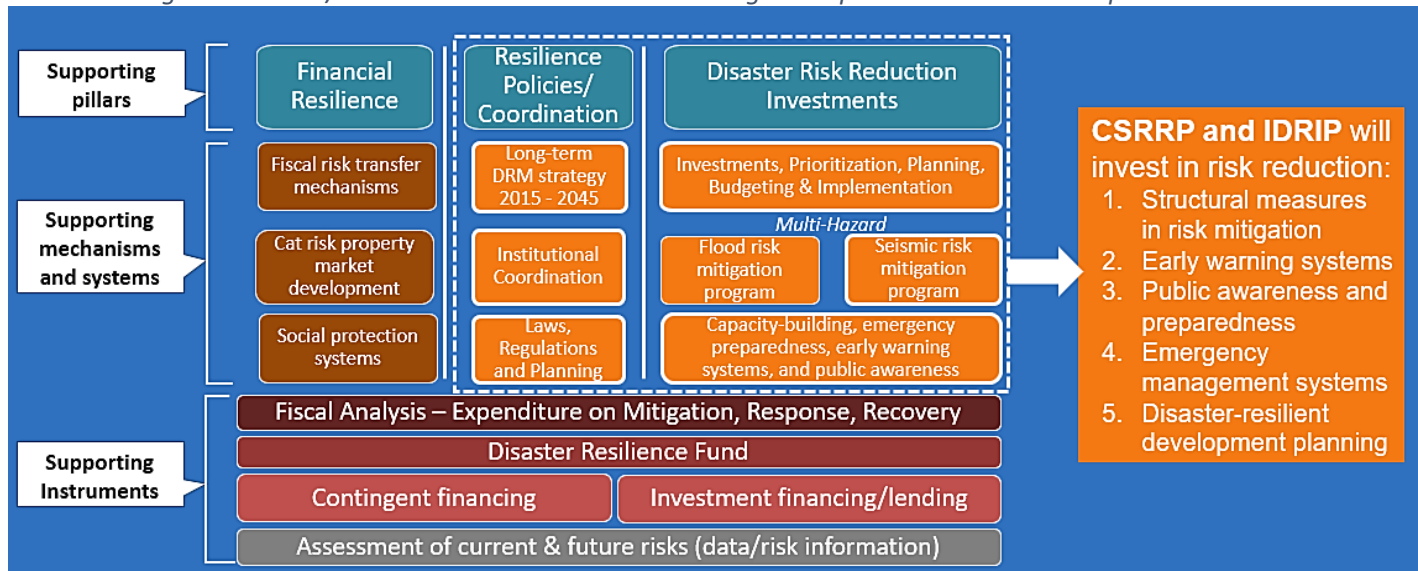
9. The GoI intends to develop the Indonesia Disaster Resilience and Reconstruction (IDRAR) program, a national platform with dual objectives: to strengthen Indonesia's disaster preparedness and emergency management systems; and enhance post-disaster rehabilitation and reconstruction programs. Indonesia's exposure to a multitude of natural hazards, large expanse, and geographic diversity necessitate accelerated investments in strategic high-risk priority areas, increased awareness and understanding of disaster risk, technological and technical innovation, and strengthened local capacity for disaster preparedness and emergency management. Recognizing these opportunities, the World Bank is working with the GoI on a comprehensive approach to strengthen Indonesia's resilience against disaster shocks (Figure 1). Key elements of this dialogue include financing instruments to reduce the budgetary cost of responding to and recovering from disasters; comprehensive DRM policy framework; and a combination of investments to reduce disaster impacts. Learning from recent disasters, the main priorities lie in five key areas: (i) investments in disaster risk reduction, including risk-informed development and spatial planning, seismic risk mitigation and urban flood risk management; (ii) public awareness and preparedness, including community-level contingency planning and disaster risk education; (iii) early warning systems capacities, including integrated monitoring networks, densification of instrumentation in high-risk areas, timely and more accurate impact-based forecasting and disaster warnings, and last-mile communication; (iv) emergency management capacity, particularly for local governments to be equipped adequately for rapid and reliable responses to multiple hazards; and (v) disaster-resilient development planning. The World Bank proposes to support Indonesia's efforts in disaster risk reduction with select investments in these areas through the two separate yet complementary projects—the CSRRP and the IDRIP—under the umbrella of the proposed IDRAR program, which will include other projects. Through this national program, and with support from project financing under CSRRP and IDRIP, the GoI will invest in initiatives such as disaster-resilient development planning, standardization of DRM procedures, knowledge management, and institutional capacity building.

²² The Sendai Framework for Disaster Risk Reduction is a 15-year non-binding international agreement that recognizes the importance of sharing the responsibility of reducing disaster risk with local government, the private sector, and other stakeholders.

²³ The World Bank is supporting the Ministry of Finance to implement the strategy including the proposed piloting of a public asset insurance scheme, developing a dedicated budgetary mechanism (pooling fund) to manage a budgetary allocation for disasters, and strengthening central-regional fiscal coordination and transfer mechanisms. Existing mechanisms that finance post-disaster activities include the On-Call Fund (*Dana Siap Pakai*), which provides rapid funding during a declared state of emergency; the Contingent Fund (*Dana Darurat*) as stipulated in the Government Regulation 44/2012; and the Special Allocation Fund (*Dana Alokasi Khusus*), which is often used in post disaster situations for the allocation of state budget to finance recovery of assets owned by subnational governments.



Figure 1. CSRRP/IDRIP contribution towards building a comprehensive DRM concept in Indonesia



10. **Apart from geophysical hazards, Indonesia is also highly vulnerable to hydrometeorological disasters, which are projected to increase with climate change.** Expected sea level rise, changing precipitation patterns, and more intense storms will increase disaster risks across Indonesian metropolitan and urban areas. Sea level rise could threaten 42 million Indonesians who live less than 10 meters above sea level. A 50-centimeter sea level rise, combined with land subsidence in Jakarta Bay, could permanently inundate densely-populated areas of Jakarta and Bekasi that house more than 270,000 residents.²⁴ Where peak precipitation increases because of climate change and large-scale interannual climate variability (such as El Niño), the risk of flooding is projected to be high to very high in several areas of the countries including Sumatra, Java, Bali, Kalimantan, and Sulawesi.²⁵ Cities are particularly vulnerable to increases in flood risks due to their high concentration of people and assets, as well as proximity to rivers and coasts. Accelerating levels of unregulated urbanization has shifted land-use change patterns, increased rates of deforestation, land subsidence, watershed degradation and increased disposal of solid waste in drains and rivers that contribute to flood risk. From 2002 to 2015, Indonesia suffered an average reported damage of US\$367 million annually due to flooding,²⁶ with a total of estimated US\$5.2 billion, discounting associated socioeconomic losses. This number is expected to increase, and an analysis of 92 cities across Indonesia indicate that the number of reported floods almost tripled from 50 to 146 from 2006 to 2017, respectively.²⁷ Following this trend, it is expected that by 2055, the number of Indonesians exposed to alluvial flood risk will increase by 75 percent when compared to exposure levels in 2015.

11. **The sheer scale of Indonesia, with over 17,000 islands, a population of over 250 million, a geographic diversity spread over 34 provinces and 514 districts, and the multiplicity of disaster risks, requires significant investments and long-term commitments to improve multi-hazard early warning systems (MHEWS).** Indonesia has 383 regencies and cities ranked as high on the disaster risk index, with almost half of its population living in hazard-prone areas; over 22 million people are exposed to high earthquake risk, with 3 million exposed to associated high tsunami risk; and 20.5 million

²⁴ Data from the Indonesia Dashboard (database), World Bank, Washington, DC (accessed August 14, 2018), http://sdwebx.worldbank.org/climateportalb/home.cfm?page=country_profile&CCode=IDN&ThisTab=NaturalHazards.

²⁵ Government of Indonesia, 2013. *National Action Plan for Climate Change Adaptation (RAN API): Synthesis Report*

²⁶ International Disaster Database EM-DAT, 2018.

²⁷ Data Informasi Bencana Indonesia (DIBI), 2018.



people settled in high flood risk, with 8.6 million people living in high landslide risk.²⁸ The establishment of a MHEWS platform in Indonesia is complex and would involve at least 13 central line agencies in upstream risk monitoring, downstream dissemination, and response. Several institutions are responsible for upstream hazard monitoring including meteorological and seismic monitoring by the Indonesian Agency for Meteorology, Climatology and Geophysics (BMKG); sea level monitoring by the Geospatial Information Agency (BIG); tsunami monitoring by the Technology Assessment and Application Agency (BPPT); monitoring of volcanic activities by the Geological Agency under the Ministry of Energy and Mineral Resources (BG-ESDM); and river flood monitoring by the Ministry of Public Works and Housing (PUPR). Although BMKG and BIG operate extensive hydrometeorological and geophysical observation networks and early warning services and have made significant investments since the Indian Ocean tsunami in 2004, seismic monitoring networks and stations are not yet fully operational. A variety of challenges exist including insufficient user information for decision-making, interoperability of instruments, and maintenance and technical capacity at the subnational levels. In addition, responsibilities are often split across multiple agencies at different levels of government, contributing to challenges related to ownership, coordination, regular maintenance, and operational efficiencies.

12. BNPB is the coordination agency of the MHEWS platform and convenes line ministries and agencies responsible for DRM efforts, providing public policy guidance and direction for disaster prevention, emergency response, and rehabilitation and reconstruction. BNPB is responsible for the dissemination of DRM information to the public, and for coordination of emergency response activities between provincial and district BPBDs, other Ministries, NGOs, and other non-state actors, and development/humanitarian international partners. BNPB's key strategies for 2015–2019 include development of a national early warning system, community disaster capacity development through a bottom-up approach and 'Resilient Villages' model, and improved logistics for local disaster management. It coordinates and provides support for 34 provincial BPBDs, and over approximately 400 district-level BPBDs. BNPB utilizes a national cluster/taskforce system, developed based on experience with the international cluster system, and has adopted a command structure based on the Incident Command System. BNPB's current annual budget is approximately US\$42.5 million, which is utilized for staffing²⁹, operations and maintenance (O&M), and investments in equipment and programs. Additionally, BNPB has access to approximately US\$488 million in on-call funds for disaster response and recovery activities. Funding for district and provincial levels is dependent on the Subnational Government Revenue and Expenditure allocations, which remains limited for DRM priorities and is generally used for staffing and regular operational costs.

13. BMKG is a key implementation partner of the MHEWS platform and is responsible for monitoring and providing information, early warnings, and services on weather, climate, air quality, earthquake and tsunami, and related environmental information. BMKG also provides weather services to other sectors such as agriculture and agro-industry, fisheries, forestry, tourism, aviation, marine and land transportation, as well as the general public. It monitors 160 broadband seismic and 220 accelerometer stations for seismological observations. BMKG is also responsible for managing the Indonesia Tsunami Early Warning System (InaTEWS), which is a comprehensive tsunami warning system that encompasses two main components: (i) systems infrastructure including monitoring equipment, telecommunications infrastructure, and data analysis; and (ii) capacity building including earthquake and tsunami risk awareness-raising, response drills, and downstream communications. BMKG's current annual budget is approximately US\$160 to US\$170 million, which is utilized for staffing, investments in instrumentation, development of products and services, and O&M. IDRIP aims to strengthen the development and delivery of BMKG's key information services feeding into the MHEWS platform, and to help BMKG to design observation networks with sustainable O&M plans.

²⁸ Risiko Bencana Indonesia (RBI), 2016.

²⁹ BNPB consists of approximately 534 staff members, with 314 men and 220 women.



14. **Establishing robust dissemination systems and coordinated emergency responses at the local level is critical for a MHEWS platform.** Downstream information dissemination stakeholders include BNPB and local BPBD offices, as well as military and police, media outlets, and other end-users. The advisory or warning messages from upstream risk monitoring and data analysis are converted into local actions (e.g., evacuation orders) from the district to households. Due to the scale and geographic spread of Indonesia, challenges exist in developing a simple, uniform and reliable MHEWS for downstream users. This is exacerbated by the variety of different disaster risks that exist in each district, which have a diverse and uneven quality of infrastructure, and varying human and fiscal capacities. A MHEWS concept led by BNPB will serve as a guide for creating an integrated and efficient platform for early warning with relevant agencies for increased coordination and dissemination of hazard data, in line with Indonesia's one data and one map policies. However, further investments will be required in this area for effective implementation and achievement of the minimum service standards for information, disaster prevention and preparedness, as well as rescue and evacuation response services, as per Government Regulation No. 02/2018 on Minimum Service Standards and Ministry of Home Affairs Regulation No. 101/201 on Minimum Service Standards for Disasters. IDRIP will enable BMKG and BNPB to pursue priority investments to improve geophysical service delivery systems and functions, while supporting operational capacity and coordination.

D. Relevance to Higher Level Objectives

15. **Whilst the CSRRP and IDRIP complement each other by reducing the vulnerability of people and assets to hydrometeorological and geophysical events through an integrated package of structural and non-structural investments, each operation supports a specific objective of the Government's IDRAR program.** CSRRP will meet urgent needs to strengthen and reconstruct critical assets and infrastructure in disaster-affected areas of Central Sulawesi, whilst developing the foundations of a national platform for disaster-resilient infrastructure strengthening and future post-disaster recovery programs. Through IDRIP, accelerated investments at the central level as well as in disaster-affected and strategic high-risk priority areas will increase public awareness and understanding of disaster risk, better preparing central and local governments as well as communities for natural hazards. These complementary investments will help to implement Indonesia's comprehensive approach to strengthening disaster resilience (see Figure 1), aligning with strategic DRM priorities of GoI and the World Bank. Furthermore, the IDRAR program proposes to further strengthen interagency collaboration and established coordination mechanisms on DRM through the Steering Committee structure, which will help to support coordination and capacity building activities for other relevant technical ministries/agencies not financed directly by CSRRP and IDRIP. The program would also help to institutionalize various lessons learned in the DRM sector and develop standards and processes to enhance resilience-building and post-disaster recovery activities.

16. **The IDRAR program will directly contribute to GoI's long-term development strategies including Indonesia's National Long-Term Development Plan (RPJPN) 2005–2025, which seeks to mitigate disaster risk.** It also contributes to the Government's long-term National Disaster Management Master Plan, which has a key aim to reduce the percentage of districts with high disaster risk by 2045. Additionally, it will contribute to Indonesia's First Nationally Determined Contributions (NDC), which outlines a medium-term strategy to reduce risks from climate change in all development sectors through local capacity strengthening, improved knowledge management, convergent policy on climate change adaptation and disaster risk reduction, and application of adaptive technology. The CSRRP and IDRIP will support these national adaptation objectives by promoting climate-resilient infrastructure development, improving early warning systems and preparedness for climate-related disasters, and financing related technology applications and capacity building. These actions are consistent with the National Action Plan for Climate Change Adaptation (RAN-API 2013), which outlines support for Indonesia's investments in climate-related development.



17. **Ongoing engagements with Bappenas, PUPR, BNPB and BMKG highlight the importance of supporting Indonesia's medium- to long-term resilience-building needs, in line with Indonesia's National Medium-Term Development Plan 2015-2019 to reduce disaster risk in priority high-risk growth centers.** IDRIP includes nationwide resilience-building activities that could help to reduce Indonesia's vulnerability to future disaster shocks and strengthen disaster preparedness capacity amongst the community and select subnational governments, through community preparedness programs, a MHEWS platform, strengthened emergency operations centers, and critical investments in geophysical early warning services. These activities are also aligned with the President's "6 Arah" (Directions) on disaster management announced during the National Coordination Meeting for Disaster Mitigation in February 2019 that emphasize risk-informed planning and design, increased disaster awareness and education, and an integrated early warning system.

18. **CSRRP and IDRIP will contribute to Engagement Areas 4 and 5 of the World Bank Group's 2018 Performance and Learning Review for the Indonesia Country Partnership Framework (CPF, 2016-2020).** The World Bank Group's Indonesia CPF (Report 99172, December 1, 2015) outlines six engagement areas. CSRRP and IDRIP contribute to Engagement Area 4: Delivery of Local Services and Infrastructure by supporting the reconstruction and upgrading of education and health facilities in both urban and rural areas. It is also aligned with Engagement Area 5: Sustainable Landscape Management by improving community recovery and resilience to the impacts of natural disasters. The World Bank Group's 2015 Indonesia Systematic Country Diagnostic Report (Report 94066, September 1, 2015) emphasizes the importance of supporting resilience to natural disasters, which impact the poor disproportionately. The IDRIP Program complements the World Bank's ongoing overall engagement on sustainable urbanization in Indonesia to help harness the agglomeration benefits of urbanization while minimizing negative spillovers such as disaster vulnerability, including through ongoing technical assistance on urban floods and DRM, and supporting development of a national urban flood resilience program. The World Bank is also committed to supporting Indonesia to address challenges arising from climate change, and the CSRRP and IDRIP will finance climate-resilient measures that will protect future development outcomes and support populations to adapt to a changing climate. Lessons learned from the 2018 Performance and Learning Review (Report No. 131849-ID, November 29, 2018) indicate that national programs could help address these challenges by leveraging available resources to improve DRM policies, institutions and delivery systems for more sustainable and transformational impacts. IDRIP will also support higher-quality early warning systems and user-tailored (impact-based) information services to better prepare hazard-vulnerable communities for disaster risks, supporting the World Bank's Adaptation & Resilience Action Plan. This includes increasing resilience to climate-related shocks in coastal areas, as well as other areas with populations vulnerable to hydrometeorological disasters exacerbated by climate change.

19. **CSRRP and IDRIP will contribute to the GoI's vision of an equitable and prosperous Indonesia and are aligned with the World Bank Group's twin goals of eliminating extreme poverty and increasing shared prosperity.** Natural disasters have socioeconomic consequences that go beyond their most obvious impacts. Small shocks, including natural disasters, can drive vulnerable and poor people into poverty.³⁰ Investments in infrastructure and in social recovery will facilitate recovery and help authorities to meet the needs of those affected by disasters, particularly the poorest and those living close to the poverty line, highly vulnerable to external shocks. A comprehensive approach needs investments in both post-disaster recovery support and ex-ante resilience. Investing in resilience pays off – first, by saving lives and avoiding destruction and losses; and second, by improving the quality of development. Proposed investments to upgrade

³⁰ Hallegatte et al. 2017. Unbreakable: Building the Resilience of the Poor in the Face of Natural Disasters.



infrastructure will increase Indonesia's disaster and climate change resilience, whilst investments in geophysical early warning systems will help prevent or lessen losses of lives and damages to assets through more reliable and timely risk information, and improved end-user communication.

II. PROJECT DESCRIPTION

A. Project Development Objective

PDO Statement

20. The PDO of the IDRIP is to improve the preparedness of central government and selected local governments for natural hazards.

21. The achievement of the PDO will be measured through the following indicators:

- i. Local governments with functioning emergency operations centers (number)
- ii. Satisfaction of end-users with geophysical information services (percentage)

22. Intermediate-Level Indicators are as follows:

- i. C1: Multi-hazard early warning system platform established and operational (yes/no)
- ii. C1: Functional emergency operations centers upgraded and meet minimum standards (number)
- iii. C1: People (disaggregated by gender) who believe they are better prepared to respond to natural disasters after participating in outreach, training and advocacy activities (percentage)
- iv. C1: Share of registered users of mobile phone applications designed for early warning dissemination that are women (percentage)
- v. C1: Women facilitators hired and trained to undertake outreach, training and advocacy activities (percentage)
- vi. C2: Local governments served by seismic information services (number)
- vii. C2: Equipment installed by the project and functioning in line with established SOPs (percentage)
- viii. C2: Government officials (disaggregated by gender) that have been trained by capacity building programs (number)
- ix. C3: Grievance redress mechanism established and functioning (yes/no)
- x. C3: Complaints resolved (percentage)

B. Project Components

23. IDRIP will finance critical investments and capacity building priorities for a MHEWS platform and local emergency management systems, to enhance preparedness for future disaster events, particularly geophysical disasters supporting central and local level governments, and communities. Following the series of catastrophic events in 2018, IDRIP will finance immediate needs for restoration of emergency preparedness and early warning functions in areas affected by recent disasters including West Nusa Tenggara (earthquakes in July and August 2018), Central Sulawesi (earthquake and tsunami in September 2018) and areas along Sunda Strait (tsunami in December 2018). At the national level, the project will help BNPB and its institutional partners to refine the technical design of the MHEWS platform in preparation for further investments. It will achieve this through three components that will complement capacity building and technical



advisory support by other development partners in this sector (including from France, Germany, Japan, and United States of America). IDRIP will finance the supporting systems, downstream communication, and instrumentation needed for preliminary strategic investments to help establish the MHEWS platform. It will also support BNPB, selected local BPBDs, and communities to improve disaster preparedness and last-mile communication, starting with the areas affected by the 2018 disasters and followed by identified priority high-risk areas. Using the principles of a people-centered early warning system, which combines technological solutions with community empowerment, activities financed under Components 1 and 2 of IDRIP are complementary and will promote a more holistic approach to disaster resilience. Annex 2 provides further detail on the design of the project components.

Component 1: Disaster preparedness and emergency management capacity (US\$70 million of IBRD Loan)

24. A key goal of the Government is to provide timely warnings to save lives and reduce damages. This component will be implemented by BNPB and strengthen the capacity of GoI and communities to better prepare for, and respond to, future natural hazards. This will be achieved through investments to scale up disaster awareness activities and strengthen emergency management for faster and more effective disaster response. It will also support development and refinement of the MHEWS platform, which aims to provide early warnings for all natural hazards in the longer term, and under IDRIP will focus on earthquake and tsunami hazards. The government will adopt a holistic approach to a people-centered end-to-end MHEWS with four (4) key elements: (i) disaster risk knowledge and awareness; (ii) detection, monitoring, analysis and forecasting of hazards and their impacts; (iii) dissemination and communication of information and warnings; and (iv) emergency preparedness and response capacity. The initial phase under IDRIP will support the immediate urgent needs of local governments affected by the catastrophic events in 2018, followed by priority high-risk areas to be identified during project implementation.

25. **Sub-component 1.1: Disaster risk knowledge and awareness** (US\$9.3 million) will increase knowledge, understanding, and awareness of disaster risk and climate change risks, promoting risk reduction behavior and climate change adaptation measures to better prepare Indonesians against future natural and climate-related hazards, and inform analyses for the multi-hazard early warning system platform. The project will support: (a) development and integration of multi-hazard risk mapping and modeling to support national and subnational disaster risk management; (b) development of an integrated disaster knowledge and information management and data analysis system; and (c) studies and pilots for the use of innovative technologies for awareness building and outreach programs, including inclusive (accessible and gender-sensitive) considerations.

26. **Sub-component 1.2: Multi-hazard early warning system platform development** (US\$25.3 million) will support preparation activities for Indonesia's MHEWS multi-sectoral platform by increasing or developing new capabilities for integrated hazard detection and public warnings system. This will include feasibility studies, detailed development plans, and technical design for MHEWS platform in collaboration with key partner ministries and agencies. The project will support: (a) designing the institutional and regulatory frameworks related to MHEWS with clear roles and responsibilities of all stakeholders; (b) establishing and operating a national MHEWS coordination platform and implementation through system integration and decision support systems; (c) establishment of data centers and communication networks; and (d) development of trainings and exercises for operating an integrated information technology platform.

27. **Sub-component 1.3 Hazard information and early warning dissemination** (\$22.1 million) will provide support to development of disaster warning information dissemination systems and last mile communication to end users that is



timely, accurate, inclusive, understandable, and can be used as a basis for action by the general public, government, and other stakeholders. This will support efforts to save lives, restore economic assets, protect the environment, and ensure business continuity in related sectors. The generated early warning information will serve communities and other relevant stakeholders—such as those managing critical infrastructure and facilities (telecommunications, electricity, transportation), business sector, and others—to be able to take informed actions to reduce the impacts of natural hazards. The project will support: (a) development of an early warning information dissemination system including liaison and portal service system; (b) strengthening dissemination capacities through national and subnational emergency operations centers (EOCs) responsible for early warning and alerts dissemination, and through mobile application platforms; and (c) upgrading and construction of new EOCs, upgrading emergency management information systems, information receiving systems, mass public alert systems for rapid-onset high-risk events, as well as acquisition and installation of communication equipment.

28. **Sub-component 1.4: Emergency management, response, and preparedness capacities** (US\$13.3 million) will enhance the capacity at subnational levels (starting with the districts affected by the 2018 disasters and prioritized high-risk districts) and communities to manage and prepare for future disaster events, as well as to integrate disaster risk and early warning information in the decision-making process. The project will support: (a) development of improved Standard Operating Procedures (SOPs), local emergency response plans, and streamlining of emergency management processes; (b) capacity building activities such as training of local BPBDs and local key actors involved in disaster response; (c) village and community preparedness planning; and (d) community-based resilience measures (e.g., disaster risk information dissemination, community awareness initiatives, and nature-based measures).

Component 2: Geophysical early warning services (US\$85 million of IBRD Loan)

29. This component will be implemented by BMKG and support GoI to advance its services toward impact-based information services through the strengthening of monitoring capacity for geophysical hazards, development of impact-based forecast and warning products, and institutional strengthening and capacity development. The aim is to improve service delivery systems to support DRM operations and strengthen future planning for disaster resilience. This component will also finance urgently needed support to local governments to restore basic earthquake monitoring and information services as well as early warning functions. This includes restoration, installation of new sites in critical areas, and upgrading and/or replacement of damaged seismological instrumentation in Central Sulawesi, West Nusa Tenggara, and along Sunda Strait.

30. **Sub-component 2.1: Service delivery systems** (US\$16 million) will support: (a) development and delivery of impact-based forecast and warning products for earthquake and tsunami hazards; (b) technical guidelines for emergency operations based on BMKG's warning services; (c) enhancement of service delivery systems and user feedback mechanisms; and (d) development of impact-based decision support systems.

31. **Sub-component 2.2: Institutional strengthening and capacity development** (US\$11.5 million) will support: (a) technical assistance to advise on institutional strategic plans such as planning for development of new geophysical impact products; (b) development of socioeconomic assessments of BMKG's geophysical early warning services; and (c) capacity development activities.



32. **Sub-component 2.3: Monitoring networks and early warning capacity** (US\$57.5 million) will support: (a) improvement of seismological information monitoring services through procurement and installation of seismological instrumentation (e.g., short-period, broadband, and strong-motion); (b) feasibility studies and development of earthquake early warning system prototypes;³¹ (c) facilitation of seismic data exchange and long-term data archiving; and (d) upgrading of seismic data processing systems and tsunami modeling and local forecast processing through high-performance computing.

Component 3: Project Implementation Support (US\$5 million)

33. This component will be implemented by BNPB and strengthen the capacity of implementing agencies, especially BNPB as the Executing Agency, to oversee project implementation at the national and subnational levels. The project will support: project management, procurement, financial management activities, technical audits, development of technical specifications, oversight of compliance with agreed social and environmental standards, oversight of compliance with social inclusion targets (e.g., gender and disability action plans), monitoring and evaluation activities, and the establishment and operation of a Technical Advisory Committee to review technical designs, outputs and findings. The component will also help to enhance coordination aspects of CSRRP and IDRIP under the IDRAR program to ensure immediate support is directed to the specific needs of local governments that were impacted by the 2018 catastrophic events. This component will provide targeted support to help develop the capacity of BNPB and Bappenas to coordinate and implement Bank-financed operations, with a broader objective to strengthen its project management, fiduciary, and safeguards systems. It will also be used to help establish the IDRAR program Steering Committee and provide technical assistance to enhance disaster awareness, develop knowledge products, facilitate knowledge sharing events, standardize processes, and facilitate joint technical workshops with Project Implementing Units (PIUs) from both CSRRP and IDRIP (and other projects as the program evolves).

C. Project Financing

34. The lending instrument is Investment Project Financing prepared under Condensed Procedures, per paragraph 12 of Section III of the Investment Project Financing (IPF) Policy, with an approximate five-year implementation period. A summary of cost estimates per component and subcomponent is outlined in Table 1.

Table 1. Summary of cost estimates.

Component/Sub-component	Cost (US\$ million)	Percentage of total cost (%)
Component 1: Disaster preparedness and emergency management capacity	70.0	43.75
Sub-component 1.1: Disaster risk knowledge and awareness	9.3	5.81
Sub-component 1.2: MHEWS platform development	25.3	15.81
Sub-component 1.3: Hazard information and early warning dissemination	22.1	13.81
Sub-component 1.4: Emergency management, response, and preparedness capacities	13.3	8.32
Component 2: Geophysical early warning services	85.0	53.13
Sub-component 2.1: Service delivery systems	16.0	10.00

³¹ An earthquake early warning system is defined as a forecasting system of ground motion (shaking) caused by an earthquake, and how the ground motion will propagate. It is not a prediction of an earthquake itself. Aftershock information (outlook) is a probabilistic information and assessment based on empirical statistical methods and should not be considered as earthquake prediction.

Component/Sub-component	Cost (US\$ million)	Percentage of total cost (%)
Sub-component 2.2: Institutional strengthening and capacity development	11.5	7.19
Sub-component 2.3: Monitoring networks and early warning capacity	57.5	35.94
Component 3: Project implementation support	5.0	3.12
Project Total	160.0	100.00

D. Project Beneficiaries

35. Populations in select disaster-affected and priority high-risk districts, approximately 15 percent of the population or 40 million people across Indonesia, will benefit from resilient investments in improved early warning systems and emergency management systems, improved Government capacity to prepare for and respond to disasters, and access to public awareness and disaster preparedness campaigns. Government officials will also benefit from improved systems related to the delivery of risk knowledge, monitoring and warnings, dissemination and communication, and response, in addition to associated institutional strengthening and capacity development activities financed by ID RIP.

E. Results Chain

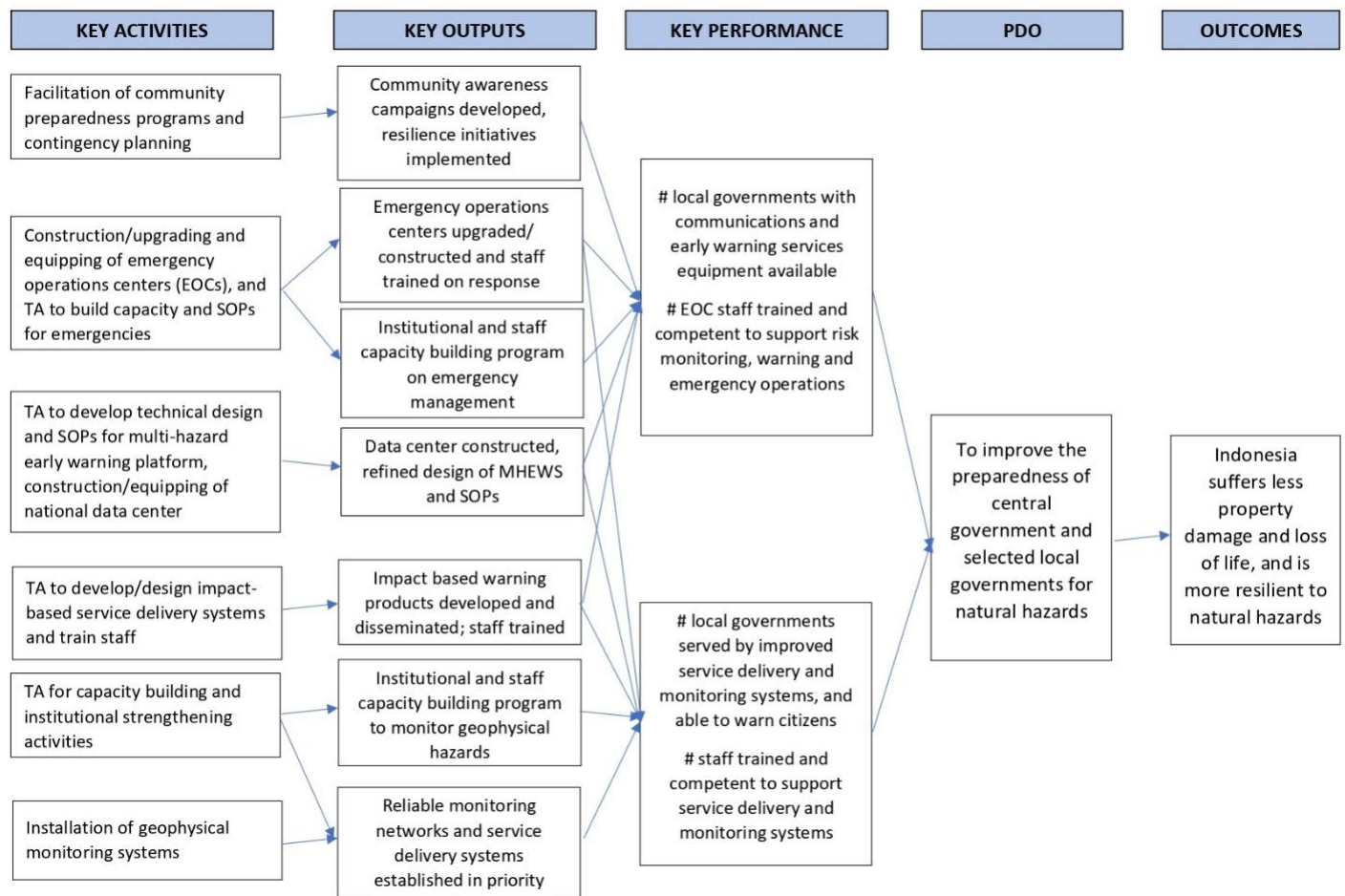
36. **Problem statement:** The devastating impacts from the disasters in 2018 highlighted key gaps in disaster preparedness and emergency management systems: the early warning systems in disaster-affected areas were not fully functional, the overall public awareness and understanding of disaster risk information (particularly related to tsunamis) was low, and limited emergency management systems and capacities at the national level limited the effectiveness of disaster responses. The intended project impact is to save lives and reduce economic losses from natural hazards in areas prone to hydrometeorological and geophysical disasters across Indonesia. The results chain is outlined in Figure 2.

F. Rationale for Bank Involvement and Role of Partners

37. **The World Bank has considerable experience supporting client countries to reduce disaster risk.** Flagship projects include the Istanbul Seismic Risk Mitigation and Emergency Preparedness Project in Turkey and the Wenchuan Earthquake Recovery Project, introducing resilient and community-based approaches, and strengthening the capacity of both central and local level agencies. The World Bank has a rapidly growing portfolio of investments in improved hydrometeorological and early warning system services, focusing specifically on service delivery, and improvement and integration of systems. Recent representative projects include Bangladesh Weather and Climate Services Regional Project and Vietnam - Managing Natural Hazards Project.

38. **The GoI established an inter-agency Coordination and Assistance Team³² for Recovery and Development of Post-Disaster Areas in Central Sulawesi in early October 2018, and conducted a series of coordination meetings with key development partners in preparation for post-disaster infrastructure recovery activities.** Partners are working with the GoI to support the recovery of selected water resources management infrastructure, transport sector infrastructure, and public facilities; and assisting with livelihoods recovery support activities. Following the Presidential Instruction 10/2018 on November 28, 2018, the GoI has committed to accelerating the recovery program in Central Sulawesi with a

³² Members include Bappenas, ESDM, BNPB, BIG, Ministry of Agrarian Affairs and Spatial Planning/National Land Agency (ATR/BPN), BMKG, PUPR.



CRITICAL ASSUMPTIONS: (A) Adequate inter-agency coordination and technical knowledge of multi-hazard systems. (B) Local governments allocate adequate operations and maintenance budgets for existing infrastructure and new investments. (C) Technical agencies provide accurate, timely and action-based disaster warnings.

Figure 2. Project results chain.

focus on the reconstruction of critical public infrastructure (roads, bridges, and sanitation), health and education facilities, government buildings, and housing settlements. The World Bank is cooperating closely with key development partners to avoid potential overlap and encourage investment synergies. The Governor of Central Sulawesi Province is responsible for coordinating the activities of all partners in the reconstruction effort, including multilateral financing and development partners, bilateral donors, NGOs, private investors, and local communities.

39. **Many NGOs, private sector entities, community groups, and multilateral and bilateral partners are involved in nationwide resilience-building activities related to Components 1 and 2.** The World Bank team has been coordinating with development partners to avoid any potential overlap in scope of investments under Component 2 as other partners—including France, Japan, and China—may finance select monitoring instruments and institutional strengthening initiatives. It will also be important to promote technical interoperability between the instrumentation. Key partners that support BNPB to strengthen preparedness and emergency management capacities include Australia, New Zealand, and several NGOs and community groups.



G. Lessons Learned and Reflected in the Project Design

40. **Preparing for future natural hazards:** Globally, there is evidence that some disaster recovery programs have focused too heavily on rebuilding infrastructure and not enough on better adaptation and preparedness for future events. This project considers lessons learnt from a number of risk reduction projects including Turkey (Istanbul Seismic Risk Mitigation and Emergency Preparedness Project), and India (Andhra Pradesh Disaster Recovery Project), informing Component 1 design; as well as lessons from World Bank-financed hydrometeorological modernization activities in other countries, such as India (National Cyclone Risk Mitigation Project-II), Nepal (Building Resilience to Climate Related Hazards), Pakistan (Pakistan Hydromet and DRM Services Project), Lao People's Democratic Republic (Southeast Asia Disaster Risk Management Project) and Bangladesh (Bangladesh Weather and Climate Services Regional Project) informing Component 2 activities.

41. **Local level capacity building and community involvement:** Communities are key to successful project outcomes as they are the first responders and worst affected in disaster events. Building community capacity (including women and young girls) in disaster response and preparedness has seen great success in Odisha, India where almost 1 million people benefitted from improved early warnings and emergency shelters across the coast during the Category 5 Tropical Cyclone Phailin. Improved early warning systems allowed for dissemination of alerts four days before Phailin struck land, and building cyclone shelters that operated in schools and community centers allowed for increased community involvement and regular maintenance. This translated to the effective evacuation of approximately 400,000 people. There were 21 fatalities due to the cyclone, and an additional 23 due to severe flash flooding in the aftermath of the cyclone. This compares to Cyclone 05B which hit the same area in 1999, but with only two days early warning largely disconnected from timely evacuation, which resulted in 10,000 fatalities. Experiences from Indonesia and Turkey also emphasised that community participation and ownership help to strengthen collective resilience. The Turkey ISMEP project trained over 920,300 volunteers to strengthen the coordination of emergency response, and campaigns reached an estimated 5.5 million residents. Experience in Indonesia also demonstrates that disaster resilience was strengthened by involving communities in improving emergency response systems, evacuation spaces and emergency facilities. Effective DRM entails systematic behavioural change, highlighting the need to strengthen awareness building and local capacity enhancing initiatives.

42. **Disaster response and communication:** Lessons learnt from disasters around the world demonstrate that communication for timely action and response is an area where early warning systems play a critical role. Often, even when early information on the track and intensity forecast of disaster events is reasonably accurate and quick, last-mile communication and response actions could be further improved to reduce fatalities and economic losses. This last-mile delivery of information must be coupled with increased awareness of desired actions by downstream stakeholders, necessitating that information must not only be technically-sound but also contextually-appropriate and delivered in an effective way that highlights potential impacts to end-users. This project will help the shift from hazard-based warnings to impact-based warnings (facilitated through local BPBDs and others) to enhance community preparedness and timely response. Private entities (including mass media, telecommunications companies) can play an important role in widening the scope and speed of information dissemination while decision support mechanism for local decision-makers is often critical to ensure timely actions. In Japan, for instance, some municipalities contract private weather companies for advisory support. In the United Kingdom, the Met Office contracts "regional DRM advisors" who provide expert advice to regional stakeholders for preparedness and response activities.

43. **System integration, institutional strengthening and sustainability, and O&M.** To ensure the sustainability of geophysical services, a comprehensive approach to investing in both structural and non-structural measures is required.



Investments reflect a realistic assessment of BMKG's existing institutional capacity and availability of recurrent budgets to ensure adequate operations and maintenance costs for sustained systems operations. Previous experiences from World Bank-financed projects elsewhere have shown that trained systems integrators play a critical role in supporting project implementation by developing detailed system designs, providing procurement and implementation support, and providing technical guidance for the overall project.

III. IMPLEMENTATION ARRANGEMENTS

A. Institutional and Implementation Arrangements

44. **Project coordination.** GoI intends to establish an inter-agency Steering Committee, chaired by BNPB, for the IDRAR Program with two designated windows: Disaster Preparedness and Emergency Management; and Rehabilitation and Reconstruction. Steering Committee members will include Project Implementation Units (PIUs) for both projects, as well as other relevant government agencies and subnational governments. The Steering Committee would be responsible for coordination between the line agencies for effective project implementation, monitoring, and evaluation; as well as for providing strategic guidance and oversight of the IDRAR Program. Its membership and scope of responsibilities would evolve when the IDRAR program develops to include other projects and activities. Establishment and operating costs of the Steering Committee will be supported by Component 3 (Project Implementation Support) under IDRIP.

45. **Project implementation.** BNPB will act as the Executing Agency (EA) for IDRIP, with day-to-day project management and project coordination under a Central Project Management Unit (CPMU) under the Office of the Secretary General. PIUs will be established for each component of the Project: BNPB (for Component 1) and BMKG (for Component 2). Component 3 will be implemented by BNPB to support project implementation through the recruitment of expert consultants that will help coordinate and implement IDRIP, and to transfer responsibilities in the longer term to BNPB staff, thereby building institutional capacity to manage multilateral financing operations. Annex 1 provides further details on the implementation arrangements.

46. **Citizen engagement** will inform the project through: (a) consultations and citizen participation during project implementation, e.g., communities and representatives from diverse groups in the planning and design of people-centered early warning systems; (b) transparent feedback and grievance redress mechanisms; (c) communication campaigns and capacity building; and (d) development of risk management processes and engagement required under the World Bank's Environmental and Social Framework (ESF).

47. The project will establish a Grievance Redress Mechanism (GRM) to allow project stakeholders to seek satisfactory resolution to grievances they may have in relation to the Project. The GRM will help to ensure that rights and interests of affected people/beneficiaries and direct workers/contracted workers are protected, and concerns are addressed adequately. The grievance process is based upon the premise that it imposes no cost to those raising the grievances (i.e., Complainants); that concerns arising from project implementation are adequately addressed in a timely manner; and that participation in the grievance process does not preclude pursuit of legal remedies under national law. The Results Framework includes two indicators to measure beneficiary feedback: that the GRM is established and functioning; and that complaints are resolved satisfactorily by the responsible agency.



B. Results Monitoring and Evaluation Arrangements

48. The Results Framework forms the basis to track the progress of activities to meet the PDO. Within the first six months of project commencement, a monitoring and evaluation (M&E) system on the project implementation status will be established. and the system will be maintained by BNPB, which will be responsible for collecting the required data, setting up the monitoring system, and reporting the results through project progress reports. Technical support and training on the M&E system will be provided from budget under Component 3. Information and data collected by BNPB and BMKG on implementation pace, efficiency, due processes, procurement performance, and construction quality will feed into the M&E system to help monitor the project's outcomes and impacts. Regular semi-annual progress reports in line with the indicators and milestones will be generated. The World Bank will conduct regular implementation support missions. A mid-term review (MTR) of project implementation will take place at the mid-point of project implementation. Annex 1 outlines the detailed implementation support plan.

C. Sustainability

49. **Long-term sustainability** of project interventions will require (i) adequate operational and technical capacity of key implementing agencies, and (ii) adequate asset management planning and budgetary support from central (Component 1 investments), and subnational and central government (Component 2 investments) for the maintenance of infrastructure and equipment.

50. **Capacity building** is integrated into the project design to enhance the institutional capacity of technical staff to receive adequate training for O&M of emergency and hazard monitoring systems, and to enhance logistical coordination capacities. A systematic training assessment will be carried out to develop a strategic training plan to address any technical gaps in implementation units.

51. **Operations and Maintenance (O&M)** costs of infrastructure investments and equipment is a critical factor in the sustainability of proposed project activities. Incremental O&M costs are typically 10–15 percent of the total budget of purchased equipment and systems, depending on the composition of networks and the types of observations. Low-maintenance designs will be encouraged in technical design packages, and costing plans and estimations for routine O&M, including for beyond the project duration, will be developed to inform adequate future budgeting by central and local governments.

IV. PROJECT APPRAISAL SUMMARY

A. Technical, Economic and Financial Analysis

(i) Technical Analysis

52. **The technical design of Component 1 provides an opportunity to strengthen the end-to-end capacity for disaster preparedness.** Community-led disaster activities at the local level provide opportunities to promote a participatory approach and mainstream gender and disability inclusion in the process of preparing for natural hazards. Local-level preparedness planning also enables the process of documenting local values, including past and existing knowledge, to support future planning and inform decision making. Local government, as mandated in the *Disaster Management*



Act 24/2007, is responsible for leading disaster management, including during the response phase. The project will finance equipment and support the development of knowledge and skills to improve emergency response operations. Considering that different hazards (especially earthquakes and tsunamis) often impact multiple districts simultaneously, and the geographical challenges faced by Indonesia, there is a need to ensure access to hazard information during and immediately after catastrophic events, often in remote affected areas.

53. **The technical design of Component 2 builds on the country and regional context, international good practices, thorough consultations with government counterparts and broader stakeholders, and engagement with a range of international expert partners and consultants.** The component combines investments in institutions, to both service providers and end-users (to ensure efficiency, effectiveness, and sustainability), and investments in infrastructure (to deliver tangible benefits) for the provision of geophysical information services. The design of Component 2 conforms to good practices established by previous World Bank-financed operations in this sector. It encourages a system-wide approach to lay the foundation for future investments and supports activities that would allow the GoI to achieve desired outcomes sustainably.

(ii) Economic Analysis

54. **The economic analysis for this project models the stream of benefits and costs for project Components 1, 2 and 3 for the next 16 years (2019-2035).** Given that Components 1, 2 and 3 work in tandem to yield expected outcomes such as avoided losses and increased resilience to disasters, the analysis quantifies the potential benefits from all three components simultaneously. Net benefits for the project are projected from 2019 to 2035, and the present value of these net benefits are summed to yield a Net Present Value (NPV) and Internal Rate of Return (IRR) for the project. The NPV of the entire project over 16 years, at a 10 percent discount rate, is estimated at US\$367 million, while the IRR is 27 percent. The positive NPV and the large difference between the IRR and discount rate imply that this project is economically feasible and will generate substantial economic benefits. The sensitivity of the program's net benefits under the with-project scenario was analysed with regard to three variables: (i) decrease in probability of disasters, (ii) changes in O&M costs, and (iii) assumed effect of enhanced monitoring systems and disaster preparedness on reduction of annual economic losses. *Ceteris paribus*, the project could sustain a reduction on the probability of disasters to as low as 0.033 from the current 0.08, up to 660 percent increase in O&M costs annually, or a reduction on the assumed effects of enhanced monitoring systems and disaster preparedness on reduction of annual economic losses to as low as 0 percent (from the baseline of 5 percent) or no impact of the effects of geophysical warning services on injury rates, and still be economically feasible. Further details of the analysis are in Annex 3.

B. Fiduciary

(i) Financial Management

55. **Arrangements:** The project will support hiring a Financial Management Consultant (FMC) to assist the CPMU with meeting the World Bank's financial management requirements, including timely quarterly reporting to the World Bank, managing the replenishment process, and following up on audits. The FMC will support the CPMU to prepare Interim Unaudited Financial Reports (IFRs) and ensure the completeness of payment remittances (*Surat Perintah Pencarian Dana* – SP2D) for all PIUs. The project would need to submit quarterly IFRs and prepare unaudited annual financial reports completed with the Notes to Financial Statements. The project will be audited by the Audit Board of the Republic of



Indonesia (BPK) and the audit report should be made available to the World Bank no later than six (6) months after the end of each fiscal year of the Borrower. The unaudited annual financial report completed with the Notes to Financial Statements should be reviewed by the Inspectorate-General prior to being submitted to BPK, at a date no later than when BPK commences their annual audits of government agencies.

56. **Budgeting.** The budgeting system follows the existing government procedures. The project budget will be included in the annual budget and the agencies budget documents (DIPA).

57. **Risks:** This project would be the first opportunity for BNPB and BMKG to receive World Bank loan financing. There is a potential risk concerning (i) delay in budget effectiveness and inadequate budget; and (ii) the verification of payments. Delay in the availability of adequate budget may delay the project implementation. The financial management consultant will assist the PIUs to prepare the annual working plan, to ensure timely budget preparation and minimize revision. The payment verification issue has been noted in previous World Bank-financed projects at the central level and is expected to be a higher concern at the provincial/city level. The project will form an agreement on all valid supporting documents required for different types of expenditures, and this will be included in the Project Operations Manual (POM).

58. **Disbursement arrangements.** The applicable disbursement method will be (1) “Advance”, (2) “Direct Payment”, and (3) “Reimbursement”. A Designated Account (DA) denominated in US dollars at the Bank Indonesia (Central Bank) or a commercial bank or financial institution acceptable to the World Bank) will be opened by the Directorate-General of Treasury (DG Treasury) in MoF. The DA will be used solely to finance eligible expenditures. The ceiling of the advance to DA will be variable, and the advance(s) will be made based on the six-monthly projected expenditures. The reporting of the use of the DA funds will be based on the quarterly IFRs, which should be submitted to the World Bank no later than 45 days after the end of each quarter. Applications for an advance to the DAs will be submitted together with the reporting on use of DA funds, which will consist of: (a) IFRs and a list of payments for contracts under the World Bank’s prior-review; (b) projected expenditures for six months; and (c) the DA reconciliation statement. Claims are made based on actual SP2D issued by the State Treasury offices. All documentation for the expenditures as reported for disbursements will be retained at the implementing units and made available to the auditors for an annual audit and to the Bank and its representatives, if requested.

59. The CPMU at BNPB will be responsible for reconciling the DA and preparing separate applications for the withdrawal of reimbursements and advances, duly approved by the DG Treasury, before their submission to the Bank. Copies of DA bank statements will be provided to the CPMU by the DG Treasury in MoF, which will authorize its relevant Treasury Offices (KPPNs) to authorize payments of eligible project expenditures by issuing SP2Ds. For this purpose, DG Treasury shall issue a circular letter to the relevant KPPN Offices providing guidelines and criteria for eligible project expenditures in accordance with the loan agreements. When expenditures are due or payment, CPMU/PIUs will prepare payment requests (SPPs) to the payment officer within the Working Unit (SatKer). After document verification, the payment officer will issue payment orders (SPMs) together with supporting documentation for submission to the relevant KPPN. The KPPN will check the budget eligibility and issue the SP2D to the KPPN’s operational bank, which transfers the funds directly to the payee’s account and arranges for debit for the loan portion to the DA.

60. Table 2 outlines the disbursement category setup, description of activities, and allocations to be financed by the World Bank.

*Table 2. Allocation of the Loan Proceeds*

Category	Amount of the Loan allocated (expressed in US\$)	Percentage of Expenditures to be Financed (inclusive of Taxes)
Goods, works, non-consulting services, consulting services, training and workshops ³³ , incremental operating costs	160,000,000	100%
TOTAL AMOUNT	160,000,000	

(ii) Procurement

61. Procurement under the project will be governed by the World Bank's Procurement Regulations for Investment Project Financing (IPF) Borrowers, July 2016, revised November 2017 and August 2018; and by the provisions stipulated in the Loan Agreement and approved Procurement Plan.

62. The Project Procurement Strategy for Development (PPSD) and Procurement Plan are being prepared by the EA/PIUs and in view of the emergency nature of the project these documents will be finalized by the first quarter of project implementation when the detailed procurement requirements and cost estimates have been defined. Given the emergency nature of the project, the PPSP, Procurement Plan and the POM will include streamlined procedures appropriate for the Project based on the flexibilities allowed under the Procurement Regulations for procurement in situations of urgent need. The possibility of putting in place Framework Agreements for certain types of standard goods that are normally required to be supplied at short notice in responding to emergency situations in case of natural disaster will also be explored and encouraged to further support advance preparedness.

63. The procurement activities under Components 1 and 3 will be carried out by BNPB while BMKG will be responsible for Component 2. BNPB and BMKG have no previous experience in carrying out procurement under World Bank-financed projects, particularly in applying the World Bank's Procurement Regulation. Further details of the initial procurement arrangements, procurement risks, mitigation and capacity building measures are provided in Annex 1 Implementation Arrangements, which will be updated upon finalization of the PPSP and Procurement Plan.

C. Legal Operational Policies

	Triggered?
Projects on International Waterways OP 7.50	No
Projects in Disputed Areas OP 7.60	No

³³ For the purposes of this Table: "training and workshops" means Project-related training and workshops, including purchase and publication of materials, rental of facilities, course fees, and travel and subsistence of trainees



D. Environmental and Social

64. The World Bank's due diligence assessment of the project's potential environmental and social risks and impacts is included in the Project's Appraisal Environmental and Social Review Summary (ESRS). Following the series of catastrophic events in 2018, IDRIP will finance immediate needs for restoration of emergency preparedness and early warning functions in areas affected by recent disasters including West Nusa Tenggara (earthquakes in July and August 2018), Central Sulawesi (earthquake and tsunami in September 2018) and areas along Sunda Strait (tsunami in December 2018). Under component 1 on disaster preparedness and emergency management capacity, the initial phase of support under IDRIP will support the immediate urgent needs of local governments affected by the catastrophic events in 2018, followed by high-risk areas to be identified during project implementation. Component 2 on geophysical early warning services will also finance urgently needed support to local governments to restore early warning functions, including restoration, upgrading and/or replacement of damaged instrumentation in Central Sulawesi, West Nusa Tenggara, and along Sunda Strait.

65. **Instruments:** The project is subject to the World Bank's Environment and Social Framework (ESF), and an Environmental and Social Commitment Plan (ESCP) was agreed with the Government. The ESCP sets out measures and actions required for the project to achieve compliance with relevant Environment and Social Standards (ESSs) over a specified timeframe. Relevant ESSs are: ESS 1 Assessment and Management of Environmental and Social Risks and Impacts, ESS 2 Labor and Working Conditions, ESS 3 Resource Efficiency, ESS 4 Community Health and Safety, ESS 5 Land Acquisition, Restrictions on Land Use and Involuntary Resettlement, ESS 7 Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities, ESS 8 Cultural Heritage, and ESS 10 Stakeholder Engagement and Information Disclosures. A Stakeholder Engagement Plan (SEP), prepared by the Government during project preparation, identifies and analyzes key project stakeholders, describes opportunities for public consultation and feedback and grievance redress mechanisms, and outlines commitments to releasing routine information on the project's environmental and social performance. The initial ESCP and SEP were cleared by the World Bank's management and disclosed by the GoI on May 22, 2019; the ESCP and the SEP were disclosed by the World Bank on May 24, 2019. The Project's Appraisal ESRS (ESRSA00232) was disclosed by the World Bank on May 18, 2019. Due to the emergency context under which the project is being prepared, the environmental and social assessments and plans required under the ESSs will be developed during the project implementation phase. These assessments and plans are established in the ESCP with specific time-bound action plans agreed by the Government.

66. Under Components 1 and 2, low to moderate environmental and social risks are anticipated for activities under Components 1 and 2, which have positive environmental and social impacts by reducing potential human losses and increasing the preparedness of GoI and communities against future disasters. For ensuring community health and safety, the GoI will conduct a risk hazard assessment and based on the result, develop a contingency plan in coordination with relevant local authorities and affected communities to build early warning communication methods and evacuation plans. A potential risk for the activities would be the possible failure to implement an adequate contingency plan, or inadequate maintenance of relevant equipment, leading to inefficient operability after project implementation. Component 1 also involves other civil works activities which would have minor and temporary negative impacts such as dust, noise, disturbance on existing traffic flows, safety, and access to local communities. The type of civil works ranges from small renovation works to building new emergency operations centers and new data center facilities. The potential risk would be contractors not implementing Health, Safety and Environment (HSE) guidelines and protocol during construction



(e.g., using personal protective equipment for worker safety) and post-construction activities (e.g., equipment maintenance) and this might lead to workplace injury at construction sites. This is because the capacities and awareness amongst supervision contractors and PIUs vary. Component 2 involves minor civil works through the installation of geophysical equipment and there are no major anticipated impacts in surrounding environments. Potential environmental and social impacts of the project activities can be managed through robust and well-implemented mitigation measures, which have been established in the ESCP. These include Environmental Codes of Practice (ECOPs) and Construction Environmental and Safety Management Plan (CESMPs) depending on the scale of the construction and type of activities.

67. **ESS 1 Assessment and Management of Environmental and Social Risks** sets the GoI's responsibilities for assessing, managing and monitoring environmental and social risks and impacts associated with each stage of project implementation. Overall Environmental and Social Risk classification is Moderate. Due to the emergency nature under which the project is being prepared, a project-level ESMF will be developed prior to loan effectiveness. Implementation of the ESMF, as well as site-specific Environmental and Social assessments, will commence once selected target districts have been confirmed by the Government, starting with areas affected by the recent catastrophic events, including in Central Sulawesi, West Nusa Tenggara, and along Sunda Strait. Learning from these events, the Government has indicated urgent priorities to strengthen public awareness and preparedness (including community-level contingency planning and disaster risk reduction); and early warning systems capacities (including timely impact-based forecasting and hazard warnings). The project will provide urgently needed support to restore damaged hazard monitoring and early warning equipment and strengthen the DRM capacity of local governments in these areas. Implementation of the ESMF will be part of the technical assistance support to strengthen the institutional capacities of the implementing agencies. No construction activities or installation of instrumentation or equipment will proceed without the World Bank's approval, which will be subject to the preparation of adequate environmental and social management plans in conjunction with the agreed ESMF.

68. **ESS2 Labor and Working Conditions** is relevant to the project as specific physical investments likely involve a small number of direct workers and contracted workers. Construction works are not expected to generate substantial labor influx since the scope of the physical construction works is minor. Installation of instrumentation and equipment will be through contractors and not involve community workers, whilst public awareness and community preparedness programs at the village level may recruit community facilitators. Gender Based Violence (GBV) and Sexual Exploitation and Abuse (SEA) risks related to the project have been assessed as low due to the agreed scope. Instruments to be developed under this ESS include: a) labor management framework and procedures, b) project workers' Grievance Redress Mechanism (GRM), c) Occupational Health and Safety (OHS) management procedures, and d) workers' codes of conduct, particularly in relation to GBV/SEA prevention.

69. **ESS3 Resource Efficiency and Pollution Prevention and Management** is relevant as the project will finance civil works including upgrading of emergency operations centers and a new integrated data center. Project investments might consume raw materials such as timber that would be sourced through measures specified in the "Good International Industry Practices". The project is likely to produce general waste such as dismantling or demolition of building materials. These materials will be disposed of in properly licensed dump sites or hazard waste management facilities.

70. **ESS4 Community Health and Safety** is relevant and includes consideration of natural hazards (e.g., earthquakes, tsunamis, tropical storms, and floods); physical hazards (e.g., unsafe facilities, unsafe operation, community entering



construction sites) and accidents (e.g., fire, electrocution); traffic and road safety hazards; health issues (including noise, fugitive dust, water-borne and vector-borne diseases, as well as communicable diseases such as HIV/AIDs); hazardous materials (asbestos-containing materials, fuels, and chemicals used/stored by contractors); and access for vulnerable groups (e.g., people with physical disabilities). Emergency events may arise from natural or man-made hazards during construction; and specific management and mitigation measures during construction and operation will be prepared. A potential risk for the project's activities may likely stem from potential weak implementation of contingency plans, poor public awareness, information distortion and/or inadequate maintenance of relevant early warning equipment, leading to malfunction and/or failures. Integral to project implementation, capacity building for BNPB and BPBDs will address issues related to community health and safety risks for disaster prevention (such as early warnings). Such provisions will be established in the project's ESMF.

71. **ESS5 Land Acquisition, Restrictions on Land Use and Involuntary Resettlement** is relevant. The need for land acquisition for minor construction works will be determined once sites and types of construction works have been identified during project implementation. The project will ensure that future land acquisition (e.g., for construction of data centers or small shelters for hazard monitoring units) will follow a voluntary "willing buyer/willing seller" arrangement whereby the owners of the land must be able to refuse to sell, without the threat of compulsory acquisition. No resettlement is envisaged under the operation. Such requirements will be established as part of the Resettlement Policy Framework, which will form part of the ESMF, and outline resettlement principles, organizational arrangements, and design criteria to be applied to project activities/sub-projects.

72. **ESS7 Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities** is relevant to this project. The interventions under the project, especially disaster risk reduction awareness-raising and training, as well as mechanisms for the inclusion of indigenous communities where they exist, need to be adapted to their situation with a view to effectively include them in the communication and participation process. Community Based Disaster Risk Management approaches to support community preparedness programs under Component 1 and service delivery systems under Component 2 would need to develop implementation mechanisms tailored to the needs of Indigenous communities. An Indigenous Peoples Planning Framework (IPPF) will be prepared as part of the project's ESMF. If Indigenous Peoples will be affected by the project activities as informed during screening, Indigenous Peoples Plans (IPPs) will be prepared to lay out engagement processes and mitigation of adverse risks and impacts based on Free, Prior and Informed Consent (FPIC).

73. **ESS8 Cultural Heritage** is relevant. Since the scale of construction and specific locations of potential infrastructure works (e.g., construction of data centers and small shelters for hazard monitoring units) are not yet finalized, the impacts on cultural heritage will be assessed during the preparation of the relevant environmental permitting processes (AMDAL and/or UKL/UPL). A chance find procedure will be established as part of the ESMF as a precautionary measure.

74. **ESS 10 Stakeholder Engagement and Information Disclosures** sets a systematic approach to stakeholder engagement by the GoI to identify stakeholders and build and maintain a constructive relationship with them, in particular project-affected parties. An initial SEP for the project has been developed, outlining general principles, engagement approach, stakeholder analysis as well as a collaborative strategy and plan for an engagement process in accordance with ESS 10. Further engagement as an iterative process will continue throughout project implementation. Due to the sensitivity of post-disaster emergency contexts, community engagement will be undertaken once the project design,

including relocation options, have been agreed upon in order to ensure that the most up-to-date information is provided. These processes have been established in the SEP and will be updated during project implementation.

E. Gender

75. The project will invest in reducing existing relevant inequalities between men and women through a community awareness program under Component 1 with a targeted focus on women's empowerment in disaster preparedness, and gender-sensitive design strategies for the specific needs of all women and men when designing service delivery systems. Table 3 summarizes the proposed gender gap, actions, and results and indicators. Annex 4 provides more detail on the gender analysis with key challenges identified as follows:

- i. **Women's access to information and knowledge about DRR, particularly of disaster preparedness and last-mile hazard warning communication.** In many natural disaster situations, women are often disproportionately impacted, and women's mortality rates are often higher than men (see data in Annex 4). Lesser access to information and knowledge about DRM than men is one of the contributing factors causing a greater impact on women than men. The Indonesian Law No. 24/2017 on Disaster Management promotes non-discrimination of all citizens in DRR planning and decision making. However, in practice, women tend to have less access than men to DRM resources, early warning information and planning processes, which limits their ability to act in the face of natural disasters and increases their overall vulnerability. Since 2012, BNPB has developed a community-based disaster risk management program called *Desa/Kelurahan Tangguh Bencana (Destana)*. Under this program, facilitators are hired and trained to assist communities in identifying and organizing local resources to mitigate disaster risk. While the views and needs of all diverse groups represented in a community³⁴ are crucial in the development of DRM planning (including preparedness and last-mile hazard warning communication), numbers of women facilitators hired and trained are reportedly lower than men. This project aims to reduce the disproportional negative impact on women by reducing the gender gap in access to information, as well as providing more targeted early warning dissemination services to women. This will be done by targeted investments that improve women's access to early warning information and knowledge about DRR, particularly disaster preparedness and early warning, so that they can be better equipped to make informed decisions when acting upon early warnings and natural hazards. This will include development of mobile phone applications, as well as other non-technological dissemination mechanisms, that will be used to disseminate early warning information under the MHEWS platform to be developed under Component 1 activities. Targeted consultations with diverse users, including people of all genders, abilities, and ages will be undertaken to help design the dissemination mechanisms and refine final designs to address specific user needs. Specific training will also be undertaken with diverse groups, including women, to download and access mobile phone applications.

Table 3: Proposed gender gap, actions, and results and indicators for IDRIP

Gender Gap	Gender Action	Results and Indicators
More women than men are impacted by disaster because they have less access than	Executing Agency will develop and design mobile phone applications to disseminate early warnings under the MHEWS platform and offer targeted training for women that	Share of registered users of mobile phone applications designed for early warning dissemination that are women

³⁴ For example, people of all genders, abilities, ages



Gender Gap	Gender Action	Results and Indicators
men to information and knowledge about disaster preparedness and last-mile hazard warning communication, and overall DRM.	will address the different societal roles, needs and capacities of women when preparing for disasters • Executing Agency and implementing partners hire and train women facilitators; and undertake outreach, training and advocacy activities about DRM, preparedness and EWS that specifically target women and address their needs • Executing Agency strengthens the capacity of relevant local women's organizations to undertake outreach, training and advocacy activities on DRM, preparedness and EWS that specifically target women and addresses their specific needs	• Women who believe they are better prepared to respond to natural disasters after participating in outreach, training and advocacy activities³⁵ (percentage) • Women facilitators hired and trained to undertake outreach, training and advocacy activities (percentage)

F. Climate Change

76. This project contributes directly to national climate change policy objectives by strengthening climate resilience of vulnerable populations and locations in Indonesia. Component 1 will support multi-hazard programs that also raise awareness on climate change adaptation and the importance of preparedness for the potential increase in frequency and severity of climate-related disasters such as floods and storms. Such activities would help vulnerable populations to better prepare for future natural hazards and reduce the loss of lives, assets and livelihoods. Component 3 will also finance technical assistance to support climate risk-informed spatial planning. Annex 2 contains more detail on the project design and Annex 5 provides further detail of Indonesia's climate vulnerability.

V. GRIEVANCE REDRESS SERVICES

77. Communities and individuals who believe that they are adversely affected by a project supported by the World Bank may also submit complaints to the World Bank's Grievance Redress Service (GRS). The GRS ensures that complaints received are promptly reviewed in order to address project-related concerns. Project affected communities and individuals may submit their complaint to the World Bank's independent Inspection Panel which determines whether harm occurred, or could occur, as a result of World Bank non-compliance with its policies and procedures. Complaints may be submitted at any time after concerns have been brought directly to the World Bank's attention, and Bank Management has been given an opportunity to respond. For information on how to submit complaints to the World Bank's corporate Grievance Redress Service (GRS), please visit <http://www.worldbank.org/en/projects-operations/products-and-services/grievance-redress-service>. For information on how to submit complaints to the World Bank Inspection Panel, please visit www.inspectionpanel.org.

³⁵ including those who believe they are better prepared to take actions following early warnings on natural hazards



VI. KEY RISKS

78. **Overall risk rating and rationale.** The summary table for the Systematic Operations Risk-Rating Tool (SORT) is included in the Data Sheet. The overall risk to achieving the PDO is assessed as Substantial, based on Substantial risks associated with complexity in technical design, implementation capacity of PIUs, and fiduciary risk. Other risks have been assessed as moderate or low. Due to the high frequency of natural disasters in Indonesia, there is also risk that another catastrophic event will impede the project outcomes and progress will be hampered.

79. **Risks related to the technical project design are rated as Substantial.** Components 1 and 2 will introduce innovative and good practice approaches in the way BNPB and BMKG operate at central and local levels, manage assets, and use of modern technologies for service delivery. To mitigate risks of related to absorption capacity for technology transfer, capacity assessments and respective strengthening is included in the project design. Likewise, the World Bank's implementation support will include technical expertise related to both components and continue to share good practice examples relevant to local context. The project includes several components and sub-components, with stakeholders at both the national and subnational level, which could create constraints in coordinating the investments between stakeholders. To mitigate coordination risks, a Steering Committee will be established prior to loan effectiveness.

80. **Risks related to institutional capacity for implementation and sustainability are rated as Substantial.** BNPB and BMKG have limited experience with the Bank and other multilateral development partner operations. Support for BPBDs across Indonesia under Component 1 could pose a risk due to their lower capacity and high staff turnover rate. Limited budgeting for operations and maintenance of assets may pose a risk for project longer-term sustainability. To mitigate these risks, Component 3 will finance suitably qualified specialists to support PIUs, and asset maintenance plans will be developed for investments.

81. **Risks related to fiduciary management are rated as Substantial.** BNPB and BMKG do not have experience with implementing and administering World Bank-financed operations. The project's financial management would generally follow government systems, including budgeting, internal controls, accounting and reporting, flow of funds, and the auditing mechanism. Based on the experience of other Bank-financed operations, financial management risks relate to the timeliness of budget availability and capacity to conduct payment verifications. The key procurement risks are due to the possibilities of: (a) delays due to no experience of carrying out procurement under Bank-funded operations, particularly for BNPB and BMKG, and also no experience of PIUs with the Bank's Procurement Regulations which govern procurement under the project; (b) inadequate procurement progress monitoring, and weak contract management; (c) procedural non-compliance due to insistence by PIUs to use the Government's Procurement procedures instead of the Bank's Procurement Regulations; (d) rejection of lower-priced bids due to narrow interpretation of qualification criteria or not seeking clarifications from bidders on factual/historic qualification information; and (e) implementing agencies' insistence to use national e-procurement system in Open International Competitive Procurement of goods, works and non-consulting services, and for consultant selection methods other than Quality and Cost Based Selection (QCBS), whereas the system is not yet ready and acceptable to the Bank for use under these procurement methods. Risk mitigation and capacity strengthening measures are outlined in Annex 1 on Implementation Arrangements, which will be updated upon the finalization of the PPSD and the Procurement Plan.



82. **The environmental risk is rated as Moderate.** Overall, the project will have positive environmental and social benefits in building disaster awareness activities through strengthening disaster risk management systems for faster and more effective disaster response. Under Component 1, the project will provide investments in strengthening systems, building and renovating infrastructure, procuring instruments, and installing technological systems and software. The moderate risk is associated with components 1 and 2 as it is directly dependent on the management capacity and commitment of individual implementing agencies (BNPB and BMKG) to apply the World Bank's Environmental and Social Standards (ESSs) requirements under the ESF, in particular ESS 4 on community health and safety. For Component 3, no potential risk is anticipated except positive impacts to enhance the Borrower's capacity to retain qualified and competent resources with environmental and social skills and experience to manage environmental and social management systems of the project.

83. **The social risk rating is rated as Moderate.** While the social development outcome is positive, a lot would depend on the ability of the implementing agencies to actively involve all stakeholders including particularly potentially disaster-prone communities in awareness-raising about the emergency management information systems and response mechanisms. The establishment of the emergency operation centers, data centers, and related infrastructure may involve limited land acquisition and, depending on the type of land, the land acquisition procedures would need to be invoked. The project has good potential to strengthen community-based disaster risk management systems for enhanced effectiveness.



VII. RESULTS FRAMEWORK AND MONITORING

Results Framework

COUNTRY: Indonesia

Indonesia Disaster Resilience Initiatives Project

Project Development Objectives(s)

To improve the preparedness of the central government and selected local governments for natural hazards.

Project Development Objective Indicators

Indicator Name	DLI	Baseline	Intermediate Targets		End Target
			1	2	
Improve preparedness of central government and selected local governments for natural hazards					
Local governments with functioning emergency operations centers (Number)		0.00	5.00	10.00	20.00
Satisfaction of end-users with geophysical information services (Percentage)		0.00	25.00	45.00	60.00

Intermediate Results Indicators by Components

Indicator Name	DLI	Baseline	Intermediate Targets		End Target
			1	2	
Component 1 Disaster preparedness and emergency management capacity					
Multi-hazard early warning system platform established and operational (Yes/No)		No			Yes
Functional emergency operations centers		0.00	5.00	15.00	20.00



Indicator Name	DLI	Baseline	Intermediate Targets		End Target
			1	2	
upgraded and meet minimum standards (Number)					
Share of registered users of mobile phone applications designed for early warning dissemination that are women (Percentage)		0.00	0.00	25.00	45.00
People (disaggregated by gender) who believe they are prepared to respond to natural disasters after participating in outreach, training and advocacy activities (Percentage)		0.00	40.00	60.00	80.00
Women facilitators hired and trained to undertake outreach, training and advocacy activities (Percentage)		0.00	25.00	35.00	45.00
Component 2: Geophysical early warning services					
Local governments served by seismic information services (Number)		0.00	15.00	35.00	50.00
Equipment installed by the project and functioning in line with established SOPs (Percentage)		0.00	30.00	60.00	80.00
Government officials (disaggregated by gender) that have been trained by capacity building programs (Number)		0.00	400.00	600.00	800.00
Component 3: Project implementation support					
Grievance redress mechanism established and functioning (Yes/No)		No	Yes	Yes	Yes
Complaints resolved (Percentage)		0.00	30.00	60.00	90.00



Monitoring & Evaluation Plan: PDO Indicators

Indicator Name	Definition/Description	Frequency	Datasource	Methodology for Data Collection	Responsibility for Data Collection
Local governments with functioning emergency operations centers	This measures the number of local governments (kota and kabupaten level) that have upgraded or constructed emergency operations centers with an updated contingency plan, as well as equipment and systems necessary to implement the contingency plan	Baseline, MTR, project close	Project monitoring reports	The number of local governments that have upgraded/constructed emergency operations centers will be determined	BNPB
Satisfaction of end-users with geophysical information services	This measures the satisfaction rate of end users towards the improved BMKG information services for government officials from different sectors, including DRM (BNPB and BPBDs), aviation, media and agriculture calculated as a percentage of users surveyed (gender disaggregated). Gender specific aspects (e.g. access to early warning information, behavioural impact) will be also assessed.	At the beginning, MTR and end of the project	Satisfaction survey	The responsible agency will conduct satisfaction surveys on end users of their information products	BMKG
People of population reached by public awareness and disaster preparedness programs in target areas	This will measure the percentage of targeted populations in selected districts (kota/kabupaten) that are reached by public	Baseline, MTR, project closure	Project monitoring reports	The responsible agency will calculate the total number of people to be reached through public awareness and disaster	BNPB and BMKG



	awareness and disaster preparedness programs financed by the project			preparedness programs financed by the project, and calculate the percentage of people reached at each stage of the required monitoring process	
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Monitoring & Evaluation Plan: Intermediate Results Indicators

Indicator Name	Definition/Description	Frequency	Datasource	Methodology for Data Collection	Responsibility for Data Collection
Multi-hazard early warning system platform established and operational	This measures whether the multi-hazard early warning system platform has been established and operational with relevant standard operating procedures, institutional arrangements, regulatory frameworks, and infrastructure requirements	Beginning and end of project	Project monitoring reports	Responsible agency will confirm that all standard operating procedures, institutional arrangements, regulatory frameworks, and infrastructure requirements are in place	BNPB
Functional emergency operations centers upgraded and meet minimum standards	This will measure the number of local emergency operations centers (based in local disaster management agencies - BPBDs) that have been upgraded or constructed using project financing and have developed a multi-hazard contingency plan specific to the local disaster risk profile, and meet	Baseline, MTR, project close	Construction and project monitoring reports	The responsible agency will calculate the number of emergency operations centers upgraded or constructed using project financing	BNPB



	the minimum standards established by BNPB				
Share of registered users of mobile phone applications designed for early warning dissemination that are women	Measures the percentage of people (by gender) who are registered on mobile phone applications designed for the MHEWS platform under Component 1	Baseline, MTR, and project closure	Project monitoring reports	The responsible agency will determine the percentage of registered users disaggregated by gender	BNPB
People (disaggregated by gender) who believe they are prepared to respond to natural disasters after participating in outreach, training and advocacy activities	Measures the percentage of people who believe they are prepared to respond to natural disasters after training under project activities related to Component 1	Baseline, MTR, project close	Project monitoring reports	The responsible agency will develop user satisfaction surveys under Component 1 and measure the satisfaction levels of project beneficiaries	BNPB
Women facilitators hired and trained to undertake outreach, training and advocacy activities	This measures the percentage of facilitators under project activities related to Component 1 that are women	Baseline, MTR, and project closure	Project monitoring reports	The responsible agency will determine the percentage of facilitators financed under Component 1 activities, disaggregated by gender	BNPB
Local governments served by seismic information services	Number of local governments (kota and kabupaten level) that are served by information services financed by the project	Baseline, MTR, project close	Project monitoring reports	The number of kota and kabupaten governments that benefit from installed monitoring systems will be determined	BMKG
Equipment installed by the project and functioning in line with established SOPs	This measures the number of seismographs and seismic intensity meters financed by the project that are operating and functioning in compliance with BMKG's	Baseline, MTR, project close	Project monitoring reports	The responsible agency will determine the number of observation stations and monitoring instruments financed by the project that are operating and	BMKG



	Standard Operating Procedures, providing near real-time access to information services and meet BMKG's agreed percentage for data reporting rates			functioning	
Government officials (disaggregated by gender) that have been trained by capacity building programs	This measures the number of BMKG staff that have been trained under capacity building programs financed by the project	Baseline, MTR, project close	Project monitoring reports	The responsible agency will record attendance of capacity building activities financed by the project and calculate participation by gender)	BMKG
Grievance redress mechanism established and functioning	This measures whether an adequate, functioning and robust grievance redress mechanism has been established by the Executing Agency	At the beginning of the project and after 2 years	Project monitoring reports	The responsible agency will confirm whether the grievance redress mechanism has been established	BNPB
Complaints resolved	This measures the number of complaints that have been resolved satisfactorily as a percentage of the total number of complaints received	Annually	Project monitoring reports	The responsible agency will calculate the total number of complaints that have been resolved satisfactorily according to satisfaction surveys as a percentage of the total number of complaints received	BNPB



ANNEX 1: Implementation Arrangements and Support Plan

COUNTRY: Indonesia

Indonesia Disaster Resilience Initiatives Project

Project Implementation Arrangements

- Project Coordination:** An inter-agency Steering Committee, chaired by BNPB, will be established for the Project. Members will include representatives from BNPB and BMKG, as well as: Bappenas; Ministry of Public Works and Housing; Ministry of Finance; Ministry of Home Affairs; Ministry of Agrarian Affairs and Spatial Planning; Geospatial Information Agency; Geological Agency; Ministry of Energy and Natural Resources; Indonesian Institute of Sciences; Agency for the Assessment and Application of Technology; National Institute of Aeronautics and Space; Ministry of Education and Culture; Ministry of Health; Ministry of Villages, Disadvantaged Areas, and Transmigration; Ministry of Environment and Forestry; and Ministry of Communication and Information. Steering Committee members will be responsible for providing strategic guidance, oversight, monitoring, and reporting on respective implementation activities. The Steering Committee membership and scope of responsibilities will evolve when the IDRAR program develops to include other projects and activities beyond IDRIP and will be supported by Component 3 (Project Implementation Support) under IDRIP.
- Project Executing Agency (EA):** BNPB will act as the EA for this project, with day-to-day project management and project coordination by a Central Project Management Unit (CPMU) under the Office of the Secretary General. As the EA, BNPB will be responsible to coordinate the results achieved by each of the Project Implementation Units (PIUs) and measure progress towards the project's objectives. The CPMU will also coordinate with the Steering Committee, facilitate regular coordination meetings with PIUs; implement Environmental and Social Standards (ESSs) in accordance with the ESF; manage and report on the Results Framework; and develop, utilize, and update the POM with PIUs. It will be led by a dedicated Project Coordinator, who will be responsible for managing the project's technical, fiduciary, safeguards, and M&E activities. Core staff of the CPMU could include an ICT Consultant, an Emergency Preparedness Consultant, Procurement Consultant, a Social Management Consultant, an Environmental Management Consultant, a Financial Management Consultant, and a M&E Consultant.
- Project Implementation Units:** Two PIUs will be established at the Office of the Secretary-General of BNPB (Component 1) and the Office of the Deputy for Geophysics of BMKG (Component 2). The relevant Directorates responsible for project activities are outlined in Table 1.1. BMKG will report to BNPB and be responsible for achieving the agreed objectives and relevant performance indicators; procuring and managing consultants and managing contractors to execute project activities; and complying with environmental and social management, fiduciary, and M&E requirements. Component 3 (project implementation support) will be implemented by BNPB.

Table 1.1. PIU by component and sub-component.

Component/Sub-component	Project Implementation Unit (PIU)
Component 1: Disaster preparedness and emergency management capacity	National Disaster Management Authority (BNPB)
1.1: Disaster risk knowledge and awareness	Directorate of Disaster Strategy Development Directorate of Disaster Risk Mapping and Evaluation



Component/Sub-component	Project Implementation Unit (PIU)
1.2: Multi-hazard early warning system development and information dissemination	Directorate of Early Warnings
1.3: Hazard information and early warning dissemination	Directorate of Early Warnings Operations Control Center National Emergency Operations Center
1.4: Emergency management, response, and preparedness capacities	Directorate of Preparedness Directorate of Mitigation Center for Education and Training
Component 2: Geophysical early warning services	Indonesian Agency for Meteorology, Climatology and Geophysics (BMKG)
2.1: Service delivery systems	Center for Network Center for Database
2.2: Institutional strengthening and capacity development	Center for Training Center for Research and Development
2.3: Monitoring networks and nowcasting capacity	Center for Earthquake and Tsunami Center for Engineering Seismology, Potential Geophysics and Time Signal
Component 3: Project Implementation Support	BNPB
Project coordination and Steering Committee support	Planning Bureau

4. **Project Operations Manual:** A POM will include all procedures, rules, and standards for the implementation of all components and implementation aspects of the Project including: (a) institutional arrangements; (ii) operation of the EA/CPMU and PIUs; (iii) project planning and M&E; (iv) social and environmental management, reporting, communication, and human resources; (v) procurement; (vi) financial management and administrative processes; (vii) grievance procedures; and (viii) procedures for amending the POM. The POM will be finalized by the time of project effectiveness.

5. **Financial Management (FM):** The CPMU will be responsible for overall project coordination, day-to-day management, budgeting, financial administration, monitoring and reporting. Following the government system, there will be a working unit (*Satker*) organization at each PIU, which includes government officers with the following FM functions: commitment maker, verification officer, treasurer and accounting officers. Additionally, a consultant will be hired to assist the CPMU in fulfilling World Bank FM requirements.

6. All PIUs will maintain separate accounting records for all payment orders (SPM) and remittance orders (SP2D). All financial transactions will be recorded in the government accounting system and included in the government accountability reports. All PIUs will keep original remittance orders (SP2D) and maintain files for audit purposes.

7. The CPMU will prepare a separate set of consolidated interim unaudited financial reports (IFRs) on a quarterly basis. The IFRs will contain all PIUs payments within that period. The CPMU will be responsible to submit the IFRs no later than 45 days after the end of each quarter. The CPMU also will prepare an annual unaudited financial report completed with Notes to the Financial Statements for auditing purposes. The annual financial statements should be reviewed by the Inspectorate prior to submission to the auditor (BPK). An annual audit report will be furnished to the Bank no later than six months after the end of the government's fiscal year.



8. **Budgeting:** In Indonesia, financing arrangements for World Bank projects implemented by the GoI agencies are governed by an integrated budget or DIPA. The sources of financing for project activities, including financing percentages, are detailed in DIPA and followed strictly.

9. **Procurement:** All Procurement under the IBRD-financed portion of the project shall be carried out under the World Bank's Procurement Framework in accordance with the Procurement Regulations for IPF Borrowers dated July 2016 revised November 2017 and August 2018, and by the provisions of the Loan Agreement and approved Procurement Plan. For procurement of goods, works and non-consultant services procured through Open National Competitive Procurement, the Government's procurement regulations may be used to the extent they do not conflict with the World Bank's Procurement Regulations and subject to the requirements listed in para. 5.4 of the World Bank's Procurement Regulations and which are also reflected in the Procurement Plan and incorporated in the harmonized model bidding documents acceptable to the World Bank for national open competitive procurement. In case of conflict or difference in opinion arising during the procurement process, the Bank shall provide clarification in writing which shall be followed.

10. The Government's SPSE e-procurement may only be used for procurement of goods, works and non-consulting services through the Open National Competitive Procurement and using the harmonized model bidding documents agreed between the Bank and LKPP (the National Public Procurement Agency). Furthermore, the SPSE International Competitive Bidding (ICB) e-procurement system modified by LKPP may be used only for selection of consultant firms under the QCBS method and using the Bank's standard Request for Proposal document adjusted satisfactorily to the Bank for electronic use. Procurement under all other methods including Open International Competitive Procurement shall be carried out through non-electronic process with manual issuance of invitation for bids and receipt of bids/proposals, until such time that the modification of the LKPP's modified SPSE ICB e-procurement system has been completed by LKPP acceptable to the Bank, which will be confirmed through the Bank's written no objection. During project implementation, the Bank's Systematic Tracking of Exchanges in Procurement (STEP) tool shall be used to record all procurement and contract implementation processing under the Project.

11. Scope of procurement expected under the Project:

- a) Procurement under Component 1 will be implemented by BNPB, which is also the Executing Agency, and the procurement activities under this component will include but not limited to procurement of emergency equipment, emergency relief supplies, mechanical handling equipment, generators, communication equipment, and other critical logistics and emergency equipment, consulting services for development and improvement Standard Operation Procedures.
- b) Procurement under Component 2 will be implemented by BMKG, and procurement under this component mainly includes select monitoring equipment including central management and quality control systems, seismographs and seismic intensity meters and systems, and also several consulting services, technical assistance to advise on institutional strategic plans, and development of socioeconomic assessments of BMKG's geophysical early warning services.
- c) Procurement under Component 3 will be implemented by BNPB. It will mainly include consultant services to support project management, procurement, financial management, technical audits, technical design, oversight of compliance with agreed social and environmental standards, oversight of compliance with social inclusion targets (e.g., gender and disability action plans), and monitoring and evaluation activities.

12. It is expected that civil works, goods and non-consulting services will be procured through Open National Competitive Procurement. The possibility of putting in place Framework Agreements for certain types of standard goods



that are normally required to be supplied at short notice in responding to emergency situations in case of natural disaster will also be explored and encouraged to further support advance preparedness.

13. Consulting services for project management and technical assistance, project management support and other technical assistance will mostly be selected through the Quality-and Cost Based Selection (QCBS) method. Given the emergency nature of the project, the detailed procurement requirements and cost estimates for each package have not yet been fully defined, and it is also still unclear whether the existing Pokja UKPBJ (Procurement Service Unit) will be assigned to carry out all procurement activities under the Project or a new Pokja UKPBJ will be established, and therefore the Project Procurement Strategy for Development (PPSD) and Procurement Plan are expected to be finalized by the first quarter of project implementation when the requirements will have been more specifically defined. Given the emergency nature of the project, the PPSP, Procurement Plan and Project Operations Manual will include streamlined procedures appropriate for the Project based on the flexibilities allowed under the Procurement Regulations for procurement in situations of urgent need. Training on the Bank's Procurement Regulation will be delivered by the Bank to EA/PIUs as soon as Pokja UKPBJ has been established and assigned.

14. BNPB and BMKG have no previous experience in carrying out procurement under Bank-financed projects as well as in applying the Bank's Procurement Regulations. The procurement risk was determined to be Substantial and the proposed risk mitigation and capacity strengthening measures are provided below, which will be updated upon finalization of the PPSP and Procurement Plan.

15. Procurement Risks include:

- a) Delays due to no previous experience under Bank-financed projects, particularly for BNPB and BMKG, and limited understanding of PIUs in carrying out procurement under the Bank's Procurement Regulations;
- b) Inadequate procurement performance monitoring;
- c) Procedural non-compliance due to implementing agencies' following Government's Procurement procedures instead of the Bank's Procurement Regulations, which govern procurement under the Project;
- d) Rejection of lower priced bids due to narrow interpretation of qualification criteria or not seeking clarifications from bidders on factual/historic qualification information;
- e) Implementing agencies' insistence to use national use e-procurement systems for open international competitive procurement and for consultant selection methods other than QCBS, whereas the system is not yet ready and acceptable to the Bank for use under these procurement methods.
- f) Weak contract management by the *Pejabat Pembuat Komitmen* (PPK – Commitment-making Official).
- g) Proceeding with issuance of notice to commence to the contractor without finishing contract requirements and signing.

16. The risks will be mitigated by:

- a) The Bank will deliver training to CPMU/PIUs on the World Bank's Procurement Regulations and also provide hands-on guidance;
- b) Requiring use of the World Bank's online procurement planning and tracking tool (STEP) and regular reporting of progress of procurement performance to ensure compliance with the World Bank's Procurement Regulation;
- c) Including an explicit provision in the Project Operations Manual and procurement plan to highlight that the Bank's Procurement Regulations shall govern all procurement under the Project and take precedence over Government procurement regulations;



- d) Specifying qualification criteria in bidding documents in an explicit manner such that there is no rejection of lower priced-bids without seeking written clarifications from bidders on historical and factual qualification information if not provided in the bid;
- e) Using manual bidding process for Open International Competitive Procurement of goods, works and non-consulting services, and for consultant services other than QCBS method, until such time that the LKPP's modified SPSE ICB e-procurement system is determined acceptable to the Bank for use in these procurement methods;
- f) In addition to the Bank's prior review of strategically-important and large value or complex contracts, it is proposed that the Bank will carry out joint fiduciary (procurement and financial management) supervision missions in the field to be conducted at least twice per year, including delivering training and carrying out ex-post reviews of no less than 30 percent of the contracts subject to the Bank's post review;
- g) Detailed procurement steps for various methods to be used under the project will be elaborated in the POM as well as guidance on due diligence on verification of bidders' qualification documents;
- h) Qualified procurement consultants will be engaged to assist PMU/PIU in carrying out the procurement under their respective project components and to build capacity;
- i) Monitoring of procurement and contract management compliance and performance will be strengthened through centralized oversight by the PMU with the support of a Project Management Consultant.

17. **Environmental and Social:** Under Component 1, BNPB will be the PIU and responsible for managing environmental and social risks. This is the first World Bank-financed project that BNPB is implementing and as such, senior management and technical officers would need to be oriented adequately to the ESF and the importance of adhering to agreed dimensions of project design in this respect. Environmental and social consultants will be recruited as early as possible in the preparation process to oversee the management of the overall environmental and social aspects of the project activities, including any environmental permitting processes (AMDAL and/or UKL/UPL) required, as well as the management of potential grievances.

18. Under Component 2, BMKG will be the PIU and responsible for managing environmental and social risks. This is the first World Bank-financed project that BMKG is implementing and as such, senior management and technical officers would need to be oriented adequately to the ESF and the importance of adhering to agreed dimensions of project design in this respect. Environmental and social consultants will be recruited as early as possible in the preparation process to oversee the management of the overall environmental and social aspects of the project activities, including any environmental permitting processes (AMDAL and/or UKL/UPL) required (e.g., construction of small-scale infrastructure to protect monitoring equipment under Sub-component 2.3), as well as the management of potential grievances.

19. **Monitoring and Evaluation:** The Results Framework provides the basis for measuring progress towards the Project's objectives. It includes the PDO-level outcome indicators related to the strengthening of resilience to disasters nationwide, as well as component-specific intermediate indicators, with baselines and targets for each over the life of the Project. Any required project design adjustments will be discussed and amended if necessary. Two types of monitoring and evaluation activities will be carried out during Project implementation: regular monitoring, and a Project MTR. The project's EA will be principally responsible for Project monitoring, including reporting regularly on the outcome and intermediate indicators. This would include monitoring progress across all components, financial management, procurement process, safeguards and progress towards achievement of results indicators. The EA will coordinate with all PIUs and concerned subnational governments for monitoring and evaluation activities. The specific roles and responsibilities of the EA and each PIU in undertaking monitoring and evaluation is described in further detail in the POM.



Implementation Support Plan

20. **Implementation support strategy and approach.** The Implementation Support Plan has been developed considering the following: (a) emergency nature of the project; (b) lessons learned from post-disaster recovery operations and DRM projects; and (c) risks and needs as summarized in the Project's ESRS. Its objective is to provide targeted assistance to the GoI on the overall project supervision and technical assistance needs during project implementation. The focus of support includes supervision related to technical aspects of the project, including selection of geophysical early warning services; mitigation of potential environmental and social risks; and assistance to enhancing procurement and project financial management responsibilities. The Bank will maintain a dedicated project team in the East Asia and Pacific region that will provide hands-on support to the project, and work closely with other technical experts and consultants. The core task team based in Jakarta will maintain frequent and intensive coordination with the Steering Committee, EA/CPMU, PIUs; as well as with global sectoral, fiduciary and safeguards specialists to support achievement of the PDO.

21. **Implementation support missions.** The World Bank will conduct, at a minimum, semi-annual implementation support missions to review Project progress, performance management issues, and provide technical advice and feedback to improve the overall performance of the Project. In the first two to three years of project implementation, and as needed, these missions will be undertaken more frequently. The results of each supervision mission will be discussed with the responsible PIUs for improvement of Project implementation and for designing technical assistance, as needed. Special attention will be paid to the following aspects: technical, including quality checks in the field; safeguards; fiduciary; and project implementation pace, expenditure efficiency, and overall progress. Various assessments and audits may be conducted during these missions to help mitigate potential project risks and measure achievement towards the project objectives. These could include technical audits, value-for-money audits, forensic audits, and rolling audits. Key findings and agreed recommendations of all formal missions will be outlined in a Management Letter and Aide-Memoire, which will be used as formal documentation by both the Government and task team for follow up actions.

22. **Dedicated Specialists.** The World Bank will maintain a core task team of dedicated specialists as follows.

- a) **Technical specialists** with expertise in areas relevant to the three components (e.g., early warning systems, seismology, disaster risk management) will participate in missions to review the quality of project implementation, provide technical guidance, and help to enhance the overall quality of project activities and achievement of project objectives. These specialists will undertake intensive coordination and dialogue with respective PIUs.
- b) **Environmental and social specialists.** The World Bank will conduct regular missions to monitor compliance with the ESCP in line with the ESF, conduct necessary assessments of environmental and social risks, and review the implementation of ESSs. Formal supervision of financial management will be undertaken as part of each formal supervision mission. The specialists will also conduct initial training to the CPMU and PIUs.
- c) **Procurement specialist.** The World Bank will provide advice on procurement prior reviews to be carried out by the task team and conduct formal procurement support missions at least every six months to carry out post review of procurement actions in the field. An Accredited Procurement Specialist based in the Jakarta office will provide dedicated procurement support with additional guidance and support from the Procurement Hub Leader, also based in the Jakarta office.
- d) **Financial management specialist.** The World Bank will conduct regular financial management assessments to monitor compliance with fiduciary controls including budgeting and financial planning arrangements; disbursement status, management and financial flows; internal controls (including quarterly financial reports, annual audited financial statements, and remedial actions, if any); accounting and financial reporting; and financial management facilitation. Formal supervision of financial management will be undertaken as part of each formal supervision mission. The specialists will also conduct initial training to the CPMU and PIUs.



- e) **Knowledge management specialist.** A knowledge management specialist will develop knowledge sharing events and good practice knowledge products related to the project activities.
- f) **Other experts** in gender, monitoring and evaluation, and capacity building will participate in implementation support missions as needed to monitor implementation (M&E) against project objectives and provide inputs for potential adjustment or improvement of operations.

Table 1.2. Skills and resources requirements.

Time	Focus	Resource	Resource Estimate (# Staff weeks per year)
0 to 24 months	Team leadership	TTL/Co-TTL	20/20
	Technical: review of bidding documents, contracts, training	Technical specialists (x3)	30
		Procurement specialist	4
	Environmental and social: training, review, monitoring and supervision	Environmental safeguards specialist	4
	Procurement: training, procurement review and supervision	Procurement specialist	4
	Financial management: training and supervision	Financial specialist	4
	Other	Gender	1
		M&E	2
		Capacity building	2
	Implementation support	ACS	12
25 to 60 months	Team Leadership	TTL/Co-TTL	15/15
	Technical: review of bidding documents, contracts	Technical specialists (x3)	30
		Procurement specialist	4
	Environmental and social: monitoring and supervision	Environmental safeguards specialist	2
	Procurement: procurement review and training	Procurement specialist	2
	Financial management: training and supervision	Financial specialist	2
	Other	Gender	1
		M&E	2
		Capacity building	2
	Knowledge management	Knowledge management specialist	4
	Implementation support	ACS	12
Closing	Drawing lessons learned and mainstreaming good practices	M&E specialist	2
		Technical specialists	2

Note: ACS = Administrative and Client Support; TTL = Task Team Leader



ANNEX 2: Detailed Project Description

COUNTRY: Indonesia Indonesia Disaster Resilience Initiatives Project

1. **Overview.** An effective end-to-end and “people-oriented” early warning system can help prevent the loss of life and reduce the economic impacts and damages caused by a disaster, by presenting actionable risk information to be used by citizens, decision-makers, and other stakeholders. Accurate and action-oriented and timely information, using applicable channels and identified users, can help stakeholders to take necessary actions to reduce disaster impacts. The global experience points to the need for four (4) key elements for a successful early warning system: (i) disaster risk knowledge and awareness; (ii) detection, monitoring, analysis and forecasting of threats and their impacts; (iii) dissemination and communication of warnings; and (iv) emergency preparedness and response capacity.³⁶ These four elements promote the concept that an effective early warning system goes beyond instrumentation and emphasizes the importance of public awareness and changing behaviour so that people can take informed actions.

Component 1: Disaster preparedness and emergency management capacity (US\$70 million)

Sub-component 1.1 Disaster risk knowledge and awareness

The Government is developing a Multi-Hazard Early Warning System (MHEWS) Master Plan that applies the principles of people-centred early warning systems and works toward the “Grand Design” that has been outlaid by BNPB. It will need integrated spatial, socio-cultural and economic data to perform multi-risk analyses and information products based on multiple information layers; and develop and disseminate more targeted and impact-based warning services through an integrated portal that will act as a multi-stakeholder MHEWS information center. This sub-component will help to enhance existing disaster risk knowledge in Indonesia by integrating and building on existing disaster management platforms and other legacy systems (e.g., InaRISK and InaSAFE).

- a) **Multi-hazard risk data and mapping.** The maps, data and information will inform the MHEWS and improve emergency management operations through enhanced hazard identification, exposure mapping (population and assets), multi-hazard risk assessment information production. The risk information will also help to inform national and subnational disaster management plans, as well as development planning and spatial planning considerations.
- b) **Integrated disaster knowledge management and data analysis system.** An integrated knowledge platform will gather and manage knowledge about previous disaster events and model future risk to inform investments in disaster risk reduction. It will also help to collect and publish thematic and sectoral disaster data. The project will also support the establishment of knowledge forums or networks for the exchange of disaster risk knowledge and information in select communities.
- c) **Technical study and pilot program.** This activity will conduct a study including a pilot effort on the use of innovative and disruptive technologies to enhance dissemination and outreach activities, including inclusive (accessible and gender-sensitive) considerations. Such activities would help to better prepare priority high-risk districts in Indonesia for future disaster events and reduce the loss of lives, assets and livelihoods.

³⁶ United Nations Office for Disaster Risk Reduction (UNDRR) *International Conference on Multi-hazard Early Warning Systems*, 2016.



Sub-component 1.2: MHEWS system platform development

2. The MHEWS design aims to provide integrated hazard data and early warnings on the following climate-related and natural hazards: earthquakes, tsunamis, floods, volcanic eruptions, landslides, drought, extreme storms, and forest and land fires. This sub-component will support BNPB to acquire capacity to lead coordination on MHEWS in Indonesia and to develop a realistic and feasible future grand design of MHEWS in Indonesia, including feasibility studies, detailed technical designs and development plans. This sub-component will include training, development of SOPs, refinement of master plan, review of policies, regulations, and guidelines.

- a) **Institutional and regulatory framework of MHEWS in Indonesia.** This activity will assist in BNPB in designing an agreed institutional and regulatory framework for MHEWS in Indonesia with clear roles and responsibilities of all relevant stakeholders at national to local levels, based on good practices.
- b) **Establishment of national MHEWS coordination platform.** This activity will assist BNPB to establish and operate a national MHEWS platform to improve coordination amongst 10 technical agencies. Under the platform, several working groups consisting experts of relevant ministries/stakeholders would be established by hazard and be implemented with the support of external experts to review the current status of relevant EWS to develop the baseline, identify priority issues, and develop workplans and coordinate necessary activities to develop a robust grand design of MHEWS for the said hazards. The component will support stakeholder analysis, governance guidelines, protocols, and regulations.
- c) **Technical analysis.** This activity will support refinement of the MHEWS master plan to help realize the Grand Design, including a feasibility and technical requirements analysis to determine baseline capabilities, and geographic and technical requirements. A gap analysis will be conducted to establish technical areas of need for additional capacity and capability. The quality of products, dissemination methods and automated data analysis will be evaluated. Stakeholder engagement is a critical process for developing the MHEWS development plans and technical designs, which will emphasize the utilization and sustainability of multi-hazard information platform early warning systems.
- d) **Systems integration.** This activity will implement strategic components of the master plan according to the GOI's 5-year strategy. This includes the establishment of data centers, development of decision support systems, integration of system components, technical equipment and instrumentation, communications network (including hardware and software), training, and exercise activities. Through the development of the master plan, the critical areas of system integration will be identified to allow seamless operation of existing and future components. Training will provide a standardized and comprehensive operational approach, and exercises will validate the effectiveness of systems.

Sub-component 1.3: Hazard information and early warning dissemination

3. This sub-component will develop and disseminate more targeted and impact-based warning services through an integrated portal that will act as a multi-stakeholder MHEWS information dissemination center. These warnings will be disseminated through multiple ICT platforms (e.g., phone, television, social media, sirens) to reach high-risk areas and communities, in an inclusive and easy-to-understand manner. This sub-component will include development of a liaison and portal service system; strengthening subnational MHEWS capacities and capabilities through national and subnational EOCs and mobile application platforms; and improving the systems and services of subnational EOCs.



- a) **Early warning information dissemination center.** This activity will establish an early warning information portal and dissemination center that operates continuously with trained personnel following agreed national standards and international benchmarks. The center will utilize disaster risk knowledge and hazard information developed under the first two sub-components to provide action-based early warning system products that can be accessed by all populations (including people of all ages, genders, and abilities), including in remote areas.
- b) **Strengthen dissemination capabilities.** This activity strengthens existing capabilities to disseminate MHEWS messages and supports new capabilities. The efforts will take into account on existing capabilities to provide warnings on natural and technical hazards, starting with the provinces which were impacted by the 2018 disasters. This includes the replacement and upgrading of communications equipment, computer networks, and ICT platforms that are currently in use. In some cases, geographic reach will be expanded and in others, outdated technologies will be replaced. These investments will take place mainly in subnational EOCs.³⁷ Equipment will be selected according to local specifications and include technical, O&M, and other considerations to allow integration into the existing systems, and ease of maintenance and operation.
- c) **Upgrading or constructing EOCs.** This activity will improve local government capacity for hazard information and early warnings dissemination in the broader context of emergency management through upgrading existing and developing new EOCs in up to 20 districts affected by the 2018 disasters³⁸, as well as selected priority districts. This will include minor civil works for upgrading or constructing EOCs (typically rooms integrated within existing BPBD offices), emergency management information systems, and basic communication infrastructure, including data centers and networks in accordance with the National Response Framework and Incident Command System (ICS), and compatible with the national level system. Most EOCs will be integrated within existing BPBDs with minor civil works. This strengthening of existing emergency operations can be in the form of support for procurement of equipment, as well as detailed engineering designs of regional operations centers, including required environmental and social impacts assessments.

Sub-component 1.4: Emergency management, response, and preparedness capacities

4. This sub-component will enhance the capabilities and capacities of the Government's emergency management systems by strengthening local BPBDs and EOCs³⁹ in selected provinces, including Central Sulawesi, West Nusa Tenggara, and those affected by the Sunda Strait Tsunami. It will utilize the Minimum Service Standards (MSS) for Technical Standards of Basic Services on Disaster Management Affairs for Cities/Regencies issued in 2018 by the Ministry of Home Affairs (MOHA) as programmatic targets. These standards include an expectation for all cities and regencies to have updated risk assessment documents and contingency planning for each relevant hazard. This sub-component will also support community preparedness activities at the village- and district-level, with a priority given to the communities affected by 2018 catastrophic events in Central Sulawesi, West Nusa Tenggara, and along Sunda Strait. At the district level, disaster preparedness activities will include updating and development of disaster management plans and hazard-specific contingency plans in high-priority districts. At the village level, activities will include the establishment and training of

³⁷ Pusat Pengendalian Operasi (Pusdalops)

³⁸ The scope for this subcomponent was informed by previous budget allocations for BNPB and typical unit costs for equipment.

³⁹ EOCs of BPBDs have a key function to handle the communications and information systems related to disasters, including providing information on early warnings, priority areas for resource distribution, and emergency response planning at the local level. They provide vital information for national and district level authorities to respond efficiently and appropriately in disaster response events.



village-level preparedness and response teams, development of village-level contingency planning, and mainstreaming of risk reduction activities in village planning. Community-based resilience measures recommended in the district-level contingency plans will be implemented and past successful programs will be leveraged as model engagements.

- a) **Technical support and planning.** This activity will support the development of SOPs, local emergency response plans, risk assessments, warning dissemination, and evacuation orders at local BPBDs and EOCs. In addition to resources provided to local organizations such as templates, tools and decision guides, horizontal diffusion of good practices will be fostered through technical exchange workshops and trainings. These activities will be informed by emergency management principles, Incident Command System, National Response Framework, and MSS. Additionally a review and update of operational guidelines for EOCs will be undertaken to align them with the current incident command system utilized by BNPB and BPBDs during emergency operations.
- b) **Capacity building.** This activity will support capacity building through training of local BPBDs, EOCs and local key actors involved in disaster response. A standardized training module will also be developed for emergency responders (field and operational support) and decision makers (future Incident Commanders) utilizing the GoI Incident Management System, MSS and National Response Framework principles. This training will also deliver standard EOC equipment; information products used during emergency response operations (e.g., flash updates, situation reports, maps, etc.); and data management for post-disaster rehabilitation planning purposes.
- c) **District-level preparedness programs.** This activity is designed to develop improved hazard risk communication activities at the district level. It includes a training program on analysis, interpretation and dissemination of disaster risk and future climate change information for GoI stakeholders in up to 30 high-priority districts (*kota/kabupaten*)—that could be scaled up to other districts across Indonesia—responsible for hazard monitoring, including training on development of inclusive and culturally-appropriate materials. This will help to develop hazard and risk information (hydrometeorological and geophysical) that will be better understood by community members and synergizes well with local knowledge and contexts, helping them to plan and mitigate their exposure to disaster risks. BPBDs will also be trained to integrate sociological factors of their region with hazards data and maps to determine impacts and risks at the local level.
- d) **Village-level preparedness programs.** This activity will be a village-level disaster preparedness program that will be developed and implemented in up to 180 villages (based on approximately 6 villages for each of the 30 high-priority districts supported) across Indonesia, reinforcing the principles of community-based disaster risk management, empowering local communities and individuals to reduce disaster risk proactively. This program will complement activities promoted under the annual *National Disaster Preparedness Day*,⁴⁰ reinforcing the principles of community-based disaster risk management. Activities that involve communities to increase public awareness and participation will be prioritized and adaptable to a variety of local contexts, considering the diversity of Indonesia. Facilitators will support villages to develop disaster risk management and evacuation plans by: conducting a hazard, risk, vulnerability and capacity analysis; developing an emergency response plan including considerations for women, people with disabilities and elderly, injured victims, psycho-social care for survivors; developing a mitigation and preparedness action plan, including identification

⁴⁰ BNPB has set April 26 as National Disaster Preparedness Day, starting in 2018 as an initiative to build a culture of disaster awareness and preparedness with activities including: early warning siren activation drills, evacuation drills, search and rescue drills, and other disaster simulations.



of safe evacuation routes, preparing a community-level mitigation program, targeted skills training, and evacuation drills, and nature-based measures. A training module to foster empowerment of women before, during and after disasters will also be developed.

Component 2. Geophysical early warning services (US\$85 million)

Sub-Component 2.1: Service delivery systems

5. This sub-component will enhance BMKG's services by developing impact-based information services as well as introducing service delivery systems for geophysical hazards. It will be essential in improving the services of BMKG to the public and decision makers. This subcomponent will include three below activities. Feasibility studies, technical assessments, and investment planning for hydrometeorological and climatological services may also be included

- a) **Development of impact-based forecast and warning products.** This activity will assist BMKG in improving forecast and warning procedures (in coordination with BNPB); developing proto-type impact-based forecast and warning products at district/subdistrict level for geophysical hazards in cooperation with relevant bodies (e.g., BNPB, BPBD, PUPR, and BG-ESDM); testing and operationalizing (and scaling up any existing) impact-based forecast and warning services in selected vulnerable districts/cities; developing technical guiding documents for emergency operations based on BMKG's warning services.
- b) **Development of service delivery systems.** This activity will support development of impact-based decision support systems, using BMKG earthquake and tsunami information, which can work on the receiving terminals of the dissemination system to be operationalized by KOMINFO, BMKG and other agencies to input hazard-related information to the dissemination system. This activity would also consider alternate pathways for delivery of last-mile communication of early warnings in the event of disruptions to power lines, telecommunication and media networks. It will include upgrading of BMKG webserver (including application program interface servers) and website. User feedback mechanisms will be put in place to collect user feedback routinely for BMKG services.
- c) **Stakeholder engagement.** This activity will support BMKG's engagement with relevant stakeholders such as government partners, media, private sector, communities at both national and sub-national level—particularly those vulnerable to disasters including women, children, the elderly and people with disabilities. Support will help BMKG to collect information and develop a strategy to design the forecasts and warnings such that they can be actionable and easily understood by the variety of diverse stakeholders. The result will be an efficient pathway from operationalization of BMKG's impact-based information services into DRM operations.

Sub-Component 2.2: Institutional strengthening and capacity building

6. This sub-component aims to strengthen BMKG's human resource capacity development, and improve its legal framework and strategic planning, including socioeconomic assessment of BMKG's services. It will include two activities.

- a) **Capacity development of BMKG at all levels.** This activity will provide BMKG staff at all levels with capacity development opportunities including internal/international training courses and on-the-job training potentially in cooperation with relevant global organizations and/or twinning support arrangements enabling BMKG to closely work with advanced national geophysical agencies. Reputable experts with professional



operational experience will be hired in the fields of high training needs, such as instrumentation, impact-based forecast and warning, and earthquake and tsunami monitoring and modelling. It is expected that a bulk of this capacity building support will be provided through extended on-the-job training within BMKG's facilities. BMKG will ensure equal capacity development opportunities to men and women staff. Capacity development activities may include key stakeholders in various sectors such as DRM, energy, transport, communication, health, media, and other relevant areas. BMKG's internal training capability will be supported for greater sustainability (e.g. training for trainers). This sub-component will also support system integration in close coordination with development partners such as Germany, Japan, and USA, reflecting lessons learned from other projects, and project implementation activities by financing consultants with expertise in project management, financial and technical auditing, technical design, oversight of compliance with agreed social and environmental standards, and monitoring and evaluation activities. A survey instrument will be institutionalized to help BMKG to self-evaluate their services to improve performance and will help to establish a baseline and monitor progress of the project. This activity will also support standardization of response protocols through the development of technical manuals and SOPs that document and specify the roles, responsibilities, processes, and actions to be undertaken by stakeholders in response to geophysical events.

- b) **Institutional strengthening.** This activity will support BMKG in reviewing and refining relevant legal and regulatory framework as well as its strategic plan; improving operational relations with other relevant national to local entities; promoting research to operation (R2O) and operation to research (O2R) activities public-private partnerships in the areas of geophysical instrumentation, modelling, telemetry, big data, high-performance computing, and/or service delivery. It will also include the support BMKG to secure budgets to sustain its operational system through a rigorous socio-economic assessment of BMKG services, business planning and the development of the O&M strategy. The assessment will include budget estimates for securing adequate redundancy of its entire operational system as well as O&M costs.

Sub-Component 2.3: Monitoring networks and early warning capacity

7. This sub-component aims to upgrade and expand seismic monitoring networks telecommunication and ICT systems, as well as data processing, management and quality control systems to support the development of impact-based information services. The sub-component will also support restoration and upgrading of equipment and systems affected by the 2018 disasters. As this sub-component will include procurement and installation of highly technically complex infrastructure, effective O&M process for and adequate year-on-year allocations are to be established for the sustainability of the investment. Over the course of the project, the incremental costs for O&M on a declining basis, will be supported with Indonesian government progressively taking these up through counterpart finances and regular allocation as part of the budget. This subcomponent will include three activities.

- a) **Strengthening seismic monitoring networks and pilot or feasibility studies for an earthquake early warning system.** This activity will assist BMKG in upgrading and expanding the seismic observation networks, including feasibility studies and development of a pilot or prototype earthquake early warning system; high performance computer for multi-genetic tsunami processing (including non- tectonic tsunami processing); upgrade of existing seismological stations, and installation of new sites to monitor high hazard fault systems or in major high-risk cities and regencies; exchanging seismic data with neighbouring countries; upgrading seismic data processing systems; developing a seismic intensity information production system; promoting use of seismic intensity information to active government emergency operations at national to local levels;



accelerating activities to further advance earthquake and tsunami information, including use of accelerographs; and feasibility assessments for strengthening computational, modelling, and operationalizing capacities for earthquake early warning systems, and consequent investments.

Component 3: Project Implementation Support (US\$5 million)

8. This component will assist BNPB, in partnership with Bappenas, on policy support, project implementation oversight and reporting, including strengthening of the CPMU, PIUs and Steering Committee Secretariat to coordinate implementation of the project at the national and subnational levels. It will include support for project management, financial and technical auditing, oversight of compliance with agreed social and environmental standards, and monitoring and evaluation activities. This component will help to strengthen disaster risk-informed development planning, support knowledge sharing and awareness-raising initiatives on disaster risk management, and finance technical experts and consultants.



ANNEX 3: Economic Analysis

COUNTRY: Indonesia

Indonesia Disaster Resilience Initiatives Project

Project Objectives

1. The intended project outcome is to save human lives and reduce economic losses during future disaster events in areas prone to geophysical risks across Indonesia. The economic analysis was carried out using a cost-benefit methodology to estimate the net benefits arising from Component 1 and Component 2, comparing the difference under a 'with-project' and 'without project' scenario. The analysis produces two key outputs—the net present value (NPV) and the internal rate of return (IRR). To inspire confidence and ensure replicability of the cost-benefit methodology, all assumptions and relevant inputs are reported in this annex.

Project Costs

2. Table 3.1 summarizes the costs of each sub-component and whether the sub-components were included in the economic analysis. Given the interdependency of each component in deriving project benefits, all 3 components and their respective sub-components are included in the analysis. The investment outlay is assumed to occur only in 2019, and is the total cost of the project components. Operating and maintenance (O&M) costs will be assumed to be 10% of the total costs of relevant subcomponents. Annual depreciation costs of equipment will also be included and is assumed to be 10 percent of relevant sub-components.

Table 3.1. Indicative Budget for IDRIP

Components	Costs	Included in Economic Analysis	Included in depreciation costs
Component 1. Disaster preparedness and emergency management capacity	US\$70 million		
Sub-component 1.1	US\$9.3 million	Yes	No
Sub-component 1.2	US\$25.3 million	Yes	Yes
Sub-component 1.3	US\$22.1 million	Yes	Yes
Sub-component 1.4	US\$13.3 million	Yes	No
Component 2. Geophysical early warning services	US\$85 million		
Sub-component 2.1	US\$16.0 million	Yes	Yes
Sub-component 2.2	US\$11.5 million	Yes	No
Sub-component 2.3	US\$57.5 million	Yes	Yes
Component 3. Project Implementation Support	US\$5 million	No	No



Project Benefits and Methodology

3. The cost benefit analysis (CBA) relies on principles derived from the World Meteorological Organization's Valuing Weather and Climate: Economic Assessment of Meteorological and Hydrological Services report (WMO et al. 2015). There are several complexities and difficulties in quantifying the benefits of improved disaster risk management, primarily driven by the unpredictability of extreme events. Thus, this CBA attempts to adopt a transparent and conservative approach. The conservative approach implies that the true economic benefits of investing in DRM management are likely to be larger than what is quantifiable in this CBA. WMO et al. (2015) categorizes the economic value of meteorological and hydrological services into three 'bottom line' benefits—social, environmental and economic. Due to data limitations, this CBA focuses on quantifying social and economic benefits.

4. **Data sources.** Inputs for the CBA were derived from (i) survey data such as the National Socioeconomic Survey (SUSENAS) for income data, (ii) secondary data sources such as historical disasters data and economic vulnerability of disasters from BNPB, and (iii) inputs from existing research such as the Global Burden of Disease Study, specifically on the effects of exposure to natural hazards on disability adjusted life years (DALYs) lost.

5. **Component 1 and Component 2 benefits.** Component 1 and Component 2 have two key outcome indicators: avoided injuries and avoided economic disruption. Given that valuing a life is difficult to "measure", the economic benefits of preventing mortality is omitted. There are three channels which influence the effectiveness of the project's ability to achieve these outcomes—the warning accuracy, lead times (time gap between issuing a warning and the appearance of a disaster) and dissemination to the disaster-affected population. Component 1 which focuses on community preparedness, MHEWS system development and emergency management capacity building would specifically affect the dissemination rate to the disaster-affected population. For Component 2 which focuses on enhancing geophysical early warning services, improved warning accuracy and lead times would be the two intermediate channels that affect avoided injuries. In terms of the calculations of project benefits, the analysis focuses on project benefits derived from specific disasters including floods, volcanic activity, landslides, earthquakes, and tsunamis. Furthermore, given that there are two additional intermediate channels—warning accuracy and lead times—which affect avoided mortality and injuries for earthquakes and tsunamis, the methodology in deriving project benefits for these two disasters would have to account for potential improvements in warning accuracy and lead times. In practice, the economic analysis assumes that in addition to the benefits derived from Component 1, an effective geophysical warning system would help minimize potential injuries by 50%. Given that the analysis omits disasters such as droughts and fires, this further adds to the conservative approach outlined in this economic analysis. Economic benefits from avoided injuries are based on monetizing DALYs by estimating the number of healthy days a person gains, and the possible income gains from these healthy years—which is likely to be an underestimate of the value of healthy days years. Informed by recent experience, the level of damage reduction that can be achieved through effective early warning systems ranges from 5%-90% (Subbiah et al. 2009)⁴¹. This CBA adopts a conservative approach and thus, the level of damage reduction achieved through effective early warning systems is assumed to be 5% of annual economic losses due to natural disasters across Indonesia.

6. **Key inputs.** To calculate the total benefits derived from avoided injuries, data on average number of disasters and disaster-specific injuries were compiled from BNPB's disaster database. Data from 2011 to 2018 were used to derive the average number of disasters and disaster-specific injuries. The assumption therefore is that future disaster trends in terms of occurrence and injuries would on average be similar to that of 2018. DALYs lost from exposure to natural hazards per person is assumed to be 0.78. Average annual income per person was derived from SUSENAS and projected up to 2035 based off a linear trend. Table 3.2 summarizes the key inputs for the CBA. Moving on to estimating the annual economic

⁴¹ Subbiah, A.R., Bildan, L., Narasimhan, R. (2009). Background Paper on Assessment of the Economics of Early Warning Systems for Disaster Risk Reduction. World Bank-UN Project on the Economics of Disaster Risk Reduction, GFDRR, Washington.



losses resulting from each type of disaster, two inputs are needed: (i) an estimation on economic vulnerability to disasters and (ii) the probability and the severity of a potential disaster occurring in a province. For (i), data on economic vulnerability to specific disasters was obtained from a BNPB official report on disaster risks, Risiko Bencana Indonesia (2015)⁴². The economic vulnerability indicator calculated in the report consists of parameters such as regional GDP and region-specific productivity measures. For (ii), while the probability of a specific type of disaster could be obtained from past trends, accounting for the severity of a disaster would require strong assumptions. Instead, the approach this CBA takes is to derive a probability which approximate closest to official reports of annual economic losses in Indonesia of US\$2.2 to US\$3 billion.⁴³ Assuming a 0.08 probability of a disaster occurring, the total expected annual economic losses from all disasters would amount to approximately US\$2.98 Billion.

Table 3.2. Summary of key inputs.

Key indicators	Value
<i>Floods</i>	
Mean number of floods (annual)	710
Mean number of injuries per flood (annual)	0.52
Estimated national economic vulnerability of floods	US\$ 18.1 Billion
Expected annual economic losses from floods (0.08 probability)	US\$ 1.4 Billion
Expected annual economic losses from floods (0.08 probability) % GDP	1.8%
<i>Earthquakes</i>	
Mean number of earthquakes (annual)	17
Mean number of injuries per earthquake (annual)	48.94
Estimated national economic vulnerability of earthquakes	US\$ 13.0 Billion
Expected annual economic losses from earthquakes (0.08 probability)	US\$ 1.0 Billion
Expected annual economic losses from earthquakes (0.08 probability) % GDP	1.3%
<i>Tsunami</i>	
Mean number of tsunamis (annual)	0.63
Mean number of injuries per tsunami (annual)	2,792
Estimated national economic vulnerability of tsunamis	US\$ 569.7 Million
Expected annual economic losses from tsunamis (0.08 probability)	US\$ 45.6 Million
Expected annual economic losses from tsunamis (0.08 probability) % GDP	0.06%
<i>Landslides</i>	
Mean number of landslides (annual)	509
Mean number of injuries per landslide (annual)	0.27
Estimated national economic vulnerability of landslides	US\$ 5.4 Billion
Expected annual economic losses from landslides (0.08 probability)	US\$ 433.2 Million

⁴² See http://inarisk.bnpb.go.id/pdf/Buku%20RBI_Final_low.pdf

⁴³ National Disaster Management Authority, Head of Data and Information, 2018; and World Bank/GFDRR 2012. ASEAN. Among Association of Southeast Asian Nations (ASEAN) countries, Indonesia faces particularly high expected annual economic losses from floods and earthquakes.



Key indicators	Value
Expected annual economic losses from landslides (0.08 probability) % GDP	0.53%
<i>Volcano Eruptions</i>	
Mean number of volcano eruptions (annual)	13
Mean number of injuries per volcano eruption (annual)	16.3
Estimated national economic vulnerability of volcano eruptions	US\$ 885,735
Expected annual economic losses from volcano eruptions (0.08 probability)	US\$ 70,859
Expected annual economic losses from volcano eruptions (0.08 probability) % GDP	0.00%

Note: GDP assumed to be US\$ 1.016 Trillion

7. **Verification.** To ensure the validity of the economic benefits generated, a benchmarking methodology is employed, following Hallegatte (2012)⁴⁴ and based on a country's GDP. Hallegatte (2012)'s findings suggest that on average, a well-functioning, modern early warning system reduces disaster-related asset damages by between 0.003 percent and 0.017 percent of GDP. Our estimate of expected annual economic losses from all disasters amounts to approximately US\$ 2.98 Billion, and with an assumed decrease in disaster related damages of 5%, this amounts to an avoided economic loss of approximately US\$149 million annually. As a percentage of GDP, this amounts to approximately 0.0148 percent of GDP. Further sensitivity analyses will also be conducted with regards to the assumed decrease in disaster related damages.

8. **Key considerations.** Early warning services and geophysical monitoring and warning services do not generate economic benefits from better quality of information unless the population benefits from the informed decisions made by users of these services. Therefore, similar services in two countries with similar qualities could vary significantly in terms of benefits, depending on the severity of natural hazards and the capacity of users to make informed decisions to mitigate disaster risks. Such considerations on the degree of information transfer are not accounted for in this CBA. Additionally, the CBA does not consider future population growth and economic activities generated as co-benefits of the DRM investment, as well as climate changes.

Results and Discussion

9. **Cost benefit analysis.** By computing the net benefits of the project over time, it is possible to assess whether the planned investments would be economically feasible and worthwhile. This CBA examines the potential economic returns over the next 16 years from 2019 to 2035. Project benefits are assumed to come into effect in the year 2024, and annual O&M costs and depreciation costs are assumed to occur annually from 2021. The results produced in this CBA should be interpreted alongside other key considerations outlined in this PAD to steer better decision-making.

10. **NPV and IRR.** To calculate the net present value (NPV), this CBA uses the concept of net present value of future economic benefits, while assuming a constant discount rate. A discount rate of 0% suggests no preference between now and in the future, while a high discount rate of 15% represents a strong preference for spending now. Assuming a discount rate of 10%, the net present value, the benefit/cost ratio and the internal rate of return of the economic benefits of the

⁴⁴ Hallegatte, S. (2012). A Cost Effective Solution to Reduce Disaster Losses in Developing Countries: Hydro-Meteorological Services, Early Warning, and Evacuation. Policy Research Working Paper 6058, World Bank, Washington, DC.



project on specific disasters are summarized in Table 3.3. Over the course of the next 16 years, the entire project is expected to generate a NPV of approximately US\$367 million, with an IRR of 27% and a benefit-to-cost ratio of 3.37. These results suggest under the current baseline assumptions, the proposed project would be economically feasible over the next 16 years. Considering that this analysis does not account for avoided mortality—which is typically the primary benefit of better disaster risk management—this adds to the conservative nature of the analysis.

11. **Sensitivity analysis.** The sensitivity analysis for the project was done with regards to three variables: (i) decrease in probability of disasters, (ii) changes in operational and maintenance costs (O&M), and (iii) assumed effect of enhanced monitoring systems and disaster preparedness on reduction of annual economic losses. Results of the sensitivity analysis are shown in Table 3.4, interpreted in terms of the changes in each variable required to switch the NPV from positive to negative—known as the “switching value”. *Ceteris paribus*, the project could sustain a reduction on the probability of disasters to as low as 0.033 from the current 0.08, up to 660% increase in O&M costs annually. The project is also able to sustain a reduction on the assumed effects of enhanced monitoring systems and disaster preparedness on reduction of annual economic losses to as low as 0%, or no impact of the effects of geophysical warning services on injury rates, and still be economically feasible.

Table 3.3. Summary of NPV and IRR for Component 1 and Component 2.

Key Indicators	Entire Project (Discount Rate 10%)
NPV (US\$)	336,901,779
IRR	27%
Benefit/Cost Ratio	3.37

Table 3.4. Switching values from base case in Table 3.3

Switching values scenarios	Description
Decrease in probability of disasters (Baseline: 0.08)	Project able to sustain a decrease in the probability of disasters as low as 0.033
Increase in O&M costs as a percentage of investment outlay (Baseline: 10% of investment outlay)	Project able to sustain an increase of O&M costs annually up to 66% of the investment outlay or 660% increase from current O&M costs.
Assumed effect of enhanced monitoring systems and disaster preparedness on reduction of annual economic losses (Baseline: 5% of current annual economic losses)	Positive throughout
Assumed effect of geophysical early warning systems on improving avoidable injuries (Baseline: 50% of injuries would be averted)	Positive throughout



ANNEX 4: Gender Analysis

COUNTRY: Indonesia Indonesia Disaster Resilience Initiatives Project

1. **Identified gender gap:** Gaps in women's access to information and knowledge about disaster preparedness and EWS, and overall DRM that contributes to disproportionate negative impacts for women compared to men.
2. **Analysis:** In many cases, the mortality rates for women are higher than those of men in disasters. For example, an Oxfam study found that following the 2004 Indian Ocean Earthquake and Tsunami—in eight villages surveyed from Indonesia's Aceh Besar and North Aceh districts—male survivors outnumbered female survivors by a ratio of 3:1 to 4:1. The Indonesian Law No. 24/2017 on Disaster Management promotes non-discrimination of all citizens in DRR planning and decision making; however, women tend to have unequal access to DRM resources, information and planning processes, which limits their ability to respond to natural disasters and increases their overall vulnerability.⁴⁵ An Asia-Pacific Economic Cooperation (APEC) (2009) study on the Mount Merapi volcanic eruptions found that participants' exposure to information about disasters was highest among adult males followed by male youth, female youth, adult females, children and then the elderly. Furthermore, a survey in Central Sulawesi found that women receive early warning information from a variety of sources, some of which can be unreliable, affecting how women respond to disasters.⁴⁶ These findings are consistent with global statistics. For example, in Nepal, a recent study indicated that 91 per cent of surveyed men were aware of official early warning systems compared with 72 per cent of surveyed women.⁴⁷ A recent study in Malaysia indicated that more male respondents (62.5%) knew about early warning systems than female respondents (37.5%).⁴⁸ The general trend in the region appears to be that women are less aware of early warning systems than men, and whilst country-specific data is not yet available in Indonesia, a baseline survey will be conducted during the early implementation phase.
3. Effective early warnings help to generate and disseminate timely and meaningful warning information to user groups, allowing them sufficient time to prepare and act appropriately in response to a hazard and avoid or reduce potential harm or loss. However, modern early warning systems are often criticized for being too techno-centric, gender 'unaware', and ultimately missing the crucial link of understanding social dynamics of user groups for last-mile communication. Early warnings that do not address social dimensions, including gender differences, may not reach end users effectively or in time, and therefore may not enable at-risk communities to make informed decisions. It is insufficient for people to only receive warning messages; the messages must be understood, believed, and personalized for people to turn them into proactive actions.⁴⁹ This Project will help to finance targeted preparedness initiatives, meetings, and training to address the specific needs of women. For example, consultations will be undertaken with diverse user groups to refine the scope, dissemination methods, and language of early warning information; consultations will endeavour to

⁴⁵ Women tend to also be at greater risk of injury or death from natural disasters due to their traditional care-giving responsibilities, physical capacity, restricted mobility, and limited survival skills.

⁴⁶ Anantasari, E. and Davies, S. 2019. *Gender-sensitive disaster risk reduction in Indonesia*. Lower Hutt (NZ): GNS Science. Women often receive information through gossip, social media, and television, and need to triangulate this information.

⁴⁷ Brown et al. 2019. *Gender Transformative Early Warning Systems: Experiences from Nepal and Peru*, Rugby, UK: Practical Action

⁴⁸ Hussain et al. 2018. Community awareness on the implementation of early warning system at Tenaga Nasional Berhad Sultan Abu Bakar Hydroelectric Scheme, Lembah Bertam, Cameron Highland. *Planning Malaysia*: 6(1), 155-162.

⁴⁹ De Silva et al. 2015. Gender equality in disaster early warning systems. *8th International Conference of Faculty of Architecture Research Unit (FARU)*. Colombo: University of Moratuwa.



enhance women's participation through women-only and women's-interest groups at suitable times; and a variety of communication channels for information disaster risk will be developed, including mobile phone application technology for the dissemination of early warning information under the MHEWS platform.

4. Further, experiences from the World Bank's Indonesia Multi-Donor Fund (MDF) found that many women—particularly poor women and women-headed households—in Yogyakarta, Central Java and Nias were left out of discussions on DRM.⁵⁰ In line with observations and findings from those studies in other natural disasters, Rapid Gender Analysis (RGA) conducted by CARE (2018) in affected area of Sulawesi earthquake and tsunami shows that women's access and control to information on emergency response and how reconstruction unfolds has been constrained by existing community structure and social norms that place women's lives to be primarily domestic, while men are more likely to be involved in the public domain. Moreover, post-disaster situation isolates women and girls further from access to information and services related to DRM and EWS due to post-disaster safe and security reasons, and also increased workloads and responsibilities.⁵¹ Despite this, experiences from the Aceh Disaster Risk Reduction project financed under the MDF indicate that it is possible to target women through a robust gender action plan, senior-level commitment and targeted strategies (e.g. house-to-house visits, meetings with women where children can attend, and working with trained women facilitators).⁵²

5. One of the strategies developed by BNPB to strengthen disaster preparedness for all diverse groups in a community, including women, is a community-based disaster risk management program called *Desa/Kelurahan Tangguh Bencana (Destana)*.⁵³ Under this program, facilitators are hired and trained to assist communities in identifying and organizing local resources to mitigate disaster risk. While the views and needs of all diverse groups represented in a community⁵⁴ are crucial in the development of DRM planning (including preparedness and last-mile hazard warning communication), numbers of women facilitators hired and trained are lower than that of men.⁵⁵ Since women play crucial roles in providing assistance at the community level, women facilitators with the appropriate training are needed to strengthen DRM planning and design to address the specific needs of women and other potentially vulnerable groups in the community.

⁵⁰ The World Bank. 2012. *More Than Mainstreaming: Promoting Gender Equality and Empowering Women through Post-Disaster Reconstruction*. MDF-JRF Working Paper Series: Lessons Learned from Post Disaster Reconstruction in Indonesia: Working Paper No. 4. Available at:

<<http://documents.worldbank.org/curated/en/455331468269434402/pdf/839020NWP0Box382108B00PULBIC00no4.pdf>> Women's traditional care-giving responsibilities, physical capacity, restricted mobility and limited survival skills also tend to increase their risk of injury or death from natural disasters.

⁵¹ Given the predominantly domestic role of women in Sulawesi context, post-disaster situation leads to increased burden of work for women due to their responsibility for doing household chores, together with taking care older, sick people, and children who are not able to go to school since schools being closed or destroyed. Moreover, for safety and security reasons during post-disaster, women and girls movement is more constrained that causing them to be more isolated from accessing information and services.

⁵² However, despite these strategies, challenges remained within the DRR-Aceh project and greater investments in time and resources were recommended to improve women's inclusion in DRR.

⁵³ Since 2012, based on regulation of Head of BNPB No. 1/2012, *Desa/Kelurahan Tangguh Bencana (Destana)* defined as villages/*kelurahan* which have the ability to identify local threats in the area and organize potential resources in the community to mitigate the risks, as well as improving the capacity to mitigate disaster risk. The program is part of the community-based disaster risk management strategy, which aims to actively engage community in mapping, analyzing, dealing, monitoring, and evaluating risks of natural hazards to strengthen mitigation efforts. Information from BNPB's official website indicates that until 2017, there were than 374 *Destana* in 38 city/districts across 26 provinces in Indonesia.

⁵⁴ For example, people of all genders, abilities, ages.

⁵⁵ Based on an analysis of data collected on facilitators hired under BNPB's *Destana* between 2015 and 2018, approximately 24 percent of facilitators were women and 76 percent were men.



6. **Action:** This project aims to strengthen women's access to information and knowledge about DRM, particularly preparedness and EWS so they are better equipped to make informed decisions about responding to early warnings of possible disasters. The project will focus on strengthening women's knowledge and capacity at the local level by:

- i. Developing and designing mobile phone applications to disseminate early warnings under the MHEWS platform and offering targeted training for women that will address the different societal roles, needs and capacities of women when preparing for disasters;
- ii. Providing tailored information outreach, training and advocacy about DRM, particularly on disaster preparedness and EWS that targets women and addresses their specific needs;
- iii. Engaging and strengthening the capacity of relevant local women's organizations to undertake DRM, disaster preparedness and EWS outreach, training and advocacy that specifically targets women; and
- iv. Increasing the share of trained women facilitators and trainers.

7. **The indicators** for this gap are:

- i. Share of registered users of mobile phone applications designed for early warning dissemination that are women (percentage)
- ii. Women believe they are better prepared to respond to natural disaster after participating in outreach, training and advocacy activities (percentage)⁵⁶; and
- iii. Women facilitators hired and trained to undertake outreach, training and advocacy activities (percentage)

⁵⁶ A survey could be designed to measure the level of knowledge for basic information about early warnings and disaster preparedness (e.g., sources of information for references in taking actions, what are the early signs of warnings for natural hazard, do they know point of gathered for evacuation in their area; and provide options for efficient responses) because of access to improved information.



ANNEX 5: Climate Change Analysis

COUNTRY: Indonesia Indonesia Disaster Resilience Initiatives Project

1. **Climate change is recognized as a key policy issue in Indonesia.** Indonesia is one of the world's largest contributors of greenhouse gas (GHG) emissions, primarily due to high rates of deforestation and land degradation. Roughly two-thirds of the country's emissions come from land use change, particularly conversion of peatlands into agricultural plantations. Emissions from energy make up another quarter of the country's emissions and are growing. At same time, Indonesia is highly vulnerable to the negative impacts of climate change. Extreme hydrometeorological events such as floods and droughts, which currently make up 80 percent of disaster occurrences in the country, are projected to increase with climate change.⁵⁷ In the long run, Indonesia is also anticipating impacts from slow-onset events namely sea level rise, increasing temperature, and shifting rainfall patterns.⁵⁸ Key future climate projections for Indonesia are:

- i. Sea level rise in Indonesia due to global warming is projected to reach 35-40 cm relative to year 2000 by 2015, and the maximum sea level rise (including the dynamics of melting ice) can reach up to 175 cm in 2100.
- ii. The projected increase in average surface temperature throughout Indonesia due to global warming until the period of 2020-2050 is approximately 0.8 - 1°C relative to recent climatic period in the 20th century.
- iii. Increasing annual precipitation is projected across most Indonesian islands, except in southern Indonesia where is it projected to decline by up to 15 percent.
- v. Changes in the seasonality of precipitation are also projected for different locations. For example, parts of Sumatra and Borneo may become 10-30 percent wetter by the 2080s during December-February. Based on two high emission scenarios (SRES A2 and B1) for 2025 and 2050, models projected reduced rainfall in June-July-August (JJA) and in the transition to the September-October-November (SON), and increased rainfall in December-January-February (DJF), in Java and Nusa Tenggara Islands. However, projections related to rainfall patterns are highly uncertain. There are broadly defined patterns that are not consistent across downscaled projections for Indonesia.

2. **The above manifestations of climate change will be felt through multiple development sectors and population groups, with particularly negative consequences for the poor that are disproportionately affected.** More frequent hydrometeorological disasters such as floods are likely to cause more damage to public infrastructure of provinces, cities and villages. Sea level rise brings a higher risk of coastal inundation which may affect up to 42 million people living in low laying coastal zones.⁵⁹ Changes in rainfall patterns could increase the risk of food insecurity linked to more frequent crop failures and water insecurity linked to reduced water availability. Change in the rainfall and temperature patterns is also associated with potentially higher public health risks from climate-sensitive diseases such as diarrhoea, dengue and malaria.⁶⁰ The Government has assessed the spatial distribution of major climate change hazard risks and their potential impact levels in Indonesia (See Figure 5.1). Java, Bali and Sumatra islands are three areas that have high and very high risk compared to other regions. The risk is associated with a high degree of vulnerability caused by population, residential areas, and infrastructure in the three regions.⁶¹

⁵⁷ Government of Indonesia. 2016. *Indonesia's First Nationally Determined Contributions submitted to the UNFCCC*.

⁵⁸ Government of Indonesia. 2013. *National Action Plan for Climate Change Adaptation (RAN API): Synthesis Report*.

⁵⁹ Government of Indonesia. 2016. *Indonesia's First Nationally Determined Contributions submitted to the UNFCCC*

⁶⁰ Government of Indonesia. 2016. Submission to the Subsidiary Body for Scientific and Technological Advice of the UNFCCC on recent work on climate impacts on human health.

⁶¹ Government of Indonesia. 2013. *National Action Plan for Climate Change Adaptation (RAN API): Synthesis Report*.



Figure 5.1: The level of climate change risks in Indonesia by region

Risks	Sumatra	Java-Bali	Kalimantan	Sulawesi	Nusa Tenggara	Maluku	Papua
Decrease in water availability	M, H, VH	H, VH	L, M	H, VH	H, VH	L, M	L
Flood	H, VH	H, VH	L, M, H	L, M, H	L	L	L, M
Drought	H, VH	H, VH	L	L, M	L, M, VH	L	L
Coastal inundation	M, H	M, H, VH	M, H, VH	M, H	M, H	M, H	M, H
The spread of dengue fever	L, M, H	L, M, H	L, M	L, M	L, M	L, M	L, M, H
The spread of Malaria	L, M	L, M, H	L, M	L, M, H	L, M, H, VH	M, H	M, H, VH
The spread of Diarrhea	L, M, H	L, M, H	L, M, H	L, M, H	L, M, H	L, M, H	L, M, H, VH
Decrease in rice production	H, VH	H, VH	-	-	H, VH	-	-
Forest fires	M, H, VH	M, H	-	-	-	-	-

Note: L: Low; M: Moderate; H: High; VH: Very High

Source: Government of Indonesia (2013)⁶²

3. **Adapting to these threats, together with mitigating the country's contribution to global GHG emissions, is a high priority of the Government of Indonesia.** The country's first Nationally Determined Contributions (NDC) articulate clear climate policy objectives. For mitigation, Indonesia is committed to achieving an unconditional emission reduction target of 29 percent and a conditional target of 41 percent of the business as usual scenario by 2030, mainly through *land use, land-use change and forestry* (LULUCF) and energy measures. For adaptation, the country's medium-term strategy is to reduce risks from climate change on all development sectors - agriculture, water, energy security, forestry, maritime and fisheries, health, public service, infrastructure, and urban system- by 2030, through local capacity strengthening, improved knowledge management, convergent policy on climate change adaptation and disaster risks reduction, and application of adaptive technology.⁶³ The National Action Plan for Reducing GHG Emissions (2010) and the National Action Plan for Climate Change Adaptation (2013) provide the basis for development planning and budgeting to achieve the climate policy objectives through 2020.

⁶² Ibid.

⁶³ Ibid.



ANNEX 6: Map

COUNTRY: Indonesia
Indonesia Disaster Resilience Initiatives Project

Figure 6.1 Indonesia Disaster Resilience Initiatives Project Map

