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National Study Report – Climate Change Adaptation in Indonesia:

Reviews on Adaptation Governance, Metrics and Financing

2021

This report is part of the project "Strengthen national climate policy implementation: Comparative empirical learning & creating linkage to climate finance (SNAPFI), see www.diw.de/snapfi. The project is part of the International Climate Initiative (IKI). The Federal Ministry for the Environment, Nature Conservation, and Nuclear Safety (BMU) support this initiative on the basis of a decision adopted by the German Bundestag. More information on IKI can be found at www.international-climate-initiative.com.

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LIST OF ABBREVIATIONS

ADB	:	Asian Development Bank
ADIK	:	*Arsitektur dan Informasi Kinerja* (Architecture and Performance Information System)
AE	:	Accredited Entities
AF	:	Adaptation Fund
AFOLU	:	Agriculture, Forestry and Other Land Use
APBN	:	*Anggaran Pendapatan dan Belanja Negara* (State Budget)
AusAID	:	Australian Agency for International Development
BAU	:	Business as Usual
BIG	:	*Badan Informasi Geospasial*/ Geospatial Information Agency
BMKG	:	*Badan Meteorologi, Klimatologi dan Geofisika* (Meteorological, Climatological, and Geophysical Agency)
BNPB	:	*Badan Nasional Penanggulangan Bencana* (National Board for Disaster Management)
BPPT	:	*Badan Pengkajian dan Penerapan Teknologi* (Agency for the Assessment and Application of Technology)
BPS	:	*Badan Pusat Statistik* (Central Bureau of Statistics)
CCA	:	Climate Change Adaptation
CCAP	:	Center for Clean Air Policy
CCM	:	Climate Change Mitigation
CCPL	:	Climate Change Program Loan
CCRAA	:	Climate Change Risk and Adaptation Assessment
COP	:	Conference of the Parties
CPD	:	Country Program Document
CRIDS	:	Climate Resilience Index Development Study
CSR	:	Corporate Social Responsibility
DA	:	Designated Authority
DANIDA	:	Danish Development Agency
DJPPI	:	*Direktorat Jenderal Pengendalian Perubahan Iklim* (Directorate General of Climate Change Control)
DNPI	:	*Dewan Nasional Perubahan Iklim* (National Council on Climate Change)
DPR	:	*Dewan Perwakilan Rakyat* (House of Representatives)
EE	:	Executing Entities
EFT	:	Ecological Fiscal Transfer
FGD	:	Focus Group Discussion
FPA	:	Fiscal Policy Agency
GCF	:	Green Climate Fund
GDP	:	Gross Domestic Product
GEF	:	Global Environment Facility
GGGI	:	Global Green Growth Institute
GHG	:	Greenhouse Gases
GIZ/GTZ	:	Deutsche Gesellschaft für Internationale Zusammenarbeit
GoI	:	Government of Indonesia
ICCSR	:	Indonesia Climate Change Sectoral Roadmap
ICCTF	:	Indonesian Climate Change Trust Fund
ICF	:	International Climate Finance
IDR	:	Indonesian Rupiah
IPCC	:	Intergovernmental Panel on Climate Change
IPPU	:	Industrial Processes and Product Use

IRBI	:	*Indeks Risiko Bencana* / Disaster Risk Index
JICA	:	Japan International Cooperation Agency
KLHS	:	*Kajian Lingkungan Hidup Strategis* (Strategic Environmental Assessment)
KRAPI	:	*Kajian Risiko dan Adaptasi Perubahan Iklim* (Climate Change Risk and Adaptation Assessment)
KRISNA	:	*Kolaborasi Perencanaan dan Informasi Kinerja Anggaran* (Collaboration Planning and Budget Performance Information)
LAPAN	:	*Lembaga Penerbangan dan Antariksa Nasional* (National Institute of Aeronautics and Space)
LIPI	:	*Lembaga Ilmu Pengetahuan Indonesia* (Indonesian Academy of Sciences)
LTS-LCCR	:	Long-term Strategy on Low Carbon and Climate Resilience
M&E	:	Monitoring and Evaluation
MoEF	:	Ministry of Environment and Forestry
MoF	:	Ministry of Finance
MoNDP	:	Ministry of National Development Planning
MRV	:	Monitoring, Reporting, and Verification
NDA	:	National Designated Authority
NDC	:	Nationally Determined Contributions
NGO	:	Non-Governmental Organization
NIE	:	National Implementing Entities
PA	:	Paris Agreement
PBI	:	*Pembangunan Berketahanan Iklim* (Climate Resilience Based Development)
PDAM	:	*Perusahaan Daerah Air Minum* (Municipal Water Company)
Podes	:	*Potensi Desa* (Village Potential)
PPP	:	Public-Private Partnership
RAD-GRK	:	*Rencana Aksi Daerah – Gas Rumah Kaca (*Indonesia Local Action – Greenhouse Gases)
RAN-API	:	*Rencana Aksi Nasional – Adaptasi Perubahan Iklim* (Indonesia National Action Plan on Climate Change Adaptation)
RAN-GRK	:	*Rencana Aksi Nasional – Gas Rumah Kaca* (Indonesia National Action – Greenhouse Gases)
RCF	:	Resilience Causal Framework
REDD +	:	Reducing Emissions from Deforestation and Forest Degradation in Developing Countries
Renja M/Is	:	*Rencana Kerja Kementerian/Lembaga* (Work Plan of Ministries/Institutions)
RKA M/Is	:	*Rencana Kerja dan Anggaran Kementerian/Lembaga* (Work and Budget Plan for Ministries and Institutions)
RKP	:	*Rencana Kerja Pemerintah* (Government Work Plan)
RoI	:	Republic of Indonesia
RPJMN	:	National Medium-Term Development Plan
SIDA	:	Swedish International Development Agency
SIDIK	:	*Sistem Informasi Data Indeks Kerentanan* (Vulnerability Index Data Information System)
SMI	:	Sarana Multi Infrastruktur
SRN	:	*Sistem Registri Nasional* (National Registry System)
TNC	:	Third National Communication
UKCCU	:	The United Kingdom Climate Change Unit
UNDP	:	United Nations Development Program
UNEP	:	United Nations Environment Programme
UNFCCC	:	United Nations Framework Convention on Climate Change
USAID	:	United States Agency for International Development
USD	:	United States Dollar

1 Introduction

1.1 Background

Referring to the Paris Agreement, climate change adaptation is a global challenge and a key component to contribute to the long-term global response to climate change. Unlike climate change mitigation (that its achievement can be measured by a single metric 'tonnes of CO2e'), adaptation cannot be assessed by a single indicator or metric.

Concerning the United Nations Framework Convention on Climate Change (UNFCCC) process, understanding adaptation metrics has evolved from prioritizing countries' adaptation needs to ensure the accountability and effectiveness of adaptation projects and, more recently, assessing global progress. The Paris Agreement recognizes that a scientific knowledge base is needed to measure effective and progressive responses to climate change adaptation or adaptation metrics as a measure. Therefore every key player, that can play a significant role based on their level and functions, is expected to contribute to the long-term global response conducted periodically through the 'Global Stocktake.' Through the Global Stocktake, it is expected that Parties be informed in updating and enhancing their actions and support.

The UNFCCC considers Indonesia as the largest archipelagic country in the world has been becoming one of the countries vulnerable to climate change (Eckstein et al., 2021), therefore, the government should give more attention to adaptation. However, due to the complexity of adaptation and the lack of appropriate metrics have resulted in lacking of political support. The absence of these metrics makes it difficult for the government to set adaptation priorities and allocate funding appropriately.

Related to the adaptation metrics, Indonesia has several tools [CCRAA (Climate Change Risk and Adaptation Assessment) and SIDIK (Vulnerability Index Data Information System) issued by MoEF (Ministry of Environment and Forestry), as well as CRIDS (Climate Resilience Index Development Study) and GDP Loss formulated by MoNDP (Ministry of National Development Planning)] as an approach for measuring quantitatively adaptation. However, the existing tools have not been built on the same framework. As a result, each institution develops tools according to their respective duties and functions without proper coordination so that the results are not synergistic with one another. Among the various tools, nationally, Indonesia has begun to indicate the link between adaptation and sustainable development through increased resilience. This research activity is presumed to be part of a contribution to the Global Stocktake efforts. If the results of research (adaptation metrics) can encourage better adaptation management improvements, then this can be a best practice for other countries that have characteristics similar to Indonesia.

Moreover, adaptation needs are three times higher than the limited available resources (Stadelmann et. al., 2014). Meanwhile, in practice, the conditions for adaptation funding experienced by the group of developing countries are the same as in Indonesia; namely, there is a financial gap between the need for and the availability of funds for adaptation.

Considering the limited funding sources for adaptation and availability of state budget and international funding support, Indonesia needs to take international funding opportunity as best as possible. Clear and measurable adaptation metrics could play an important role in allocating funding effectively by determining the adaptation action that will provide the highest contribution to implementing adaptation and at the priority location. It is necessary to consider the linkages between climate change adaptation and climate resilience and sustainable development to particularly focus this study concerning these metrics.

1.2 General Research Framework

Based on the background of this research, it can be seen that Indonesia currently does not yet have metrics that are built-in consensus manner amongst stakeholders and have not been proven as a tool to measure the success of adaptation in Indonesia. These conditions can hinder the prioritization of adaptation actions, and can lead to adaptation funding with limited resources not being allocated effectively. Therefore, the root causes of these conditions need to be examined further, especially in terms of milestones of the "from conceptual to implemented model" of adaptation and climate resilience in adaptation governance and international climate finance in Indonesia. This will be studied in 2 more years study with the focus of the study described below.

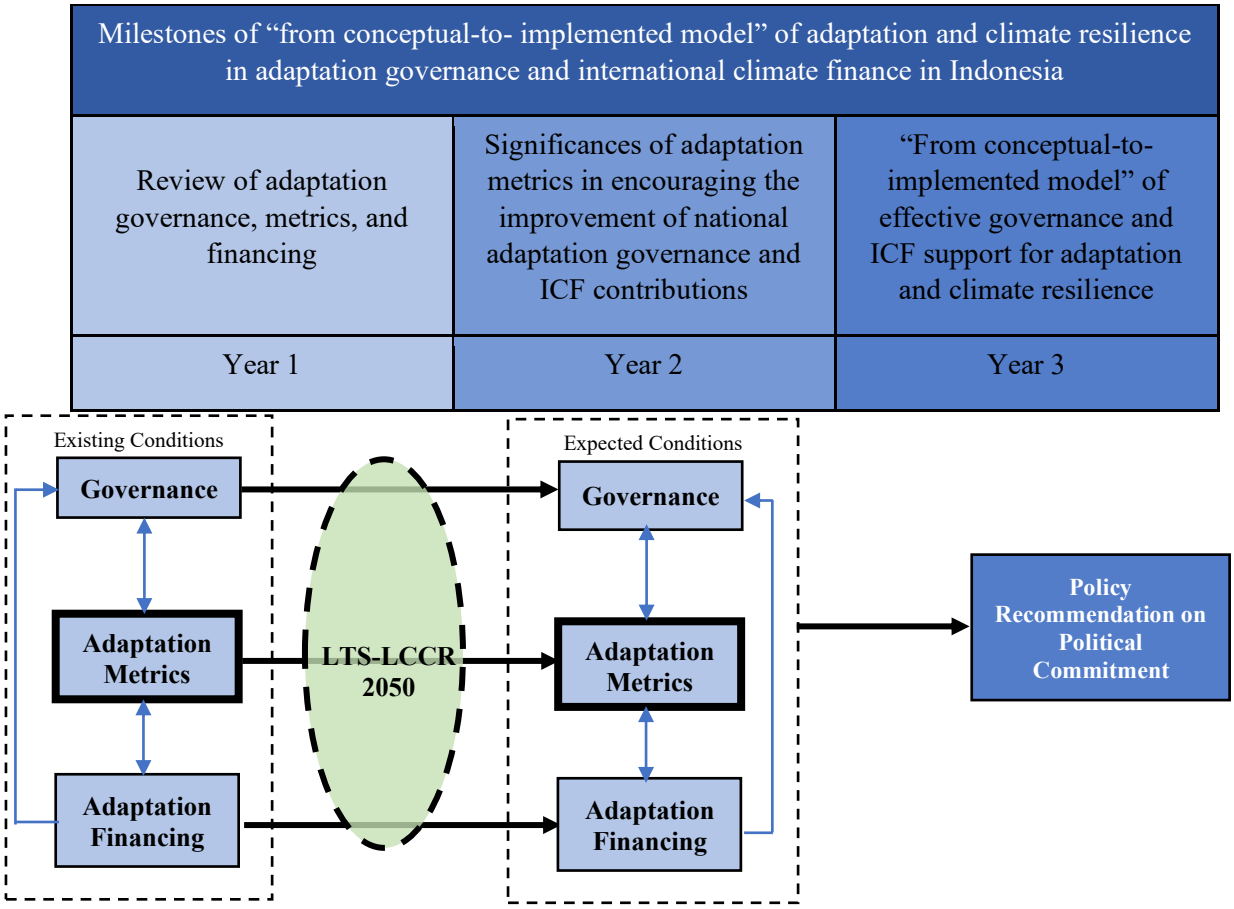

Figure 1 Framework and Milestones

In the first year, an overview of the conditions of adaptation governance, metrics, and financing in Indonesia will be reviewed firstly. This is very important as basic information for research in the following years. The metrics reviewed tend to shift from an adaptation approach to resilience to measure adaptation needs or achievement. As explained in the background, Indonesia has several metrics that can be used to approach adaptation metrics. However, it is necessary to determine to what extent these metrics have been used in allocating funding or how these metrics can be used to formulate the appropriate adaptation metrics for funding allocations. Related to financing, the focus will be on ICF as a funding source that can ease the burden on state finances but is very competitive.

Then, in year 2, if the appropriate adaptation metrics have been formulated, they should encourage improvements in the management of national adaptation. Good national adaptation governance should be able to synergize international commitments on climate change with national development targets.

This aims to improve resource management efficiency in achieving NDC targets contained in the Long-term Strategy on Low Carbon and Climate Resilience 2050 (LTS-LCCR 2050), as well as to maximize the use of international funding based on the Paris Agreement. In addition, good adaptation governance can also synergize between government institutions and the private sector, and NGOs / communities. Based on the current portrait, the private sector is still reluctant to participate in adaptation efforts. The private sector considers that adaptation efforts are closely related to the public sector, which is the government's responsibility and is closely related to elements of community engagement.

After a complete understanding of adaptation metrics and their relation to adaptation governance and ICF, then in the third year, it will be studied more about implementing the conceptual model of effective governance and ICF support for climate adaptation and resilience. Implementation is meant not only in projects or activities carried out nationally but also in how it affects Indonesia's policies and political commitment to adaptation efforts.

2 Literature Review

2.1 Nature of Adaptation and Its Implication for Measurement

Mohner in UNEP (2018) provided an overview of the broad evolution of the concept of adaptation metrics under the UNFCCC and the Paris Agreement. Figure 2 shows that adaptation metrics have evolved over the last twenty years, starting with measuring the degree of vulnerability to identify and prioritize adaptation needs; monitoring and evaluating adaptation progress and actions; and to recently evaluating effectiveness, adequacy, and collective progress towards achieving the global adaptation goal in the Paris Agreement in 2015.

<table>
<tr><th rowspan="2">Level</th><th colspan="6">Time Based</th></tr>
<tr><th>1992 UNFCCC</th><th>2001 LDC Fund, SCCF, Adaptation Fund (Financial support for particularly vulnerable developing countries)</th><th>Results-based management of funds (Accountability of projects)</th><th>2011 Cancun Adaptation Framework (National adaptation plans, inclusing monitoring & reviewing of efforts undertaken)</th><th>2015 Paris Agreement (Global goal on adaptation)</th><th>2023 Global Stocktake (Adequacy & effectiveness of adaptation and support, progress toward the global)</th></tr>
<tr><td>Global</td><td></td><td></td><td></td><td colspan="3">Metrics to evaluate collective adaptation progress</td></tr>
<tr><td>National</td><td></td><td colspan="5">Metrics to identify and prioritize adaptation needs</td></tr>
<tr><td>Local/ Project</td><td></td><td></td><td colspan="4">Metrics to monitor and evaluate adaptation actions</td></tr>
</table>

Figure 2 Evolution of Functional Needs of Adaptation Metrics over Time with the UNFCCC Process

Source: Visually Modified from Mohner, 2018

IPCC (2014) distinguishes three potential uses of adaptation metrics, i.e., 1) to identify the needs for adaptation, 2) to guide decision making on the funding allocation, and 3) to assess progress in implementation and effectiveness of adaptation (M&E).

1) to identify the needs for adaptation

Leiter & Olhoff (2009) argue that there are two components in the use of adaptation metrics to identify adaptation needs, i.e building climate change adaptation capacity and guiding future adaptation efforts. The use of adaptation metrics in determining the adaptation needs may also help to prevent maladaptation. Hedger et al. (2008) emphasized that if an adaptation intervention is poorly done, it can lead to maladaptation where the intervention aggravates climate change. Bours et al. (2013) also summarised that "maladaptive programs may indeed meet targets, but actually cause harm."

2) to guide decision making on the funding allocation

In contrast to mitigation actions that tend to potentially generate revenues (for instance, via carbon taxes), adaptation actions might largely increase the expenditure side (Bachner et al., 2019). Moreover,

Stadelmann et al. (2014) highlighted that the adaptation resources available are often less than the adaptation needs, which is three times higher than Parry et al. (2009). This implies that funds strongly need to be invested in those programs that result in the most significant benefits (efficient allocation).

3) to assess progress in implementation and effectiveness of adaptation (M&E)

The Paris Agreement Article 2.1.c calls for alignment of financing flows with climate-resilient development pathways. Leiter and Olhoff (2019) stated that "it requires financing institutions to develop approaches for assessing the extent to which their financing operations are aligned with and deliver climate resilience objectives." Accordingly, climate resilience metrics are necessary to deliver information on the quality and results of funded adaptation activities. In line with Leiter and Olhoff, UNFCCC (2010) considered the adaptation designed as a continuous and flexible process. The implementation of adaptation actions needs to be monitored, evaluated, and revised regarding the projects, policies, and program's appropriateness, including their effectiveness and efficiency.

Many other terms are being raised since there is no universal terminology on the 'unit(s) of measurement.' The most common one being 'indicator.' UNEP (2018) provided a simple way to make a distinction between 'indicator' and 'metric':

Table 1 Simple Differences between Indicator and Metric

	Indicator	Metric
Definition	It might be used for the particular element of adaptation success being assessed	It might be used for the specific 'unit of measurement with which to quantify it
Example	The level of climate change vulnerability in a given population or the resilience of crop yields to climate change-induced drought	A specifically designated vulnerability index value or water use in m^3/tonnes of harvest

Source: Adapted from UNEP, 2018

According to some literature, the adaptation measurement has a broad interpretation and context-specific nature. Context-specific precisely means that (1) appropriate metrics in measuring the adaptation results at the local/ project level may not be appropriate at the national or international (aggregate) level, (2) different metrics are often used in different sectors, and (3) the specific local economic, environmental or social context could make it necessary to use different metrics even for activities at the same level and sector (Mohner, 2018). Further, Peltonen (2010) suggest that adaptation need to be measured by considering the different scale and sector level.

As suggested by GIZ (2017) as well as Leiter and Pringle (2018) in Table 2, the nature of adaptation leads to a challenging adaptation metrics formulation due to the characteristics of adaptation. The key characteristics of mitigation and adaptation .are presented in Table 2.

Table 2 Key Characteristics of Mitigation and Adaptation

Characteristic	Mitigation	Adaptation
Global target	**Quantitative:** keeping 'the global average temperature to well below two°C above pre-industrial levels' (Paris Agreement).	**Qualitative**: 'enhancing adaptive capacity, strengthening resilience and reducing vulnerability' (Paris Agreement).
What is being measured?	**Physical** conditions.	**Combination** of **socio-economic** and **physical** conditions.
Type of measurement	Direct: expressed in **CO_2 equivalents.**	Indirect: assessed through concepts such as **risk, vulnerability, and resilience,** or proxies that are expected to lead to adaptation.
Can it be objectively measured?	**Yes**. The underlying units (°C and tons of CO_2) are based on **objective scales. Universal applicability.**	**No,** vulnerability and resilience **depend on the definition** and **operationalization. Context-specific.**

Characteristic	Mitigation	Adaptation
Is the unit of measurement to define success specific to a particular place and context?	**No**, one ton of avoided CO_2 emissions has **the same global effect** no matter where it was avoided.	**Yes, the** adaptation of a particular population group at a particular place is **not directly comparable** to another place.

Source: Adapted from GIZ, 2017; Leiter and Pringle, 2018

There are differences in the global targets between the two, where mitigation has a quantitative target to keep the global average temperature below 2°C. Meanwhile, adaptation has qualitative targets in increasing adaptation capacity, strengthening resilience, and reducing vulnerability. Another difference is that in the measured subject, where mitigation measures physical conditions in greenhouse gas emissions in the atmosphere. In contrast, the subject measured for adaptation is a combination of biophysical and socio-economic conditions, i.e., changes in human and/or natural systems as current and future impacts of climate change. Then in terms of measurement types, mitigation tends to be a direct measurement of GHG emissions, while in adaptation, direct measurements cannot be made because conceptual and methodological challenges hamper them.

In addition, GIZ (2017) as well as Leiter and Pringle (2018) argued in measurement objectivity, mitigation measures through global emissions and temperatures can be based on an objective scale, while adaptations that measure vulnerability and resilience depend heavily on definition and operationalization. Furthermore, lastly related to the dependence of measurement of success in a particular place and context, mitigation does not depend on place and context because the global effect of a ton of CO_2 emissions must be the same everywhere. At the same time, adaptation is very dependent on place and context because a particular population group in one particular place is not directly comparable to another.

By considering the characteristics of adaptation that are different from mitigation, Leiter et al. (2019) described several points that need to be considered in the development of adaptation metrics:

- Start with the goals, not the metrics. The choice of metrics is determined based on (1) the objective of the measurement (what it is trying to measure or achieve), (2) the types of decisions that require the metric (e.g., allocation of funding or learning), (3) its usefulness to users, and (4) the scale to be communicated
- Ignore the search for a single adaptation metric but focus on improving comparability, consistency, and continuity of indicator sets that can capture adaptation information. The context-specific metrics can be build using an indicator in existing adaptation metrics.
- Encourage collaboration between key actors in various sectors and thematic areas to create a more systematic and transparent approach for generating and selecting effective adaptation metrics.
- Explore new technologies and options by leveraging the available frameworks, indicators, and data sources, then developing them further.

In the broader context, effective CCA implementation also needs to look at the opportunities to integrate adaptation with other global targets, so that measurement can be more efficient. A study from UNCCS (2017) looks at opportunities for integration between adaptation, sustainable development, and disaster risk reduction policies that have the potential to increase resilience and reduce vulnerability more comprehensively. The visualization of the integration of the three things is illustrated in the following figure.

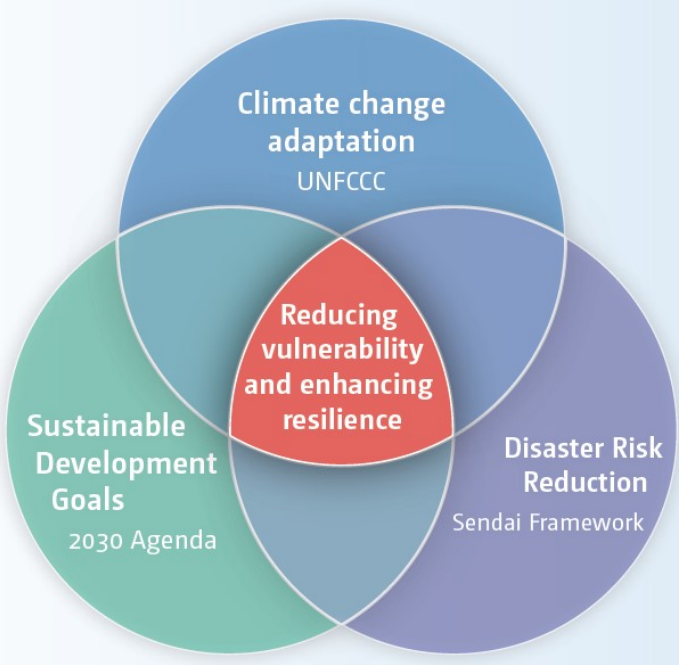

Figure 3 Scheme of the Opportunities for Integrating Climate Change Adaptation with the Sustainable Development Goals and the Sendai Framework for Disaster Risk Reduction 2015–2030

Source: UNCCS, 2017

The integration of the three can produce three possible benefits, among others (UNCCS, 2017):

- Increased coherence: ensuring complementarity between actions taken as part of each agenda. There are policy priorities of the three conflicting global agendas; an integrated policy approach can resolve contradictions where possible or prioritize objectives if they cannot be reconciled.
- Increased efficiency: an integrated approach will enable better use of available capacities, such as increasing data sharing between relevant actors, encouraging policy learning on best practices and common problems, and reallocating resources from operations and maintenance to innovation and addressing complex issues.
- Increased effectiveness: Achieving the goals of one global development agenda should effectively contribute to the substantial progress of the other two agendas.

Concerning the synergy between climate change targets and the other global targets, Indonesian key actors (MoNDP, MoEF) are starting to look at the linkage between climate resilience and disasters in the Indonesian context with their own perspective. This can be seen in the National Priority 6 of the 2020-2024 RPJMN with the title Building the Environment, Increasing Disaster Resilience and Climate Change. These national priorities include various programs and activities related to reducing disaster risk and increasing climate resilience. However, this also creates ambiguity because, in the end, the climate resilience actions carried out only focus on climate-related hazards. Meanwhile, climate resilience actions related to adaptation to productive activities in economic sectors are not included in these national priorities. Thus, concern to the linkage of climate change adaptation and disaster risk reduction in Indonesia still creates new challenges.

Moreover, adaptation is closely related to climate resilience. Based on the figure of climate-resilient pathways scheme below, high levels of resilience can be achieved if adaptive learning is undertaken, increased scientific knowledge, effective adaptation and mitigation measures, and other options that reduce risk. In the scheme, in column B (opportunity space), there are two path opportunities, namely a path that leads to achieving high levels of resilience and low vulnerability in the future (represented

by a green line), as well as a path that leads to the opposite condition (represented by a red line). Thus adaptation contributes to determining the level of resilience in the future.

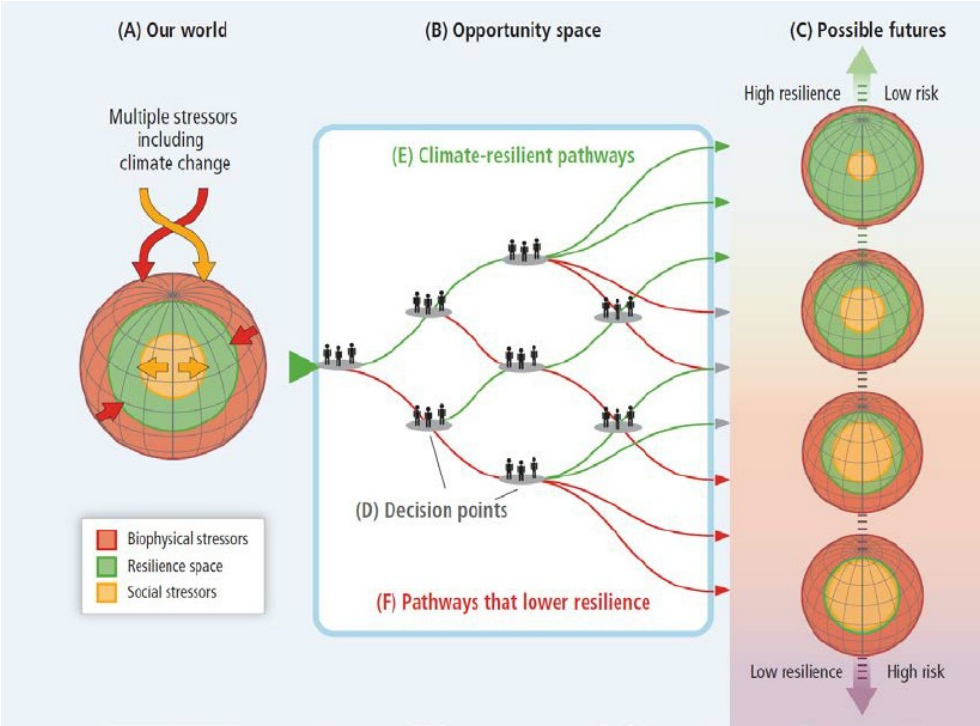

Figure 4 Climate-Resilient Pathways Scheme

Source: IPCC, 2014

If then the resilience is further understood, it can be described in Figure 5 below.

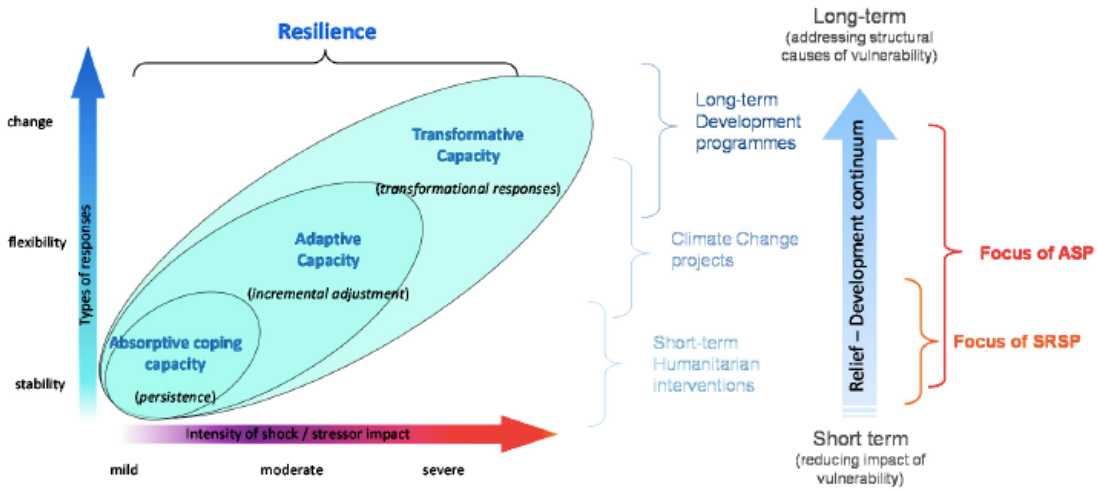

Figure 5 The Place of Shock Responsive Social Protection (SRSP) and Adaptive Social Protection (ASP)

Source: Bene et al., 2018

Resilience is formed from a combination and interaction between 3 (three) types of capacity, i.e., absorptive capacity, adaptive capacity, and transformative capacity, where all three have different types

of responses depending on the intensity of the impact of the shock/stressor. In addition, the three of them also have different types of intervention, i.e., short-term humanitarian, climate change projects, and long-term development programs. These types of intervention can influence the formation of several overlap capacities. The effect of these short-term to long-term interventions will result in different ranges of humanitarian–development continuum and increase following the readiness of long-term of the program.

The two pictures above (figure 4 and 5) show that the concept of resilience more fully includes aspects that are more sustainable, and adaptation is a part of it. In the future, in order to achieve more sustainable development, the resilience concept needs more research attention so it is easier to operationalize by policy makers.

2.2 Adaptation Governance

The governance of adaptation includes government and actors outside of government, from local to global levels, so the need for collaboration between actors is increasing (Peltonen et al., 2010). Adaptation measures that are carried out are multi-scale and multi-sector, so the integration and synergy between policies is a central challenge because there are conflicts between public policies and adaptation policies in various regions. One of the reasons is due to lack of communication and dialogue between areas and cross-sectors.

There are still many ambiguities and different interpretations of adaptation until now, which can hinder the development of more specific, targeted, and legally binding governance efforts (Persson, 2019). Persson (2019) also assumes that adaptation is a fuzz concept with the biggest challenge in measuring it, i.e., the problematic methodology and data (including baseline, time, attribution), so the public can set specific criteria and metrics for adaptation will be hard to achieve.

In dealing with the complexity of adaptation measurement, it is necessary to design a mature adaptation implementation in considering the complexity. A mature adaptation implementation design begins with a strong institutional and legal framework, then an adaptation strategy by prioritizing actions, concrete sector targets (line ministries), as well as appropriate funding allocations. (Hallegatte et al., 2020).

Moreover, challenges in adaptation governance also arise in terms of the availability of reference documents for implementing adaptation. On adaptation planning (that relates to governance issues), the UNFCCC provides recommendations for countries parties to formulate the NAP document as a reference document for adaptation composed by all relevant stakeholders, so implementing adaptation in each country can be implemented more synergistic and effective. This directive is stated in the Paris Agreement Article 7 (9), where each Party shall, as appropriate, engage in adaptation planning processes and the implementation of actions, including the development or enhancement of relevant plans, policies, and/or contributions, which may include:

a) The implementation of adaptation actions, undertakings, and/or efforts;
b) The process to formulate and implement national adaptation plans;
c) The assessment of climate change impacts and vulnerability, to formulate nationally determined prioritized actions, take into account vulnerable people, places, and ecosystems;
d) Monitoring and evaluating and learning from adaptation plans, policies, programs, and actions; and
e) Building the resilience of socio-economic and ecological systems, including economic diversification and sustainable management of natural resources.

The NAP formulation is actually a more active form of the NDC target, but it is emphasized that drafting must be participatory or involve all related parties. If the NAP and NDC have been formed, the priorities for long-term adaptation for resilient development should be integrated into it (IIED, 2018).

2.3 Relation of Adaptation Metrics with Funding Allocation

In terms of metrics and funding allocation, the existence of robust metrics will help allocate the budget properly because the measure of achievement of each activity/program becomes clearer. If metrics do not yet exist, then alignment of policy makers for the development of metrics is necessary in order to produce robust metrics. However, there are challenges in allocating funding based on the level of vulnerability, according to the UNFCCC (Art. 4), which states that developed countries must assist the developing countries that are very vulnerable to the negative impacts of climate change through adaptation funding. Further, the way to assess vulnerability cannot be easily realized and cannot be determined objectively, so prioritizing funding based on vulnerability index will always be a political and technical challenge (Leiter and Pringle, 2018; Klein, 2019; Klein and Mohner, 2011).

Lack of agreement on the definition of vulnerability components, their usage, and representative indicators cause the absence of solid guidelines for policymakers in determining the distribution of financing (Muccione et al., 2017). Therefore, to avoid unfair and inefficient distribution of adaptation funding, it is crucial to agree on a metric that contains a set of indicators or international standards for adaptation (Stadelmann et al., 2015 and Christiansen et al., 2018). Moreover, the lack of universal adaptation metrics also continues today. Without adaptation metrics, adaptation finance vehicles such as the Adaptation Fund (AF) and the Green Climate Fund (GCF) face challenges when comparing the adaptive effects of projects to achieve an efficient allocation of adaptation funding (Stadelmann et al., 2015). IPCC also stated the potential use of the metrics of adaptation, one of which is to guide decision-making about funding allocations (WG3 of IPCC Report, 2014).

According to Leiter and Olhoff (2019), the use of adaptation metrics temporally can be used to predict future conditions (ex-ante) or to measure what has happened through monitoring and adjustment (ex-post) (Michaelowa and Stadelmann, 2018). The measurement objectives for ex-ante can be oriented towards three different things, one of which is the allocation of funding. The existence of adaptation metrics can be used to determine the allocation of climate finance that is used at the global, national, and sub-national levels. Christiansen et al. (2018) stated that universal adaptation metrics would be the basis for improved fairness and accountability in the distribution of resources and increasing the probability of prioritizing high-value activities and impactful adaptation activities. Politically, the existence of adaptation metrics can reduce risk due to squandering of money allocated for adaptation, in addition, ethically, the existence of an adaptation metric can play play a role in avoiding ad-hoc allocation of funds to powerful groups through increasing transparent criteria for projects (Michaelowa and Stadelmann, 2018).

2.4 Key Takeaways

- Adaptation has a broad interpretation and context-specific nature so that it has implications for its measurement which is difficult to determine single-metrics
- In designing the implementation of adaptation, it is necessary to consider the complexity of the nature of adaptation
- There is a lack of communication among sectors as well as among regions in adaptation, so it is necessary to consider multi-scale and multi-sectoral adaptation governance.
- The existence of adaptation metrics can help budget allocation because the measures of achievement are clearer so the funding can be allocated efficiently.

3 Methodology

This study uses primary data from in-depth interviews and Focus Group Discussion (FGD) as well as secondary data from relevant documents. Due to the pandemic covid-19 situation that restricts offline meetings, all of the primary data collection processes were done through online interviews. The in-depth interviews were conducted with several actors that play a strategic role in determining funding

priorities for climate change adaptation in Indonesia, i.e., Ministry of National Development Planning, Ministry of Environment and Forestry, and Fiscal Policy Agency; with other related stakeholders, i.e., Kemitraan. Detailed themes for the interviews of each of these sources are presented in Table 3. Meanwhile, the FGD were also conducted. The FGD was opened to the public in the form of a webinar with the theme: To What Extent Adaptation Metrics can Contribute to Identify the Needs of both National Development Planning and International Climate Financing, inviting representatives from the Ministry of Environment and Forestry, Ministry of National Development Planning, Ministry of Finance and National Network Coordinator of Mercy Corps Indonesia.

Table 3 List of interviewees and their respective themes

Position/Institution	Themes	Key Question for discussion of Adaptation Metrics
Director of Development Funding Planning, MoNDP	Linking climate change funding and national development finance planning in a cross-sector way	What is the position of adaptation in national development financing planning?
Program Manager, Kemitraan (Partnership for Governance Reform)	The role of Accredited Entity to encourage Indonesian policies that are in line with ICF requirements	What are the indicators/metrics used and how are the applied in proposals and implementation of activities/programs?
Head of the NDA Secretariat, Fiscal Policy Agency (FPA)	The role of NDA in planning and proposing funding of climate change adaptation to ICF (GCF)	What are the indicators/metrics used and how are the applied in proposals and implementation of activities/programs?
Director for Climate Change Adaptation, Ministry of Environment and Forestry (MoEF)	The role of the coordinator to ensure the implementation of NDC-CCA	What policies have been prepared by the Ministry of Environment and Forestry (MoEF) and how are they used in the implementation of adaptation by actors?

The collected data is analyzed using qualitative analysis methods through qualitative-descriptive analysis. Qualitative descriptive analysis is a method to condense an abundance of data to develop a more coherent understanding of something or to build a solid foundation for analyze the “how” or “why” something happens (Miles et al., 2014).

4 Portrait of Adaptation Governance, Assessment Tools, and Financing in Indonesia

Up to now adaptation governance including budget allocation for adaptation is a reflection of the attention of policy makers and politicians in looking at adaptation issues both at national and international levels (Schipper, 2006; Singh & Bose, 2018). Historically, when the UNFCCC was signed in 1992, adaptation became an important parameter in the convention’s goal in Article 2, which is to stabilize greenhouse gases in the atmosphere for a sufficient period of time to allow ecosystems to naturally adapt to climate change, to ensure that food production is not threatened and to enable economic development to continue in a sustainable manner. Since this moment, discussions on adaptation became increasingly prominent and were always discussed in the IPCC assessment reports.

According to The Synthesis Report (SYR) of the IPCC Fifth Assessment Report (AR5), there are three potential uses of adaptation metrics i.e., to identify the needs for adaptation, to guide decision making on the funding allocation, and to assess progress in implementation and effectiveness of adaptation (M&E). These three potential uses of adaptation metrics are the basis for analysis of this report.

Regarding the potential uses to identify the needs for adaptation, it is explained through the results of the analysis in section 4.1 (Issues on Adaptation Governance at the National Level). For the potential uses of adaptation metrics to guide decision making on the funding allocation, it is explained through the results of the analysis in section 4.3 (Adaptation Financing in Indonesia). Then, for the potential uses to assess progress in implementation and effectiveness of adaptation, because there is no monitoring and evaluation yet, the analysis begins with defining the assessment tools which are explained through the analysis in section 4.2 (Adaptation Assessment Tools Development in Formal Document in Indonesia).

4.1 Issues on Governance of Adaptation at the National Level

4.1.1 Actor of Indonesia for Climate Change Adaptation

Managing climate change adaptation in Indonesia from a planning and funding aspect is the responsibility of several ministries at the central government level. There are 3 (three) ministries that play a central role in climate change planning and funding, i.e., MoNDP, MoEF, and MoF. The following is a list of key actors' roles in tackling climate change in Indonesia.

Table 4 Roles of Key Actors in Climate Change Planning and Funding in Indonesia

No.	Actors	Roles
1	Ministry of National Development Planning (MoNDP)	• Designing policies related to climate control in the short, medium, and long term in the concept of national development planning. • Synergize climate control policies into the duties and responsibilities of Ministries / Agencies. • Manage the use and distribution of domestic resources and international funds into projects in line with low-carbon development action and adaptation to the impacts of climate change
2	Ministry of Environment and Forestry (MoEF)	• Organizing the formulation and implementation of policies in the area of climate change control • As Indonesia's National Focal Point for the UNFCCC • As a Designated Authority (DA) for funding from the Adaptation Fund (AF). • Manage environmental funds (including climate finance) sourced from domestic and international optimally, transparently, accountably, effectively, and efficiently
3	Ministry of Finance (MoF)	• Design and regulate fiscal policies regard to climate finance • As the NDA for the GCF (Green Climate Funds) in Indonesia • Developing new domestic funding instruments, such as issuing green bonds and green sukuk • Developing an Ecological Fiscal Transfer (EFT) instrument in the budget transfer mechanism to the regions

Source: Synthesis from FPA, 2019; MoNDP, 2021

Besides, there are other actors who are operationally carrying out adaptation-related activities, both from the government and non-government sides. The following is a list of these actors.

Table 5 List of Other Actors Involved in Handling Climate Change in Indonesia

No.	Actors	Field of Work-Related to Climate Change
1	Ministry of Public Works and Housing	Providing and maintaining the main and supporting infrastructure in reducing the potential risks and impacts of climate change

No.	Actors	Field of Work-Related to Climate Change
2	Ministry of Marine and Fisheries	Providing and maintaining the main and supporting infrastructure that can support the reduction of potential risks and impacts of climate change on the marine and coastal sectors
3	Ministry of Agriculture	Providing infrastructure to increase the production and productivity of agricultural commodities, as well as to conduct counselling and development of human resources in agriculture
4	Ministry of Health	Carrying out the development and empowerment of human resources in the health sector as well as communication to the community to improve a healthy environment, healthy lifestyle, and control of disease vectors related to climate change
5	Ministry of Social Affairs	Formulate, determine and implement policies related to adaptive social protection for communities and business actors (individuals/groups) working in sectors affected by climate change.
6	Ministry of Transportation	Providing and maintaining infrastructure in reducing the potential risks and impacts of climate change, especially in shipping activities
7	Ministry of Energy and Mineral Resources	Formulating and implementing policies related to efforts to achieve energy independence
8	Ministry of Industry	Encouraging the application of the green industry as an effort to mitigate and adapt to the impacts of climate change
9	Ministry of Education, Culture, Research, and Technology	Encouraging the conduct of research in various fields, including climate change adaptation efforts
10	Ministry of Agrarian Affairs and Spatial Planning/National Land Agency	Carrying out climate change adaptation efforts in spatial planning
11	Ministry of Internal Affairs	Coordinating with local governments at the provincial level to develop a climate change adaptation strategy
12	Ministry of Village, Development of Disadvantaged Regions and Transmigration	Empowering rural communities to increase the adaptive capacity of individuals or groups to the impacts of climate change, as well as providing rural infrastructure that encourages the reduction of potential risks and impacts of climate change in priority sectors
13	Ministry of Women's Empowerment and Child Protection	Conducting the communication function to increase the adaptive capacity of women, children, and vulnerable groups to the potential risks and impacts of climate change, as well as to formulate, determine and implement related policies.
14	Ministry of Law and Human Rights	Enacting regulations related to climate change adaptation in the State Gazette of the Republic of Indonesia
15	Meteorological, Climatological, and Geophysical Agency	Delivering information to related agencies and parties as well as the public regarding climate change and hydrometeorological disaster, as well as providing and maintaining infrastructure to improve the quality of climate information services
16	National Board for Disaster Management	Improve the quality of disaster management coordination in a planned, integrated, and comprehensive manner, especially in relation to hydrometeorological disasters.
19	Central Bureau of Statistics (BPS)	Providing data services and statistical information that can be used as supporting data in climate-based science studies
20	Geospatial Information Agency (BIG)	Providing spatial data and information services that can be used as supporting data in climate-based science studies
21	Indonesian Institute of Sciences (LIPI)	Conducting basic, inter and trans-disciplinary research to promote the reduction of potential risks and impacts of climate change

No.	Actors	Field of Work-Related to Climate Change
22	National Institute of Aeronautics and Space (LAPAN)	
23	Agency for the Assessment and Application of Technology (BPPT)	Conducting research, assessment, development, and technology diffusion, as well as providing recommendations and services for the application of technology related to reducing the risks and impacts of climate change
24	Local Government	Ensure synchronization / mainstreaming of national climate change policies in local planning documents as well as formulate climate change adaptation strategies at the local level
25	CSO	Provide assistance to the community as well as infrastructure development that can target the most minor administrative areas and embrace the community groups
26	Private	Apply/invest in adaptation actions against climate change impacts (e.g., climate risk planning, infrastructure development such as resilient treatment plants and distribution network, also through PPPs)

Source: Extracted from Table 1 of Book 2 and Book 3 of PBI (Climate Resilience Based Development) - MoNDP, 2021 Table 6.1 of NDC-Adaptation Roadmap - MoEF, 2020

4.1.2 Adaptation Implementation Policy in Indonesia

During the administration of Joko Widodo era, policy on climate change governance is reflected basically in the Presidential Regulations No. 16 of 2015 concerning The Ministry of Environment and Forestry. These include merger of four ministries/institutions, namely the Ministry of Forestry, the Ministry of Environment, the National Council for Climate Change (DNPI), and the REDD + Management Agency, to become the Ministry of Environment and Forestry (MoEF). Based on the presidential regulation, it is stated that the implementation of climate change control is coordinated and implemented by the Ministry of Environment and Forestry through the Directorate General of Climate Change Control (DJPPI). According to FPA (2019), the DJPPI plays a role in formulating and implementing policies in the climate change management sector, focusing on mitigation, adaptation, resources mobilization, GHG inventory, monitoring-reporting-verification (MRV), and forest and land fire management activities. In addition, based on the Regulation of the Ministry of Environment and Forestry No.18 of 2015 concerning the Organization and Work Procedure of the Ministry, the Directorate General of Climate Change Control also plays a role as organizer of the formulation and implementation of policies in the field of climate change which includes playing the role of the National Focal Point (NFP) to the UNFCCC.

Regarding to the foreign policy on climate change, Indonesia has signed the Paris Agreement in New York on April 22, 2016. This was followed up by Law No. 16 of 2016 concerning the Ratification of the Paris Agreement to the United Nations Framework Convention on Climate Change (UNFCCC). The Government of Indonesia (GoI) has a national commitment towards a low carbon and climate-resilient development, with climate change adaptation and mitigation as an integrated and cross-sectoral priority in the national development agenda. In the explanation of Law No. 16 of 2016, Indonesia mentioned several laws that are in line with and support the implementation of the Paris Agreement, such as Law No. 31 of 2009 on Meteorology, Climatology, and Geophysics, and Law No. 32 of 2009 on Environmental and Protection Management. The GoI through Law No.31 of 2009, has considered aspects of climate change by mandating the government to mitigate and adapt to climate change, by implementing the formulation of national policies, strategies, programs, and activities to control climate change; coordination of climate change control activities; and monitoring and evaluating the implementation of policies on the impacts of climate change. In-Law No.32 of 2009, climate change has been considered at the stages of planning, control, and maintenance of the environment.

In actual since the enactment of this law in 2009 to 2016, the policy formulation process in the form of government regulation has not yet been realized. As the need for adaptation has emerged, the GoI then made a shortcut through the formulation of Regulation of the Ministry of Environment and Forestry (MoEF) No. 33 of 2016 concerning the guideline for national adaptation action development. The regulation is intended to provide guidance for national and local governments in preparing climate change adaptation action plans and integrate these plans into specific regional and/or sector development plans that consider the impacts of climate change to achieve adaptive development. Directorate General of Climate Change Control (2017) stated that the regulation had become a strong foundation for implementing adaptation actions to support the transition towards implementation of NDC under the framework of the Paris Agreement. As current status, the regulation is being reviewed by the Ministry.

In November 2016, Indonesia delivered Indonesia's First Nationally Determined Contribution (NDC) document, which was submitted to the UNFCCC. The NDC document describes Indonesia's transition to low emission and climate-resilient future. In the NDC document, the GoI has committed to reducing greenhouse gas (GHG) emission by 29 % (unconditional) using its own resources and 41% (conditional) with international support from the business as usual (BAU) scenario in 2030. As for adaptation, Indonesia's commitment includes increasing economic resilience, social and livelihoods resilience, and ecosystem and landscape resilience. In 2018, the GoI issued Regulation of the Ministry of Environment and Forestry (MoEF) No. 7 of 2018 concerning Climate-Risk Vulnerability Assessment (CVRA). The MoEF regulation aims to provide guidelines for the national and local government, and also the community in determine the scope of analysis, the selection of methods, indicators, data indicators, and data sources in the preparation of a climate change vulnerability, risk, and impact. In addition, the regulation also aims to determine the verification criteria for the result of vulnerability, risk, and impact of climate change.

As requested by Paris Agreement to periodically (every five years) update NDC, the GoI continues to improve climate change adaptation and mitigation efforts, one of which is through the preparation of an updated NDC document by raising climate change adaptation ambitions through concrete adaptation actions and integrated with important issues such as biodiversity and diversification (MoEF, 2021b). In addition, since 2020, Indonesia has also developed a document, Long-term Strategy on Low Carbon and Climate Resilience 2050, towards net-zero emission. Adaptations have been considered and are only a minor part of being integrated in the document. The document is a long-term direction that will guide the implementation of climate change mitigation and adaptation as well as the subsequent five-year NDC commitments (ibid).

4.1.3 Formal Documents as References for or to be Mainstreaming into Adaptation Related Policy Development in Indonesia

Formal documents published by some key actors that will be explained in this section may contain either adaptation in a specific manner or adaptation as a part of climate change beside mitigation. The specific documents for adaptation are KRAPI, RAN-API, SIDIK, CRIDS, and PBI. Meanwhile, formal documents that discuss climate change as a whole include the ICCSR, NDC, CPD, and Public Finance for Climate Change. .

These documents can also be grouped into the category of formal documents for adaptation substances, namely those issued by the MoEF and MNDP and formal documents for adaptation funding launched by the MoF. Since 2012, the MoEF has produced three documents that can be used as references for adaptation, i.e., KRAPI, SIDIK, and NDC. Meanwhile, since 2010 MNDP has produced ICCSR, RAN-API, CRIDS, and PBI documents. Meanwhile, the MoF, which focuses on financial management, has produced two documents related to funding allocations for climate change, i.e., CPD and Public Finance

for Climate Change. The following is a detailed explanation of these documents, which is presented based on the publication chronology.

A. **ICCSR (Indonesia Climate Change Sectoral Roadmap) - 2010**

Definition: Indonesia Climate Change Sectoral Roadmap (ICCSR) is the roadmap to provide policy guidance and mainstream climate change tools into all aspects of development planning for considerations of the sectoral and cross-sectoral development programs.

Objective: ICCSR published with aimed to set national goals, sectoral targets, milestones, and priorities for action regarding adaptation and mitigation of climate change. ICCSR provides inputs about implementing national adaptation and mitigation to climate change for the five-year National Medium-Term Development Plan (RPJMN) 2010-2014 and the subsequent RPJMN until 2030.

Scope: For adaptation actions, the high priority sectors, i.e., water resources sector; marine and fisheries sector; agriculture sector; and health sector. The roadmap process included several activities designed to address inter-sectoral issues related to climate change. Besides, the Roadmap recognizes the diversity of each region's physical, economic, political, and cultural dimensions in Indonesia. The proposed policy responses to climate change that are outlined in this ICCSR have been tailored to the specific characteristics of Indonesia's central regions: Sumatra, Jamali (Java, Madura, Bali), Kalimantan, Sulawesi, Nusa Tenggara, Maluku, and Papua.

Figure 6 Chart of National Roadmap for Climate Change Adaptation and Mitigation

Source: MoNDP,2010

Within the scope of 20 years or until 2030, there are three main activity categories, i.e.:

- Category 1. Data, Information and Knowledge Management (KNOW-MANAGE): data collection, information development, and knowledge management about the impacts of climate change and GHG emissions from each sector achieved through scientific research, based on collaboration between universities, research institutions, and government.
- Category 2. Planning and Policy, Regulation and Institutional Development (PLAN-PRIDE): Formulates specific adaptation and mitigation action plans that utilize information from activities in category one complemented by additional capacity building and institutional strengthening.
- Category 3. Implementation and Control of Plans and Programs with Monitoring and Evaluation (ICON-MONEV): Implement and monitor and evaluate climate change adaptation and mitigation plans.

Framework: Risk assessment framework ICCSR, beginning with identifying climate hazards with the development of regional climate change projections, including projections of temperature, rainfall, sea-level rise, and the occurrence of extreme events to guide the formulation of adaptation strategies in the priority sectors. Priority activities for adaptation are formulated based on the resulting potential impacts on each of the priority sectors.

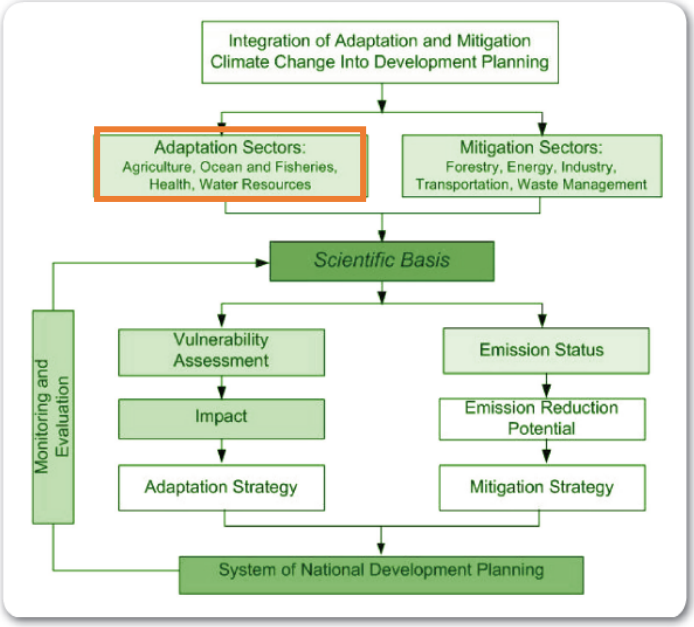

Figure 7 Roadmap Development Approach
Source: MoNDP,2010

Responsible ministry/agency: ICCSR was published by the Ministry of National Development Planning (MoNDP) in 2010.

Line ministries/agencies: The implementing agency for the roadmap formulated for each sector in the ICCSR document is the relevant ministry/agency that is the technical implementer of each sector. Government agencies related to adaptation sectors (water resources; agriculture; marine and fisheries sector; and health sector), i.e., the Ministry of Public Works and Housing; Ministry of Agriculture; Ministry of Environment and Forestry; Ministry of Marine and Fisheries; Climatology, Meteorology and Geophysics Agency; National Board for Disaster Management; and Ministry of Health.

Funding sources: The development of the ICCSR document was supported by the Deutsche Gesellschaft fur Technische Zusammenarbeit (GTZ) through its Study and Expert Fund for Advisory Services in Climate Protection

In general, the ICCSR report per adaptation sector still does not indicate the source of funding. However, there is an indication of the source of funding for adaptation action from the APBN for 2010-2020 activities in the agricultural sector. Besides, the GoI also developed a national trust fund mechanism called the Indonesian Climate Change Trust Fund (ICCTF) to facilitate financial support for climate change actions. ICCTF will be one of several financing mechanisms for national policies and programs and will guide implementation issues from the ICCSR.

B. **KRAPI (Climate Change Risk and Adaptation Assessment) - 2012**

Definition: Climate Change Risk and Adaptation Assessment (CCRAA), also known as KRAPI (Kajian Risiko dan Adaptasi Perubahan Iklim), is an approach that includes identifying vulnerable sectors, formulating the problems, also mainstreaming adaptation strategies into existing development policies. KRAPI was developed by The Ministry of Environment and Forestry, Indonesia, and

supported by GIZ (Gesellschaft fur Internationale Zusammenarbeit) and The Government of Australia (MoEF, 2012).

Objective: As a guide for formulating adaptation actions at the national and local levels needed to avoid multiple impacts of climate change through approaches, frameworks, and methodologies to assess vulnerability and adaptation capacity to climate change.

Scope: The sectors that are the focus of KRAPI are adaptation sectors which are also prioritized in the ICCSR, i.e., water resources, agriculture, health, and coastal areas. The pilot sites of KRAPI, i.e., Tarakan City, South Sumatera Province, Greater Malang region including Malang City, Malang Regency, and Batu City. Before those sites, KRAPI had initiated activity in Lombok Island in 2009. It is hoped that the study results in the pilot areas can be replicated nationally in other regions.

For the scope of the planning period, based on the results of the study in the three pilot areas, there are different implementation time targets for the adaptation strategies of each sector. There is an adaptation strategy that is written without a target year of realization, but there are also sector adaptation strategies that are planned for the short-term (2010-2020), medium-term (2020-2030), and long-term (2030-2050).

Framework: In general, KRAPI is formulated based on analysis of scientific basis, hazard, vulnerability, and climate risk before developing adaptation options. A complete explanation of the risk and adaptation assessment process at KRAPI is presented in sub-chapter 4.2.1.

Responsible ministry/agency: KRAPI was published by the Ministry of Environment and Forestry (MoEF) in 2012.

Inline ministries/agencies: The agency that implements KRAPI is an institution related to the four sectors that are the focus of this study, i.e., Ministry of Public Works and Housing; Ministry of Marine and Fisheries; Ministry of Health; Ministry of Environment and Forestry; Ministry of Agriculture; Meteorological, Climatological, and Geophysical Agency; Geospatial Information Agency; Ministry of Research and Technology; Indonesian Academy of Sciences (LIPI); as well as National Institute of Aeronautics and Space (LAPAN). Besides, based on the three pilot areas in KRAPI, the agencies implementing the planned adaptation strategy are local agencies that are related to 4 priority sectors, such as the Irrigation Service, Agriculture Service, Public Works Service; PDAM (= Perusahaan Daerah Air Minum; Municipal Water Company); District Government. However, in this report, there is not yet an indication of funding needs and funding sources that can be used by in-line ministries/agencies.

Funding Sources: The preparation of this document was supported by funding from the Australian Agency for International Development (AusAID).

C. RAN-API (Indonesia National Action Plan on Climate Change Adaptation) - 2014

Definition: RAN-API is a national planning document containing cross-sectoral climate change adaptation strategies and efforts for the short, medium-term, and also provides adaptation directions for the long term.

Objective: The main objective of the RAN-API is the implementation of a sustainable development system that has high resilience to climate change impacts. The strategic objectives of RAN-API are to build economic resilience, establish the livelihood (social) resilience to climate change impacts (social resilience), maintaining the sustainability of environmental services (ecosystems resilience), and strengthen the resilience in particular regions such as urban areas, as well as coastal and small islands. RAN-API is a cross-cutting thematic plan to prepare climate change resilient development plans at the national level in terms of national development planning. RAN-API is intended to provide input to the

future Government Work Plan (RKP) and the National Medium Term Development Plan (RPJMN) to become more responsive to climate change impacts.

Scope: In substance, the scope of adaptation discussed in the RAN-API is directed as an effort to increase the resilience of a system to the impacts of climate change. Therefore, the strategic objectives of RAN-API are directed at: (i) building economic resilience, (ii) building (social) systems that are resilient to the impacts of climate change (resilience of living systems), (iii) maintaining the sustainability of ecosystem environmental services (ecosystem resilience) and (iv) strengthening the resilience of particular areas in cities, coastal areas and small islands. To support the strengthening of these various fields, a support system is needed to strengthen national resilience towards a sustainable and resilient system to climate change.

Framework: To strengthen the objectives, it requires a support system that is reflected in knowledge management, planning, and budgeting, capacity building, as well as monitoring and evaluation.

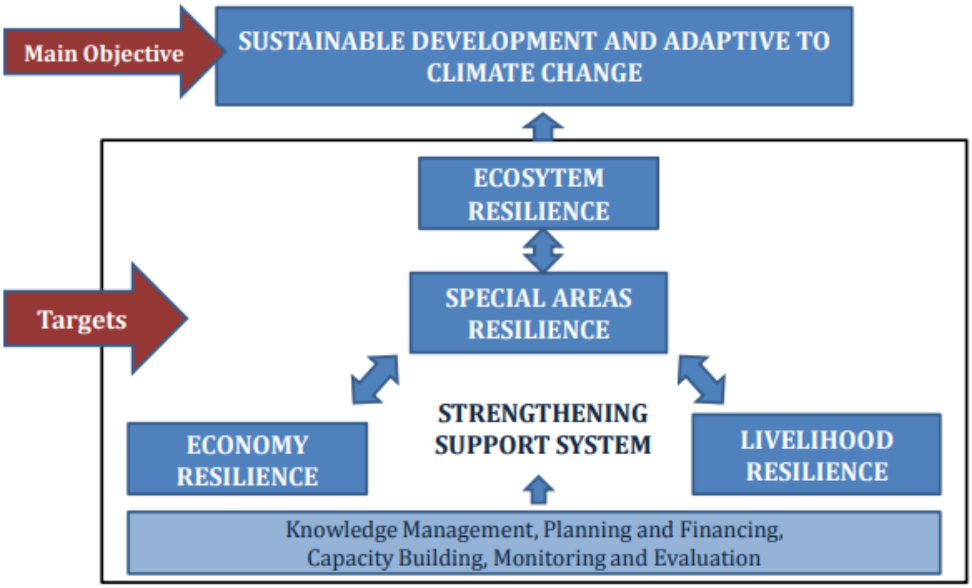

Figure 8 RAN-API Targets Framework

Sources: MoNDP, 2014

Responsible ministry/agency and respective process conducted: RAN-API was published by the Ministry of National Development Planning (MoNDP) in 2014. Before being officially published, the plan for preparing this document was announced at COP 13 in Bali in 2007. After being published, in the implementation process, the government conducted a review of RAN-API in 2017. The results of this review, the government launched a new document in 2021 entitled PBI (Climate Resilience Based Development).

Inline ministries/agency: The RAN-API is a national action plan document on adaptation to climate change impacts, which involves integrated coordination among all the stakeholders, including government, community organizations, public, private, etc.

Funding Sources: A development partner that supports funding for the preparation of the RAN-API, i.e., the Japan International Cooperation Agency (JICA), Asian Development Bank (ADB), and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)

D. **SIDIK (Information System of Vulnerability Index Data) – 2015**

Definition: SIDIK is a system that compares relative vulnerability conditions between regions at the national, provincial, and district/city levels, with the village as the smallest unit of analysis. As a system, SIDIK continues to develop to improve it. Limited data, determination of indicators, detailed data, methodologies that are not based on topography are some of the challenges faced in its development.

Objective: SIDIK aims to provide information on climate vulnerability needed in development by the central and local governments in adaptation planning efforts and reduce the risks and impacts of climate change. SIDIK is used for 1) supporting RAN-API, 2) assisting the preparation of a Strategic Environmental Assessment (KLHS) as mandated by Law No. 32/ 2009 and PP No. 46/2016, and 3) determining priority locations for '*Program Kampung Iklim'* (Climate Village Program) development.

Scope: The scope of areas discussed in SIDIK is at the national, provincial, and district/city levels, with the village as the smallest unit of analysis. Meanwhile, in the substance scope, SIDIK focuses on measuring vulnerability using a 3-factor approach, i.e., exposure, sensitivity, and adaptation capacity. These three factors can be reflected by biophysical and environmental conditions, infrastructure, and socio-economic conditions. These three factors can change over time in line with the implementation of development activities and adaptation efforts.

Framework: The objectives of Indonesia's climate change adaptation strategy stated in the updated NDC are to reduce risk, improve adaptive capacity, strengthen resilience and reduce vulnerability to climate change in all development sectors by 2030. These objectives lead to economic, social, and livelihood and ecosystem and landscape resilience by integrating adaptation and mitigation responses into development. Regarding the adaptation response, such objectives will be achieved by improving climate literacy, strengthening local capacity, improving knowledge management, converging policies between climate risk adaptation and disaster reduction, and applying adaptive technologies. To respond to this, the Ministry of Environment and Forestry created SIDIK (Information System of Vulnerability Index Data) as the adaptation metrics by utilizing socio-economic, demographic, geographic, and infrastructure data from the Village Potential. A complete explanation of the social-economic vulnerability assessment process at SIDIK is presented in sub-chapter 4.2.2.

Responsible ministry/agency: MoEF published SIDIK in 2015.

Inline ministries/agencies: SIDIK only contains information on the indication of the vulnerability status of each village in Indonesia so that it does not reach the formulation of program plans or actions that require a working institution for implementation or budget allocation. If the vulnerability data is to be used in prioritizing adaptation plans, actions, and strategies in each sector or by local governments, additional data and further analysis are necessary.

Funding Sources: Initially, the source of funding for the preparation of SIDIK came from the state budget. Along the way, there is ADB (Asian Development Bank) assistance for the Citarum Study based on village vulnerability, that the method is used as the basis for developing SIDIK. Then Mercy Corps helped its online system with Arcgis and its servers. Furthermore, the development of SIDIK is currently supported by funding from JICA (Japan International Cooperation Agency).

E. **NDC (National Determined Contribution) – CCA Component - 2016**

Definition: NDC is a document issued by Indonesia as a form of commitment to implementing the Paris Agreement, where previously the results of the 2015 Paris Agreement were ratified in Law No. 16 of 2016.

Objective: Indonesia's NDC was prepared with the aim of outlining Indonesia's transition to a low-emission and climate-resilient future. This goal will be achieved through empowerment and capacity

building, improving basic health and education services, technological innovation, and sustainable natural resource management in line with the principles of good governance.

Scope: Scope of greenhouse gas emission reduction targets, in 2010, the GoI set an unconditional target of reducing GHG emissions by 26% by 2020, and up to 41% if there is international support, compared to the business as usual scenario in 2020. Post- 2020, Indonesia increased the unconditional target to 29%. However, the scope of commitment stated in the NDC is related to mitigation and adaptation. The focus of mitigation sectors is energy; Agriculture, Forestry, Other Land Use (AFOLU); Industrial Processes and Product Use (IPPU); and waste management sector. The focus of adaptation sectors is agriculture, water, energy security, forestry, maritime and fisheries, health, public services, infrastructure, and urban systems.

Framework: The framework for implementing NDC is based on four strategic approaches, namely employing a landscape approach; highlighting existing best practices; mainstreaming climate agenda into development planning; as well as promoting climate resilience in food, water, and energy

Responsible ministry/agency and respective process conducted: The NDC document is developed and continually updated by the MoEF as a form of Indonesia's commitment to addressing climate change issues submitted to the UNFCCC. The initial NDC document was submitted to the UNFCCC in 2016. Then in 2017, the MoEF published the NDC Implementation Strategy as an operational guide for the MoEF to implement mitigation and adaptation measures. Currently, the MoEF has updated the NDC document, and public consultation has been conducted but is still waiting for the MoEF minister's approval. In addition, an Adaptation NDC Roadmap has also been prepared that contains NDC adaptation targets and is expected to be a guide for the operational implementation of adaptation by Ministries / Agencies, but the legal umbrella is currently being prepared.

Inline ministries/agency: The NDC document (2016) contains a statement of Indonesia's commitment to mitigation and adaptation efforts, so it does not contain programs/activities or implementing agencies. Details of implementing agencies are contained in the NDC Implementation Strategy document (2017). In the document, there are 9 (nine) NDC implementation programs with implementing parties, including related ministries/agencies, local government, private, civil society, non-governmental organization, financial institutions, and parliament

Funding Sources: The source of funding for the formulation of NDCs in Indonesia comes from the state budget.

F. CRIDS (Climate Resilience Index Development Study) - 2018

Definition: CRIDS (Climate Resilience Index Development Study) document was prepared intended as a monitoring and evaluation instrument to measure the achievement of adaptation actions in the RAN API.

Objective: CRIDS is aimed to develop a climate resilience performance measurement in Indonesia, which will be used as the foundation on scoping the new RAN API, monitoring and evaluation framework, and to determine climate resilience baseline as well.

Scope: The outputs of CRIDS are used as the primary recommendation to strengthen RAN API's quality. So, the study, in general, is focusing on developing a prototype of a climate resilience index for Indonesia. This study focuses on four sectors for describing resilience to climate, i.e., water resources sector, ocean and coastal sector, agriculture sector, and health sector in sectors that represent four focus sectors of RAN-API. The detailed system of each sector is shown in the figure below.

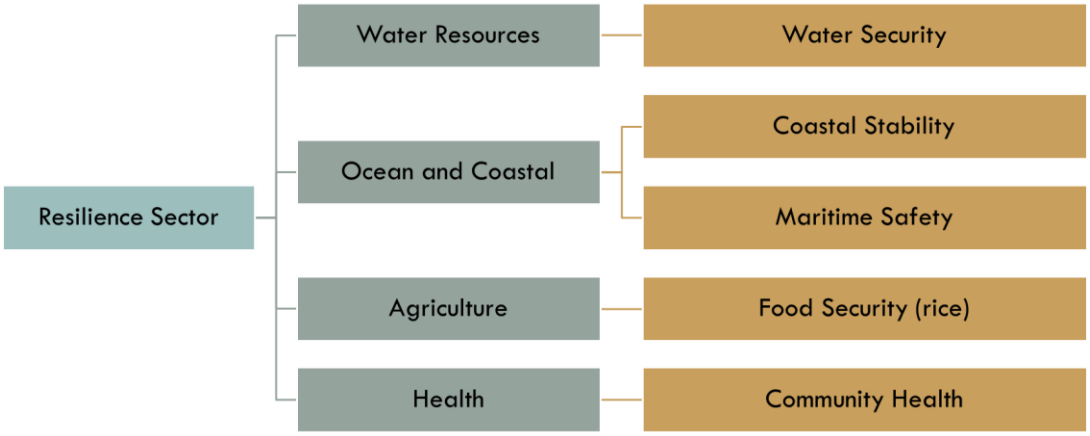

Figure 9 Resilience Sector Scope in CRIDS

Framework: The resilience approach was chosen to be used in measuring the achievement of adaptation because this approach can provide a unified response to shock and to stressors associated with the ongoing exposure to risks that threaten well-being due to climate change and the threats that have become more difficult to predict. A complete explanation of the resilience measurement in CRIDS is presented in sub-chapter 4.2.3.

Responsible ministry/agency: Preparation of CRIDS carried out in 2018 and is under the responsibility of Bappenas, but this document has not been officially published.

Inline ministries/agency: CRIDS only contains information on the indication of the resilience status of each sector in each province in Indonesia, so there is no program or actions that require an implementing institution or budget allocation. If the resilience data is to be used in prioritizing adaptation plans, actions, and strategies in each sector or by Local Governments, additional data and further analysis are necessary.

Funding Sources: A development partner that supports funding for the preparation of the CRIDS is the Japan International Cooperation Agency (JICA).

G. **Public Finance for Climate Change in Indonesia – 2018, 2020**

Definition: This document published by the government to the public contains the designation of the climate change budget, both for mitigation and adaptation. Until now, 2 (two) series of these books have been published, i.e., Public Finance for Climate Change in Indonesia 2016-2018 and 2018-2020. However, in the second year, the report's title changed to the 2018-2020 Climate Change Mitigation and Adaptation Budget Report.

Objective: The objectives of this document are to establish transparency in budget management; reference for evaluation and development of budgeting policies for climate change; as well as to support reporting on the progress of the achievement of the contribution target to tackling climate change in Indonesia under the Paris Agreement.

Scope: The substance scope of this document contains the results of the tagging of climate change budgets for mitigation, adaptation, and co-benefits (mitigation and adaptation in one output) at ministries and agencies.

Framework: The framework used in this report is related to the climate budget tagging, which follows the national planning and budgeting cycle. A full explanation will be presented in section 4.2.5.

Responsible ministry/agency and respective process conducted: This document is published by the Ministry of Finance and will continue to be updated in the future. Two series of these reports have been published, i.e., for the years 2016-2018 and 2018-2020.

Inline ministries/agencies: In this report, several relevant ministries/agencies receive funding allocations for climate change mitigation and adaptation, including the Ministry of Environment and Forestry; Ministry of Agriculture; Ministry of Energy and Mineral Resources; Ministry of Transportation; Ministry of Industry Ministry of Public Works and Housing; Ministry of Marine and Fisheries; Ministry of Health; Ministry of Agrarian and Spatial Planning; Central Bureau of Statistics (BPS); Meteorological, Climatological, and Geophysical Agency (BMKG); National Board for Disaster Management (BNPB); Geospatial Information Agency (BIG); Agency for the Assessment and Application of Technology (BPPT); Indonesian Academy of Sciences (LIPI); National Institute of Aeronautics and Space (LAPAN); Ministry of Internal Affairs; as well as Ministry of Social Affairs.

Funding Sources: The preparation of this document was supported by funding from the United Nations Development Program (UNDP) and the United Nations Environment Program (UNEP).

H. **CPD (Country Program Document) of Indonesia for GCF - 2020**

Definition: Country Program Document (CPD) for the Green Climate Fund (GCF) is a guideline for stakeholders who want to access the GCF or want to know Indonesia's priority climate change activities for the GCF. The CPD was published by the National Designated Authority (NDA) Indonesia. The CPD explains policies and strategies in Indonesia related to climate change and support by the GCF in achieving the emissions reduction target and resiliency to climate change impact. The CPD also encloses a potential list project currently being developed by accredited entities and project proponents.

Objective: There are three purposes of the CPD. First, the CPD aims to outline Indonesia's climate change policies and strategies and describe how the GCF fits in them. Second, the CPD provides the list of priorities of climate actions, both mitigation and adaptation, that Indonesia will carry out to achieve the NDC targets. Third, the CPD provides information on how the stakeholders decide on the priority actions that will be financed by the GCF.

Scope: The Country Program Document (CPD) presents specific targets on climate mitigation and adaptation and discusses how climate change is mainstreamed into Indonesia's development plans. The document also presents required financial sources to finance climate actions to achieve NDC targets and positions the GCF in Indonesia's climate finance landscape to determine priority actions financed by the GCF.

Framework: The process of drafting Indonesia's Country Program Document for the GCF tends to refer to the implementation strategy document issued by The Ministry of Environment and Forestry (MoEF) in 2017, which is listed in the UNFCCC compared to the national priority in the National Medium Term Development Plan (RPJMN) 2020-2024, mainly on national priority six concerning building the environment, increasing disaster resilience and climate change. The implementation strategy document issued by The MoEF in 2017 provides climate adaptation plans categorized into three main themes: economic resilience, social and livelihoods resilience, and ecosystem and landscape resilience. The three themes refer to NDC, including economic, social and livelihoods, ecosystem, and landscape.

The following is a picture of the Proposed Thematic Priority for Climate Adaptation.

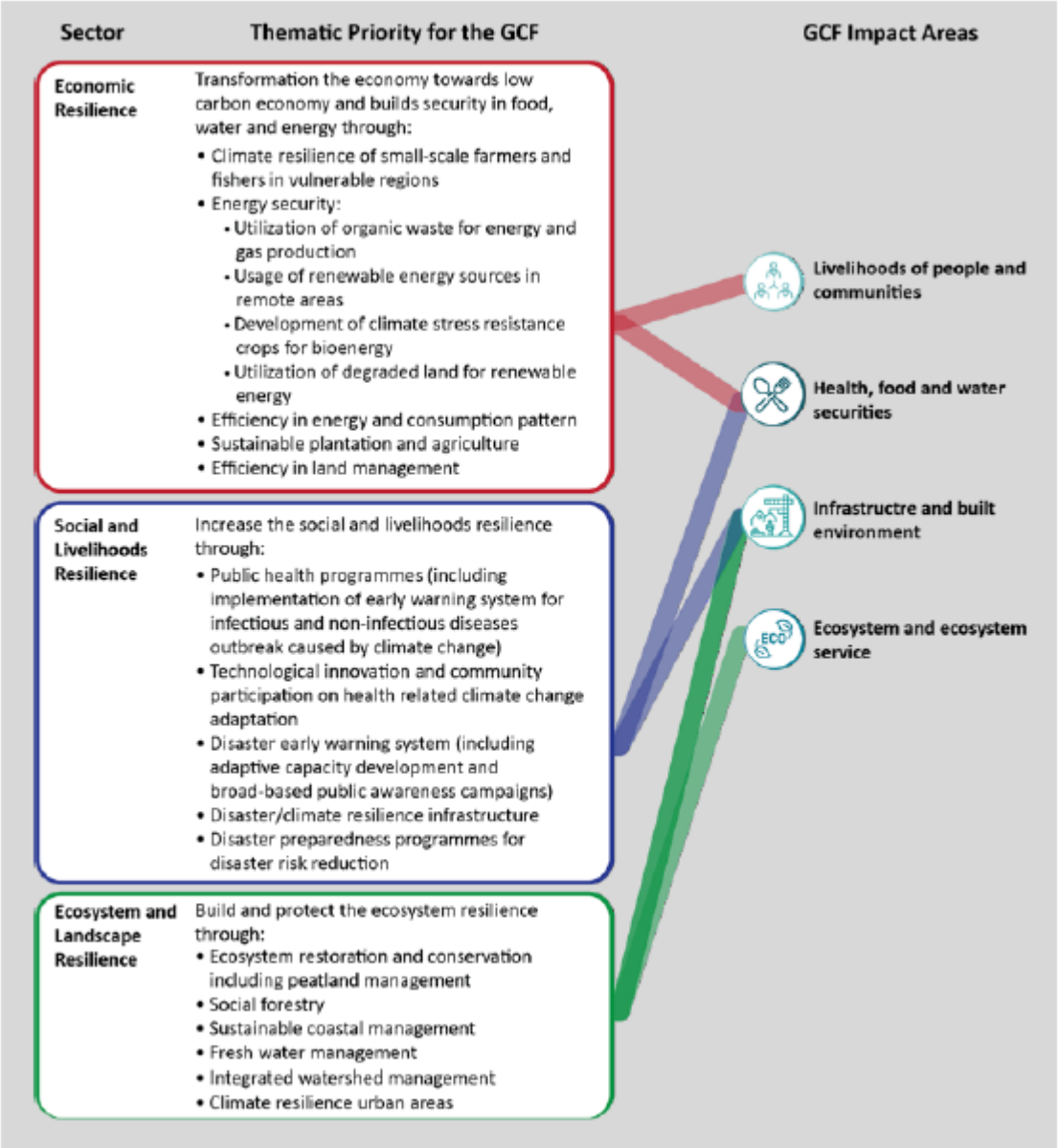

Figure 10 Proposed Thematic Priority for Climate Adaptation

Source: FPA, 2020

Responsible ministry/agency: To access the Green Climate Fund (GCF), there are three main actors in interacting with the GCF, namely the National Designated Authority (NDA), Accredited Entities (AE), and Executing Entities (EE). Based on the Decree of the Ministry of Finance No. 756 / KMK.10 / 2017, the Fiscal Policy Agency (FPA) representing the Ministry of Finance is designated as NDA-GCF Indonesia accessing GCF funding. PT. Sarana Multi Infrastruktur (SMI) and The Partnership for Governance Reform (Kemitraan) are accredited entities (AE) whose roles are to gain direct access to funding from the GCF.

Inline ministries/agencies: This document serves as a guideline for stakeholders who want to access the GCF. These opportunities are open to the public, so there is no direction for a particular ministry or agency. However, there is an institution that assists and ensures the functioning of the FPA as the NDA of the GCF, i.e., GGGI (Global Green Growth Institute).

Funding Sources: The preparation of this document was supported by funding from the GCF.

I. **PBI (Climate Resilience Based Development) - 2021**

Definition: Climate Resilience Based Development is the transformation form of the RAN-API after the reviewing process by MoNDP.

Objective: The purposes of the formulation of this document include:

- As a reference for the parties in implementing National Priority 6 (Building the Environment, Improving Resilience of Disaster and Climate Change), Priority Program 2 (Increasing Resilience of Disaster and Climate), Priority Activities 2 (Increasing Climate Resilience) RPJMN 2020-2024
- As the following national development planning framework, in
  1. To plan climate resilience programs and activities;
  2. Guidelines for division of authority for ministries and agencies to avoid duplication of climate resilience efforts in priority sectors;
  3. Reference for the implementation of the monitoring and evaluation function of Ministries / Agencies in assessing the contribution of climate resilience achievements to the predetermined targets; and
  4. Guidelines for marking climate resilience activities in the planning, budgeting, and performance information system (KRISNA).

Scope: As an effort to reduce the level of national climate vulnerability, impact, and risk, so climate-resilient development is focused on 4 (four) priority sectors that have a significant contribution to GDP, i.e., Marine and Coastal, Water, Agriculture, and Health. Each of these sectors was mapped the priority locations for climate resilience actions, climate resilience actions, and monitoring and evaluation (M&E) methods of the achievements of climate resilience actions.

Framework: Climate resilience actions, both in the aspects of planning and M&E, can be classified into:

- Core Activities: activities whose benefits can be calculated and converted into rupiah values, thus contributing directly to reducing GDP losses due to climate change.
- Supporting Activities: activities that cannot be directly converted into rupiah (intangible) values but benefit from reducing vulnerability and increasing the adaptive capacity of communities and the environment in the affected areas.

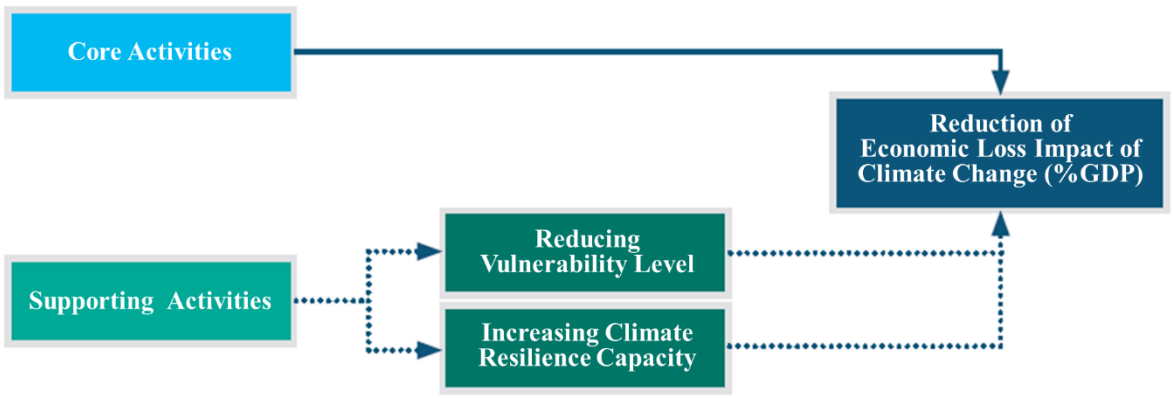

Figure 11 Linkage of Core and Supporting Activities in Achieving Climate Resilience Targets

Source: MoNDP, 2021

In the above scheme, it is known that the primary indicator used by M&E for implementing climate resilience measures is the reduction in potential economic losses calculated from a percentage of GDP.

The quantitative calculation is only carried out for core activities because supporting activities are considered difficult to quantify.

Responsible ministry/agency: Climate Resilience Based Development Policy Document was launched by the Ministry of National Development Planning (MoNDP) on April 1, 2021.

Inline ministries/agency: There are quite a several ministries/agencies as the implementing agencies for various climate resilience actions in this document, including Ministry of Environment and Forestry (MoEF); Ministry of Public Works and Housing; Ministry of Marine and Fisheries; Ministry of Agriculture; Ministry of Health; Ministry of Social Affairs; Ministry of Transportation; Ministry of Village, Development of Disadvantaged Regions and Transmigration; Ministry of Women's Empowerment and Child Protection; Meteorological, Climatological, and Geophysical Agency; National Board for Disaster Management as well as Indonesian Institute of Sciences.

Funding Sources: A development partner that supports funding for the preparation of this document, i.e., the ADB, JICA, and USAID (United States Agency for International Development)

4.2 Adaptation Assessment Tools Developed in Formal Documents in Indonesia

Several methods are related to adaptation metrics developed by several ministries/agencies in Indonesia, most of which still rely on determining adaptation needs. Some of them are Climate Risk and Adaptation Assessment Tools (KRAPI) and Social Economic Vulnerability Assessment Tools (SIDIK) by MoEF and Climate Resilience Assessment Tools and GDP Loss formulated by MoNDP and Climate Budget Tagging developed by MoF. Among them, the tools produced by MoEF and MoNDP have used science basis as the basis for conducting adaptation studies, but there is not yet agreement between these actors regarding the types of scientific-based study methods that are used together. Chronologically, the order of preparation of adaptation assessment tools are KRAPI, SIDIK, Potential GDP Loss, Climate Budget Tagging Tools and CRIDS. For further explanation on the adaptation assessment tools, as follows:

4.2.1 Climate Risk and Adaptation Assessment Tools (KRAPI)

The approach of KRAPI comprises a process of identifying and projecting climate risks and reflecting them during the development of adaptation measures (GIZ 2013). The approach of KRAPI starts with problem formulation and sectors vulnerable identification, science-based analysis: climate trends, baseline and projected hazard analysis, sectors vulnerability assessment, baseline and projected risk analysis for sectors, adaptation strategy formulation, multi-risk assessment, and sector prioritization, and mainstreaming of adaptation strategies into development policies. The sectors analyzed comprise water resources, agriculture, health, and coastal. The sectors identified by the Government of Indonesia (GoI) through sector prioritization in a document prepared, namely the Indonesia Climate Change Sectoral Roadmap (MoNDP, 2010).

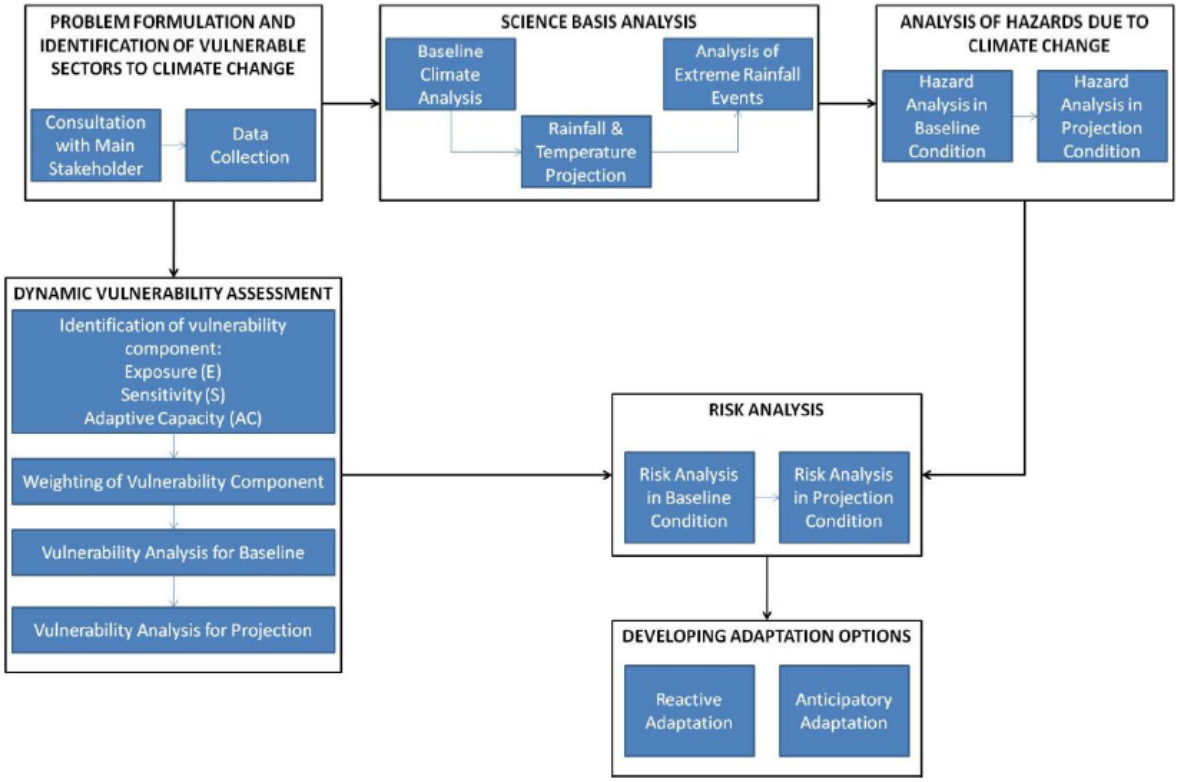

Figure 12 KRAPI Identification of Adaptation Option Through a Climate Risk Assessment

Source: MoEF, 2012

4.2.2 Social Economic Vulnerability Assessment Tools (SIDIK)

SIDIK (Information System of Vulnerability Index Data), as the adaptation metrics developed by MoEF, utilized socio-economic, demographic, geographic, and infrastructure data from the *Potensi Desa* (Village Potential Database) of the Statistics Central Agency (BPS) to calculate the exposure and sensitivity index and the adaptation capacity index. The indicators for calculating the Exposure and Sensitivity Index are 1) the ratio of the number of heads of family living on the riverbank, 2) the ratio of the number of buildings along the river, 3) types of drinking water sources, 4) the ratio of the number of poor people, and 5) types of income sources. The indicators for the Adaptation Capacity Index are 1) the ratio of families that enjoy electricity services, 2) the ratio of the population who attend school; 3) the ratio of the population to the available health facilities; and 4) the type of road infrastructure. This vulnerability data is still indicative, so in its use to prioritize plans, actions, and adaptation strategies in each sector or by the Local Government, additional data and further analysis should be provided. Apart from vulnerability, SIDIK also provides information on risks to hazards related to climate change, namely floods and droughts.

The SIDIK database system is a database that generally provides services for users, namely the Central and Local Governments. The type of service produced is a vulnerability and impact risk index visualized on a map and a summary, with national and regional specific formulas, both of which can be modified by the user according to their rights. The system input - process - output description is as follows.

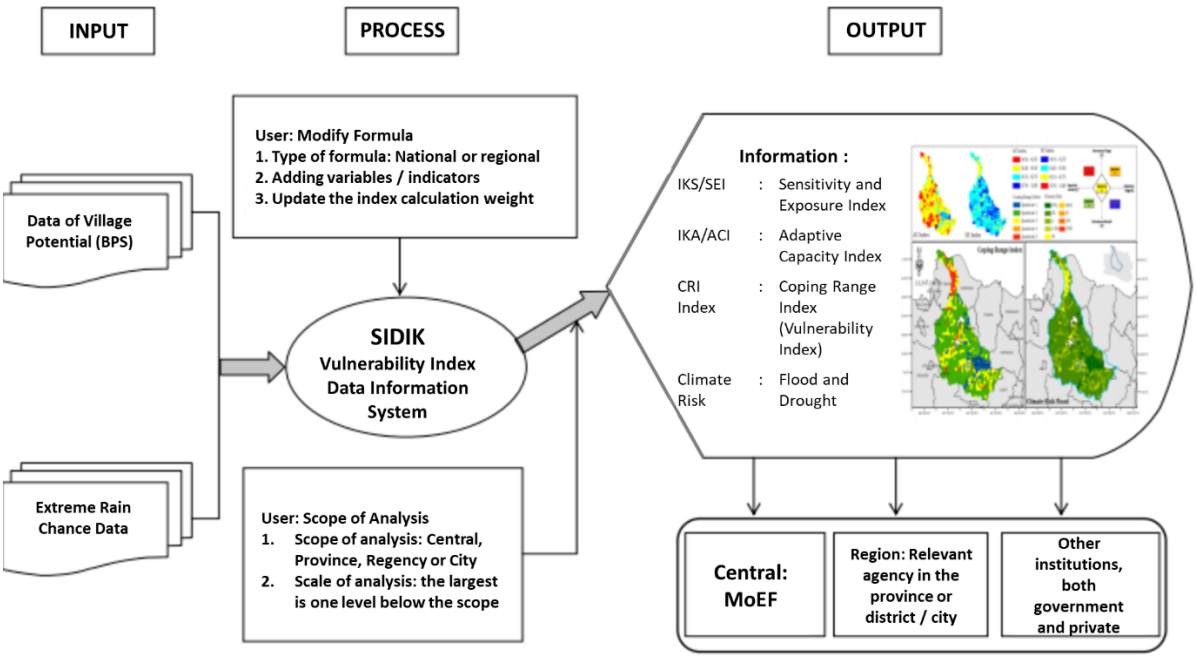

Figure 13 Input - Process - Output System to Generate a Vulnerability Index

Source: MoEF, 2017a

4.2.3 Reduction of Potential Losses of Gross Domestic Product as Assessment Tools

MoNDP (2019) described how to determine the estimated economic losses due to climate change impacts in four priority sectors of the RAN API (National Action Plan – Climate Change Adaptation), i. e., water, agriculture, marine, and coastal, and health sectors. The analysis result of economic losses would provide an overview of the magnitude of climate change impacts in economic values, assumptions, and approaches to its constituent parameters and the calculation so that adaptation policy scenarios could be selected per regional characteristics and capabilities. In this way, climate-resilient development planning is expected to achieve.

The assessment of potential economic losses begins with predicting future climate conditions through analysis of climate projections so that the level of potential hazards and impacts of climate change can be predicted. After the analysis of the potential hazards in each sector, the potential economic losses can be calculated. Adding a vulnerability and risk analysis to the calculation would strengthen the economic losses assessment in a more accurate location and level of exposure.

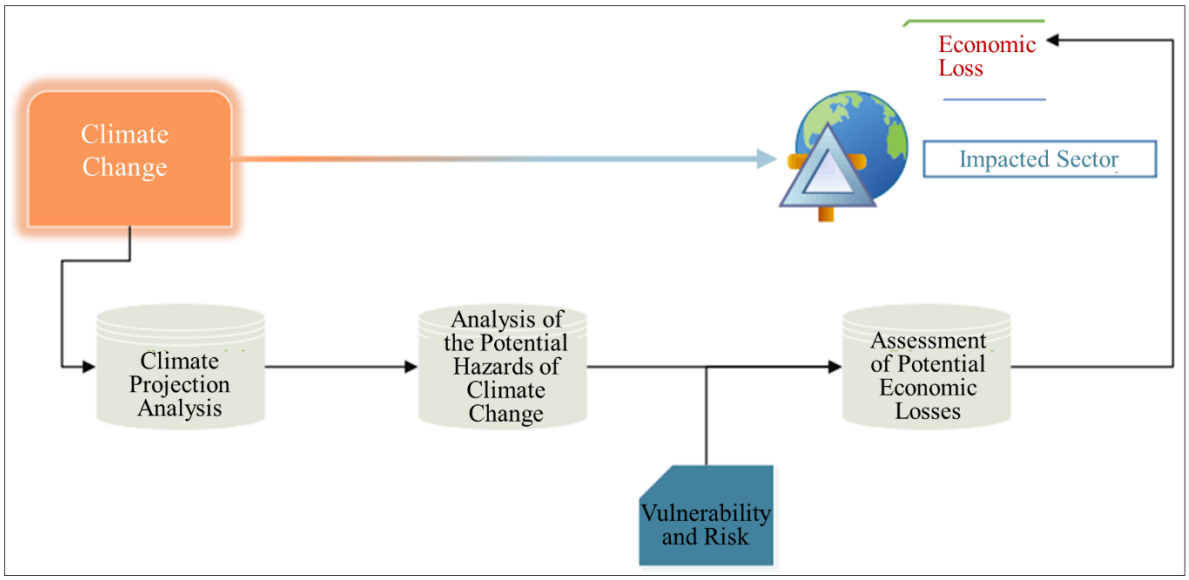

Figure 14 Concept of Economic Losses Assessment of Climate Change Impacts

Source: MoNDP, 2019

Climate change adaptation and disaster risk reduction are converged and considered one of the National Priority 6 in National Mid-term Development Planning (RPJMN) 2020-2024, particularly in the second priority program 'increasing resilience of disaster and climate.' Several priority activities to increase climate resilience include 1) protecting marine and coastal vulnerability, 2) increasing water security, 3) increasing food security, and 4) protecting health from climate change impact. MoNDP, through this plan, applies 'reduction of potential Gross Domestic Production (GDP) losses' as an indicator to measure the outcome of adaptation actions in the absence of agreed adaptation metrics. MoNDP set the target of 0.34% by 2020 and 1.15% by 2024. Figure 15 below shows that adaptation efforts can avoid potential economic loss from IDR 115 trillion (without adaptation actions) to IDR 57 trillion (with adaptation actions) in 2024.

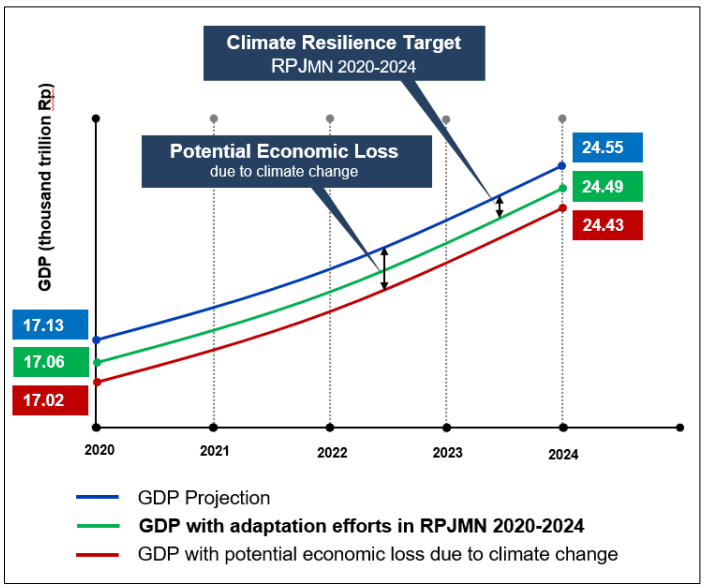

Figure 15 Scenarios of Potential Economic Loss

Source: MoNDP, 2020

The operational definition of adaptation and criteria of adaptation activity by MoNDP as "a planned or spontaneous anticipatory action to reduce the value of potential losses due to hazards, vulnerability, impacts, and risks of climate change on people's lives in an area" is subsequently linked to potential locations for intervention. The location is defined by specific criteria such as Potential Climate Hazard, SIDIK, IRBI, Potential Economic Loss, and K/L inputs (see Figure 6). Through this scheme, priority locations to receive adaptation interventions per sector can be caught up for the next five years. These locations are classified into three priority locations, as follows:

1) super-priority: if the three criteria (hazard assessment, SIDIK, and IRBI) refer to the same area,
2) top priority: if one of the two criteria (SIDIK and IRBI) targets the same area with that of hazard assessment,
3) priority: if the area is only referred by the hazard assessment

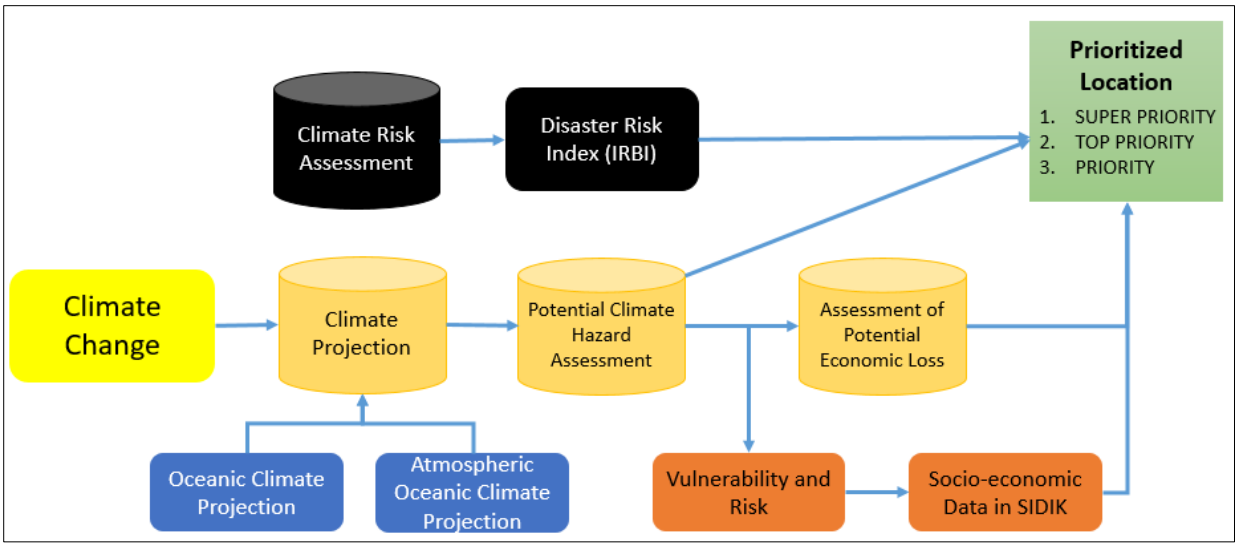

Figure 16 Scheme on Determining Priority Location for Adaptation Intervention

Source: MoNDP, 2020

Tools using the potential loss of GDP approach are also used by the MoEF in the draft NDC Adaptation roadmap document. However, there are differences in the concerns of MoNDP and MoEF in using this approach. MoNDP uses this approach to achieve climate resilience targets in the national development plan, while the MoEF target is the achievement of Indonesia's NDC targets. Here is the design approach of the NDC target of adaptation aspect.

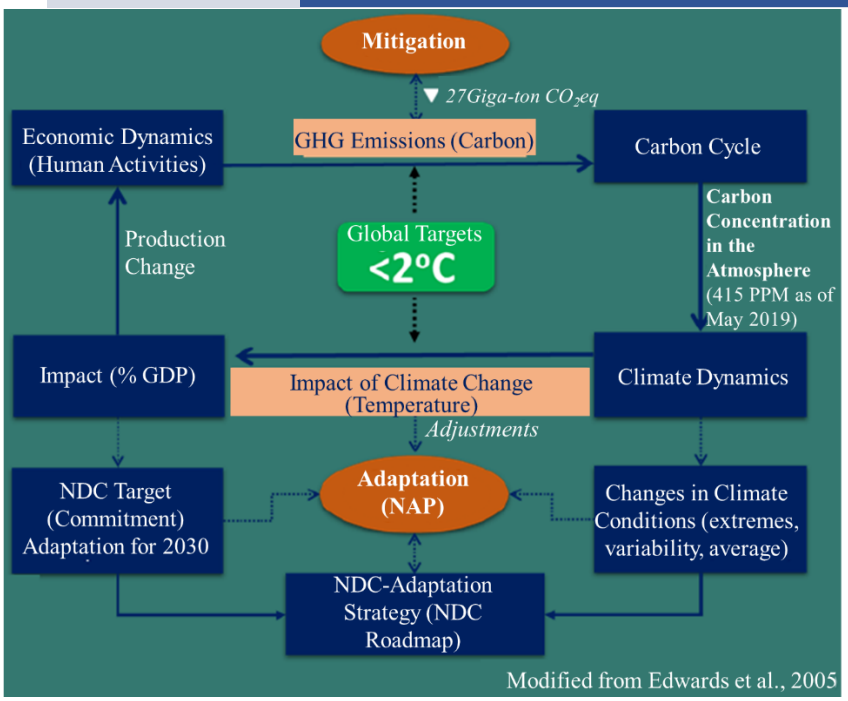

Figure 17 The Design Approach of the NDC Target of Adaptation Aspect

Source: MoEF, 2020

The concentration of greenhouse gas emissions that affect the carbon cycle in the atmosphere must be controlled not to trigger a temperature increase above 2°C. The increase in temperature due to carbon concentration will impact the dynamics of the global climate, which will directly or indirectly impact the regional economy (represented in GDP). Mitigation and adaptation strategies require maximum and sustainable synergy to achieve the target of reducing global temperature increases below 2°C.

4.2.4 Climate Budget Tagging Tools

Budget tagging is regulated in the Regulation of the Ministry of Finance No.208 of 2019 concerning Guidelines for Preparation and Review of Work Plans and Budget of State Ministries / Institutions and Ratification of Budget Implementation List. Budget tagging is a process of attaching a tag or mark to the planning and budgetary document that will be useful for tracking and identifying the output of a specific activity and its budget (FPA, 2020c). Related to climate change, the tagging of the budget for climate change identifies the amount of budget used to finance a specific output from activities related to climate change mitigation and adaptation. With a budget tagging process, climate change funding needs can be identified and allocated effectively and efficiently. In addition, budget tagging for climate change aims to improve the transparency and accountability in managing the state budget (APBN) to fund climate change mitigation and adaptation activities.

In 2016-2017, budget tagging was done for activities related to the mitigation of climate change in the Work and Budget Plan for Ministries and Institutions (RKA M/Is) through the Architecture and Performance Information System (ADIK) (FPA, 2019). In 2018, budget tagging both for activities of mitigation and adaptation was carried out by marking the output found in the Work Plan of Ministries/Institutions (Renja M/Is) through the Collaboration in Planning and Budget Performance Information system (KRISNA) (ibid). Climate budget tagging is applied only in sectors and is done by the corresponding ministries/institution that fall under the National Action Plan for Greenhouse Gas Emissions Reduction : agriculture, forestry and peatland, energy and transportation, industry, and waste management (World Bank, 2021). Meanwhile, for subnational level a preparatory study to expand

tagging and earmarked transfers is ongoing. Currently, there is already piloting climate budget tagging for subnational level.

The process of budget tagging follows the national planning and budgeting cycle (FPA, 2020c). In the development planning and budgeting cycle, ministries/institutions will prepare the Work Plan of Ministries/Institutions (Renja M/Is) by referring to the Government Work Plan (RKP) document. In this process, ministries/institutions will conduct self-assessment related to climate change mitigation and adaptation output by referring to the guidebook for marking climate change budgets that refers to national policies related to climate change (RAN-GRK, RAN-API, NDC). Furthermore, to ensure the validity of the output, the results of the review output data were consulted with the Ministry of Finance, the Ministry of National Development Planning, and the Ministry of Environment and Forestry. This process also aims to identify outputs that have a direct and indirect impact on reducing emissions. Analytical reports on climate change budget allocations, published by The Ministry of Finance's Fiscal Policy Agency (World Bank, 2021). Data from climate budget tagging are used for monitoring and reporting progress toward achieving the NDC targets.

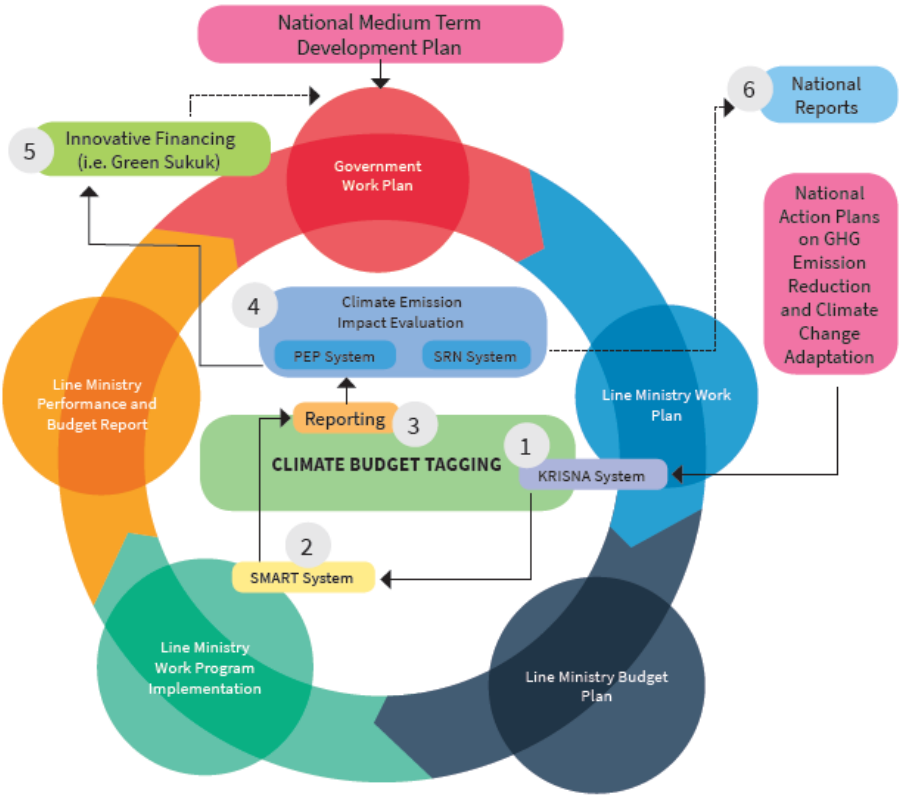

Figure 18 Budget Tagging in the National Planning and Budgeting

Source: FPA, 2020c

4.2.5 Climate Resilience Assessment Tools (CRIDS)

In 2014, as previously explained in sub-chapter 4.1.3, Indonesia published the RAN-API, which contained adaptation action plans in various fields of resilience to achieve sustainable development that had high resilience to the impacts of climate change. When this document was published, Indonesia still did not have a monitoring and evaluation instrument to assess the success of adaptation actions. This is different from a mitigation strategy that already has precise measuring tools to measure its success. The CRIDS study aims to develop performance measures for climate resilience in Indonesia that will be used as a basis for the scoping of the new RAN-API monitoring and evaluation framework and

determining the baseline for climate resilience. This study will be used as the main recommendations for strengthening the quality of the RAN-API.

The framework used as a reference in CRIDS is the Resilience Causal Framework adapted from Constas et al. (2014).

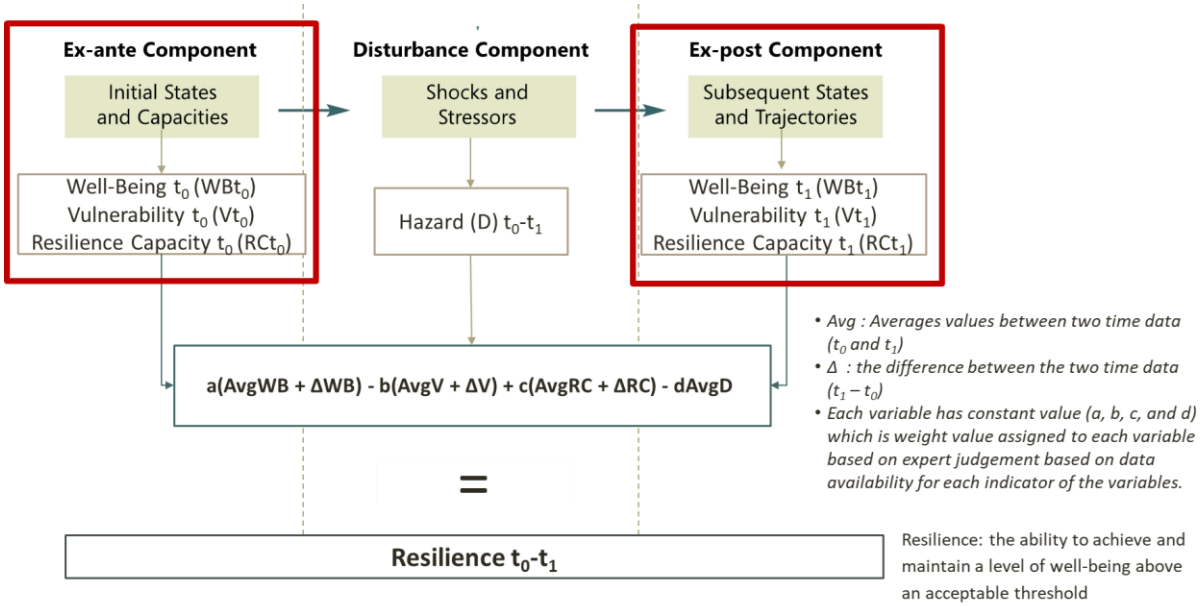

Figure 19 Resilience Causal Framework for Climate Resilience Index Development Study

Source: MoNDP, 2018

The key features of the RCF are expressed in 4 components; ex-ante component, disturbances component, ex-post component, and contextual component. In the ex-ante component, this part generates data to describe the initial state before the shock, using categories of indicators that represent: development outcome of interest (initial well-being), resilience capacities, and initial vulnerability. While in the ex-post component, the component generates data to describe the end state when the last round of measurement data are collected, using categories of indicators representing resilience capacity, vulnerability, and development outcome (well-being). In the disturbance component, the component generates data to describe the intensity and effects of various types of shocks and stressors. Disturbances that are focused on in CRIDS are climate hazards in drought, floods, extreme events, and coastal inundation.

Based on the framework, the main variables that will be used in the measurement, i.e., well-being, vulnerability, resilience capacity, and disturbance. Each of these variables is measured using appropriate indicators for each sector. Therefore, to operationalize the framework, the sectors that will be the focus of the assessment are first determined. The sectors that are focused on CRIDS are sectors that are following the focus of the RAN API sector, including the water resources sector, ocean and coastal sector, agriculture sector, and health sector. Even though the measurements are carried out on a sector-based basis, these sectors are also interrelated in one climate resilience system.

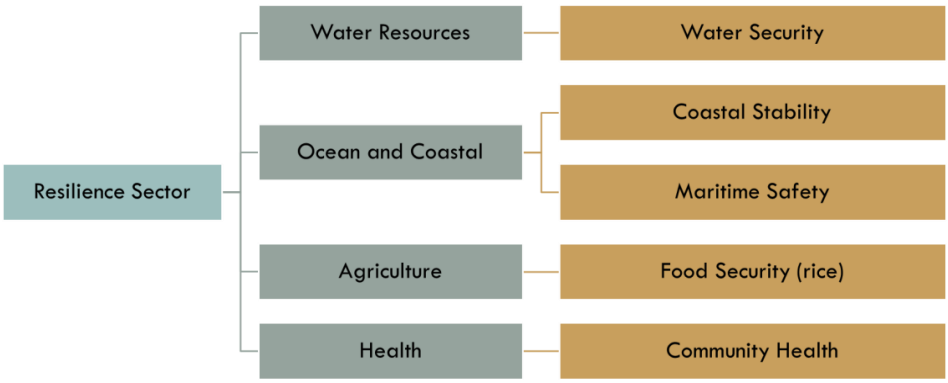

Figure 20 Resilience Sectors in Climate Resilience Index Development Study

Source: MoNDP, 2018

4.3 Adaptation Financing in Indonesia

4.3.1 Adaptation Financing Policy and Strategy

The Ministry of Finance is one of the institutions that play a crucial role in regulating climate change financing policy. The Ministry of Finance is responsible for ensuring that climate change management is reflected in budget priorities, pricing policies, and financial market regulation. Related to adaptation, there are several adaptation financing policies produced by the Ministry of Finance, including the Decree of the Ministry of Finance No. 756 / KMK.10 / 2017 concerning the Appointment of the Fiscal Policy Agency (FPA) to Represent the Minister of Finance as the National Designated Authority (NDA) of The Green Climate Fund (GCF), and the Regulation of the Ministry of Finance No.208/PMK.02/ 2019 concerning Guidelines for Preparation and Review of Work Plans and Budget of State Ministries / Institutions and Ratification of Budget Implementation List. The Regulation of the Ministry of Finance No.208 of 2019 also regulates budget tagging to compatible the categories of output produced. To support the Government of Indonesia's (GoI) commitment in financing climate change actions, as well as to achieve low carbon development goals in the 2020-2024 National Mid-term Development Planning (RPJMN) agenda, especially in national priority 6 concerning building the environment, increasing disaster resilience and climate change, the GoI has developed several funding instruments to finance climate change mitigation and adaptation actions. Funding instruments include public and non-public funding, both domestic and foreign. Public funding originating from domestic sources mainly comes from the state budget (APBN) allocations with funding instruments originating from *Rupiah Murni* (Domestic-Source), Foreign / Domestic Loans, Government Securities, and Grants (MoNDP, 2020).

Based on FPA (2019), funding from international donors must be recorded in the state budget. International funds can be channeled and managed through government budgets (on-budget, on treasury) such as the Climate Change Program Loan (CCPL) by World Bank and the Indonesia Climate Change Trust Fund (ICCTF), or recorded in the state budget but channeled directly by donor agencies (on-budget, off-treasury) such as AUSAID, USAID, UNDP and etc. (FPA, 2019). In addition, there is also funding that is not recorded in the state budget and through mechanisms outside the state budget (off-budget, off-treasury) such as the Green Climate Fund (GCF) through the Fiscal Policy Agency (FPA) and Global Environment Facility (GEF) and Adaptation Fund (AF) through the Ministry of Environment and Forestry. It is expected that these funding sources can meet the funding needs to achieve the NDC target, especially for adaptation.

4.3.2 Adaptation Financing Mechanism

According to FPA (2019), to ensure that climate change funding reflect budget priorities and allocated effectively and efficiently, the Ministry of Finance, as the form of responsibility on national budget management, carries out budget tagging to identify budgets related to mitigation and adaptation

activities. The climate change tagging discussed in this report is public funding for climate change control on budget and sourced from the state budget (APBN).

In the cycle of planning and budgeting of development, the tagging of a budget will be performed during the phase of drafting the Work Plan of Ministries/Institutions (Renja M/Is) and the Work and Budget Plan for Ministries and Institutions (RKA M/Is) by collecting the data on outputs related to climate change from the planning and budgeting systems (FPA, 2019). The data then through an independent review process by technical Ministries/Institutions related to climate change mitigation and adaptation by referring to national policies related to climate change (RAN GRK, RAN API, NDC). To ensure the validity of the output, the data then consulted with the Ministry of Finance, the Ministry of National Development Planning, and the Ministry of Environment and Forestry. The output data from the validation results become a reference for technical Ministries / Agencies to carry out mitigation and adaptation markings in the planning and budgeting system to draft the Renja M/Is and RKA M/Is.

According to FPA (2019), Indonesia's climate change budget experienced an increase between 2016 and 2018. Indonesia's climate change budget grew by 51.6 percent from IDR72.4 trillion in 2016 to IDR109.7 trillion in 2018. Based on the TNC report (2017b), it is stated that the need for climate finance for adaptation in the 2015-2020 period was USD 64 Billion, whereas based on the Budget Allocation for Climate Change in the State Budget 2016-2018, in 2018, APBN expenditure for adaptation was IDR 37.5 trillion (table 6).

Table 6 Budget Allocation for Climate Change in the State Budget 2016-2018

Year	Climate Change Mitigation (CCM) Budget (IDR trillion)	Climate Change Adaptation (CCA) Budget (IDR trillion)	Portion of the Climate Change Budget in APBN
2016	72.4	NA	3.6 %
2017	95.6	NA	4.7 %
2018	72.2	37.5	4.9 %

* The adaptation budget tagging has not been carried out in year 2016 and 2017 state budget (APBN)

Source: FPA, 2019

According to FPA (2020c), the total climate change budget allocation for the last three years has reached IDR 307.84 trillion and is still dominated by mitigation, with the proportions of 61% for mitigation and 39% for adaptation. The climate change budget mentioned in the state budget (APBN) for 2018-2020 is based on the climate change budget tagging results carried out by ministries/institutions. From 2018-2019, the GoI has realized a climate change budget of IDR 209.58 trillion with an absorption rate of 91.1%. Based on the climate change mitigation budget tagging results, in 2018, the mitigation budget reached IDR 83.83 trillion, then in 2019, the mitigation budget decreased to IDR 58.46 trillion, and in 2020 it decreased further to IDR 44.51 trillion. This was due to the policy of refocusing activities and a budget reallocation. As for the results of climate change adaptation budget tagging, in 2018, the adaptation budget reached IDR 48.69 trillion, then in 2019, it became IDR 39.20 trillion, and in 2020 the adaptation budget decreased to IDR 33.29 trillion.

Table 7 Climate Change Budget Realization in the State Budget (APBN) 2018-2020

Year	CCM Budget (IDR trillion)	CCA Budget (IDR trillion)
2018	83,83	48,69
2019	58,46	39,20
2020	44,51	33,29
Total	**186.8**	**121.18**
Percent	**61 %**	**39 %**

Source: FPA, 2020c

Several public funding instruments currently exist in Indonesia, including the management of funds through trust funds managed by the Indonesia Climate Change Trust Fund - ICCTF under the MoNDP and Environment Fund Management Agency (BPDLH) under the Ministry of Finance (FPA, 2019). The formation of the ICCTF is a form of the GoI commitment to international climate finance. ICCTF

was designed as an institution that can raise climate change funds from international and domestic, which are then channeled to implement various policies and activity programs according to RAN and RAD GRK. The primary role of the ICCTF is to collect and coordinate various sources of funds needed to fund mitigation and adaptation programs in Indonesia. ICCTF is operated by a steering committee, namely the MoNDP, in terms of policy planning and oversight of implementing activities at the central and regional levels. ICCTF utilized funds from UNDP in the first phase, while during the second phase, ICCTF's financing was provided through the State Budget. From 2010 to 2011, ICCTF channeled as much as USD 5.52 million received from the United Kingdom Climate Change Unit (UKCCU), AusAID, and Swedish International Development Agency (SIDA), where USD 4.59 million was used for climate change activities that were prioritized by the government, such as mitigation based on land, energy vulnerability and adaptation (ICCTF, 2012 in FPA, 2019). In 2017, ICCTF was able to channel funds amounting to IDR58.3 billion, where the funds were used for mitigation activities (IDR 15.98 billion), adaptation and resilience (IDR 4.74 billion), forest and peatland (IDR 11.96 billion), prevention of fires (IDR6.16 billion), and others for internal management (ICCTF, 2018 in FPA, 2019). The funds were provided by the State Budget, the Danish Development Agency (DANIDA), USAID, and UKCCU. In Addition, the GoI has developed an Environmental Fund Management Agency (BPDLH), which aims to optimally mobilize environmental funds from within and outside the country, manage them transparently and accountably, and distribute effectively and efficiently. BPDLH has a role as a financial hub that can accommodate various environmental resources such as energy and mineral, forestry, carbon trading, environmental services, industry, transportation, marine and fisheries, and industry.

Multilateral funding sources for adaptation have also been pursued through the Adaptation Fund (AF) and Green Climate Fund (GCF) (FPA, 2019). The Green Climate Fund (GCF) is the most significant climate change trust fund with a pledged endowment of 10.3 billion to support the achievement of the Paris Agreement (CCAP, 2018 and FPA, 2020b). According to GCF global dashboard, as of February 2021, the total funds allocated by GCF amounted to USD 7.3 billion. In addition, according to GCF project portofolio, the nominal funding for mitigation is USD 4.6 billion (64%), while for adaptation, it is USD 2.63 billion (36%) (FPA, 2021b). In Indonesia, the current portfolio of the GCF funding is USD 110.8 million, ranging from 10-20 years (FPA, 2020b). To date, climate change funding from the GCF in Indonesia has only been allocated for mitigation projects. Three projects are currently financed by the GCF, i.e., Bus Rapid Transit Development in Semarang, Geothermal Resource Risk Mitigation, and Climate Investor One for renewable energy (ibid). In addition, there is also the Adaptation Fund (AF) as one of the multilateral sources with a focus on adaptation activities to climate change. AF funding is sourced from 2 percent of the carbon transactions from the Clean Development Mechanism, and the funds can be accessed by accredited Implementing Entities in Indonesia National Implementing Entities (NIE), i.e., Kemitraan. In 2000-2016, total AF funds tapped by Indonesian stakeholders was USD 138 million from 47 donors and funding partners (FPA, 2019). In 2016, the amount of AF funds for Indonesia was USD 4.77 million from 18 donors and funding partners that were still active in that year. The funds obtained in 2016 were distributed to 17 projects dealing in democratic and fair governance, sustainable development, and center of learning sources (Kemitraan, 2017 in FPA, 2019).

5 Initial Findings and Way Forward

5.1 Initial Findings

Currently, several available assessment tools can be used as an approach to determine adaptation needs, based on differently specific purpose. However, there are still no available metrics that have been developed together among stakeholders with agreed scientifically based on studies. Besides, the adaptation indicators used by MoNDP and MoEF tend to measure the economic impact of climate

change on development (loss of GDP) rather than measuring the environmental impact of climate change.

In the absence of well-defined (consensus among actors/institutions including consideration of the use for different level of governments) adaptation metrics in Indonesia, adaptation needs are not yet mapped appropriately. Therefore, government programs or activities are dispersed or they may be overlapping or not on target and it is difficult to measure the effectiveness of achieving NDC-Adaptation. This can be seen from the overlapping roles and positions of MoNDP and MoEF in adaptation efforts. These two institutions together with the MoF play an important role in adaptation governance in Indonesia. MoNDP and MoEF have issued various reference documents for adaptation and assessment tools, but they should have further collaborative efforts to synchronize those references and tools. Even the RAN-API document formulated by MoNDP is also not clearly positioned and has not been integrated into the RPJMN (National Mid-Term Development Plan), so it has not been able to bind stakeholders to commit to the implementation of adaptation. An in-depth analysis of these key actors and other related actors has not been carried out in this report, but it is planned to be done in the following year.

In addition to the relevance of adaptation metrics to governance issues, metrics are also needed to guide decision-making regarding funding allocation. The existence of adaptation metrics makes programs or activities more measurable so the amount of funding needs can be estimated more precisely and funds can be allocated more efficiently and effectively. This is very helpful for countries experiencing financial limitations for adaptation, such as Indonesia today. The problem is not only the financial gap between the need and the availability of funds for adaptation, but also the tendency for the allocation of funds for adaptation to be smaller than mitigation, both from domestic and international sources.

Besides the use of adaptation metrics in formulating adaptation needs and determining funding allocations, metrics are also needed in assessing the progress of adaptation implementation. In practice, adaptation actions need to be monitored, evaluated, and revised related to the feasibility of projects, policies and programs, including their effectiveness and efficiency. Such a kind of metrics is a particularly important in a situation where comprehensiveness of adaptation metrics is not yet operationally available. The existence of several assessment tools in Indonesia as an approach to determine adaptation needs can be a starting point for the development of adaptation metrics. Indonesia still does not have an assessment or measurement tool that is engangely used by potential users (sectoral leading agencies, local governments, and others) as a reference in monitoring and evaluating the implementation of adaptation. However the Regulation of MoEF No. 33 of 2016 concerning the Guideline for National Adaptation Action Development has provided example of some indicators that are useful for reference and further development of other sectors that are not covered within the document. Once specific metrics (indicators) are successfully developed and defined, then they can be used for monitoring and evaluation.

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5.2 Way Forward

Portraying various limitations of conditions experienced by Indonesia in its adaptation efforts, it is necessary to find a systematic way out so that the development of adaptation in the future would be better managed. Based on the identification of actors, one of the actors playing an important role is the MoEF or precisely the Directorate General of Climate Change as Indonesia's NFP in the UNFCCC collaboration. The NFP has a role as a liaison for Indonesia to the international on climate change issues, so it is necessary to coordinate with cross-sectors or cross ministries/agencies. However, the next problem is, the existence of NFP for UNFCCC, which is mandated to a DG (Director General) level and only confirmed through the Decree of the Minister of Environment and Forestry No. 462 of 2015, not strong enough to ensure the implementation of NDC in Indonesia and integrate it into all relevant sectoral programs/ activities. This matter needs to be studied further in the future, whether Indonesia needs 1 (one) leading agency that is accepted by its presence or has "political blessing" as coordinator

from other related Ministries / Agencies and is also known by the House of Representatives (DPR). The mandate, role and authority to be given to the leading agency includes the determination of key technical issues such as adaptation metrics.

Besides NFP, which can be strengthened in its function and role, several potential actors encourage the implementation of adaptation in Indonesia, i.e., NPS (Local Government, NGO, community, and private sector). The active role of Local Governments and NGOs can encourage the acceleration of adaptation actions through assistance to communities. However, communities can also carry out adaptation activities on their initiative. Meanwhile, the role of the private sector, based on a study from FPA (2020a), until now, the private sector is still not sufficiently interested in investing in climate change adaptation. This is because they assume that adaptation is more related to public sector affairs which are the government's domain/responsibility, and tends to be closely related to elements of community engagement. However, one of the efforts to involve the private sector is when the private sector is interested in investing in mitigation actions, it is necessary to look for adaptation activities that can be a co-benefit of mitigation. Apart from that, the private sector can also be directed to implement business sustainably and anticipate possible risks that they may pose, where adaptation efforts must be considered in assessing medium and long-term business risks.

Then related to the unsynchronized adaptation reference documents published by different agencies with different understandings, the solid solution directed by the UNFCCC for this problem is relatively straightforward, namely through the National Adaptation Plan (NAP) document development. This directive is stated in the Paris Agreement Article 7 (9). The NAP formulation is actually a more active form of the NDC target, but it is emphasized that drafting must be participatory or involve all related parties. Indonesia, through the MoNDP, has actually been trying to formulate NAP since COP 13 in Bali, but in the process of compiling it, there were various adjustments so that it was published in 2014 in the form of the RAN-API. The document was then reviewed in 2017, and the final result was the release of the PBI document in 2021. However, these documents have not been applied as NAP to be used as a reference for robust adaptation implementation in Indonesia for all related stakeholders. If the NAP and NDC have been formed, the priorities for long-term adaptation for resilient development should be integrated into it (IIED, 2018).

Further, coming NAP formulation also needs to consider the complexity of adaptation reflected in the emergence of new regulatory issues concerning Climate Resilience Based Document (PBI) that politically demand to be also linked to adaptation issues. This implies an urgent need to provide new derivative rules and adapt to existing regulations that are different or contradictory.

Regarding the adaptation reference document, it can be said that Indonesia is experiencing delays in preparation for the implementation of the Adaptation NDC. Further, analysis and elaboration of implementation of NDC-CCA at the operational level will be delivered in next year's report. The delays in the preparation are indicated from the PBI document from the MoNDP and the NDC Adaptation Roadmap from the MoEF, which was officially published to the public in 2021. In fact, this year, Indonesia should already have reference documents that can be referred by all relevant ministries/agencies. In addition, Indonesia also needs a platform/framework that is mutually agreed upon in the context of efficiency and effectiveness of climate change adaptation implementation in general or NDC-CCA in particular. This framework should address at least the following issues:

1. The concept of CCA metrics as a measuring tool for adaptation progress includes the concept or framework for integrating into existing systems (such as SRN, Krisna, etc.)
2. The policy concept for integrating climate change adaptation financing planning in a holistic way (including planning to finance in the RPJMN). This includes at least the division/clustering of climate change adaptation activities/programs into three major groups, i.e.:
    - Climate science and analysis

- Climate governance
- Climate resilience or climate change adaptation action programs

The existence of this platform can be a form of Indonesia's contribution to the process of forming a Global Stocktake. One national platform regarding climate resilience can be an example for countries with complex governance characteristics similar to Indonesia. The platform can contain both of the above, but the process needs to be adapted to the conditions of each country. The platform can serve as a conceptual reference that provides a clear picture for governance and adaptation metrics so that measurement of adaptation is not in the form of a single number such as mitigation.

Regarding the climate resilience pathway, it is known that the achievement of targets in sustainable development cannot be separated from the achievement of targets in adaptation and disaster risk reduction. Sustainable development goals will not be achieved if there is climate change disruption. Therefore, it requires adaptation efforts to the impacts of climate change and efforts to reduce vulnerability to achieve sustainable development goals (SDGs). Related to financing, the relationship between sustainable development, adaptation, and disaster risk reduction also has implications for financing. It is hoped that available funding, which is mainly directed at sustainable development goals, can also accommodate the achievement of climate change adaptation targets and risk reduction.

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