



**MINISTRY OF NATIONAL DEVELOPMENT
PLANNING / NATIONAL DEVELOPMENT
PLANNING AGENCY**

BAPPENAS

**Dam O&M Sustainability using
International Sustainability Protocol**

POLICY BRIEF

2021

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I. Urgency of dam O&M sustainability in Indonesia

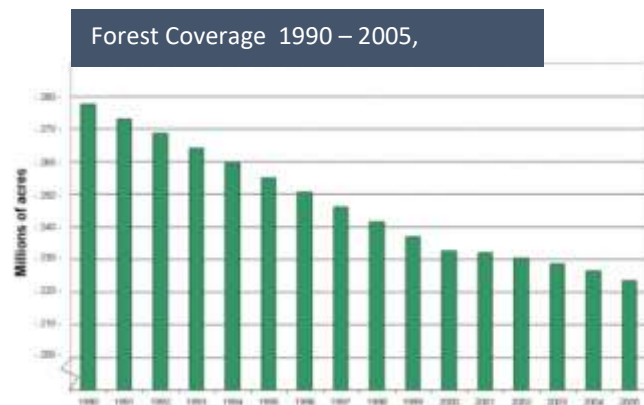
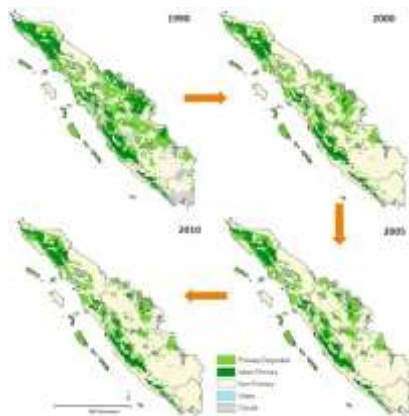
Indonesia is planning to have 61 new dams in 2024 and 72 new dams in 2027. Besides these new dams, Indonesia has 186 existing dams under Ministry of Public Works and Public Housing (MPWH) management with 53% of them are 20-50 years old dams. O&M fund and processes for all of these dams need to be planned to ensure their function are working as designed.

II. Issues in current dam O&M management

Issues in the existing dams O&M are mainly from:

1. Sedimentation

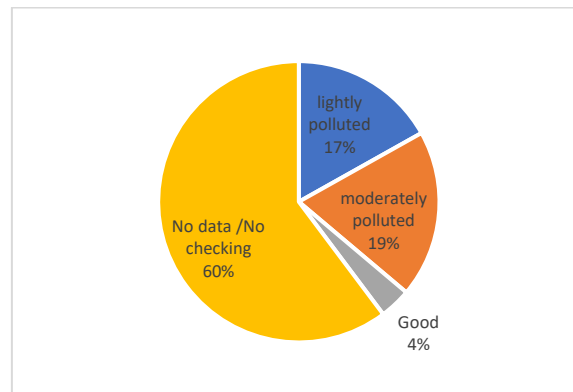
Sedimentation is the main issue of dam management in Indonesia. According to Bappenas analysis (2018) and Ministry of Environment and Forestry (2016), 74% of catchment areas of the dams are non-forest area. Deforestation rate in Java is 140.000 Ha/year, Sumatera is 370.000 Ha/year, and Kalimantan is 550.000 Ha/year (Forest Watch Indonesia).



2. Water quality

Water quality is a term used to express the suitability of water to sustain various uses or processes. The measurement of water quality is not only for the use of water as raw water but also for irrigation because irrigation is a key factor in food security in Indonesia. The water quality status in dam based on IME DOISP data, about 19% of the dams are

moderately polluted, only 4% that have a good condition, and 60% with no data/no checking of water quality.



The pollution in water quality caused of floating net karamba and the domestic/garbage wastes in the dam.

3. Social and governance issue.

Environmental problems are mainly caused by social and governance issues.

- Conflict of water use between upstream and downstream community or between local government and dam manager result in reservoir use for rice field and fish farming that impact to the water quality.
- Activities at the reservoir boundaries, such as tidal areas that are used as agricultural areas by the community have impact of increasing sedimentation.
- Lack of stakeholder coordination and participation in the catchment area, i.e. forestry institution/local agency and communities, to preserve the dams result in large sedimentation that impact to lack of water availability to supply.

4. Lack of O&M budget

Based on budget planning FY 2022, total O&M budget for 173 dams are IDR 234,7 billion, or IDR 1,3 billion/dam. For comparison the calculation for yearly O&M cost for these following dams are as follow: Karinga Dam yearly O&M cost is IDR 1,48 billion, Lokojange Dam yearly O&M cost is IDR 1,8 billion, Bili-Bili Dam yearly O&M cost is IDR 8,4 billion, Ponre-Ponre Dam yearly O&M cost is 2,3 billion.

Table 1. Dam O&M Budget FY 2022 - 2025

IDR x1000

RO	Target (Unit)	2022	2023	2024	2025
001-Bendungan yang dioperasikan dan dipelihara	173	234.712.031	258.183.234	284.001.557	312.401.713

Source: Renja, 2022

Current dam O&M consists of yearly, routine and special O&M. Structural and environmental aspects have been included in O&M, but not for social management. Current dam O&M aspects are as follows:

(1) Yearly O&M:

- a) Operation: yearly dam operation planning (Rencana Operasi Tahunan Waduk), hydromechanical, office, official travel;
- b) Maintenance: grass maintenance, sediment dredging at drainage channel, painting, maintenance of hill reinforcement, and hydromechanical, office and vehicle maintenance;
- c) Monitoring and Evaluation: visual inspection, hydromechanical operational test, instrumentation reading, water quality measurement

(2) Routine and Special O&M for once in 2 years, 5 years and 20 years:

- a) 2 years O&M: nitrogen and seal change;
- b) 5 years O&M: O&M updating, large inspection;
- c) 20 years O&M: sediments dredging from reservoir, special study, rip rap rehabilitation, hydromechanical overhaul;
- d) Special O&M: hill reinforcement and channel rehabilitation

III. International Sustainability Protocol for dam O&M sustainability

Bappenas encourages the use of international sustainability protocol for dam management to have an international benchmark and to open access for new funding from green financing. The commitment is stated in national mid-term planning 2020-2024 to have 1 sustainability document planning for new dam development per year.

Table 2. Target of New Dam with Sustainability Protocol FY 2020 - 2024

Proyek	Indicator	2020	2021	2022	2023	2024
Planning of new dam construction with sustainability protocol	Number of dam planning document with sustainability protocol	1	1	1	1	1

Source: RPJMN 2020-2024

In order to have better knowledge of sustainability protocol, Bappenas has collaborated with International Hydropower Association (IHA) in form of trainings and joint assessment. IHA's protocol, called Hydropower Sustainability Assessment Protocol (HSAP) covers technical,

social, environmental, and financial aspects. It also includes Early Stage (E), Preparation Stage (P), Implementation Stage (I), and Operation Stage (O). The protocol can be modified to dam development and management.

Table 3. HSAP Protocol for Operation Stage

O-1	Communication and Consultation	O-8	Project Benefits	O-15	Biodiversity and Invasive Species
O-2	Governance	O-9	Project-Affected Communities and Livelihoods	O-16	Erosion and Sedimentation
O-3	Environmental and Social Issues Management	O-10	Resettlement	O-17	Water Quality
O-4	Hydrological Resource	O-11	Indigenous People	O-18	Reservoir Management
O-5	Asset Reliability and Efficiency	O-12	Labour and Working Condition	O-19	Downstream Flow Regimes
O-6	Infrastructure Safety	O-13	Cultural Heritage	O-20	Climate Change Mitigation and Resilience
O-7	Financial Viability	O-14	Public Health		

Source: HSAP Protocol

Topics in the HSAP Protocol are already in accordance with World Bank and IFC standards. The following table shows the compatibility between the HSAP tools and World Bank and IFC standards.

HESG Section	WB Environmental and Social Standards	IFC Performance Standards
1. Environmental and Social Assessment and Management	ESS1. Assessment and Management of Environmental and Social Risks and Impacts	PS1. Assessment and Management of Environmental and Social Risks and Impacts
2. Labour and Working Conditions	ESS2. Labor and Working Conditions	PS2. Labor and Working Conditions
3. Water Quality and Sediments	ESS3. Resource Efficiency and Pollution Prevention	PS3. Resource Efficiency and Pollution Prevention
4. Project-affected Communities and Infrastructure Safety	ESS4. Community Health, Safety, and Security	PS4. Community Health, Safety, and Security
5. Resettlement	ESS5. Land Acquisition and Involuntary Resettlement	PS5. Land Acquisition and Involuntary Resettlement
6. Biodiversity and Invasive Species	ESS6. Biodiversity Conservation and Sustainable Management of Living Natural Resources	PS6. Biodiversity Conservation and Sustainable Management of Living Natural Resources
7. Indigenous Peoples	ESS7. Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities	PS7. Indigenous Peoples
8. Cultural Heritage	ESS8. Cultural Heritage	PS8. Cultural Heritage
9. Governance and Procurement	World Bank Procurement Framework: Guidelines on Preventing and Combating Fraud and Corruption in Projects Financed by IBRD Loans and IDA Credits and Grants; Access to Information Policy.	IFC Corporate Governance Methodology; Access to Information Policy. The IFC does not participate in the procurement processes for projects it finances.
10. Communications and Consultation	ESS10. Stakeholder Engagement and Information Disclosure, ESS1	PS1. Assessment and Management of Environmental and Social Risks and Impacts.
11. Hydrological Resource	ESS1, ESS3	PS1, PS3
12. Climate Change Mitigation and Resilience	ESS1, ES6	PS1. Assessment and Management of Environmental and Social Risks and Impacts.

Source: International Hydropower Association (IHA)

Benefits of using international sustainability protocol are as follows:

1. Benchmarking internal practices against global best practices
2. Increase operation performance

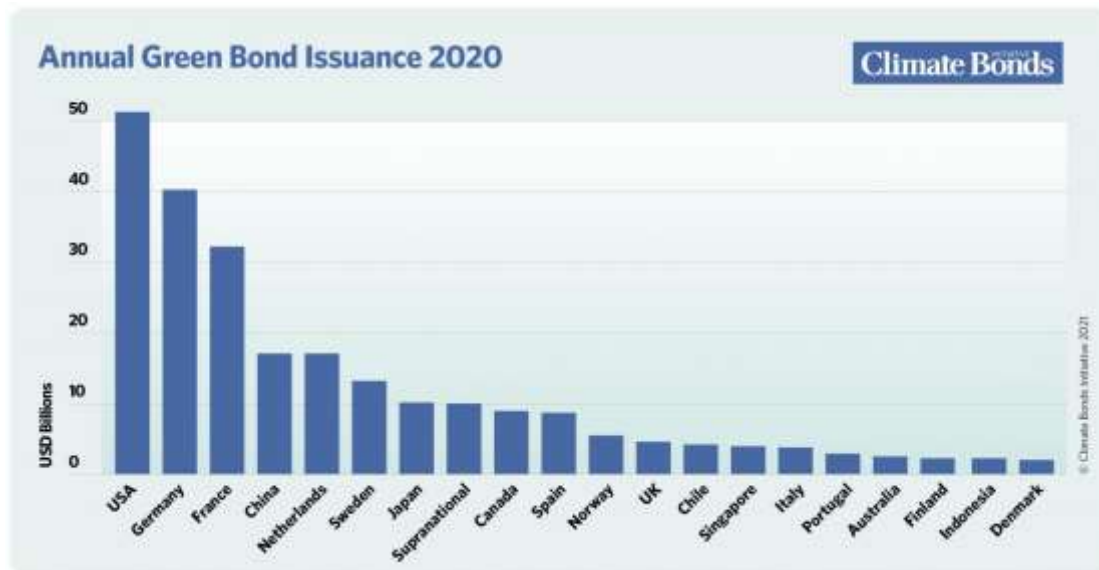
Increasing operation performance through asset reliability and efficiency assessment with intention that assets are maintained to deliver optimal performance in the short- and long-term in accordance with the overall of the facility owner.

3. Social engagement and sustainable water resource

Sustainability protocol manages social and environmental issues systematically. Social and environmental issues management intent is that negative impacts associated with the facility are manage; avoidance, minimisation, mitigation, compensation and enhancement measures are implemented; and environmental and social commitments are fulfilled. Regulatory requirement for ESIA (Environmental and Social Impact Assessment), environmental and social management plans, expert utilization are examples of evidence required.

4. Sustainable financing

Financial viability addresses financial management of the facility, including funding of measures aimed at ensuring project sustainability (including social and environmental measures and commitments) and the ability of the project to generate the financial returns to meet funding requirements as well as to optimise its financial opportunities. From Top 20 Countries for Annual Green Bond Issuance in 2020, The United States again led national rankings (USD51.1bn). The remaining national places in the ranking are occupied by the UK, Chile, Singapore, Italy, Portugal, Australia, Finland, **Indonesia**, and Denmark. The top 20 have a combined total issuance of USD243.8bn. A host of other countries comprise the remaining USD25.7bn of annual issuance.



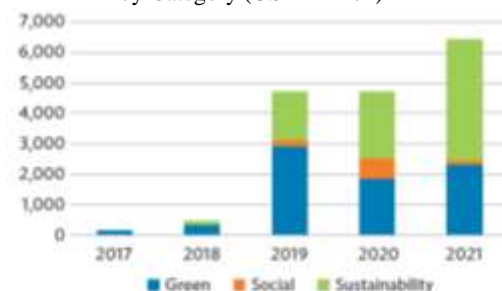
Source: www.climatebonds.net

Since the introduction of ASEAN Green, Social, and Sustainability Bond Standards by the ACMF in 2017, green, social, and sustainability bond issuance—all of which has been based on a use-of-proceeds approach—has grown rapidly among ASEAN issuers as they seek direct financing to fund investments in response to longterm environmental and social challenges. As of September 2021, the cumulative value of ASEAN-labeled green, social, and sustainability bonds had reached \$16.4 billion (Figures below).¹

Figure 1: Issuance of ASEAN-Labeled Bonds by Country (USD million)



Figure 2: Issuance of ASEAN-Labeled Bonds by Category (USD million)



Source: Securities and Exchange Commission, Philippines; and Association of Southeast Asian Nations (ASEAN) Capital Markets Forum.

Building on this recent growth, ASEAN has significant opportunities to expand its sustainable finance markets, as well as for private sector issuers to incorporate environmental, social, and governance (ESG) considerations into their operations. It is also critical to simultaneously strengthen the capacity of capital market intermediaries to expand the pool of talent in this area.

¹ ASEAN+3 comprises the members of the Association of Southeast Asian Nations (ASEAN) plus Japan, the People’s Republic of China, and the Republic of Korea.

5. Increasing contribution to regional GDP

Increase operation performance and optimise financial opportunities (enter new markets, changing operational pattern to meet higher demand) along with social and environmental management can potentially increase contribution to regional GDP by irrigating larger area or allocating excess water for other purpose such as raw water for industry or domestic or electricity generation. Currently, irrigation of DOISP II dams contribute 11% to GDP Food Crop sub sector of 14 provinces. If we compare to total national GDP FY 2020 (IDR 15.434,2 billion), the contribution is around 0,3%.

Table 4. DOISP II Dams' Irrigation Contribution to Provincial GDRP of Food Crops Sub Sector, FY 2020

No	Province	GDRP from DOISP Dams' Irrigation (Rp. bio)	Provincial GDRP of Food Crop Sub Sector (Rp. bio)	Contribution (%)
1	Aceh	226	10.144	2,2%
2	Riau Island	-	24	0,0%
3	Lampung	5.664	39.159	14,5%
4	Banten	-	4.252	0,0%
5	West Java	7.053	94.059	18,1%
6	Central Java	10.484	9.095	17,7%
7	Yogyakarta	170	.208	3,3%
8	East Java	4.445	79.220	5,6%
9	Bali	210	3.753	5,6%
10	West NT	2.389	3.117	18,2%
11	East NT	174	8.250	2,1%
12	East Kalimantan	121	1.471	8,2%
13	North Kalimantan	8	434	1,7%
14	South Sulawesi	1.606	32.907	4,9%
Total		42.551	361.093	11,8%

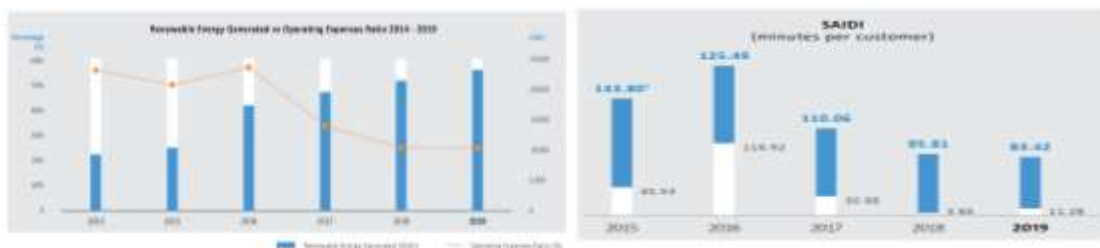
Source: IME's calculation, 2021

Assumption: irrigation from 162 DOISP dams; irrigation contribution are from paddy and corn; IP, price and productivity are based on BPS FY 2020

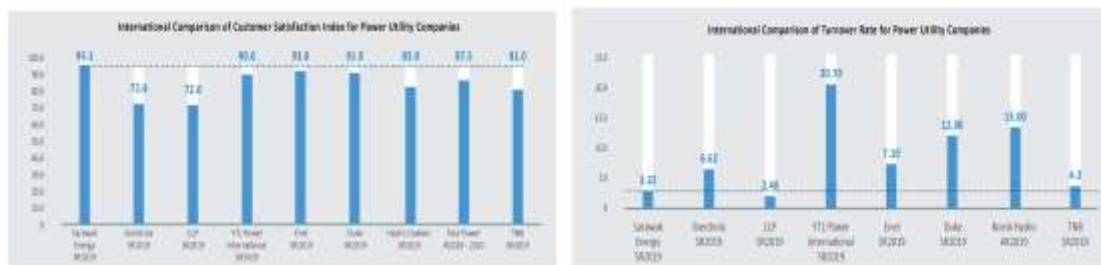
Lesson Learned from Sarawak Energy

Sarawak Energy has adopted the HSAP within its processed in stages since 2012 and implemented its internal HSAP governing structure in 2014. The company measures their performance to the triple bottom-line, while serving their customer needs, contributing to environmental sustainability and uplifting society.

- *Catalysing growth.* Higher renewable generated from 2015 – 2017 does not increase company’s operating expenses. Operating expenses decrease from RM1834 billion in 2017 to RM 1459 billion in 2019. Measures have been taken to reduce power loss by implement system efficiency initiatives, including power theft, which reflected to decreasing SAIDI number.



- *Managing environmental.* In order to maintain water sustainability, the company made MoU signing with the Forest Department of Baleh Watershed Wildlife Connectivity Project to protect its catchment area and ecosystem. They also made MoU with Sarawak Energy and Department of Environment to further promote and implement environmental programmes. Environmental Impact Assessments also have been conducted.
- *Engaging stakeholders.* Company conducts Business Continuity Management (BCM) Framework to maintain and ensure the continuity of its services to minimise the impact to its customers in the event of a service disruption. Communications and trainings with key government agencies have been taken. Company also sustainably improves their employees capabilities through trainings which result in low staff turnover ratio. As the result, customer satisfaction index has been improved from 75,23% in 2014 to 95,08% in 2019.



Source: Sarawak Energy Annual and Sustainability Report, 2019

IV. Recommendation

Short term

1. Holding a joint assessment between related ministries, local governments and communities on an existing dam operation & management using international sustainability protocol as a pilot project, preferably with international accredited assessors;
2. Assessing and modifying the protocol to suit with Indonesia practices;
3. Building an MoUs among related ministries, local governments and communities
4. Creating and socializing the standard operating procedure (SOP) for handling environmental issues in the dam water body
5. Formulate rules prohibiting the use of dam inundation areas.

Mid to long term

1. Enhance the adoption of sustainability protocol at the dam O&M manual and financing processes
2. Capacity development on the Protocol among related dam stakeholders
3. Developing task team consists of related ministries, local governments and communities to have a mutual policy on integrated dam management
4. Implementing the standard operating procedure (SOP) for handling environmental issues in the dam water body
5. Dissemination and application of the prohibition rules and sanctions

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