Water Stewardship Vietnam

BUILDING CATCHMENT RESILIENCE: ADVANCING WATER STEWARDSHIP IN THE DONG NAI BASIN

A COMPREHENSIVE REPORT

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Building Catchment Resilience: Advancing Water Stewardship in the Dong Nai Basin A Comprehensive Report

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Abbreviations

DNRB	Dong Nai River Basin
DARD	Department of Agriculture and Rural Development
DoC	Department of Construction
DoF	Department of Finance
DoH	Department of Health
DoIT	Department of Industry and Trade
DONRE	Department of Natural Resources and Environment
DoST	Department of Science and Technology
DoT	Department of Transport
GDP	Gross Domestic Product
IPCC	Intergovernmental Panel on Climate Change
MoC	Ministry of Construction
MoF	Ministry of Finance
MoH	Ministry of Heath
MOIT	Ministry of Industry and Trade
MAE	Ministry of Agriculture and Environment
MoST	Ministry of Science and Technology
MPI	Ministry of Planning and Investment
NGO	Non Governmental Organisation
ODA	Official Development Assistance
PPC	Provincial People's Committee
SAWACO	Saigon Water Corporations
SERC	South East River Cluster
SIWRP	Southern Institute of Water Resource Planning
UNDP	United Nations Development Programme
WASH	Water, Sanitation and Hygiene
WB	World Bank
WRG	Water Resource Group
VAWR	Vietnam Academy for Water Resource

Introduction

Assessing water security and ensuring sustainable water management are more urgent than ever, especially given Vietnam's increasing environmental challenges. The country's river basins each present distinct water challenges and opportunities. Recognizing the importance of a catchment management approach to water resource management, Vietnam has made strides at the institutional level, reflected in the recent Law 28/2023/QH15 on Water Resources. However, successfully implementing this policy demands significant coordination across multiple sectors.

Report purpose:

This report aims to provide a comprehensive overview of water management at catchment level in Vietnam, covering governance frameworks, the principles of good water stewardship, and a case study analysis of the Dong Nai River Basin and the SERC catchment. It emphasizes the importance of stakeholder engagement and the role of the private sector in effective water governance. The report presents a holistic perspective on the path toward sustainable water management—starting with an understanding of the shared challenges within the basin and moving toward collective solutions. It underscores the need for coordinated efforts to ensure the sustainable use of Vietnam's critical water resources in the face of climate change and other emerging water-related challenges.

The detailed analysis of the Dong Nai and SERC catchment—one of the country's most important basins—covers the potential risks posed by internal and external factors. The Dong Nai basin contributes over 60% of Vietnam's industrial GDP and 28% of its agricultural GDP and has a high concentration of industrial zones. This basin faces challenges related to water balance, and water quality, all of which are influenced by varied water usage patterns across different sectors and climate change.

Addressing the water challenges in the Dong Nai Basin requires a nuanced approach that considers the role of all water users and stakeholders, including private companies, communities, and governance structures. This report proposes a roadmap for joint action by providing insights into several key areas:

- **Chapter 1: Water Basins in Vietnam**: The first chapter provides an overview of Vietnam's water resources status. It includes an analysis of the country's water resources, highlighting the availability and distribution of water across various basins. Furthermore, the chapter explores the Vietnamese water governance landscape, including the current policies, regulations, and institutional frameworks related to water management in Vietnam.
- **Chapter 2: Good Water Stewardship**: This chapter introduces the Water Stewardship concept and framework. It discusses the driving forces for companies to improve and demonstrate sustainable practices through local and international standards and commitments.
- **Chapter 3: Dong Nai & SERC Catchment Analysis**: An in-depth Catchment Analysis of the Dong Nai and SERC basins is presented in this chapter. The catchment boundaries are outlined, followed by an assessment of water use distribution within these regions. An analysis of the impact of climate change on water availability highlights the challenges posed by changing climatic conditions. Additionally, water quality and environmental issues are identified, and risks these water challenges present for catchment water users and stakeholders.
- **Chapter 4: Private Sectors & Water Stewardship**: This chapter focuses on the role of the private sector in water stewardship by identifying the barriers to good water governance. It provides initiatives and solutions to overcome these barriers. The chapter concludes with a roadmap to water stewardship in the Dong Nai River Basin for the 2024-2030 period, offering strategic recommendations for enhancing water stewardship through collaborative efforts between the public and private sectors.
- **Chapter 5: Conclusion and Recommendation:** A framework for the next steps in advancing water stewardship in Vietnam

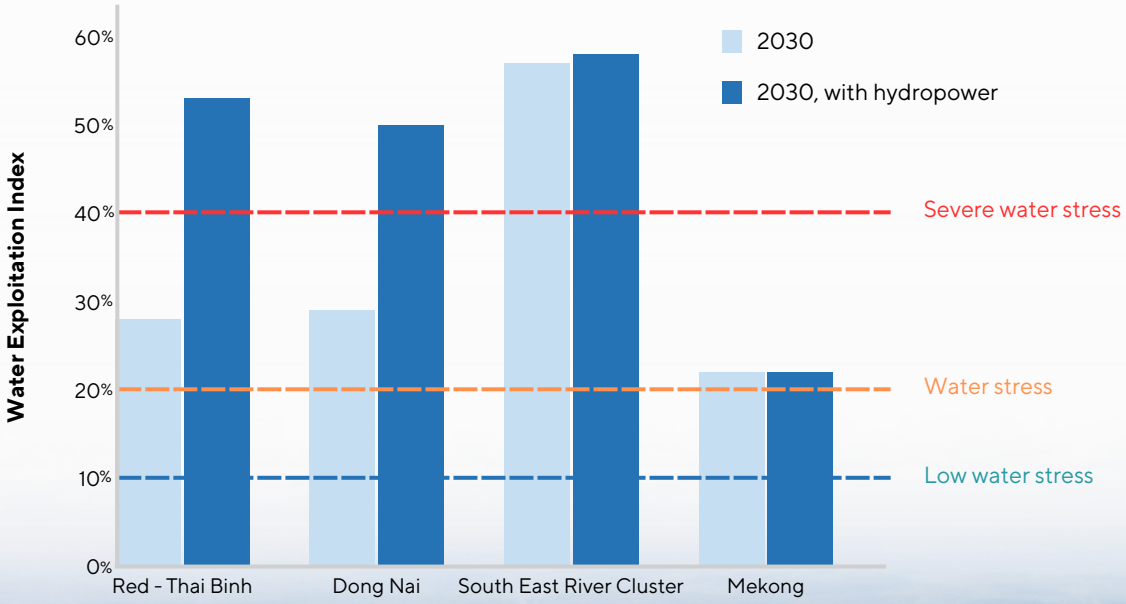
Chapter 1
BASINS IN VIETNAM

1.1. Vietnam water resources status

Vietnam has 16 major river basins, including the Southeast River Cluster (SERC), a cluster of smaller river catchments along Vietnam's southern coastline (Figure 1). About 60% of the total water resources originate upstream of Vietnam, while the three dominant basins—the Red-Thai Binh, Dong Nai, and Mekong—account for 80% of Vietnam's annual average water resources in the country. These three basins, along with the SERC, also have the highest population density, accounting for two thirds of the total population at over 60 million people and contributing 80% of the country's GDP. With the population concentrated mostly along rivers and the extensive coastline, more than 70% of the population is prone to water-related hazards. Unsustainable water use, due to lack of monitoring, insufficient pollution control, and increasing demand, also exacerbates water stress. It is projected that by 2030, the Red-Thai Binh, Dong Nai and SERC will experience severe water stress, especially with high water exploitation for hydropower (Figure 2). This poses substantial risks to the economy, water security, energy and food security in many provinces situated in the affected catchment areas[1].

(Source: 2030 WRG, 2017)

Figure 1: *16 River Basins in Vietnam*



(Source: 2030 WRG, 2017)

Figure 2: *Water Exploitation Index of four major basins*

1.2.1 Water resources planning

In 2022, the Prime Minister issued Decision 1622/QD-TTg, mandating the development of master plans for water resources management for the 2021-2030 period. These plans aim to tackle drought and pollution across six socio-economic regions and 13 major river basins, to ensure national water security, sustainable water resource management, and balance water needs between livelihoods, socio-economic development, and environmental protection.[3]

Following this directive, several basin-specific master plans were developed for 2021-2030, with a long-term vision to 2050. Among these is the master plan for the Dong Nai River Basin, established under Decision No. 22/QD-TTg.[4]

Decision 161/QD-TTg (2024) provides a roadmap for implementing and adjusting inter-provincial river basin master plans. It is a follow-up directive to ensure the effective execution of the master plans by 2025 and provides a framework for adapting the plans as needed.[5]

For the Dong Nai River Basin, Decision No. 1585/QD-BTNMT promulgates the Ministry of Natural Resources and Environment's action plan to enact Decision No. 22/QD-TTg. It serves as a detailed guide for operationalizing the goals and strategies defined in the Dong Nai basin's master plan.

A number of other plans and strategies also address water-related risks and challenges, including climate change and environmental protection (Figure 4). The Master Plan on Water Resources and its Implementation Plan were developed in alignment with national strategies to mitigate natural disasters, balance competing demands such as irrigation, energy production, and industrial development, and manage pollution levels within river capacities.

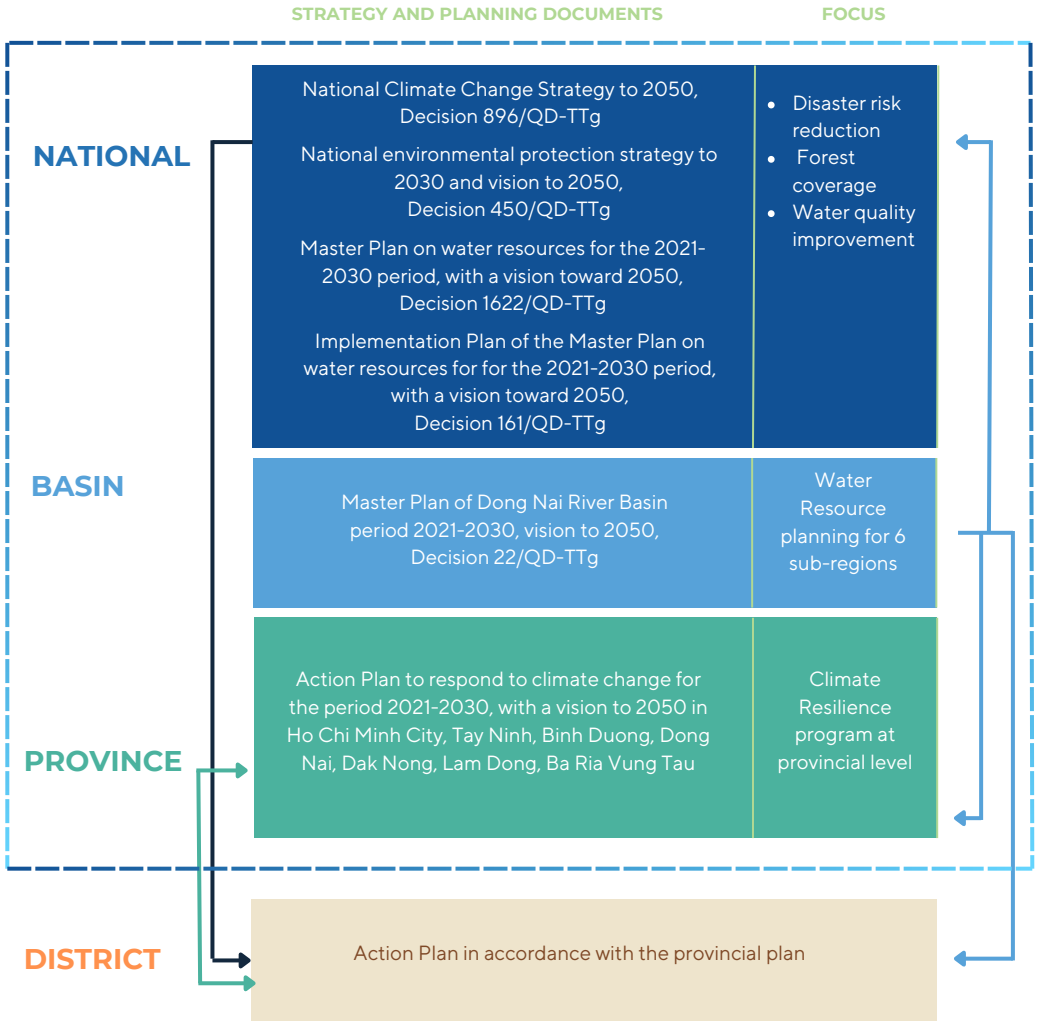


Figure 4: *Government plans and strategies related to water governance*

1.2. Vietnam water governance landscape

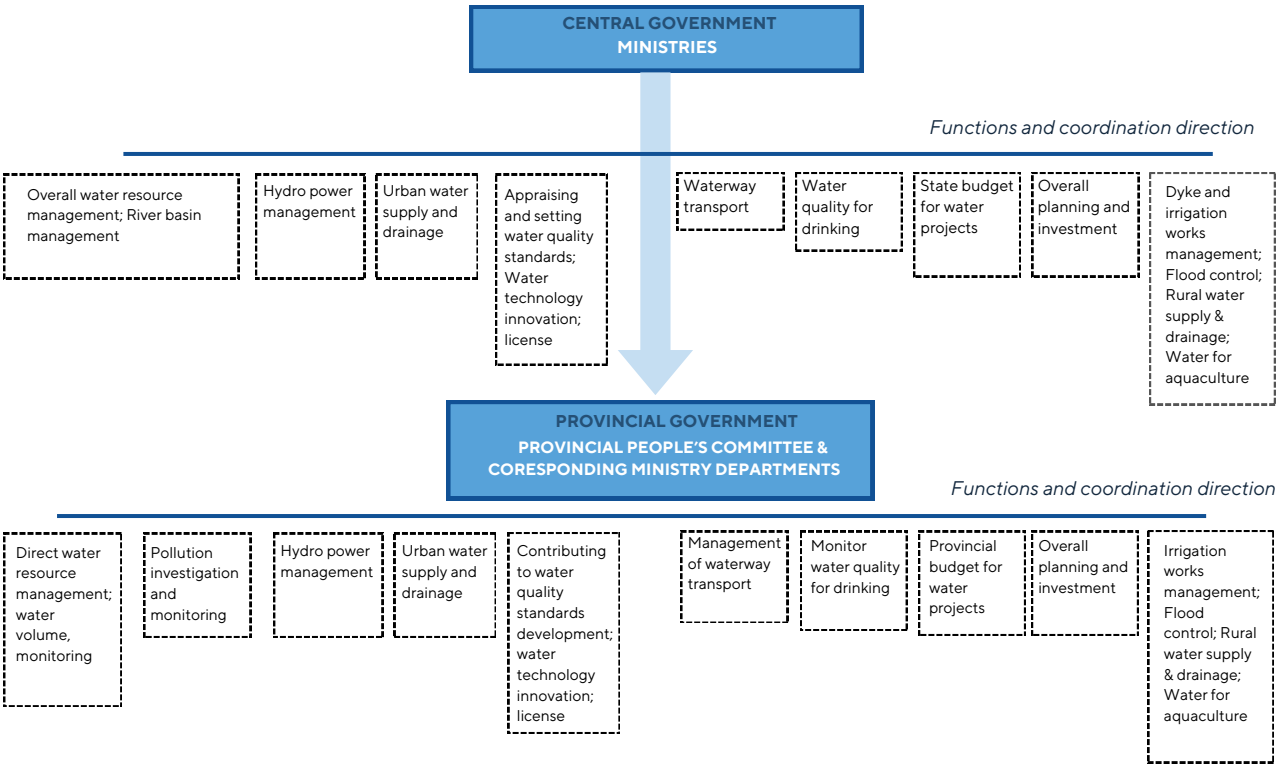


Figure 3: *Water Governance Structure*

The water governance structure in Vietnam is a complex ecosystem involving multiple government departments addressing different aspects of water management and usage.

At the national level, Ministries are responsible for drafting laws and formulating strategies for managing Vietnam's water resources. These laws define the responsibilities and functions of various Ministries, covering different activities that depend on water, such as hydropower, agriculture, waterway transportation, industrial production, and municipal consumption. An overview of the legal framework on water is compiled in Annex A.

Beneath the Ministries are specialized departments operating at provincial and regional levels. These departments provide critical functions by advising Ministries, facilitating thematic discussions, making national policy recommendations, and resolving conflicts between Ministries and provinces (Figure 3).

In 2024, the new Law 28/2023/QH15 on Water Resources introduced significant changes aiming to improve water management and security. This new framework also integrates related legislation, including the Law on Environmental Protection, the Law on Irrigation, and regulations from the Law on Planning, the Law on Fisheries, and the Law on Natural Disaster Prevention and Control.[2]

Water Stewardship is the use of water that is **socially and culturally equitable, environmentally sustainable** and **economically beneficial**

Chapter 2
GOOD WATER STEWARSHIP

2.1. Definition

Water Stewardship is defined by the Alliance for Water Stewardship as "the *use* of water that is socially and culturally equitable, environmentally sustainable and economically beneficial, achieved through a stakeholder-inclusive process that involves site- and catchment-based actions."

Good water stewards understand their own water use, their catchment context, and shared water challenges, and engage in meaningful individual and collective actions that benefit people, the economy and the environment.

Any organization can use the Water Stewardship framework to improve water management. The **5-step** process keeps efforts manageable and allows impacts to be traced back to actions to achieve the following **5 outcomes**:[6]

(Source: Alliance for Water Stewardship)

Figure 5: *5 Steps of Water Stewardship*

2.2. Water Stewardship & Sustainability Commitments

Water stewardship initiatives encompass a wide range of actions, from localized catchment-level efforts to global commitments. By adopting these initiatives, companies demonstrate their willingness to integrate sustainable water practices into their operations, either at specific sites or across their entire operations.

Prominent internationally recognized water initiatives include the CEO Water Mandate, the WASH Pledge, and Alliance for Water Stewardship (AWS) International Water Stewardship Standard. The CEO Water Mandate encourages endorsing companies to actively address critical water risks in their operations, harness water-related opportunities, and contribute to the achievement of the UN Sustainable Development Goals (SDGs).

Facilitated by the World Business Council for Sustainable Development (WBCSD), the WASH Pledge commits companies to provide access to safe water, sanitation, and hygiene (WASH) within their workplaces, across their value chain, and in the communities that surround their workplaces and/or where their workers live.

Companies adopting the AWS Standard focus on mitigating water-related risks at both site and catchment levels, addressing challenges such as scarcity, pollution, environmental and regulatory pressures. By doing so, they enhance their operational performance, strengthen stakeholder relationships, and bolster their reputation for sustainable practices.

In Vietnam, growing demand for Environmental, Social, and Governance (ESG) reporting—including water—is also being driven by global market requirements and sustainability commitments. Increasingly, international markets are demanding ESG disclosures aligned with standards such as GRI 303: Water and Effluent,[7] CDP Water Security[8], IFRS S1 General Requirements for Disclosure of Sustainability-related Financial Information[9], IFRS S2 Climate-related Disclosures, and the IFC's Performance Standards on Environmental and Social Sustainability.[10]

Companies must also comply with national technical standards, which are often adapted from ISO standards to align with domestic requirements. These standards are managed by the Commission for Standards, Metrology, and Quality of Vietnam (TCVN). Additionally, tools such as the Corporate Sustainability Index (CSI) and the Assessment Tool for Business Sustainability Practices have been customized from the GRI standard to facilitate Vietnam's transition toward sustainable development and support local businesses in aligning with ESG principles.

While most sustainability initiatives—apart from national technical standards—are voluntary, they reflect companies' level of interest and commitment to sustainability, particularly relating to water security. A summary comparison between selected ESG initiatives and the AWS Standard is provided Annex B.

Chapter 3

DONG NAI & SERC CATCHMENT ANALYSIS

3.1. Catchment boundary

The Dong Nai River and SERC catchments extend across the administrative boundaries of Ho Chi Minh city and the provinces of Dong Nai, Binh Duong, Binh Phuoc, Tay Ninh, Dak Nong, Lam Dong, parts of Long An (excluding the areas of that province that fall under the master planning for the Cuu Long River Basin), Ba Ria-Vung Tau, Binh Thuan and Ninh Thuan. Parts of Ninh Thuan and Binh Thuan Provinces, which are located in the SERC basin area, receive water transferred from the Dong Nai River Basin.

The upstream reach of the Dong Nai River, known as Da Dung, converges with the Da Nhim River to form the Dong Nai Thuong. From this point to the junction with the Saigon River, the waterway is officially referred to as the Dong Nai River.

In its downstream reach within Ho Chi Minh City, the river splits into two main tributaries: the Long Tau River, which flows through Can Gio and into Gành Rái Bay, and the Nha Be River, which flows into the sea through the Xoai Rap Estuary.

Under Decision No. 22/QD-TTg, the Prime Minister approved the master planning for the Dong Nai River Basin for the 2021–2030 period, with a vision extending to 2050. This Master Plan encompasses both the Dong Nai and SERC basins covering six sections: the upper Dong Nai River, the lower Dong Nai River, the Saigon River–upper Vam Co River, the Be River, the La Nga River, and the coastal regions (Figure 6)[4].

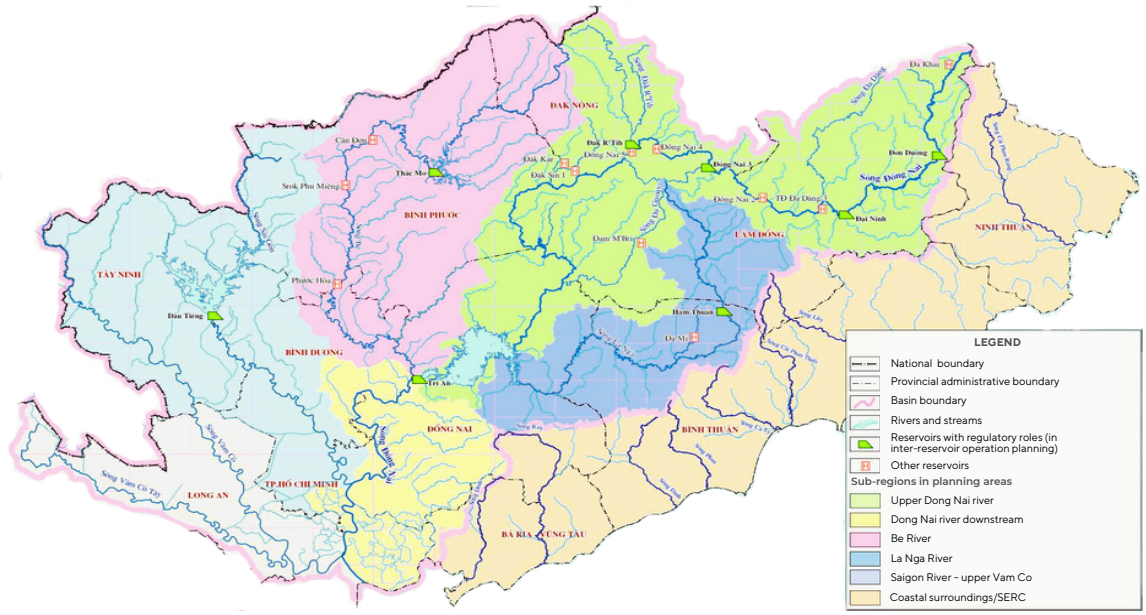


Figure 6: *Dong Nai & SERC basins* *(Source: Decision No.22/QD--TTg)*

3.2 Water governance

3.2.1. Stakeholders

The Dong Nai River Basin (DNRB) & SERC provide critical water resources for millions in Vietnam, sustaining agriculture, industry, urban development, and vital ecosystems. Effective governance and collaboration efforts among stakeholders are essential to enhancing water security, promoting sustainable usage, and building resilience to climate challenges. The following stakeholders have been identified and categorized into three main groups (Figure 7):

- **Water suppliers** including provincial water supply companies that oversee water provision, and in many cases drainage and wastewater management. Their responsibilities include constructing and maintaining essential infrastructure, such as water plants and reservoirs.
- **Water users** including industrial and corporate entities (e.g. Samsung, British American Tobacco, Nestle water, etc.), agricultural producers, energy producers, and domestic users who depend on these water resources for their activities.
- **Promoters:** These stakeholders play a pivotal role in advancing water stewardship as an effective management tool. They contribute to water security by analyzing regional water risks, developing strategies for sustainable water management that ensure community water supply and address climate change impacts, and setting standards and regulations that promote sustainable water usage and development. This group includes:
  - National-level planners and managers: Ministries (MAE, MOIT, EVN, MOC), local governments, RBOs.
  - NGOs, international organizations, cooperation agencies, and donors,.
  - Financial institutions, media, civil society and local communities.
  - Academia and research institutions

Fostering effective collaboration among these diverse groups is crucial to achieving sustainable water governance and resilience against climate change. A detailed list of stakeholders is provided in Annex C.

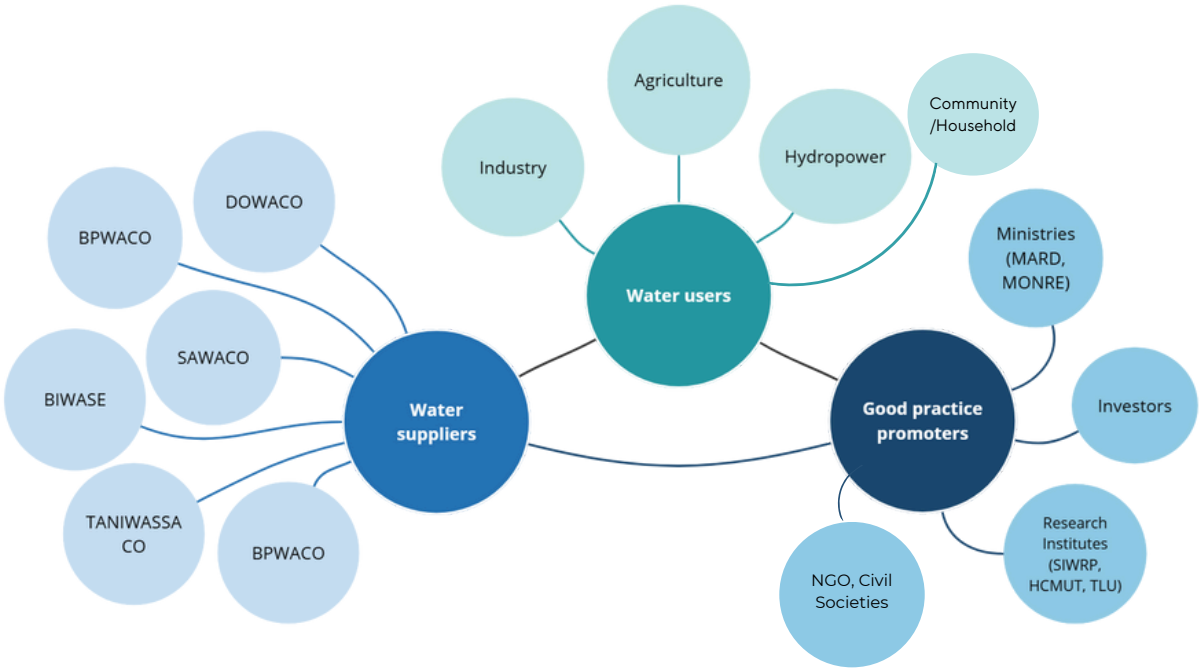


Figure 7: *Water governance stakeholders in Dong Nai Basin (Annex C)*

3.2.2. Existing initiatives

Select relevant initiatives for advancing water stewardship in the DNRB are summarized in Table 3.1, with additional details on these and other initiatives provided in Annex D.

These initiatives offer valuable guidance for stakeholders in the region as they develop water management strategies that align with national plans and strategies.

WATER STEWARDSHIP OUTCOMES	EXISTING INITIATIVES (ANNEX D)
GOOD WATER GOVERNANCE	• Master Plan of the Dong Nai River Basin for the period of 2021 - 2030, with a vision to 2050
SUSTAINABLE WATER BALANCE	• Action plan to respond to climate change for the period 2021-2030, vision to 2050 of Ho Chi Minh city, Binh Duong, Dong Nai, Tay Ninh, Binh Phuoc, Lam Dong, Dak Nong, Ninh Thuan, Binh Thuan, Lam Dong, Ba Ria Vung Tau, Tay Ninh • Plan to respond to drought, water shortage and saltwater intrusion in 2024 in Ninh Thuan province.
GOOD WATER QUALITY STATUS	• Report on Environmental Status period 2021-2020 of Ho Chi Minh city, Binh Duong Dong Nai, Binh Phuoc, Dak Nong, Lam Dong. • Protection Project in the Dong Nai River basin in Ho Chi Minh City until 2020. • Strategic environment assessment report of Dong Nai, Lam Dong province planning for the period of 2021-2030, with a vision to 2050.
IMPORTANT WATER-RELATED AREAS	• Action plan to respond to climate change for the period 2021-2030, vision to 2050 of Ho Chi Minh, Binh Duong, Dong Nai, Tay Ninh, Binh Phuoc, Lam Dong. • Strategic environment assessment report of Dong Nai province planning for the period of 2021-2030, with a vision to 2050.
SAFE WATER, SANITATION AND HYGIENE FOR ALL (WASH)	• National Strategy on Rural Water Supply and Sanitation by 2030, with a vision to 2045.

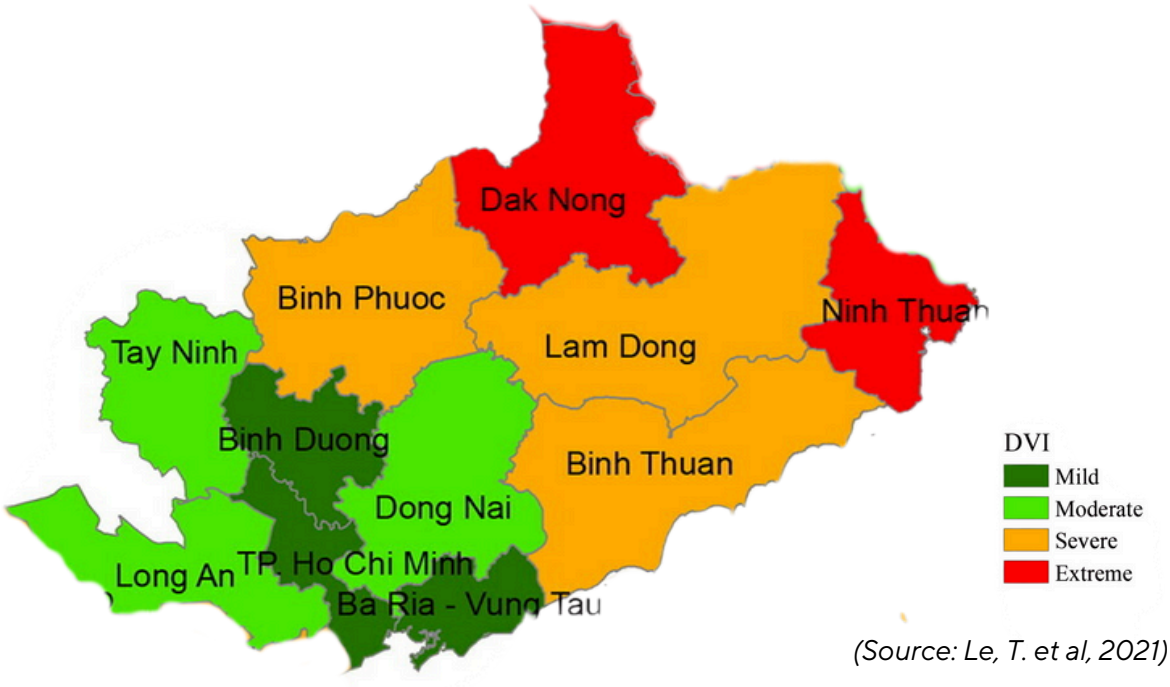
Table 3.1: *Water initiatives in Dong Nai Basin (see also Annex D)*

3.3. Water availability

The Dong Nai River Basin generally has abundant and reliable water resources in its downstream regions. However, upper catchment areas, such as Dak Nong and Lam Dong, experience significant water stress during the dry season. These challenges are expected to intensify, with water supplies increasingly insufficient to meet the demands of growing populations and industrial development (Figure 8).[12]

In many provinces within the Dong Nai River Basin, groundwater extraction remains a critical source of water supply. However, this reliance comes with increasing risks associated with groundwater pollution, land subsidence, and salinity intrusion. To address these issues, new regulations on groundwater management have been introduced, emphasizing stricter oversight of groundwater extraction. Local government departments across the provinces are required to continuously update restricted groundwater exploitation zones to maintain groundwater balance within sustainable thresholds and prevent subsidence.[2]

With the introduction of the Law on Water Resources 2023, annual water resource scenarios for major basins were published for the first time in 2025. These scenarios provide comprehensive data on water conditions at the catchment and sub-catchment levels, as well as sectoral water demands. They aim to enhance coordination and preparedness among government departments responsible for water supply, irrigation, energy, and waterway transportation. The first Dong Nai River Basin water resource scenario covers both the DNRB and the SERC for the period January to June 2025. It outlines the water quantity status for surface water, groundwater, and reservoirs, including 59 hydropower and 578 irrigation reservoirs. It also provides forecasts of flow and rainfall, along with guidance for managing water shortages arising from increased hydropower demand, low rainfall, or reduced water flow in some areas.[13]



(Source: Le, T. et al, 2021)

Figure 8: *Drought vulnerability Index (DVI) of provinces in Dong Nai and SERC basins*

3.3.1. Water use distribution and demand

According to the Dong Nai River Basin Master Plan, the six sub-regions exhibit varying levels of water distribution. Downstream areas, such as the lower Dong Nai River, the SERC, and the Saigon River–Upper Vam Co, account for the highest distribution, with the Saigon River–Upper Vam Co being the highest—almost double that of other sub-regions. This sub-region plays a critical role in supplying water to Ho Chi Minh City and Binh Duong, both of which are vital to the region's socio-economic development and make significant contributions to the national budget.

The basin's fertile land and ample water resources enable the cultivation of high-value crops, including rubber, coffee, and cashews. These crops sustain specialized agricultural zones that supply raw materials to processing industries. Additionally, surface water is vital for electricity generation. The water required for hydropower plants is managed by the Ministry of Industry and Trade and is often accounted for separately from other water demands.

According to estimates from the DNRB Master Plan, agriculture represents the largest share of water use, accounting for nearly 44%, followed by industry at 39% and urban/domestic use at 12% (Figure 9).

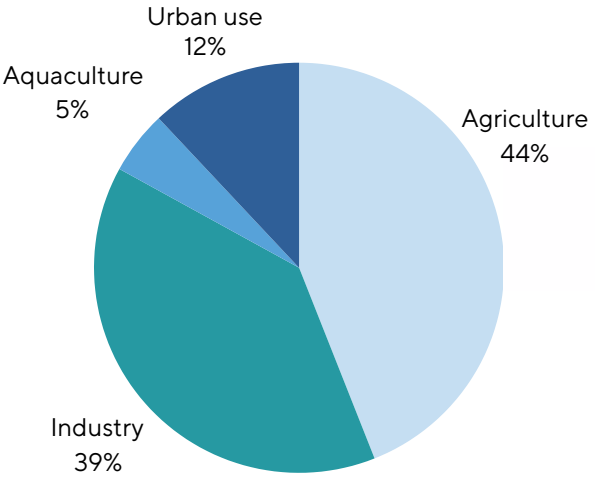


Figure 9: *Dong Nai Water Use Distribution*

The total water supply for these three sectors was approximately 12.8 billion cubic meters in 2020 and is projected to grow to 13.5 billion cubic meters by 2030.

Urban areas demonstrate the highest water-use efficiency due to advanced infrastructure and management practices. Industrial zones are moderately efficient, while rural areas face significant challenges in improving water-use efficiency. The growth of agriculture and industry necessitates substantial water input and improved management strategies (Table 3.2).[14]

Water Use Efficiency	Areas	Characteristics
High Efficiency	Ho Chi Minh City, Can Don (Binh Phuoc), Phuoc Hoa (Binh Duong), Long An, Go Dau, Can Dang (Tay Ninh)	Advanced infrastructure, effective water management practices, and significant investments in technology
Moderate Efficiency	Binh Duong, Tay Ninh, Lam Dong	Relatively efficient water use in industrial zones and agricultural activities
Low efficient	Ham Thuan, Ta Pao (Binh Thuan), Thac Mo (Dak Nong), Dong Nai	Challenges in managing water resources for both agricultural and domestic use, insufficient investment in water-saving technologies and practices

Table 3.2 *Water efficiency level by provinces in Dong Nai Basin* (Source: WRUE, 2021)

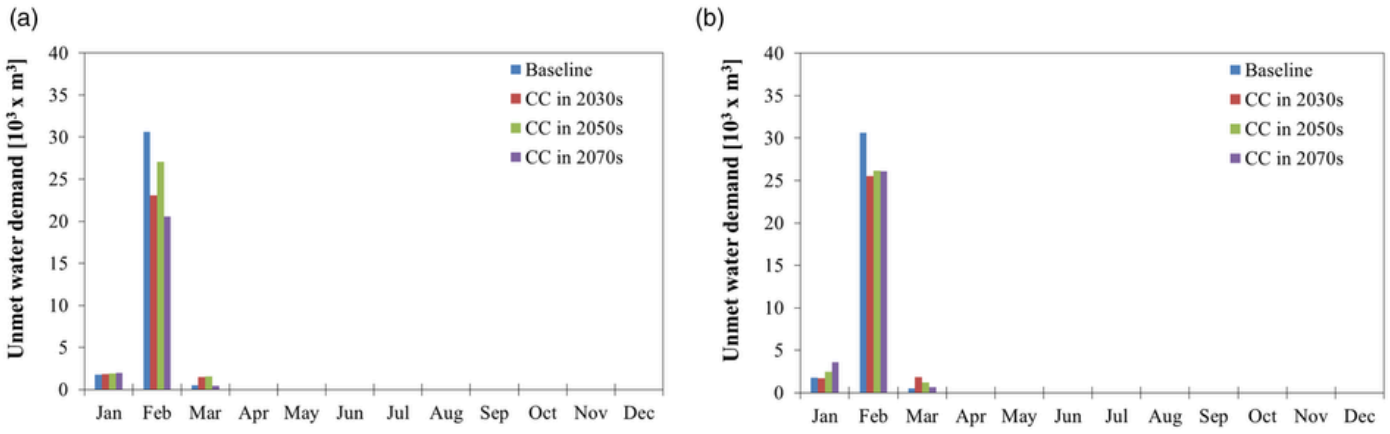
3.3.2. Climate change risks

Climate change poses a significant threat to global water availability and is exacerbating environmental challenges in the Dong Nai River Basin. These challenges include increased land salinization, landslides, and erosion.

To better understand the impacts of climate change on water availability in the upper Dong Nai River Basin, future rainfall data from five global climate models were analyzed in a study under two scenarios: RCP4.5 (a moderate climate change scenario) and RCP8.5 (a severe climate change scenario) (Figure 10). Under both scenarios, unmet water demand during the dry season may decrease slightly compared to the baseline scenario, based on 2010 water use data, due to an upward trend in rainfall.[15]

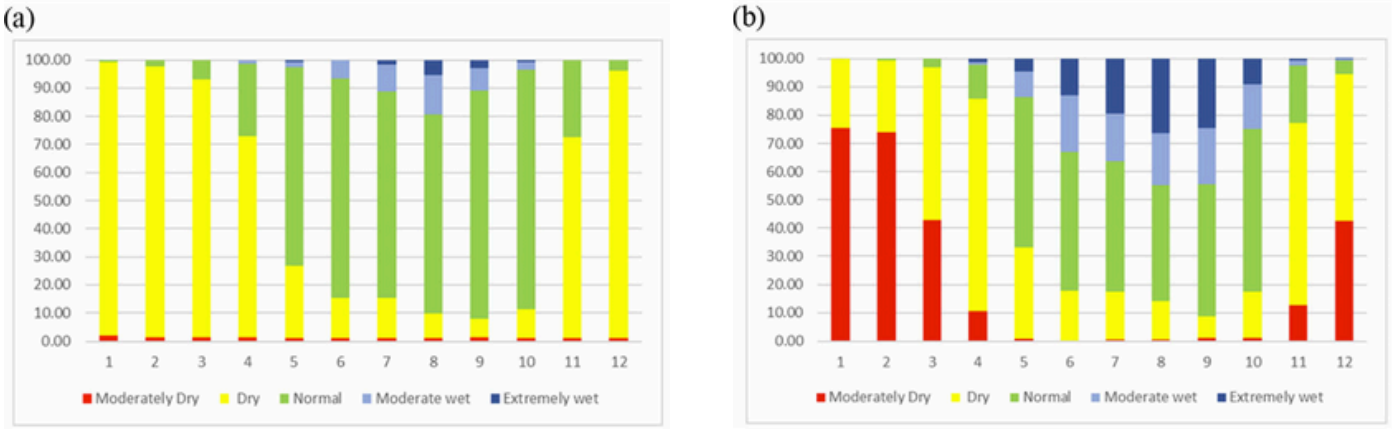
Results from another study on the climate modelling for the entire DNRB show water-related impacts associated with climate change occurring in the DNRB (Figure 11), including:

- Increased Variability: Increased variability in water availability, with more frequent and severe droughts and floods affecting the basin.
- Occurrence of moderate drought increases with the highest value occurring in Dak Nong, Bình Thuan and Dong Nai provinces.[16]



(Source: Dao N. Khoi, et al, 2021)

Figure 10: *Unmet water demand under the climate change (CC) scenarios: (a) RCP4.5 scenario and (b) RCP8.5 scenario in Upper Dong Nai basin*



(Source: Linh, V.T, et al , 2021)

Figure 11: *Monthly meteorological drought area in baseline (a) and RCP4.5 (b) scenarios*

3.3.3. Water quality risks

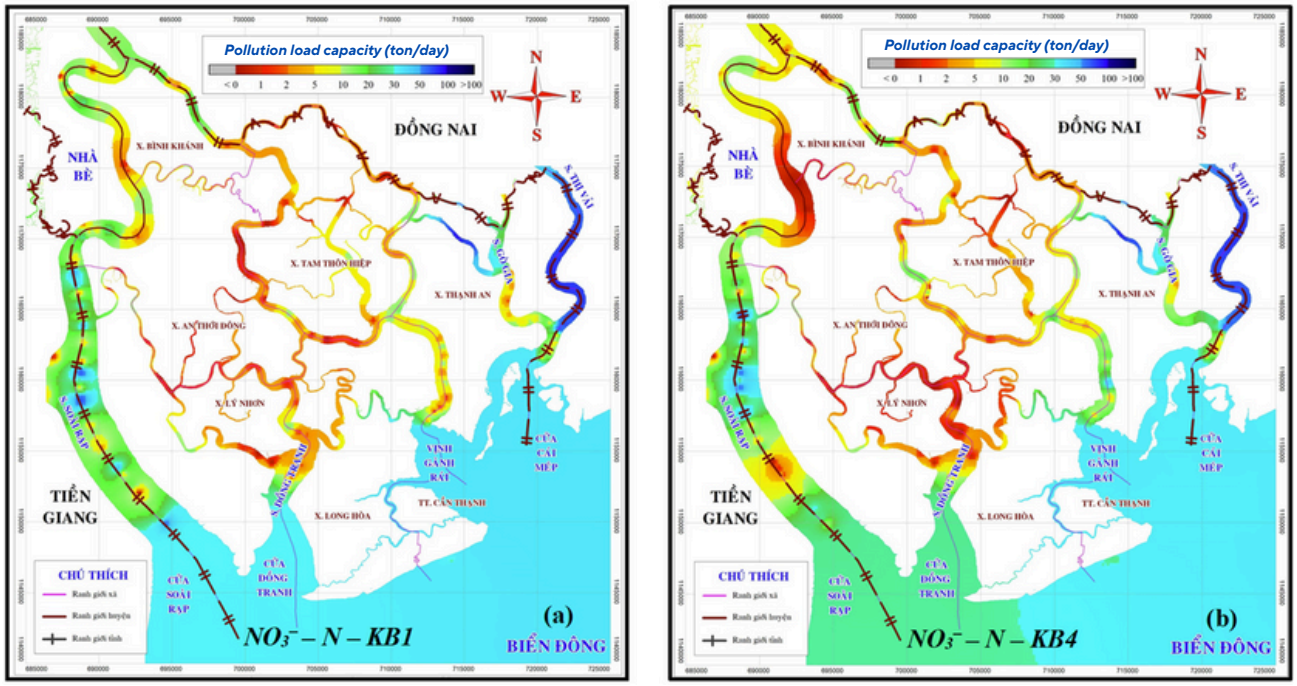
Water quality in the DNRB and the SERC is among the major risks to the water security, particularly in regions with dense populations and industrial activity. A study in 2023 found that the water quality in the downstream region of the DNRB varied from poor to good based on the Vietnamese Water Quality Index (VN-WQI) and ranged from medium to poor under the American Water Quality Index (NS-WQI) standard. Key pollutants identified include temperature, coliform bacteria, and dissolved oxygen levels. The primary contributors to pollution identified in the study were agricultural and domestic activities.[17]Another study also found the presence of restricted pesticides with high toxicity to living organisms in the lower stream of the DNRB that could have originated from the upper stream.[18]

The National Technical Regulation on Surface Water Quality (2023)[19] and the National Technical Regulation on Industrial Effluent (2025)[20]provide the basis for water quality requirements across different industries and set standards for various types of water use. These regulations define the permissible limits for different pollutants that rivers can receive after wastewater has been treated and discharged. Water quality is categorized from Class A to D, with Class A representing the highest quality, suitable for household use, and Class D being the lowest, potentially posing risks to aquatic life.

Studies that evaluate a river's capacity to receive wastewater typically rely on national standards to establish pollutant thresholds. These thresholds are essential for assessing whether specific catchment areas can continue to accommodate industrial growth and increasing population demands under different wastewater treatment scenarios. In Ho Chi Minh City, for instance, surface water in many sub-catchments has already exceeded its receiving capacity. If wastewater treatment infrastructure does not improve, the catchment's overall capacity is projected to decline further by 2030 (Figure 12).[21]

In contrast to surface water quality, there are fewer assessments available on groundwater pollution risks across the Dong Nai River Basin (DNRB). The monitoring and regulating of groundwater use remain under the authority of provincial governments.

Most studies and guidance around water quality in the DNRB focus on the physical and chemical parameters and less on water use and health values, such as ecological health, which could hinder effective communication on the implication of the pollution level impact on relevant users and uses, including aquatic ecosystems and the community.



(Source: J Le, Ngoc Tuan & Doan, Huy, 2021)

Figure 12: *Pollution load of HCMC (a) NO3-N level in 2019 (baseline); (b)NO3-N level in 2030 (in the scenario the wastewater treatment capacity remains the same)*

3.3.3. Other risks

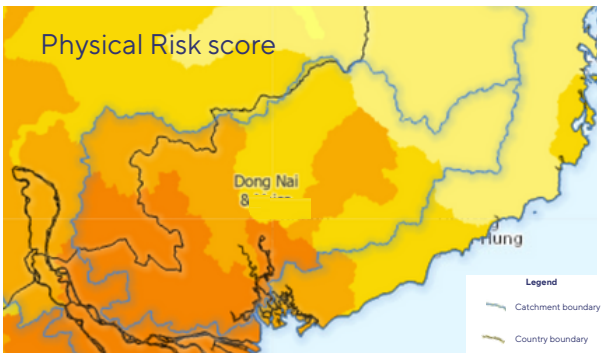
Other water-related risks further exacerbate the challenges to water security in the DNRB and SERC. Online tools such as the WWF Water Risk Filter[22] and the WRI Aqueduct Water Risk Atlas[23] provide companies with a useful approach to assess various water risk factors in their own operations or supply chain catchments. These tools evaluate physical water risks at a basin scale, such as water depletion, drought, flooding, and pollution. However, their results differ due to variations in the indicators and methodologies used for risk analysis.

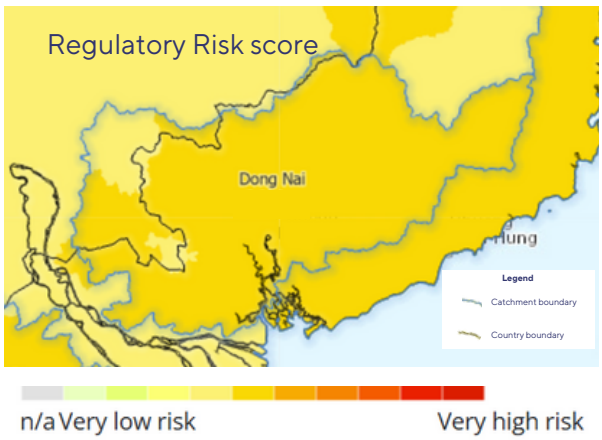
According to the WWF Water Risk Filter map, the average physical water risk levels in the DNRB and SERC range from low-medium to medium-high. In contrast, the WRI Aqueduct Water Risk Atlas rates these risks as high to extremely high (Figure 13). One key distinction is that the WWF map incorporates ecosystem services into its physical risk analysis, while the WRI Aqueduct Atlas does not. A description and comparison of these tools are provided in Annex E.

Both tools also evaluate regulatory and reputational risks, albeit with differing scopes and indicators. The WRI Aqueduct Atlas assesses risks related to regulatory uncertainty and public conflicts over water issues using data from countries and businesses to quantify its ESG risk index. Meanwhile, the WWF tool focuses on national progress toward SDG 6.5.1, which measures the implementation of integrated water resources management (IWRM). As a result, users can select and assess different risk factors in each tool as relevant to their decision-making needs.

While these tools provide useful visualizations of physical and regulatory risks at the catchment level, they may lack the granularity needed for site- or sub-catchment-level decision-making. Site-specific data collection and collaboration with stakeholders are essential to identify localized risks effectively. For example, in recent years, saline intrusion in the Vam Co Estuary has worsened, degrading water quality and adversely affecting daily life in these sub-catchment areas.[24]

WWF Water Risk Filter (2024)





WRI Aqueduct Water Risk Atlas

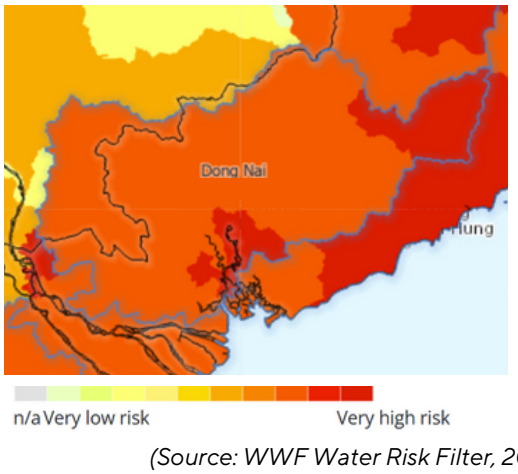
Figure 13: *Water Risk Score by WWF Water Risk Filter and WRI Aqueduct Water Risk Atlas*

3.4. Important Water Related Areas (IWRAs)

Important Water-Related Areas (IWRAs) are defined as areas or features of significant value to humans or nature from environmental, community, or cultural perspectives at regional or international levels. In the DNRB and SERC, IWRAs contribute directly to regional development through activities such as hydropower generation and ecosystem services, including flood control, irrigation, water supply, water balance regulation, and tourism. Examples of IWRAs include waterways, reservoirs, wetlands, springs, national parks, and mangrove forests.

The planning area of the DNRB and SERC encompasses a total of 109 reservoirs and hydropower dams, with 21 more being approved for construction[4]. This region is also home to significant national parks and biosphere reserves, such as Nam Cat Tien, Ma Da, and Ta Dung. However, areas crucial for ecosystem services, such as wetlands, are at high risk of degradation (Figure 14). There are very few assessments and compilation of the status of all the IWRAs in the DNRB available to public.

Under the new Law on Water Resources 2023, lists of lakes, streams, water protection corridors, and protected areas for drinking water extraction will be made publicly accessible at the provincial level. For the Dong Nai Basin, the goal is to have 80% of water-related infrastructure monitored and operated through a centralized monitoring system. Additionally, by 2030, 70% of lakes, streams, and canals with high biodiversity, cultural, and economic value will be mapped, published, managed, and protected.



(Source: WWF Water Risk Filter, 2024)

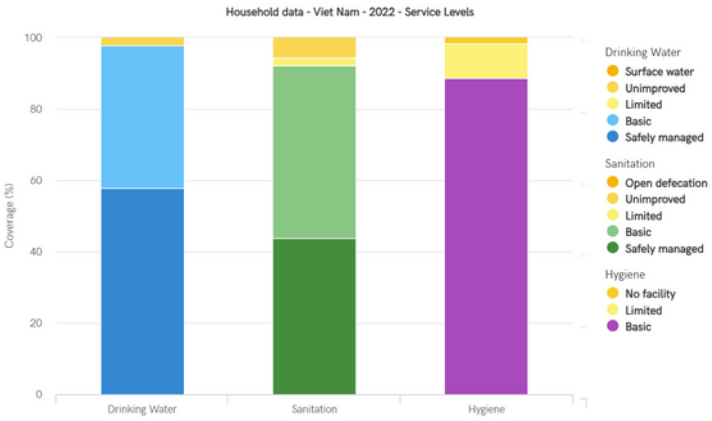
Figure 14: *Wetland degradation status*

3.5. Water, Sanitation, and Hygiene (WASH)

Vietnam has made notable progress in improving water, sanitation, and hygiene (WASH) services in recent years. As of 2022, approximately 98% of the population had access to basic drinking water services, 92% to basic sanitation services, and 89% to basic handwashing facilities (Figure 15).

Despite this progress, challenges remain. Nationally, access to safely managed drinking water is reported at only 58%, leaving a considerable portion of the population vulnerable to consuming contaminated water. Rural areas in particular lack adequate sanitation infrastructure and face an urgent need for sustainable financing solutions. WASH data and assessments at basin and provincial levels is limited.[25]

The National Target Program for Rural Water Supply and Sanitation and the Vietnam Water Supply and Sanitation Strategy are central policies for enhancing access to water and sanitation, particularly in rural areas. Cooperation and coordination at provincial level—including the private sector and civil society—is especially crucial to closing the gaps in safely managed water services for vulnerable groups, including low-income and marginalized populations in both urban and rural areas.



(Source: WHO & UNICEF, 2022)

Figure 15: *Water, Sanitation & Hygiene status in Vietnam*

3.6. Potential Risks to Business

Increasing pressure on water resources has introduced a range of risks to businesses, ranging from regulation and compliance to operational disruptions and insecurity.

Table 3.3 provides an overview of potential water-related risks categorized according to the five water stewardship outcomes.

WATER STEWARDSHIP OUTCOMES	CATCHMENT CHALLENGES	RISKS TO BUSINESS
 GOOD WATER GOVERNANCE	• Limited access to comprehensive information and water data • Lack of guidelines for implementation of new laws and regulations • Complex governance environment: Implementation requires coordination of multiple local departments	• Limited information to support longer term strategic planning and risk management • Regulatory compliance risks
 SUSTAINABLE WATER BALANCE	• High drought vulnerability in highland and coastal areas during dry season • Over extraction of groundwater	• Lack of access to water in dry season for some areas • Disruption of operation or supply chain due to the lack of access to water either at site or in supply chain • Infrastructure affected by subsidence from over extraction of groundwater
 GOOD WATER QUALITY STATUS	• Pollution from municipal areas • Lack of capacity in municipal wastewater treatment • Excess of chemical from agriculture and aquaculture production	• Low water quality intake for household use and production • Increase potential for waterborne diseases • Regulatory compliance and reputational risks
 HEALTHY IMPORTANT WATER-RELATED AREAS (IWRAs)	• Lack of comprehensive information on IWRAs status • IWRAs degradation due to pollution, exploitation and urban development.	• Reduced productivity due habitat and biodiversity loss and degradation (agriculture and aquaculture) • Costs from loss of ecosystem services, such as infrastructure damage in areas affected by riverine and coastal flood
 SAFE WATER, SANITATION AND HYGIENE FOR ALL (WASH)	• Assessment at provincial and basin level is not available • Cost for water treatment is high • Limited sustainable financing	• Health impact on local communities and workers

Table 3.3: *Potential water-related risks to business in Dong Nai Basin*

Chapter 4

PRIVATE SECTORS & WATER STEWARDSHIP

4.1. Barriers to good water governance

In 2024, WSVN conducted a survey and interviews with 12 companies with strong commitments to sustainability to identify water-related challenges faced by businesses and to develop improved tools and programs to support better water management in the Dong Nai Basin (Annex F).

The survey consisted of three main sections: (i) general information, (ii) water use, and (iii) initiatives, solutions, and recommendations, complemented by follow-up in-depth interviews.

Respondents represented a diverse range of industries, including water supply, food and beverage (F&B), information and communication technology (ICT), manufacturing, and education, operating in various provinces within the Dong Nai River Basin.

In the water use section of the survey, only 25% of the companies reported monitoring their water inputs, as well as recycling and reused water in the 12 months prior to the survey (Figure 16).

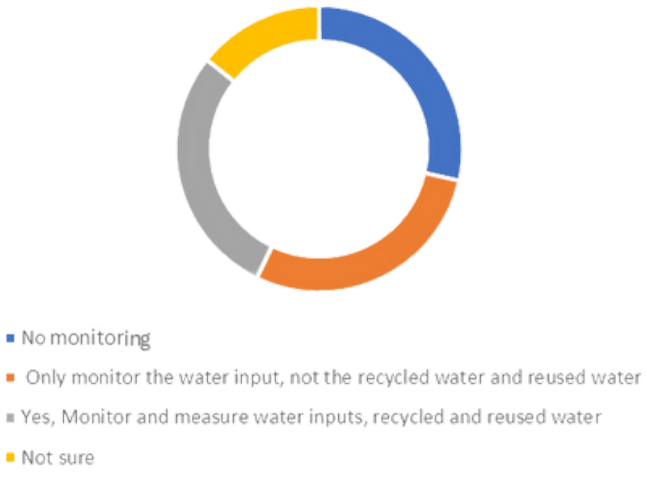


Figure 16: *Water monitoring status of surveyed companies*

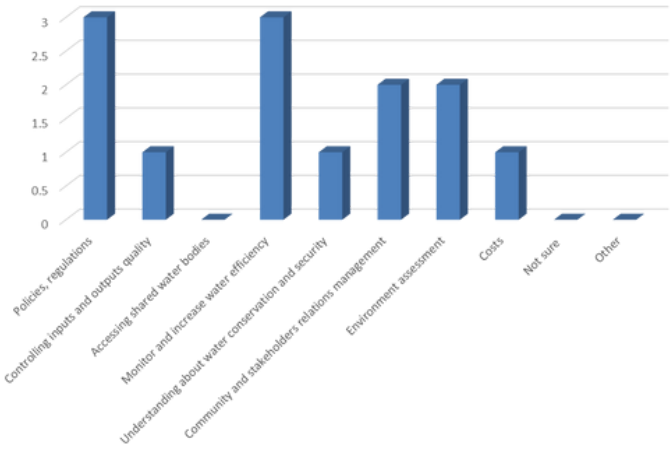


Figure 17: *Barriers to water management for companies in Dong Nai Basin*

Survey responses indicate that the key barriers to effective water management and use are related to policies and regulations, limited capacity for monitoring and enhancing water efficiency, stakeholder relations, and environmental assessment (Figure 17).

In follow-up interviews, companies further emphasized challenges in advancing their water management practices, citing a lack of sufficient information and knowledge to set effective targets and develop action plans. Regulatory barriers were also a concern, such as lack of provincial-level policies on water circularity, or guidance on how businesses can contribute to improving catchment water quality and balance.

Cost and water access were not seen as major barriers by most respondents. This may be because the surveyed companies adhere to high operational standards aligned with their international market requirements and do not require major upgrades to meet national standards. Furthermore, all surveyed companies rely solely on utility-supplied water, providing sufficient access, and operate in Ho Chi Minh City, Ba Ria-Vung Tau, and Binh Duong, which are not considered high-risk for water availability.

Despite having adequate water access, many of the companies surveyed have faced operational challenges due to water issues in the Dong Nai River Basin, including pollution, salinity intrusion, drought, and flooding (Figure 18).

Financial impacts stem from these physical water challenges, as well as growing regulatory and reputational pressures to enhance water management practices, driven by both customer expectations and national regulations (Figure 19).

Stricter international standards and national regulations require companies to invest in facility upgrades to improve water efficiency, implement better monitoring systems, and ensure higher quality water outputs.

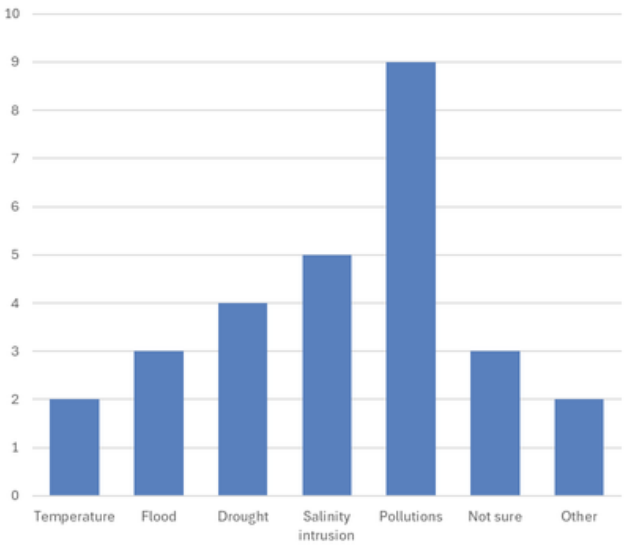


Figure 18 *Factors affecting operations and water sources*

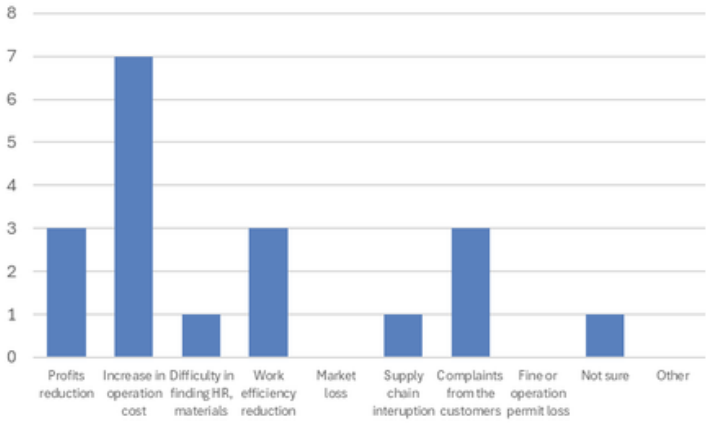


Figure 19: *Impact from water risks on companies*

Overall though, potential impacts from water-related risks to the operation were not well aware by the companies in the survey as stated in the follow up interviews. There was even less awareness on the social issues in the community caused directly and indirectly by lack of access to clean water.

The majority of companies that participated in this survey are large enterprises with greater financial capacity to manage risks, but at the same time are also more exposed to damage associated with reputational risks.

Key Findings include:

- Policy, regulations (either lack of or not comprehensive) and the companies' capacity to increase water use efficiency are identified as the main barriers to advance their water management practices.
- Monitoring data on water quality, water quantity, and water efficiency both publicly and internally, is limited. As a consequence, existing data is not made available for those who could use it to improve water management practices.
- Pollution was recognized as the major risk to water security by most respondents.
- Social issues including clean water access, infrastructure for vulnerable groups, and inclusive decision-making are noticeable, while other social issues are either not existing or not recognized by the respondents.

4.2. Initiatives and solutions

According to the survey, companies have implemented various strategies and initiatives to improve their water use and enhance good practices (Figure 20). Their key priorities include raising awareness, improving disaster risk planning, and promoting water recycling, while less emphasis is placed on overhauling operational models. The reported benefits of these efforts as shared in the interviews include the promotion of sustainable practices among employees, reduced wastewater output, and positive contributions to local communities. Notable initiatives involve the adoption of technologies for wastewater reuse, improvements to local water supply systems, and efforts to ensure continuous access to clean water.

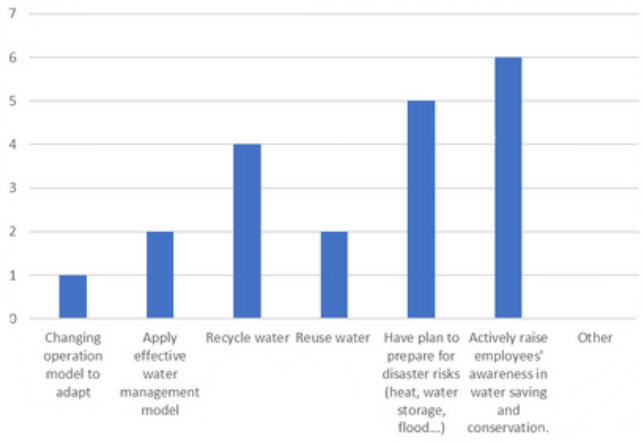


Figure 20: *Companies initiatives towards water stewardship*

According to survey results, companies identified various areas where government support is pivotal in fostering effective site-level water management (Figure 21).

- High-priority areas: Coordinating catchment water usage, capacity building, and issuance of permits for water reuse.
- Other potential initiatives: Promoting water sharing policies and monitoring capacity are considered to be less significant is this phase.

All companies participating in the survey recognized the important role of government in enabling sound water management practices. The potential low hanging fruits regarding the government support as proposed by the companies from this survey are the capacity and awareness raising; and the permit to reuse water.

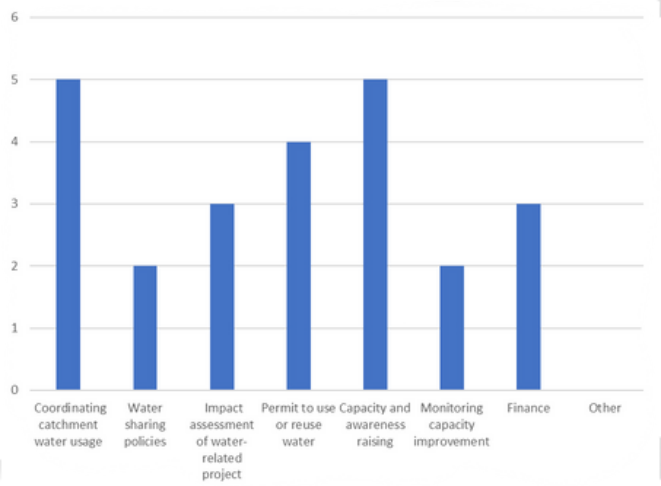


Figure 21: *Potential government support*

Chapter 5

CONCLUSION & RECOMMENDATIONS

5.1. Roadmap to water stewardship in the DNRB

Addressing the mounting water challenges in Vietnam requires enhanced joint efforts and collaborative actions. This report provides a thorough analysis of water management with a specific focus on the Dong Nai River Basin. It examines governance frameworks, water risks and challenges, and the role of stakeholder engagement and private-sector participation.

The insights from this analysis provide a roadmap for advancing water stewardship efforts and initiatives, and practical steps to ensure the sustainable management of the basin's vital water resources in the face of climate change and other emerging threats.

Creating an environment that fosters sustainable change requires multi-stakeholder participation and coordination from both public and private sectors. Based on the study findings, the following activities are recommended as initial actions for advancing water stewardship.

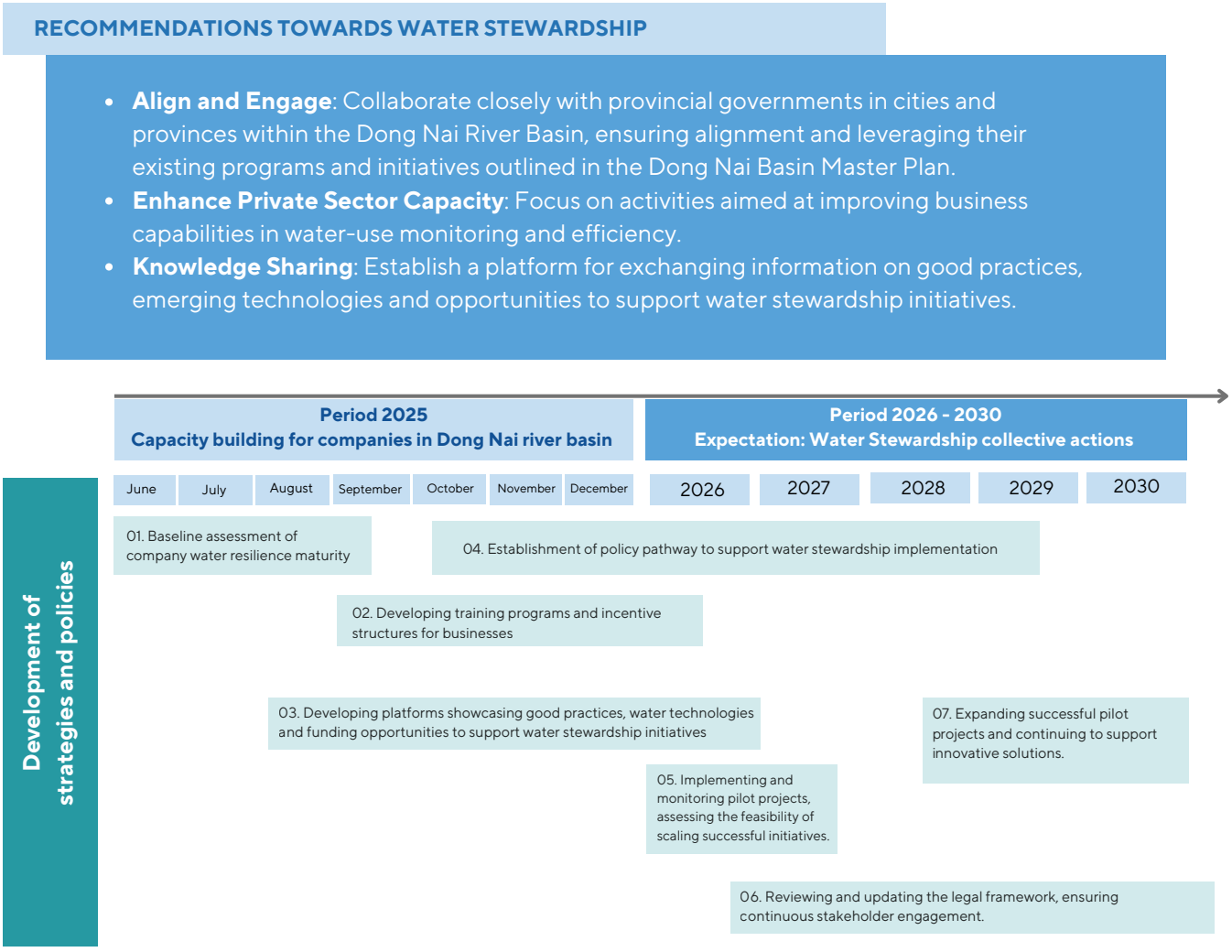


Figure 22: *Roadmap to water stewardship in Dong Nai River Basin*

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Annex A : Legal Framework Related To Water Resources

LAW/DCREE	AGENCY	DATE	TITLE/FOCUS	WATER STEWARDSHIP OUTCOMES
Law No. 28/2023/QH15	National Assembly	2023	Water Resources	
Decree No. 45/2022/ND-CP	Government	2022	Penalties for administrative environmental protection offences	
Decree No. 41/2021/ND-CP	Government	2021	Amending and supplementing a number of articles Decree No. 82/2017/ND-CP stipulating the method of calculating and collecting money for granting rights to exploit water resources	
Decree No. 66/2019/ND-CP	Government	2019	Conservation and Sustainable Use of Wetlands.	
Decree No. 167/2018/ND-CP	Government	2018	Restricts groundwater exploitation	
Decree 114/2018/ND-CP	Government	2018	The Government on safe management of dams and reservoirs	
Decree No. 82/2017/ND-CP	Government	2017	Stipulates the method of calculating and collecting money for granting rights to exploit water resources	
Decree No. 54/2015/NĐ-CP	Government	2015	Incentives for economical use of water	
Decree No. 43/2015/ND-CP	Government	2015	Regulations on establishment and management of water source protection corridors.	
Decree No. 201/2013/NĐ-CP	Government	2013	The implementation of a number of articles of the Law on Water Resources	
Decree No. 120/2008/NĐ-CP	Government	2008	River basin management	
Decree No. 112/2008/NĐ-CP	Government	2008	Management, protection and integrated exploitation of natural resources and environment of hydropower and irrigation reservoirs	
Decree No. 80/2014/ND-CP	Government	2014	Water drainage and wastewater treatment.	
Resolution No. 73/NQ-CP	National Assembly	2023	The adjustment of land-use planning to 2020 and the final land use plan (2016 - 2020) of Tra Vinh province	

Annexe A : Legal Framework Related To Water Resources

Decision No. 174/QD-TTG	Government	2021	Approving the Mekong River Basin Integrated Plan for the period 2021 - 2030, vision to 2050	
Decision No. 1622/QD-TTG	Government	2022	The water resources planning for the period 2021 - 2030, vision to 2050	
Decision No. 1383/QĐ-TTg	Government	2021	The scheme on the national water resources inventory, period up to 2025	
Decision No. 1748/QD-TTG	Government	2023	Formulating water resources planning for the period 2021-2030, vision to 2050	
Decision No. 1612/QD-TTg	Government	2019	Promulgating the Procedure for Inter-reservoir Operation in the Srêpôk River Basin	
Decision No. 1606/QD-TTG	Government	2019	Procedure for Inter-reservoir Operation in the Ca River Basin	
Decision No. 1605/QD-TTg	Government	2019	Procedures for inter-reservoir operation in river basins	
Decision No. 1553/QD-TTG	Government	2019	the adjustment of the program of investigation and search for groundwater sources to supply domestic water in high mountainous areas and water-scarce areas	
Decision No. 1200/QD-TTg	Government	2017	The Appraisal Council for the task of formulating water resources planning for the period 2021-2030, with a vision to 2050	
Circular 17/2021/TT-BTNMT	MONRE	2021	Supervision of extraction and use of water resources	
Circular 03/2024/TT-BTNMT	MONRE	2024	Detailing the implementation of certain provisions of the Law on Water Resources	
Circular No. 04/2020/TT-BNNPTNT	MARD	2020	Planning for integrated inter-provincial river basins and inter-provincial water sources	

Annex B : Benchmarking ESG Standards – AWS

STANDARDS	OVERLAP	GAP
GRI 303: water and effluents (GRI STANDARDS)	Share a common goal of promoting sustainable water management.	GRI 303 focuses on transparency and corporate-level reporting of water and effluents. AWS requires assessment of site and catchment relations in order for site to prepare for potential risks that could affect the site or how site can affect the catchment.
	Address the need to monitor and manage water quality and quantity	GRI 303 focus more on corporate-level reporting and transparency, with less emphasis on site-specific management practices.
	Require organizations to establish policies and procedures to manage water responsibly.	GRI 303 provide comprehensive guidelines for reporting water-related data but lacks specific implementation strategies for water management.
	Require organizations to disclose water-related data, including water withdrawal, discharge, and consumption.	GRI 303 Access to a broader audience, including investors and regulators, without requiring direct local stakeholder engagement.
	Recognize the importance of engaging with stakeholders	
IFC Performance Standards on Environmental & Social Sustainability	Both standards address efficient water use, pollution prevention, and stakeholder engagement.	AWS and IFC standards differ in their scope, level of detail, and specific focus areas, AWS offers a more detailed and holistic approach to water stewardship, including social and ecological considerations, IFC provides broader guidelines on resource efficiency and pollution prevention within industrial contexts.
	Monitoring water consumption and reduce water usage.	IFC standards cover a wider range of environmental and resource efficiency issues
	Treatment of wastewater and prevention of water pollution.	The AWS Standard specifically emphasizes the protection and management of important water-related areas
	Both standards stress the need for strong governance structures to manage water resources and ensure compliance with relevant regulations and standards.	The AWS emphasis on the social and ecological impacts of water use, including community access to water and the protection of ecosystems
	Engaging with stakeholders to ensure transparency and collaborative water management.	The AWS Standard provides more comprehensive guidance on implementing water stewardship practices, including specific steps and methodologies, whereas the IFC standard provides more high-level principles and requirements
Guide notebook evaluation tool level of sustainable business practices of enterprises under framework ESG for Vietnamese companies	AWS and ESG guide involve Water Consumption, water quality and water treatment and reusing wastewater. They emphasize Environmental standards for suppliers.	The ESG guide assess according to 3 pillars with 16 criteria related to the environment, but water related criteria is only 2 (E10 and E13). The AWS provides a more comprehensive framework for water stewardship compared to ESG guide focuses on resource efficiency.

Annex C : Water Governance Stakeholders In DNRB

STAKEHOLDER GROUPS	COMPANY / ORGANIZATIONS	SECTORS
Water suppliers	Saigon Water Supply Corporation (SAWACO)	Water Utility
	Binh Duong Water and Environment Corporation (BIWASE) Joint Stock Company	
	Ba Ria Vung Tau Water Supply Joint Stock Company (BWACO)	
	Ben Thanh Water Supply Joint Stock Company	
	Phu My Water Supply Joint Stock Company	
	Dong Nai Water Supply Joint Stock Company	
	Long Khanh Water Supply Joint Stock Company	
	Nha Be Water Supply Joint Stock Company	
	Nhon Trach Water Supply Joint Stock Company	
	Phu Hoa Tan Water Supply Joint Stock Company	
	Tan Hoa Water Supply Joint Stock Company	
	Thu Duc Water Supply Joint Stock Company	
	Trung An Water Supply Joint Stock Company	
	Binh Phuoc Water Supply and Sewerage Joint Stock Company	
	Binh Thuan Water Supply and Sewerage Joint Stock Company	
	Lam Dong Water Supply and Sewerage Joint Stock Company	
	Long An Water Supply and Sewerage Joint Stock Company (LAWACO)	
	Hà Lan Water Supply Co., Ltd.	
	Ben Luc Water Supply and Urban Services Joint Stock Company	
	Tay Ninh Water Supply and Sewerage Joint Stock Company	
	Dong Nai Water Supply Service and Construction Joint Stock Company	
	Saigon - Cu Chi Water Supply Joint Stock Company	
	Binh Duong Water - Environment Joint Stock Company	
	Ho Chi Minh City Rural Domestic Water Supply Enterprise (NTWACO)	
	Ho Chi Minh City Rural Water and Sanitation Center	
	Ba Ria - Vung Tau Rural Water and Environmental Sanitation Center	

Annex C: Water governance stakeholders in DNRB

Water Users with sustainability commitments (AWS membership, WSVN network, AWS registered)	Apple	Electronics
	Samsung	Electronics
	Dell	Electronics
	Cisco	Electronics
	Abbott	Pharma
	Coca Cola	F&B
	Heineken	F&B
	L'Oréal	Personal care
	Nestle	F&B
	Nestle Waters – La Vie	F&B
	Suntory	F&B
	Unilever	Personal care
	Farm Angel	Agriculture
	Pizza 4P's	F&B
	Amazon Web Services (AWS)	Logistics
Promoters	Department of natural resources and environment of Ho Chi Minh city and provinces in the Dong Nai River Basin	Government
	Department of climate change	Government
	Ho chi minh city department of agriculture and rural development	Government
	Southern Institute for Water Resources Planning (SIWRP).	Research institute
	Institute of Policy and Strategy for Agriculture and Rural Development (IPSARD)	Research institute
	HCMUT	Research institute
	Centre for Water Resources Conservation and Development (WARECOD)	NGO

Annex C: Water governance stakeholders in DNRB

Promoters	HCMUNRE	Research institute
	Disability Research and Capacity Development (DrD)	CSO
	Vietnam River Network	CSO
	Women Union	CSO
	VCCI HCM	Business association
	Auscham	Business association
	Eurocham	Business Association
	VWSA	Business Association

Annex D : Water Governance Initiatives In DNRB

SUB-REGIONS BY MANAGEMENT PLAN	PROVINCES	INITIATIVES	REFERENCES & LINK
Upper Dong Nai river: Lam Dong; Dak Nong; Binh Phuoc; Dong Nai; Binh Thuan	Lam Dong (Don Duong, Da Lat city, Lac Duong, Duc Trong, Dam Rong, Lam Ha, Di Linh, Bao Lam, Cat Tien,Da The, Da Huoai, Bao Loc city)	Decision No. 946/QD-TTg of the Prime Minister: Approving the task of planning Lam Dong province for the period 2021 - 2030, vision to 2050	Quyết định số 946/QĐh-TTg, Phê duyệt nhiệm vụ quy hoạch tỉnh Lâm Đồng thời kì 2021-2030, tầm nhìn đến năm 2050, https://datafiles.chinhphu.vn/cpp/files/vbpq/2021/06/946.signed.pdf
		Action plan to respond to climate change for the period 2021-2030 with a vision to 2050 in Lam Dong province	Kế hoạch hành động ứng phó biến đổi khí hậu giai đoạn 2021-2030, tầm nhìn 2050 trên địa bàn tỉnh Lâm Đồng, https://thuvienphapluat.vn/van-ban/Tai-nguyen-Moi-truong/Quyet-dinh-2065-QD-UBND-2020-Ke-hoach-hanh-dong-ung-pho-bien-doi-khi-hau-tinh-Lam-Dong-460412.aspx
		Decision No.2362/QD-UBND, Report on the current environmental status of Lam Dong province in the period 2016-2020.	Quyết định số 2362/QĐ-UBND, Báo Cáo Hiện Trạng Môi Trường tỉnh Lâm Đồng giai đoạn 2016-2020, https://lamdong.gov.vn/sites/tonghop/tnmt/Shared%20Documents/Cac%20Van%20ban/khoangsan10-2020/2362 signed.pdf
		Strategic environmental assessment report of Lam Dong province planning for the period 2021-2030, with a vision to 2050	Báo cáo đánh giá môi trường chiến lược của quy hoạch tỉnh Lâm Đồng thời kỳ 2021-2030, tầm nhìn đến năm 2050, https://lamdong.gov.vn/Lists/Ly%20%20kin%20quy%20hoch%20%20k%20hoch/Attachments/12/04.DMC %20QH%20tinh%20L%C3%A2m%20%C4%90%E1%BB%93ng 2708.pdf
	Dak Nong (Dak Glong, Dak Song, Gia Nghia city, Tuy Duc, Dak R'Lap)	Decision No. 964/QD-TTg of the Prime Minister: Approving the task of planning Dak Nong province for the period 2021 - 2030, with a vision to 2050	Quyết định số 964/QĐh-TTg, Phê duyệt nhiệm vụ quy hoạch tỉnh Đăk Nông thời kì 2021-2030, tầm nhìn đến năm 2050, https://datafiles.chinhphu.vn/cpp/files/vbpq/2020/07/964.signed.pdf
		Decision No.835/QD-UBND, Action plan to respond to climate change for the period 2021-2030, vision to 2050, Dak Nong province	Quyết định số 835/QĐ-UBND, Kế hoạch hành động ứng phó biến đổi khí hậu giai đoạn 2021-2030, tầm nhìn 2050 trên địa bàn tỉnh Đắk Nông, https://lawnet.vn/vb/Quyet-dinh-835-QD-UBND-2021-Ke-hoach-hanh-dong-ung-pho-voi-bien-doi-khi-hau-tinh-Dak-Nong-78262.html
		Decision No.1852/QD-UBND Environmental status report of Dak Nong province for 5 years, period 2016 - 2020	Quyết định số 1852/QĐ-UBND, Báo Cáo Hiện Trạng Môi Trường tỉnh Đắk Nông giai đoạn 2016-2020, http://cdn.daknong.gov.vn/stn-files/10122020163941pm_qd_1852_1signed_20201211074849120208 6_2020-11-11-9-33-11.pdf
	Binh Phuoc (Bu Dang)	Decision No. 518/QD-TTg of the Prime Minister: Approving the task of planning Binh Phuoc province for the period 2021 - 2030, with a vision to 2050	Quyết định số 518/QĐh-TTg, Phê duyệt nhiệm vụ lập quy hoạch tỉnh Bình Phước thời kì 2021-2030, tầm nhìn đến năm 2050, https://datafiles.chinhphu.vn/cpp/files/vbpq/2020/04/518.signed.pdf
		Decision No.2146/QĐ- UBND, Approval of Implementation Approach to limiting groundwater exploitation in Binh Phuoc Province	Phương án thực hiện việc hạn chế khai thác nước dưới đất trên địa bàn tỉnh Bình Phước, https://stnmt.binhphuoc.gov.vn/vi/news/tn-nuoc-ks/phe-duyet-phuong-an-thuc-hien-viec-han-che-khai-thac-nuoc-duoi-dat-tren-dia-ban-tinh-binh-phuoc-1335.html?download=1&id=0
		Decision No 1327/QĐ-UBND, Approval of Restricted areas to exploitation of groundwater in Binh Phuoc Province	Phê duyệt danh mục vùng hạn chế khai thác nước dưới đất và danh mục khu vực phải đăng ký khai thác nước dưới đất trên địa bàn tỉnh Bình Phước, https://stnmt.binhphuoc.gov.vn/vi/news/tn-nuoc-ks/1327-qd-ubnd-517.html?download=1&id=0
	Dong Nai (Tan Phu, Vinh Cuu, Trang Bom, Thong Nhat, Dinh Quan)	Decision No. 1016/QD-TTg of the Prime Minister: Approving the task of planning Dong Nai province for the period 2021 - 2030, with a vision to 2050	Quyết định số 1016/QĐh-TTg, Phê duyệt nhiệm vụ lập quy hoạch tỉnh Đồng Nai thời kì 2021-2030, tầm nhìn đến năm 2050, https://datafiles.chinhphu.vn/cpp/files/vbpq/2020/07/1016.signed.pdf
		Action plan to respond to climate change in Dong Nai province, period 2021-2030 with vision to 2050	Kế hoạch hành động ứng phó với biến đổi khí hậu trên địa bàn tỉnh Đồng Nai, giai đoạn 2021 - 2030 tầm nhìn đến năm 2050, https://thuvienphapluat.vn/van-ban/Tai-nguyen-Moi-truong/Quyet-dinh-2728-QD-UBND-2021-Ke-hoach-hanh-dong-ung-pho-voi-bien-doi-khi-hau-tinh-Dong-Nai-487833.aspx
		Strategic environmental assessment report of Dong Nai province planning for the period 2021-2030, with a vision to 2050	Báo cáo đánh giá môi trường chiến lược của quy hoạch tỉnh Đồng Nai thời kỳ 2021-2030, tầm nhìn đến năm 2050, https://www.dongnai.gov.vn/Shared%20Documents/3.%20BAO%20CAO%20DMC%20QUY%20HOACH%202021-2030-DNAI.pdf
	Binh Thuan (Duc Linh, Tanh Linh)	Decision No. 348/QD-TTg of the Prime Minister: Approving the task of planning Binh Thuan province for the period 2021 - 2030, with a vision to 2050	Quyết định số 348/QĐh-TTg, Phê duyệt nhiệm vụ lập quy hoạch tỉnh Bình Thuận thời kì 2021-2030, tầm nhìn đến năm 2050, https://datafiles.chinhphu.vn/cpp/files/vbpq/2020/03/348.signed.pdf
		Plan 2758/KH-UBND Binh Thuan 2022 implementing the Project on Developing Urban Areas Responding to Climate Change	Quyết định 2758/KH-UBND, Kế hoạch triển khai thực hiện đề án phát triển các đô thị ứng phó với biến đổi khí hậu giai đoạn 2021-2030 trên địa bàn tỉnh, https://thuvienphapluat.vn/van-ban/Xay-dung-Do-thi/Ke-hoach-2758-KH-UBND-2022-phat-trien-do-thi-ung-pho-bien-doi-khi-hau-Binh-Thuan-2021-2030-527691.aspx
		Environmental status report (2016-2020) of Binh Thuan province	Báo cáo hiện trạng môi trường 05 năm (2016 - 2020) của tỉnh Bình Thuận, https://storage-vnportal.vnpt.vn/btn-ubnd/sitefolders/skhcn/vanban/16-9-2020/bchtmt0-nam.pdf

Annex D : Water governance initiatives in DNRB

SUB-REGIONS BY MANAGEMENT PLAN	PROVINCES	INITIATIVES	REFERENCES & LINK
Dong Nai river downstream : Dong Nai, Binh Duong, HoChiMinh City, Ba Ria-Vung Tau	Dong Nai (Bien Hoa city, Long Khanh city, Vinh Cuu, Trang Bom, Thong Nhat, Cam My, Long Thanh, Nhon Thach)	As Above	
	Binh Duong (Thu Dau Mot city, Thuan An city, Di An city, Ben Cat commune, Tan Uyen city, Bac Tan Uyen)	Decision No. 462/QD-TTg dated April 7, 2020 of the Prime Minister approving the task of planning Binh Duong province for the period 2021-2030, with a vision to 2050	Quyết định số 462/QĐh-TTg, Phê duyệt nhiệm vụ lập quy hoạch tỉnh Bình Dương thời kì 2021-2030, https://datafiles.chinhphu.vn/cpp/files/vbpq/2020/04/462.signed.pdf
		Action plan to respond to climate change for the period 2021-2030, vision to 2050 of Binh Duong province	Quyết định 430/QĐ-UBND, Kế hoạch hành động ứng phó biến đổi khí hậu giai đoạn 2021-2030, tầm nhìn 2050 trên địa bàn tỉnh Bình Dương, https://thudaumot.binhduong.gov.vn/Portals/0/Images/430QDngay08022021cuaUBNDtinhB%C3%ACnhD%C6%B0%C6%A1ng.pdf
		Report on the current environmental status of Binh Duong province in the period 2016-2020	Báo cáo hiện trạng môi trường của tỉnh Bình Dương giai đoạn 2016-2020, https://www.binhduong.gov.vn/_layouts/LacVietBio/LacViet.DichVuCong/Pages/DownloadFilePage.aspx?FileUrl=https://www.binhduong.gov.vn/chinhquyen/Lists/VanBanChiDaoDieuHanh/Attachments/4330/BAO_CAO_TONG_HOP_23.12.2020.pdf
	Ho Chi Minh city (Thu Duc city, District 7, District 8, Binh Chanh, Can Gio, Nha Be)	Report on the environmental status of Ho Chi Minh city in 2021	Báo cáo hiện trạng môi trường thành phố Hồ Chí Minh, https://geoportal-stnmt.tphcm.gov.vn/geonetwork/srv/api/records/7080ab51-25a4-4335-8c45-9b97157431ca/attachments/bchientrangmt2021.pdf
		Decision No. 642/QD-TTg of the Prime Minister: Approving the Task of planning Ho Chi Minh City for the period 2021 - 2030, with a vision to 2050	Quyết định số 642/QĐh-TTg, Phê duyệt nhiệm vụ lập quy hoạch Thành Phố Hồ Chí Minh thời kì 2021-2030, https://datafiles.chinhphu.vn/cpp/files/vbpq/2022/05/642-ttg.signed.pdf
		Decision 3273/QD-UBND in 2021 on Action Plan to respond to climate change for the period 2021-2030, with a vision to 2050 in Ho Chi Minh City	Quyết định 3273/QĐ-UBND, Kế hoạch hành động ứng phó với biến đổi khí hậu giai đoạn 2021-2030, tầm nhìn đến 2050 trên địa bàn Thành phố Hồ Chí Minh, http://www.donre.hochiminhcity.gov.vn//Lists/vanbanmoi/Attachments/960/3273qdsigned.pdf
		CIRCULAR 06/2023/TT-BTNMT Guidance on integrating climate change response content into strategies and planning	Thông tư 06/2023 TT-BTNMT, Hướng dẫn lồng ghép nội dung ứng phó với biến đổi khí hậu vào chiến lược, quy hoạch, http://www.donre.hochiminhcity.gov.vn//Lists/vanbanmoi/Attachments/1005/06-2023-tt-btnmt_Signed.pdf
	Ba Ria - Vung Tau (Phu My commune, Chau Duc)	Decision No. 1442/QD-TTg of the Prime Minister: Approving the Task of Ba Ria - Vung Tau province planning for the period 2021-2030, vision to 2050	Quyết định số 1442/QĐh-TTg, Phê duyệt nhiệm vụ lập quy hoạch tỉnh Bà Rịa-Vũng Tàu thời kì 2021-2030, tầm nhìn đến năm 2050, https://datafiles.chinhphu.vn/cpp/files/vbpq/2020/09/1442.signed.pdf
		Decision 3070/QD-UBND, Action plan to respond to climate change of Ba Ria - Vung Tau province for the period 2021 - 2030, vision to 2050.	Quyết định 3070/QĐ-UBND, Kế hoạch hành động ứng phó với biến đổi khí hậu của tỉnh Bà Rịa - Vũng Tàu giai đoạn 2021 - 2030, tầm nhìn đến 2050, https://thuvienphapluat.vn/van-ban/Tai-nguyen-Moi-truong/Quyet-dinh-3070-QD-UBND-2021-ung-pho-voi-bien-doi-khi-hau-tinh-Ba-Ria-Vung-Tau-2021-2030-494731.aspx
		Report on the current environmental status of Ba Ria-Vung Tau province in the period 2016-2020	Báo cáo hiện trạng môi trường tỉnh Bà Rịa-Vũng Tàu giai đoạn 2016-2020, https://baria-vungtau.gov.vn/sphere/baria/cms/asset/download.cpx?code=c18ff48b-1bb2-4cac-9562-c34361f11486&view=true

Annex D : Water governance initiatives in DNRB

SUB-REGIONS BY MANAGEMENT PLAN	PROVINCES	INITIATIVES	REFERENCES & LINK
Saigon River – upper Vam Co : Tay Ninh, Binh Phuoc, Binh Duong, HoChiMinh City	Tay Ninh (Tan Bien, Tan Chau, Duong Minh Chau, Go Dau, Trang Bang Commune, Tay Ninh city, Hoa Thanh Commune, Chau Thanh, Ben Cau)	Decision No. 775/QD-TTg of the Prime Minister: Approving the task of planning Tay Ninh province for the period 2021 - 2030, with a vision to 2050	Quyết định số 775/QĐh-TTg, Phê duyệt nhiệm vụ lập quy hoạch tỉnh Tây Ninh thời kì 2021-2030, tầm nhìn đến năm 2050, https://datafiles.chinhphu.vn/cpp/files/vbpq/2020/06/775.signed.pdf
		Decision 1138/QD-UBND, Action plan to respond to climate change in Tay Ninh province for the period 2022-2030, with a vision to 2050.	Quyết định số 1138/QĐ-UBND, Kế hoạch hành động ứng phó với biến đổi khí hậu tỉnh Tây Ninh giai đoạn 2022 -2030, tầm nhìn đến năm 2050, https://taniza.tayninh.gov.vn/Upload/Images/files/1138%20QD%20KH%20HD%20ung%20pho%20BDKH.pdf
		Report on the current environmental status of Tay Ninh province in the period 2016 - 2020	Báo cáo Hiện trạng môi trường tỉnh Tây Ninh giai đoạn 2016 - 2020, https://sotnmt.tayninh.gov.vn/vi/news/moi-truong/cong-bo-bao-cao-hien-trang-moi-truong-tinh-tay-ninh-giai-doan-2016-2020-1703.html?download=1&id=1
	Binh Phuoc (Bu Dop, Loc Ninh, Binh Long Commune, Hon Quan, Chon Thanh)	As above	
	Binh Duong (Dau Tieng, Bau Bang, Ben Cat Commune, Tan Uyen Commnune, Thu Dau Mot city, Thuan An city, Di An city, Bac Tan Uyen)	As above	
	Ho Chi Minh city (District 1, District 3, District 4, District 5, District 6, District 7, District 8, District 10, District 11, District 12, Phu Nhuận District, Go Vap District, Tan Binh District, Binh Tan District, Binh Thanh District, Tan Phu District, Thu Duc city, Binh Chanh, Cu Chi, Hoc Mon)	As above	
Be River : Dak Nong, Binh Phuoc, Binh Duong, Dong Nai	Dak Nong(Tuy Duc, Dak R'lap)	As above	
	Binh Phuoc (Bu Dang, Bu Dop, Bu Gia Map Phuong Long commune, Binh Long commune, Dong Xoai city, Phu Rieng, Dong Phu, Loc Ninh, Hon Quan, Chon Thanh)	As above	
	Binh Duong (Phu Giao, Bau Bang, Bac Tan Uyen)	As above	
	Dong Nai (Vinh Cuu)	As above	
La Nga River : Lam Dong, Binh Thuan, Dong Nai	Lam Dong (Di Linh, Bao Lam, Bao Loc city, Da Huoai)	As above	
	Binh Thuan (Duc Linh, Tanh Linh, Ham Thuan Bac, Ham Thuan Nam)	As above	
	Dong Nai (Tan Phu, Dinh Quan, Xuan Loc, Thong Nhat, Long Khanh city)	As above	
Coastal surroundings: Binh Thuan, Binh Thuan, Ba Ria Vung Tau, Lam Dong, Dong Nai	Ninh Thuan	Decision No. 501/QD-TTg of the Prime Minister: Approving the task of planning Ninh Thuan province for the period 2021 - 2030, vision to 2050	Quyết định số 501/QĐh-TTg, Phê duyệt nhiệm vụ lập quy hoạch tỉnh Ninh Thuận thời kì 2021-2030, tầm nhìn đến năm 2050, https://datafiles.chinhphu.vn/cpp/files/vbpq/2020/04/501.signed.pdf
		Decision 1655/KH-UBND, Plan to respond to drought, water shortage and saltwater intrusion in 2024 in Ninh Thuan province	Kế hoạch số 1655/KH-UBND, Ứng phó hạn hán, thiếu nước và xâm nhập mặn năm 2024 trên địa bàn tỉnh Ninh Thuận, https://ninhthuan.gov.vn/portal/VanBan/2024-04/a4e8dd370d644aad1655-KH-UBND.pdf
	Binh Thuan	As above	
	Ba Ria - Vung Tau	As above	
	Lam Dong (Dong Duong, di Linh	As above	
	Dong Nai (Xuan Loc, Long Khanh city, Cam My)	As above	

Annex E : WRI Water Risk Atlas & WWF Water Risk Filter

WRI Water Risk Atlas	WWF Water Risk Filter
Risk categories available for query: • Overall water risk • Physical risks quantity • Physical risks quality • Regulatory and reputational risk Note: Physical risks quantity measures risk related to too little or too much water, which combine data on water flow, flood, and drought risks. Query for each quantity-related risks can be selected by user under the subcategories. Common risk indicators for query: • Water stress: measures the ratio of total water demand to renewable surface water and groundwater supply. • Riverine flood risk: measures the percentage of population expected to be affected by Riverine flooding in an average year. • Drought risk: measures where droughts are likely to occur, the population and assets exposed, and the vulnerability of the population and assets to adverse effects	Risk categories available for query: • Physical Risk • Regulatory Risk • Reputational Risk Note: This tool does not provide an aggregate "overall water risk" and can only be queried by risk category or specific risk indicator. Commonly used risk indicators (also called risk subcategories): • Water availability: refers to the abundance or scarcity of freshwater resources. Water availability is usually calculated based on the amount of surface water and groundwater available in a given area. • Drought: refers to a long period of absence of precipitation, resulting in a severe hydrological imbalance that gradually affects various sectors of the economy over time. • Floods: The flood indicator considers historical patterns based on empirical evidence of major flood events from 1985 to the present, which is obtained from various news, government, instrumental and remote sensing sources. And flood depth within the 100-year flood prone range. • Water quality: Water quality indicates whether water resources are suitable for human use and ecosystems.

Annex F : Industry Survey

Section I - Organization Info

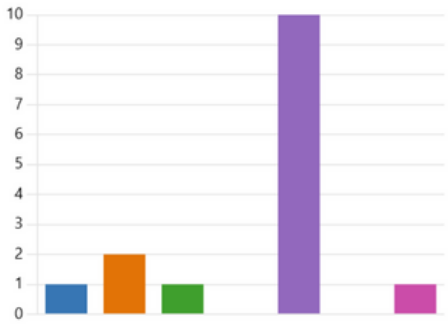
Organization size

Doanh nghiệp siêu nhỏ (<10 người, vốn dưới 3 tỷ)/ Super small (<10 people)	1
Doanh nghiệp nhỏ (<20 người, vốn dưới 50 tỷ)/ Small (<20 people)	2
Doanh nghiệp vừa (<200 người, vốn dưới 200 tỷ)/ Medium (<200 people)	2
Doanh nghiệp lớn (>200 người)/ Large (>200 people)	7

Section II - Water Useinitiatives, solutions, and recommendations

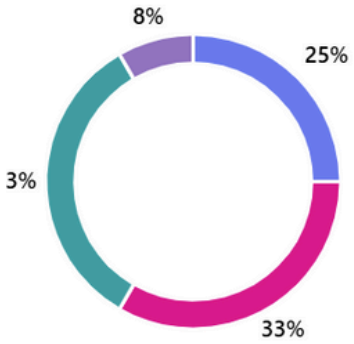
Water inputs sources

Nước ngầm / Ground water	1
Nước bề mặt, bao gồm nước từ các vùng đầm lầy, sông, hồ, và đại dương / Surface water (from lake, river,..	2
Nước mưa do tổ chức thu thập trực tiếp và lưu trữ / Rainwater collected and stored by the organization	1
Nước thải từ tổ chức khác/ Wastewater from other companies	0
Các nguồn cấp nước đô thị hoặc cơ sở cấp nước công cộng hoặc tư nhân khác./ From water supply compai	10
Không rõ/ Not sure	0
Other	1



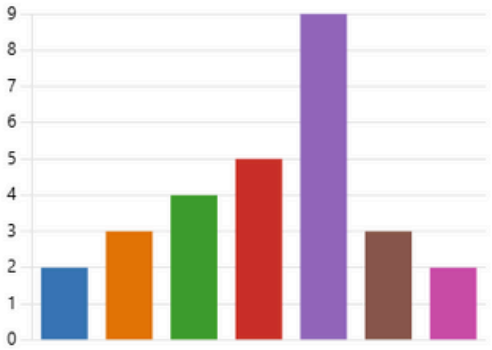
Do you monitor your inflows and outflows, recycled & reused water in the last 12 months?

Không /No	3
Chỉ thống kê lượng nước đầu vào và đầu ra (không sử dụng nước tuần hoàn và tái sử dụng) / Only monitor the water input, not the recycled water and reused water	4
Có - thống kê và đo lường lượng nước đầu vào, đầu ra, nước tuần hoàn và nước tái sử dụng / Yes, Monitor and measure water inputs, recycled and reused water	4
Không rõ / Not sure	1
Other	0



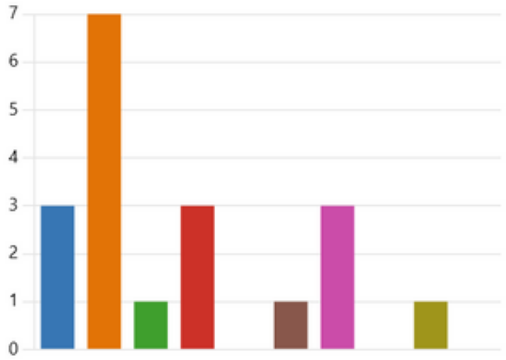
What are the factors affecting your operations and water sources?

Nhiệt độ/ Temperature	2
Bão lũ/ Flood	3
Hạn hán/ drought	4
Xâm nhập mặn/ Salinity intrusion	5
Ô nhiễm/ Pollutions	9
Không rõ/ not sure	3
Other	2



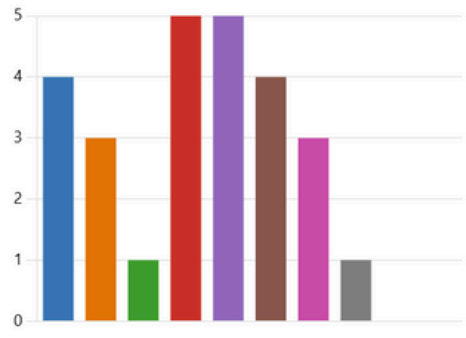
How do the water-related problems affect your companies?

Giảm doanh thu, lợi nhuận/ profits reduction	3
Tăng chi phí sản xuất/ increase in operation cost	7
Khó khăn trong việc tìm kiếm nguồn lực, nguyên liệu/ Difficulty in finding HR, materials	1
Giảm năng suất lao động/ work efficiency reduction	3
Mất thị trường/ Market loss	0
Gián đoạn chuỗi cung ứng/ Supply chain interruption	1
Than phiền từ người dân, khách hàng / Complains from the community, customers	3
Phạt hoặc mất giấy phép kinh doanh/ Fine or operation permit loss	0
Không rõ/ Not sure	1
Other	0

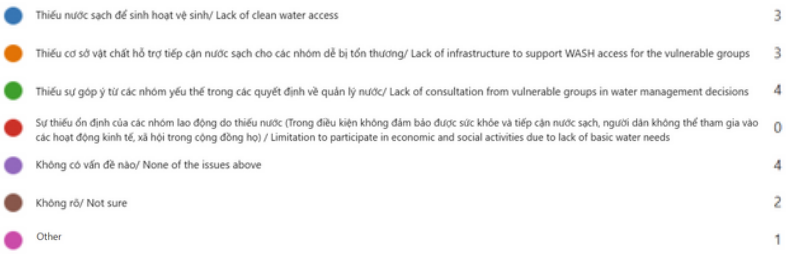


What are the barriers or difficulties in managing and using water?

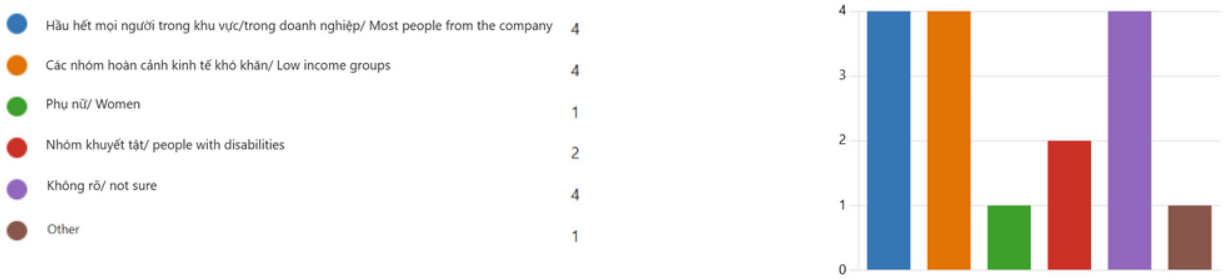
Chính sách, Luật/ Policies, regulations	4
Kiểm soát chất lượng đầu vào và đầu ra / Controlling inputs and outputs quality	3
Tiếp cận nguồn nước từ các hệ thống sông và hồ chứa nước tổng hợp/ accessing shared water bodies	1
Quản lý, giám sát, nâng cao hiệu quả nguồn nước sẵn có/ Mornitor and increase water efficiency	5
Nhận thức về bảo tồn và an ninh nguồn nước/ Understanding about water conservation and security	5
Quản lý các mối quan hệ với cộng đồng và các bên liên quan/ Community and stakeholders relations management	4
Đánh giá tác động môi trường/ Environment assessment	3
Chi phí/ Costs	1
Không rõ/ not sure	0
Other	0



What are the social water issues your organization experienced?



Which groups affected by the issues from the last question?



Section III - Initiatives, solutions, and recommendations

What solutions have been implemented to manage water challenges at your site(s)?

What are the following initiatives from the government that could support businesses in improving water security?

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