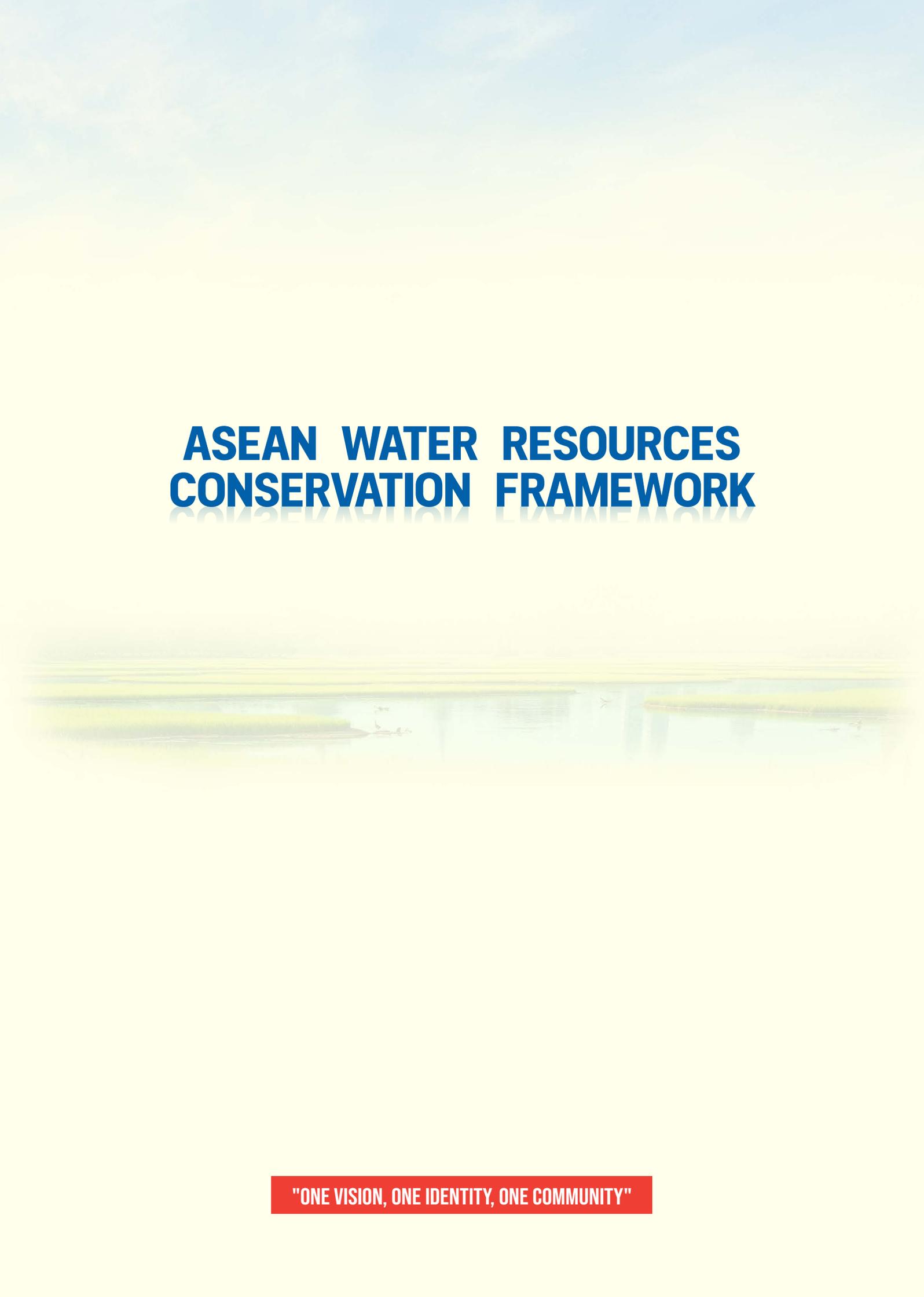




WATER RESOURCES CONSERVATION FRAMEWORK



one vision
one identity
one community



ASEAN WATER RESOURCES CONSERVATION FRAMEWORK

"ONE VISION, ONE IDENTITY, ONE COMMUNITY"

ASEAN WATER RESOURCES CONSERVATION FRAMEWORK

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Preface

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Ministry of Natural Resources and Environment
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The Department of Water Resources (DWR) under the Ministry of Natural Resources and Environment (MNRE), as the National Focal Point for the ASEAN Working Group on Water Resources Management (AWGWRM) of Thailand, was honored to lead the development of the ASEAN Water Resources Conservation Framework. The Framework was formulated through an inclusive, participatory drafting process involving multiple rounds of national and regional consultations with key stakeholders and technical experts from all ASEAN Member States (AMS). These engagements ensured that the content reflected diverse national contexts and collective regional priorities. Following the consolidation of final inputs from AMS, the Framework was formally endorsed in March 2025, marking a major milestone in advancing ASEAN's shared commitment to sustainable water resources management.

The Framework consolidates shared commitments, national priorities, and collective expertise under a common vision. Developed in alignment with the ASEAN Strategic Plan of Action

on Water Resources Management (2005), the ASEAN Strategic Plan on Environment 2016–2025 (ASPEN), and the ASEAN Socio-Cultural Community Blueprint 2025, it provides a practical and voluntary roadmap to enhance water use efficiency, protect aquatic ecosystems, strengthen climate resilience, and promote inclusive and equitable governance across the region.

On behalf of the DWR, I extend my sincere appreciation to all AMS for their active participation and valuable contributions throughout the drafting process. I am also deeply grateful to the ASEAN Secretariat (ASEC) for its continued support and guidance. The success of this Framework is the result of a truly collaborative endeavor—one that exemplifies ASEAN's commitment to addressing critical water-related challenges together. The DWR is proud to have played a leading role in this initiative and remains committed to supporting its implementation. I am pleased to witness ASEAN's continued cooperation and collective progress toward a more resilient, inclusive, and water-secure future for the region.

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Inclusive Summary

Water resources are fundamental to the sustainability, economic development, and well-being of ASEAN member states. However, growing pressures from climate change, rapid urbanization, industrial expansion, and increasing water demand have led to severe challenges in managing and conserving these resources. Recognizing these shared challenges, **the ASEAN Water Resources Conservation Framework (AWRCF)** has been developed to provide a structured and cooperative approach for sustainable water management across the region. The Framework is built upon guiding principles, overarching goals, strategic approaches, and collaborative mechanisms designed to align national efforts with regional priorities.

Guiding Principles for Water Conservation

The Framework is grounded in four key **guiding principles** that shape ASEAN's collective efforts in water conservation:

- 1. Integrated Water Resources Management (IWRM)** ensures that water, land, and related resources are managed holistically to maximize economic and social benefits while preserving ecosystems.
- 2. Ecosystem-Based Management (EBM)** emphasizes the need to protect and restore aquatic ecosystems, recognizing their role in water retention, flood control, and biodiversity preservation.
- 3. Sustainable Development Goals (SDGs) Alignment** ensures that ASEAN's water conservation efforts contribute to global sustainability targets, particularly **SDG 6** (Clean Water and Sanitation), **SDG 13** (Climate Action), and **SDG 15** (Life on Land).
- 4. Equity and Inclusion guarantee that all communities**, particularly vulnerable and marginalized groups, have equitable access to water and participate in decision-making processes related to water resources management.

Overarching Goals of the Framework

The AWRCF establishes four **overarching goals** that serve as the foundation for sustainable water management:

- 1. Enhancing Water Use Efficiency:** Promoting efficient water use across sectors (agriculture, industry, domestic) by adopting water-saving technologies and improving water infrastructure.
- 2. Protecting and Restoring Aquatic Ecosystems:** Ensuring the conservation and rehabilitation of key water-dependent ecosystems, including rivers, wetlands, and groundwater systems.
- 3. Strengthening Climate Resilience:** Enhancing preparedness for climate-induced water-related disasters such as floods, droughts, and saline intrusion.
- 4. Fostering Regional Cooperation:** Encouraging ASEAN member states to collaborate on transboundary water management, information sharing, and coordinated conservation efforts.

Strategic Approaches for Implementation

To operationalize the Framework's goals, five **strategic approaches** have been outlined, ensuring a comprehensive and actionable water conservation strategy:

- 1. Water Demand and Supply Management:** Optimizing water resources through improved irrigation, wastewater recycling, infrastructure enhancements, and leakage reduction in urban water systems.
- 2. Ecosystem Conservation and Restoration:** Implementing projects that protect and rehabilitate vital ecosystems such as wetlands, riparian buffers, and mangrove forests.
- 3. Public Awareness and Stakeholder Engagement:** Promoting educational campaigns, fostering community-based conservation efforts, and ensuring public participation in water governance.
- 4. Water Quality and Sanitation:** Harmonizing water quality standards, reducing pollution, and expanding access to safe sanitation, particularly in underserved communities.
- 5. Addressing Water-Related Disasters:** Strengthening resilience to floods, droughts, and extreme weather events through disaster risk reduction strategies and climate-adaptive infrastructure.

Each of these strategies integrates best practices from ASEAN member states and aligns with ongoing national and regional initiatives, ensuring both flexibility and relevance for implementation.

Regional Priorities and Collaborative Implementation Mechanisms

Given that water challenges in ASEAN often transcend national boundaries, **regional collaboration** is at the heart of the AWRCF. The Framework identifies key **regional priorities** that require cooperative action, including:

- Shared governance of transboundary water bodies such as the Mekong River.
- Collaborative disaster risk management and real-time hydrological data sharing.
- Promotion of public-private partnerships (PPPs) to finance sustainable water projects.
- Knowledge-sharing mechanisms for water conservation innovations and best practices.

To **support implementation**, ASEAN has identified several collaborative mechanisms, such as the **ASEAN Working Group on Water Resources Management (AWGWRM)**, a proposed **Regional Water Quality Monitoring Network**, and an **ASEAN Water Conservation Knowledge Hub**. These mechanisms will ensure consistent communication, information exchange, and the harmonization of conservation efforts across the region.



Showcasing Best Practices and Innovations

To encourage mutual learning, the Framework highlights **case studies** of successful water conservation projects across ASEAN. These include:

- **Singapore's NEWater Program**, a pioneering initiative in wastewater recycling for sustainable urban water management.
- **Vietnam's Mekong Delta Salinity Intrusion Management**, which integrates nature-based solutions to combat coastal freshwater depletion.
- **Indonesia's Mangrove Rehabilitation Program**, a large-scale restoration effort to enhance coastal resilience.
- **Thailand's Community-Based Water Conservation Initiatives**, which engage local communities in sustainable water management.
- **Malaysia's Sustainable Water Resources and Quality Management**, which manage Putrajaya wetland resources sustainably.

Additionally, the Framework identifies **gaps and emerging needs** where ASEAN could adopt global best practices, such as **advanced desalination technologies (Australia)**, **transboundary groundwater governance (South America)**, and **payment for ecosystem services (Costa Rica)**.

Way Forward

The ASEAN Water Resources Conservation Framework represents a milestone in **regional cooperation** for sustainable water management. The **way forward** involves:

- Encouraging member states to **adapt** the Framework to their national contexts while aligning with regional priorities.
- Strengthening technical **capacity-building programs** to improve national and local implementation.
- Mobilizing **financial resources** through a mix of national budgets, regional funding mechanisms, and international partnerships.
- Conducting **regular monitoring and evaluation** to assess progress, identify challenges, and ensure the Framework remains dynamic and responsive.

By working together under this Framework, ASEAN member states can ensure that water conservation becomes a **regional priority**, fostering long-term resilience, sustainability, and prosperity for all. The success of this Framework will ultimately depend on the continued **commitment, collaboration, and knowledge exchange** among ASEAN nations, ensuring that water resources are effectively managed for generations to come.

ASEAN Water Resources Conservation Framework

1. Introduction

ASEAN Water Resources Conservation Framework serves as a collective commitment and guiding document for ASEAN member states to advance water conservation efforts in alignment with regional and global sustainability goals. While recognizing the unique circumstances and priorities of each member state, the Framework emphasizes the shared responsibility and mutual benefits of collaborative action. By working together under this Framework, ASEAN can strengthen its leadership in sustainable water resources management, protect vital ecosystems, enhance regional resilience to climate impacts, and ensure equitable access to water for all. Member states are encouraged to adopt and adapt the Framework to their national contexts while contributing to the shared vision of a water-secure and sustainable ASEAN region.

1.1 Background

Water resources are central to the livelihoods, economies, and ecosystems of ASEAN member states. However, the region faces growing challenges that threaten the sustainability of these resources. Rapid population growth, urbanization, industrial expansion, and climate change have intensified the pressures on water availability, quality, and ecosystems. Many ASEAN countries face seasonal water shortages, increasing competition among sectors, and pollution that degrades vital aquatic ecosystems. These challenges underscore the urgent need for a comprehensive and collaborative approach to water conservation and management.

ASEAN has long recognized the importance of sustainable water resources management as a cornerstone for regional development. Key milestones include the adoption of the **ASEAN Strategic Plan of Action on Water Resources Management (2005)**, which laid the foundation for regional cooperation, and the **ASEAN Strategic Plan on Environment 2016-2025 (ASPEN)**, which prioritizes water conservation under Strategic Priority 3. Building on these frameworks, the ASEAN Water Resources Conservation Framework seeks to address emerging challenges while fostering alignment with global commitments such as the **Sustainable Development Goals (SDGs)**, particularly **SDG 6: Clean Water and Sanitation**.



1.2 Vision and Mission

Vision

A sustainable ASEAN region where water resources are managed efficiently, ecosystems are protected, and communities thrive with equitable access to clean and sufficient water.

Mission

To provide a guiding framework for ASEAN member states to achieve sustainable water resources management by enhancing water use efficiency, protecting and restoring aquatic ecosystems, and fostering regional cooperation. This Framework serves as a tool to strengthen national and regional efforts, ensuring resilience to emerging challenges such as climate change and growing water demands.

1.3 Scope and Objectives

Scope

The ASEAN Water Resources Conservation Framework covers all member states, addressing diverse water resource challenges across the region. It focuses primarily on water conservation, grounded in integrated water resources management (IWRM) and ecosystem-based approaches. Recognizing the interdependence of conservation and optimal water utilization, this Framework provides guidance to improve water efficiency and protect ecosystems while encouraging partnerships with key sectors such as agriculture, industry, and domestic water use. This Framework serves as a flexible and adaptive guide that supports member states in aligning their national strategies with regional priorities.

The scope of this Framework encompasses water conservation as a central pillar of water resources conservation, focusing on the sustainable use, management, and protection of water resources in ASEAN. Water conservation efforts target optimizing water use efficiency across sectors, reducing wastage, and promoting innovative technologies. Simultaneously, the Framework integrates these efforts with broader measures to protect and restore aquatic ecosystems, maintain water quality, and enhance resilience to climate impacts. This integrated approach reflects the interconnected nature of water resources and aligns with ASEAN's regional priorities and global commitments, ensuring that conservation efforts address the diverse challenges faced by member states.

Objectives

- 1) To align with ASPEN's **Strategic Priority 3 on Water Resources Management**, particularly with an emphasis on the integration of direct water conservation efforts with ecosystem protection and resilience-building.
- 2) To establish regional goals and promote collaboration on water use efficiency and ecosystem-based management, ensuring sustainability across shared water resources.
- 3) To enhance the capacity of ASEAN member states to implement innovative solutions, leverage technology, and share knowledge in water conservation practices.
- 4) To strengthen regional cooperation mechanisms for managing transboundary water resources and addressing common challenges such as climate change impacts, water-related disasters, and pollution.

2. Water Resources and Distribution in ASEAN

2.1 Overview of Water Resources in ASEAN

ASEAN is endowed with diverse and abundant water resources that are critical to the region's social, economic, and environmental well-being. Key water resources include surface water from rivers and lakes, groundwater reserves, and coastal ecosystems. These resources sustain agriculture, industry, and domestic needs while supporting the region's rich biodiversity.

Surface Water

Major river systems like the **Mekong River**, flowing through Laos, Thailand, Cambodia, and Vietnam, provide water for irrigation, fisheries, and hydropower. Similarly, the **Chao Phraya River** in Thailand and the **Red River** in Vietnam are vital for domestic and agricultural water use. However, these rivers are increasingly stressed by pollution, overuse, and hydropower development.

Groundwater

Groundwater plays a critical role, particularly in rural areas, providing drinking water and irrigation. For example, in **Indonesia** and **the Philippines**, groundwater meets up to 60% of domestic water needs. However, in cities like **Bangkok** and **Ho Chi Minh City**, over-extraction has led to land subsidence and saline intrusion, threatening long-term availability.

Coastal and Marine Water Resources

ASEAN's extensive coastline includes critical ecosystems like mangroves and coral reefs. Countries like **Indonesia**, **the Philippines**, and **Vietnam** rely on coastal areas for fisheries, tourism, and storm protection. Mangroves in the Mekong Delta, for instance, provide vital flood defense but are under threat from deforestation and sea-level rise.

2.2 Variability in Water Availability

Water availability in ASEAN is uneven, both geographically and seasonally, creating challenges in meeting water demands.

Seasonal Variability

ASEAN countries experience pronounced wet and dry seasons. For instance, **Myanmar** and **Vietnam** face severe water shortages during dry periods, while excessive monsoonal rains lead to flooding in **Thailand** and **Malaysia**. Rainfall distribution varies significantly, with some areas like the Mekong Delta receiving abundant water, while others, such as northern **Lao PDR**, face seasonal deficits.



Climate Change Impacts on Availability

Changing precipitation patterns have exacerbated variability. In **the Philippines**, extreme weather events, including typhoons and droughts, disrupt water availability. Sea-level rise threatens coastal aquifers in **Vietnam's Mekong Delta** and **Indonesia**, where saline intrusion is reducing freshwater supplies.

Transboundary Water Challenges

Shared rivers like the **Mekong** create interdependencies among countries. Upstream developments in China and Laos, including hydropower dams, affect downstream water flows, impacting agriculture and fisheries in **Cambodia** and **Vietnam**.

2.3 Socioeconomic Impacts of Water Distribution

Water distribution challenges have significant socioeconomic impacts across ASEAN, affecting agriculture, industry, urban areas, and vulnerable communities.

Agriculture

In countries like **Cambodia** and **Lao PDR**, agriculture relies heavily on seasonal water availability. Rice paddies in the Mekong Basin depend on reliable irrigation, but water scarcity during dry seasons threatens crop yields and food security.

Industry and Urban Growth

Rapid urbanization in **Thailand**, **Indonesia**, and **Vietnam** increases demand for water, placing stress on existing infrastructure. Industrial hubs like Jakarta face severe water shortages, exacerbated by pollution and inefficient use.

Rural Communities

In **Myanmar** and **the Philippines**, rural populations often lack reliable access to clean water, forcing communities to depend on untreated surface water sources, leading to health risks and reduced quality of life.



3. Pressing Challenges for Water Conservation

3.1 Key Challenges at the Regional Level

ASEAN faces several interconnected challenges in managing and conserving its water resources, driven by growing demand, pollution, and ecosystem degradation.

Increasing Water Demand

Population growth and economic expansion drive water demand in agriculture, industry, and urban areas. For example, **Thailand's agricultural sector** consumes more than 70% of its water resources, while rapid industrialization in **Vietnam** and **Malaysia** significantly increases water stress.

Water Pollution

Pollution from agricultural runoff, industrial discharge, and untreated domestic wastewater is a pervasive issue. The **Citarum River in Indonesia**, ever known for facing water pollution in the past, exemplifies the need and showcase for better waste management and regulation. **Thailand** also faces significant challenges in marine and coastal management due to rapid development, tourism, industrial activities, and agricultural practices.

Depletion of Groundwater Resources

Over-extraction in urban areas like **Bangkok** and **Jakarta** has led to significant land subsidence, while saline intrusion affects coastal aquifers, reducing freshwater availability for agriculture and drinking.

Loss of Aquatic Ecosystems

Wetlands, rivers, and mangroves that support biodiversity and water regulation are under threat. In **the Philippines**, more than 50% of mangroves have been lost to urbanization and fish farming, while **Cambodia's Tonle Sap Lake** faces ecosystem degradation due to changing water flows and overfishing.

3.2 Climate Change Impacts on Water Resources

Climate change exacerbates existing water challenges, threatening both availability and quality.

Floods and Droughts

Changing precipitation patterns lead to more frequent and intense floods in **Malaysia**, **Thailand**, and **Vietnam**, while droughts in **Myanmar** and **the Philippines** reduce water availability for agriculture and domestic use.



Sea-Level Rise and Salinity Intrusion

In coastal areas, rising sea levels threaten freshwater supplies. In **Vietnam's Mekong Delta**, saline intrusion during the dry season has become a critical challenge for agriculture and drinking water.

Ecosystem Stress

Climate change increases stress on aquatic ecosystems. Coral reefs in **Indonesia** and **the Philippines**, vital for fisheries and coastal protection, are threatened by warming waters and acidification.

3.3 Transboundary Collaborative Water Management Issues

Shared water resources present unique challenges for ASEAN, requiring effective collaboration and governance mechanisms. It advises discussing international water law and the rights and responsibilities of riparian states and highlights the importance of legal frameworks for transboundary water management.

Equitable Water Allocation

Challenges over water use in shared rivers, such as the **Mekong**, highlight the need for agreements on equitable allocation. Cascaded hydropower projects are likely to change water flow and sediment transport, impacting fisheries and agriculture downstream in the sub-region of ASEAN.

Pollution Management

Pollution from one country often affects downstream users. For example, agricultural runoff in Thailand impacts water quality in the Mekong, affecting neighboring countries. This transboundary issue extends beyond rivers to coastal environments as well, creating complex international management challenges, e.g., The Gulf of Thailand, shared by Thailand, Cambodia, and Vietnam, experiences significant plastic pollution that moves across national maritime boundaries. During monsoon seasons, debris from one country's coastline frequently washes up on neighboring shores, and this requires coordinated cleanup and prevention efforts.

Governance and Cooperation

While initiatives like the Mekong River Commission (MRC) exist, their effectiveness is limited by uneven participation and enforcement. Strengthening governance structures and expanding them to other transboundary basins, such as the Salween River, is essential.



4. Guiding Principles for ASEAN Water Resources Conservation

4.1 Integrated Water Resources Management (IWRM) for Sustainable Water Management

Integrated Water Resources Management (IWRM) is a comprehensive framework that seeks to promote the coordinated development and management of water, land, and related resources. The goal is to maximize economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems. This approach recognizes the interconnectedness of water systems and the need for a holistic management strategy that considers the entire water cycle, from source to sea. IWRM promotes the coordinated development and management of water, land, and related resources to achieve equitable and sustainable outcomes. IWRM has been advocated globally since the 2000s as a solution to water-related challenges, especially in regions facing growing water demand, climate variability, and competing uses. Since the Johannesburg Summit in 2002, IWRM has emphasized the need to integrate sectors and stakeholders, ensuring that water management is effective, inclusive, and adaptable to climate impacts. The ASEAN Strategic Plan of Action on Water Resources Management, adopted in 2005, underscores the importance of IWRM in addressing issues such as water scarcity, pollution, and climate change impacts.

4.1.1 Key Components of IWRM

- **Stakeholder Involvement:** Effective IWRM requires the active participation of all stakeholders, including government agencies, local communities, private sector entities, and non-governmental organizations. This inclusive approach ensures that diverse perspectives and needs are considered in decision-making processes.
- **Policy and Institutional Frameworks:** Establishing robust policies and institutions is crucial for the successful implementation of IWRM. This includes creating legal frameworks that support integrated management practices and fostering inter-agency cooperation.
- **Data and Information Management:** Reliable data on water resources, usage patterns, and environmental impacts are essential for informed decision-making. IWRM promotes the development of comprehensive monitoring and information systems to support adaptive management. The integration of hydrological data with early warning systems to support decision-making is necessary, including examples of hydrological modeling tools to analyze climate change impacts on water resources.
- **Economic and Financial Instruments:** Implementing economic tools such as water pricing, subsidies, and incentives can encourage efficient water use and support the financial sustainability of water management initiatives.

4.1.2 Case Studies and Applications

- The Mekong River Commission (MRC), which covers four ASEAN nations, is a prime example of how IWRM has been successfully applied to manage shared water resources while addressing challenges like energy demand, agriculture, and biodiversity conservation. In the Lower Mekong Basin, IWRM principles are actively used to manage transboundary waters, balancing energy needs (e.g., hydropower development) with the protection of vital ecosystems. The Mekong River



Commission has developed several multilateral agreements that promote cooperation, preventing potential conflicts and facilitating sustainable water use across borders.

- Singapore's Water Management Strategy: Singapore's holistic approach to water management, including rainwater harvesting, wastewater recycling, and desalination, serves as a model for other ASEAN countries.
- Malaysia's National Water Balance Management System (NAWABS) is the initiative aimed at monitoring and managing the country's water resources efficiently. It provides real-time data on water availability, usage, and demand prioritization. The system will assist policymakers in making informed decisions to ensure sustainable water resources management, which may also serve as a reference for AMS countries.
- Lao PDR's Ministerial Agreement on Water Resources Protection (2017) emphasizes collaborative water conservation efforts and illustrates how specific, localized solutions can contribute to a broader regional framework. The Agreement includes the identification of protected areas related to water supply, wetlands, flood and drought management, water quality, groundwater, etc.

4.1.3 Key Components of IWRM in ASEAN

- Transboundary Water Management: Many ASEAN countries share river basins, such as the Mekong River, which flows through six countries. Effective transboundary water management is essential to ensure equitable water distribution and conflict resolution.
- Community-Based Approaches: Involving local communities in water management decisions is crucial. For example, in Thailand, community-based water management has been successful in managing local water resources and reducing conflicts.
- Policy Harmonization: ASEAN countries are working towards harmonizing water policies to facilitate regional cooperation. This includes aligning national policies with regional frameworks to ensure cohesive water management strategies.

4.2 Ecosystem-Based Management with an Emphasis on the Protection and Restoration of Aquatic Ecosystems

- Ecosystem-Based Management (EBM) is an approach that considers the entire ecosystem, including humans, in the management of natural resources. It aims to maintain the health, productivity, and resilience of ecosystems to provide the services humans rely on, such as clean water, food, and climate regulation. Ecosystem-Based Management (EBM) emphasizes protecting entire ecosystems—rivers, wetlands, and lakes—while sustaining services they provide to human societies. Global water resource strategies now highlight the importance of protecting aquatic ecosystems, which serve not only as sources of water but also as buffers against floods, droughts, and water quality degradation. This is particularly important in ASEAN, home to biodiverse ecosystems like the Mekong Delta and Sundaland forests, which are under pressure from urbanization, agriculture, and pollution. EBM reinforces the alignment with SDGs, particularly SDG 2, 6, 13, 15 and emphasizes the use of ecosystem-based management practices to balance conservation and economic use.

4.2.1 Principles of EBM

- **Holistic Perspective:** EBM takes into account the complex interactions within ecosystems, including the relationships between different species, habitats, and environmental processes.
- **Adaptive Management:** This approach emphasizes flexibility and learning, allowing management strategies to be adjusted based on new scientific knowledge and changing environmental conditions.
- **Precautionary Principle:** EBM advocates for precautionary measures to prevent environmental degradation, even in the absence of complete scientific certainty.
- **Stakeholder Engagement:** Involving local communities, indigenous people, and other stakeholders in the management process is essential for the success of EBM initiatives.

4.2.2 Principles of EBM in ASEAN

- **Biodiversity Conservation:** Protecting and restoring biodiversity is a key focus. For instance, the Coral Triangle Initiative aims to safeguard marine biodiversity in the region, which is home to some of the world's most diverse coral reefs.
- **Integrated Coastal Zone Management (ICZM):** ICZM is implemented to manage coastal areas sustainably, balancing environmental, economic, and social objectives. This approach is crucial for countries like Indonesia and the Philippines, which have extensive coastlines.
- **Climate Resilience:** EBM strategies in ASEAN also emphasize building resilience to climate change impacts, such as sea-level rise and increased frequency of extreme weather events.

4.2.3 Examples of EBM in Practice

- **Coral Triangle Initiative:** This multilateral partnership works to protect marine biodiversity and ensure sustainable livelihoods for coastal communities in Indonesia, Malaysia, Papua New Guinea, the Philippines, the Solomon Islands, and Timor-Leste.
- **Mangrove Restoration Projects:** Countries like Vietnam and Thailand have implemented large-scale mangrove restoration projects to protect coastal areas from erosion and enhance biodiversity.
- **Mekong Delta, Vietnam:** Ecosystem-based management is crucial in the Mekong Delta, where efforts are made to restore wetlands and manage floodplains sustainably. These ecosystems provide critical ecosystem services, such as flood control and water filtration, supporting both biodiversity and the livelihoods of millions.

4.3 Sustainable Development by Aligning Water Conservation Efforts with Broader Sustainable Development Goals

Sustainable development involves meeting the needs of the present without compromising the ability of future generations to meet their own needs. Aligning water conservation efforts with the Sustainable Development Goals (SDGs) ensures that water resources are managed in a way that supports broader social, economic, and environmental objectives. Also, it should ensure that the Framework aligns with national strategies and emphasizes climate resilience. It highlights the importance of ecosystem restoration, such as mangrove and wetland rehabilitation, to mitigate climate impacts.



4.3.1 Key Aspects of Sustainable Development in Water Management

- **Integration with SDGs:** Water management strategies should be aligned with SDG 6 (Clean Water and Sanitation) and other related goals, such as SDG 2 (Zero Hunger), SDG 3 (Good Health and Well-being), SDG 13 (Climate Action), SDG 14 (Life Below Water) and SDG 15 (Life on Land).
- **Cross-Sectoral Coordination:** Effective water management requires coordination across different sectors, including agriculture, energy, health, and urban planning. This integrated approach helps to identify synergies and avoid conflicts between competing water uses.
- **Innovative Technologies:** The adoption of innovative technologies, such as smart water management systems, wastewater recycling, and desalination, can enhance the efficiency and sustainability of water use.
- **Capacity Building:** Strengthening the capacity of institutions and communities to manage water resources sustainably is crucial. This includes providing training, technical assistance, and financial support to enhance local capabilities.

4.3.2 Case Studies and Applications

- **Singapore's Water Management Strategy:** Singapore has implemented a comprehensive water management strategy that includes rainwater harvesting, wastewater recycling, and desalination to ensure a sustainable and resilient water supply.
- **The Vientiane Action Programme (2004-2010)** initiated by ASEAN leaders, prioritized integrated river basin management and the efficient management of water resources. The aim was to align national policies with broader sustainable development objectives, ensuring equitable access to water resources across sectors and generations.
- **Water Sector Transformation 2040:** Malaysia's strategic initiative aimed at overhauling the nation's water sector to ensure sustainability, economic growth, and resilience against the future.

4.3.3 Key Aspects of Sustainable Development in ASEAN

- **Integration with SDGs:** ASEAN countries are committed to achieving SDG 6 (Clean Water and Sanitation) and other related goals. This includes improving access to safe drinking water and sanitation, particularly in rural and underserved areas.
- **Cross-Sectoral Coordination:** Effective water management requires coordination across sectors such as agriculture, industry, and urban development. For example, the Philippines has integrated water management into its national development plans to ensure water security and support economic growth.
- **Innovative Technologies:** ASEAN countries are adopting innovative technologies to enhance water efficiency and sustainability. This includes the use of smart water management systems, wastewater recycling, and desalination technologies.
- **Capacity Building:** Strengthening the capacity of institutions and communities to manage water resources sustainably is crucial. ASEAN initiatives focus on providing training, technical assistance, and financial support to enhance local capabilities.

4.4 Equity and Inclusion in Water Resources Conservation

Ensuring equity and inclusion in water resources conservation means that all groups within society, particularly vulnerable and marginalized communities, have fair access to water resources and a voice in water management decisions. In ASEAN, where disparities in water access exist between urban and rural populations, promoting inclusive water management is essential to reducing inequalities and ensuring sustainable development.

4.4.1 Principles of Equity and Inclusion

- **Inclusive Governance:** Inclusive water governance involves creating platforms for all stakeholders to participate in decision-making processes. This includes local communities, indigenous groups, women, and marginalized populations, who often rely directly on natural water sources for their livelihoods. Decentralized governance frameworks can empower local authorities and communities, making it easier to address specific water needs at the local level. Effective inclusion in governance ensures that water policies and conservation strategies reflect the diverse needs of ASEAN's populations.

- **Gender and Social Equity:** Water policies should address the distinct needs of different social groups, especially women, rural communities, and low-income households, who are often disproportionately affected by water scarcity and pollution. Involving women in water management, for example, has been shown to improve water conservation outcomes, as women frequently play key roles in household water use. By promoting gender-sensitive approaches, ASEAN countries can foster greater social equity and ensure that all groups benefit from water resources conservation.

- **Access to Resources:** Equity in water resources means ensuring that marginalized communities have reliable access to clean, affordable water. Policies that incorporate equitable water pricing and distribution systems can help address disparities in access. Water subsidies for low-income households, fair water allocation, and improved infrastructure in underserved areas are all measures that can support equitable access to water resources across ASEAN.

4.4.2 Key Elements for Equity and Inclusion in ASEAN

- **Decentralized Water Management:** Decentralizing water management allows local governments and communities to take part in conservation efforts. In Thailand, for instance, community-based water management initiatives have empowered rural areas to manage their water resources more effectively. ASEAN countries can adopt similar practices, ensuring local solutions to water challenges that reflect the unique needs of each community.

- **Engagement of Vulnerable Communities:** Water conservation efforts must prioritize vulnerable groups, such as indigenous populations in remote areas who are often most affected by water scarcity and pollution. Programs that specifically engage these communities in planning and management, like the Philippines' participatory water management programs in rural areas, can improve both conservation outcomes and social equity.

- **Inclusion of Women in Decision-Making:** Recognizing the role of women in water management, ASEAN countries can work towards including women in water governance structures. In Vietnam, for example, efforts to involve women in community water projects have strengthened community resilience and improved access to water. ASEAN could promote similar initiatives across the region to enhance gender equity in water management.



4.4.3 Examples of Equity and Inclusion Applied in ASEAN

- **Thailand's Community-Based Water Management:** In rural Thailand, community-driven water management initiatives have provided local populations with control over their water resources. This model ensures that communities can manage water according to their needs, promoting equitable and sustainable use of resources.
- **Cambodia's Rural Water Supply and Sanitation Project:** This project has improved access to clean water in rural areas, focusing on equitable distribution of resources and community involvement. Through local partnerships, Cambodia has increased water access for rural populations, reducing inequalities in water supply.
- **Indonesia's Gender-Inclusive Water Programs:** Indonesia has implemented water programs that actively involve women in the planning and management processes. This gender-inclusive approach ensures that water conservation initiatives address the specific needs of women and promote their leadership in water resources management.
- **Malaysia** has established the Ministry of Women, Family, and Community Development, which has implemented several policies and frameworks to promote gender equity and inclusion, aiming to ensure equal rights and opportunities for all genders.

Equity and inclusion are essential for sustainable water resources management. By incorporating inclusive governance practices, addressing gender and social equity, and ensuring access to resources, ASEAN can create a water conservation framework that serves all members of society. This inclusive approach not only supports social equity but also strengthens community resilience and fosters long-term sustainability in water resources conservation across the region.



5. Overarching Goals for ASEAN Water Resources Conservation

Water conservation lies at the heart of the ASEAN Water Resources Conservation Framework, representing both an end goal and a means to achieve sustainable water resources management. The overarching goals reflect a holistic view of water conservation, integrating efforts to optimize water use efficiency, protect ecosystems, and strengthen climate resilience through cooperative regional action. These goals ensure that water conservation is not limited to reducing water use but also encompasses the protection and restoration of ecosystems and the sustainable management of water systems to meet the needs of both current and future generations.

The ASEAN Water Resources Conservation Framework is anchored by four overarching goals that serve as a roadmap for sustainable water management across the region. These goals are designed to address both immediate and long-term challenges by focusing on efficient water use, ecosystem conservation, resilience to climate impacts, and strengthened regional cooperation. The first two goals, Enhance Water Use Efficiency and Protect and Restore Aquatic Ecosystems, are primary goals that directly support the conservation of water resources. The additional goals, Strengthen Climate Resilience and Foster Regional Cooperation, provide critical support to ensure these efforts are sustainable, adaptable, and coordinated across ASEAN member states.

5.1 Enhance Water Use Efficiency

Water use efficiency is a fundamental element of water conservation, addressing the need to optimize water use across key sectors—agriculture, industry, and domestic. By reducing wastage, adopting water-saving technologies, and enhancing infrastructure, ASEAN can significantly lower water stress while maintaining productivity. Water use efficiency efforts will also ensure the sustainable use of finite water resources, contributing to the broader objective of water security and conservation.

Efficient water use is essential for ASEAN's growing population and economies. As demand for water resources rises due to rapid urbanization, industrial growth, and agricultural expansion, it is crucial to adopt water-saving technologies and practices to optimize water use across all sectors. ASEAN aims to establish regional goals that promote water efficiency in agriculture, industry, and domestic water use, aligned with global standards and Sustainable Development Goals (SDGs), particularly SDG 6: Clean Water and Sanitation.

Agricultural Water Efficiency

Agriculture remains the largest water-consuming sector in most ASEAN countries. By introducing modern irrigation techniques like drip and precision irrigation and promoting rainwater harvesting, ASEAN can significantly reduce water wastage in agriculture while supporting food security. Member states can also benefit from sharing knowledge on drought-resistant crops and efficient water use practices that suit smallholder farmers, which are common across the region.



Industrial Water Efficiency

Industries in ASEAN are expanding rapidly, particularly in manufacturing hubs like Thailand, Vietnam, and Indonesia, placing additional strain on water resources. Establishing standards for industrial water recycling and encouraging closed-loop systems can minimize water consumption and reduce wastewater discharge. ASEAN can facilitate industry collaborations to share best practices for water efficiency, including the use of smart water monitoring technologies.

Domestic Water Efficiency

Urbanization across ASEAN has increased demand for domestic water use. Implementing public awareness campaigns and encouraging the use of water-saving appliances can reduce household water consumption. ASEAN member states can benefit from developing water pricing models that incentivize conservation and from sharing best practices on reducing non-revenue water losses through leak detection and infrastructure improvements.

5.2 Protect and Restore Aquatic Ecosystems

The conservation of water resources is intrinsically linked to the health of aquatic ecosystems. This goal emphasizes protecting and restoring rivers, wetlands, groundwater systems, and coastal ecosystems, which regulate water availability and quality. Sustainable ecosystem management not only safeguards biodiversity but also supports water conservation by maintaining natural hydrological processes, such as groundwater recharge and flood mitigation.

ASEAN's rivers, wetlands, lakes, and coastal areas are vital ecosystems that support biodiversity, provide ecosystem services, and contribute to the resilience of communities. However, these ecosystems are under increasing pressure from pollution, habitat destruction, and climate change. ASEAN is committed to setting regional targets for the protection, restoration, and sustainable management of these critical ecosystems to ensure they continue to support livelihoods, regulate climate, and maintain biodiversity.

Protection of Aquatic Ecosystems

Protecting rivers, lakes, and wetlands from pollution and degradation is essential for conserving biodiversity and sustaining ecosystem services. ASEAN will encourage member states to designate protected areas for critical ecosystems and enforce regulations that prevent habitat destruction. Policies should prioritize safeguarding ecosystems such as the Mekong Delta, Tonle Sap Lake, and coastal mangroves, which are invaluable for biodiversity and community resilience.

Restoration of Degraded Ecosystems

Restoring degraded ecosystems is vital for reversing environmental damage and enhancing ecosystem services. ASEAN member states can focus on restoring wetlands and mangroves, which serve as natural buffers against floods, store carbon, and support fisheries. Examples such as Indonesia's National Mangrove Rehabilitation Program and Thailand's wetland restoration initiatives provide models that can be scaled across the region.

Sustainable Management and Biodiversity Conservation

Sustainable management of ecosystems ensures that they continue to provide benefits over the long term. ASEAN will support the adoption of ecosystem-based management (EBM) practices that balance conservation with economic use, such as eco-tourism, sustainable fisheries, and agroforestry. Promoting biodiversity conservation within aquatic ecosystems aligns with SDG 15: Life on Land, and is key to preserving ASEAN's rich natural heritage.

5.3 Strengthen Climate Resilience

Building climate resilience ensures the conservation of water resources under changing climatic conditions. By addressing water-related disasters, such as floods and droughts, and integrating ecosystem-based adaptation strategies, ASEAN can conserve water while protecting vulnerable communities and ecosystems. This goal reinforces the Framework's focus on conserving water as a critical resource for long-term sustainability. Also, efforts related to improving the accuracy of flood and drought forecasts and enhancing community resilience to climate change through early warning systems and hydrological data collection should be strengthened.

The impacts of climate change, including increased frequency of floods, droughts, and sea-level rise, pose significant risks to water resources and ecosystems across ASEAN. Strengthening the resilience of water resources to climate change is essential for safeguarding communities, economies, and ecosystems in the region. This goal supports disaster risk reduction and aligns with SDG 13: Climate Action.

Disaster Risk Reduction and Early Warning Systems

ASEAN countries frequently experience extreme weather events, and climate change is expected to exacerbate these risks. ASEAN will promote the integration of disaster risk reduction into water management practices by encouraging member states to adopt early warning systems for floods, droughts, and storm surges. Countries like the Philippines, which has an advanced early warning system for typhoons, provide valuable insights for other member states. Malaysia has developed an early warning system for flood disaster preparedness, as well as a water balance management system capable of monitoring low-season conditions, which can serve as a reference for water management operators. Such a system will help communities adapt to climate change.

Climate-Resilient Infrastructure

Building resilient infrastructure, such as flood-resistant roads, water storage systems, and protective coastal structures, is essential for adapting to climate impacts. ASEAN will support member states in incorporating climate resilience into infrastructure planning and development. By sharing knowledge on resilient designs, ASEAN can help reduce vulnerability and protect water resources from climate-induced stresses.

Ecosystem-Based Adaptation (EbA)

Nature-based solutions, such as wetland and mangrove restoration, provide natural defenses against climate impacts. ASEAN member states can incorporate ecosystem-based adaptation strategies into their climate resilience plans, recognizing that healthy ecosystems are a critical component of resilience.



5.4 Foster Regional Cooperation

Water conservation requires coordinated action across borders, particularly for shared rivers, aquifers, and ecosystems. This goal promotes regional collaboration to address transboundary challenges and implement collective water conservation measures. ASEAN's commitment to shared water resources management underpins the Framework's broader scope of conservation, ensuring equitable and sustainable use across member states.

Water resources in ASEAN are interconnected, with shared rivers, aquifers, and ecosystems that link the fates of member states. Effective water conservation requires collaboration across borders, joint initiatives, and harmonized policies. Fostering regional cooperation is essential to addressing transboundary challenges and promoting mutual support, aligning with SDG 17: Partnerships for the Goals.

Transboundary Water Management

Shared water bodies, like the Mekong River, require collaborative management to prevent conflicts and ensure sustainable use. ASEAN will strengthen frameworks for transboundary water management, building on existing structures like the Mekong River Commission. Cooperative management and data sharing are crucial for addressing issues such as water allocation, pollution, ecosystem health and development planning.

Joint Initiatives and Information Sharing

ASEAN will support joint initiatives that address shared water challenges, such as transboundary river basin management, regional research on water-saving technologies, and joint disaster response programs. Creating an ASEAN Water Conservation Knowledge Hub would provide a platform for member states to share data, research findings, and best practices, facilitating a coordinated regional approach to water conservation. In addition, promoting a water-energy-food nexus approach to integrate water management with other critical sectors is to ensure comprehensive resources conservation and utilization strategies that benefit all sectors across ASEAN.

Capacity Building and Technical Assistance

ASEAN member states have varying capacities for water resources management. Through capacity-building programs, ASEAN can strengthen the technical skills of water management professionals, particularly in areas like climate resilience, ecosystem-based management, and advanced water treatment technologies. Workshops, training sessions, and exchange programs will foster a culture of collaboration and collective learning.



6. Strategic Approaches

The strategic approaches outlined in this Framework address the diverse dimensions of water conservation, combining direct measures to optimize water use with broader strategies for ecosystem restoration, climate resilience, and public engagement. These approaches reflect the integrated scope of water conservation, which extends beyond efficient water use to encompass sustainable management of ecosystems, water quality, and disaster risk reduction.

6.1 Water Demand and Supply Management

Platforms for sharing data and technology related to sustainable water management should be established. Strategies for the conjunctive use of groundwater and surface water, ensuring efficient and sustainable water management that aligns with local hydrological conditions, should be initiated to enhance water availability during dry seasons and mitigate over-extraction issues.

Managing water demand and optimizing supply are critical to ensuring water security and sustainability across ASEAN. Given the region's diverse needs and varying levels of water availability, ASEAN member states should develop and implement guidelines for demand and supply management that are adaptable to different national contexts.

Demand Management

Countries like Singapore have successfully implemented measures to reduce water consumption, which include active promotion of water-efficient household fittings and appliances, as well as working with non-domestic sectors to manage their water demand and adopt sustainable practices. ASEAN can encourage other member states to adopt similar demand management strategies, including public education, water pricing to discourage excessive use, and smart metering to provide real-time data on water consumption. Agriculture, as the largest water-consuming sector in many ASEAN countries, should prioritize efficient irrigation practices, such as drip irrigation and soil moisture monitoring.

Supply Optimization

Improving water supply infrastructure to reduce losses, particularly non-revenue water (NRW), is a significant need in the region. Malaysia and Thailand have taken steps to reduce NRW through leak detection and infrastructure improvements. ASEAN could establish guidelines to support all member states in improving supply efficiency, setting targets for NRW reduction and infrastructure modernization.

Enhancing Water Reuse and Recycling

Water reuse can supplement freshwater sources, especially in urban and industrial areas. Singapore's NEWater program, which produces high-quality reclaimed water, serves as a model for water-scarce countries. ASEAN can promote the development of wastewater treatment and recycling plants, particularly in urban centers facing water stress. Guidelines can encourage countries to explore water reuse options in agriculture, industry, and municipal uses, with a focus on cost-effective technologies.



Role of Optimal Water Utilization

Optimal water utilization supports water conservation by reducing inefficiencies in water demand across agriculture, industry, and domestic sectors. Strategic actions include:

- Promoting water-efficient irrigation techniques (e.g., drip irrigation, soil moisture management). Encouraging industries to adopt closed-loop systems and water recycling.
- Raising awareness on water-saving practices in households, such as rainwater harvesting and low-water-use appliances.

Box 6.1 Integrated Water Supply Management for Urban Areas

Country: Brunei Darussalam

Period: 2015–2021

Goals and Approaches Used (alignment with ASEAN Water Resources Framework): Enhancing water use efficiency by reducing non-revenue water (NRW) aligns with **Strategic Approach 6.1** (Water Demand and Supply Management) and **Goal 5.1** (Enhance Water Use Efficiency).

Outputs: Upgraded urban water infrastructure, reduced NRW by 30%, and improved access to safe drinking water for urban residents.

Lessons Learnt: Comprehensive investment in infrastructure and technology, combined with public education campaigns, significantly improves water distribution efficiency and reduces wastage, making it a replicable model for other ASEAN urban areas.

Box 6.2 NEWater and Urban Water Recycling Program

Country: Singapore

Period: 2003–Ongoing

Goals and Approaches Used (alignment with ASEAN Water Resources Framework): Advanced water recycling aligns with **Strategic Approach 6.1** (Water Demand and Supply Management) and **Goal 5.1** (Enhance Water Use Efficiency).

Outputs: NEWater ensures long-term water security through recycling and advanced treatment technologies.

Lessons Learnt: Technological innovation and public acceptance campaigns are key to overcoming water scarcity and ensuring sustainability in urban settings.

Box 6.3 Salinity Intrusion Management in the Mekong Delta

Country: Vietnam

Period: 2015–2021

Goals and Approaches Used (alignment with ASEAN Water Resources Framework): Managing salinity aligns with **Strategic Approach 6.1** (Water Demand and Supply Management) and **6.5** (Addressing Water-Related Disasters).

Outputs: Installed salinity control infrastructure restored 1,000 hectares of wetlands and improved agricultural productivity.

Lessons Learnt: Addressing salinity requires integrated approaches that combine structural interventions with ecosystem restoration to sustain livelihoods.

Regional Collaboration

ASEAN could establish a framework for sharing technical knowledge on water demand and supply management, including best practices in reducing water loss, enhancing reuse, and optimizing supply. A collaborative platform would enable member states to benefit from shared experiences and research on emerging technologies for efficient water management.

Box 6.4 Groundwater Recharge and Management for Dry Zone

Country: Myanmar

Period: 2015–2020

Goals and Approaches Used (alignment with ASEAN Water Resources Framework):

Sustainable groundwater management aligns with **Strategic Approach 6.1** (Water Demand and Supply Management) and **Goal 5.1** (Enhance Water Use Efficiency).

Outputs: Constructed 120 groundwater recharge structures, increased water availability during dry seasons, and reduced over-extraction.

Lessons Learnt: Community-driven approaches using low-cost technologies ensure long-term sustainability in arid regions, mitigating water scarcity and increasing local water security.

6.2 Ecosystem Conservation and Restoration

Ecosystem conservation and restoration directly support water conservation by preserving the natural systems that regulate water cycles, such as wetlands, rivers, and aquifers. These actions include protecting riparian zones, restoring degraded habitats, and managing coastal ecosystems to mitigate salinity intrusion. By prioritizing ecosystem-based management, ASEAN can strengthen the link between ecosystem health and water conservation.

Protecting and restoring aquatic ecosystems, such as rivers, wetlands, lakes, and coastal areas, is essential for preserving biodiversity, supporting livelihoods, and sustaining ecosystem services. ASEAN can play a crucial role in setting conservation goals and guiding member states to adopt ecosystem-based approaches to water management.

Aquatic Ecosystem Conservation

ASEAN countries are home to unique and vulnerable ecosystems, including the Mekong Delta, Tonle Sap Lake, and mangrove forests along coastlines. Conserving these ecosystems is critical for biodiversity and the provision of ecosystem services such as flood control, water filtration, and habitat for aquatic species. ASEAN could guide member states in identifying and protecting high-priority ecosystems through legal protection, enforcement of conservation laws, and habitat monitoring.

Wetland and Riparian Zone Restoration

Restoring degraded wetlands and riparian zones provides flood protection, enhances groundwater recharge, and improves water quality. Thailand has implemented projects to restore wetlands in flood-prone areas, enhancing biodiversity while reducing flood risks. ASEAN can promote wetland restoration across member states, providing technical assistance and setting regional goals for wetland area restoration by 2030.



Box 6.5 Community-Based Wetland Conservation in Tonle Sap

Country: Cambodia

Period: 2017–2023

Goals and Approaches Used (alignment with ASEAN Water Resources Framework): Ecosystem-based management aligns with **Strategic Approach 6.2** (Ecosystem Conservation and Restoration) and **Goal 5.2** (Protect and Restore Aquatic Ecosystems).

Outputs: Rehabilitated 2,500 hectares of wetlands, enhanced fisheries, and supported community livelihoods through eco-tourism.

Lessons Learnt: Empowering local communities with training, financial incentives, and eco-tourism opportunities fosters ownership of conservation efforts, leading to sustainable outcomes in biodiversity and water resources management.

Promoting Biodiversity and Ecosystem-Based Management

Indonesia's mangrove restoration projects provide a valuable model for promoting biodiversity in coastal ecosystems. ASEAN can encourage other countries to adopt ecosystem-based management (EBM) practices that integrate conservation with economic activities, such as ecotourism, sustainable fisheries, and agroforestry. These practices will protect biodiversity while supporting local livelihoods.

Regional Cooperation for Transboundary Ecosystems

Some aquatic ecosystems, like the Mekong River, are shared across borders. ASEAN can facilitate joint management of transboundary ecosystems by establishing frameworks for collaboration, data sharing, and coordinated conservation activities. An ASEAN Ecosystem Conservation and Restoration Fund could provide financial resources to support cross-border initiatives.

Box 6.6 Community-Based Mangrove Reforestation in the Andaman Region

Country: Thailand

Period: 2016–2022

Goals and Approaches Used (alignment with ASEAN Water Resources Framework): Ecosystem-based adaptation aligns with **Strategic Approach 6.2** (Ecosystem Conservation and Restoration) and **Goal 5.3** (Strengthen Climate Resilience).

Outputs: Reforested 5,000 hectares of mangroves, enhanced biodiversity, and increased coastal protection.

Lessons Learnt: Engaging local communities and combining ecosystem restoration with livelihood support strengthens resilience against climate impacts.

6.3 Public Awareness and Stakeholder Engagement

Water conservation requires widespread public participation and cross-sectoral coordination. Strategic actions focus on raising awareness of water-saving practices, engaging stakeholders in integrated water resources management, and fostering community stewardship of aquatic ecosystems. Public and stakeholder support is critical to achieving the Framework's water conservation objectives. Community and private sector involvement in water resources management and conservation should be promoted.

Public awareness and active stakeholder engagement are essential to foster a culture of water conservation and ensure inclusive water governance. ASEAN can play a leadership role in promoting water conservation through education and facilitating stakeholder engagement at all levels.

Public Awareness Campaigns

Raising public awareness about water conservation and pollution prevention can drive behavioral changes that reduce water consumption and pollution. Singapore's Water Conservation Campaign and Malaysia's Save Water Campaign demonstrate the impact of well-coordinated efforts. ASEAN could support similar campaigns across the region, focusing on themes such as "Save Every Drop" or "Protect Our Waterways," with tailored messages for different cultural and economic contexts.

Stakeholder Engagement for Integrated Water Resources Management (IWRM)

Water management requires coordination among diverse stakeholders, including government agencies, industries, local communities, and NGOs. The Mekong River Commission offers a model for engaging stakeholders in transboundary water management. ASEAN can promote frameworks for stakeholder engagement in each country, ensuring that water management decisions consider the needs of all users and the input of marginalized communities.

Cross-Sectoral Coordination

Encouraging collaboration between sectors such as agriculture, industry, and urban planning will strengthen IWRM across ASEAN. For example, Thailand's National Water Resources Committee coordinates water resource planning across ministries, enabling a more integrated approach. ASEAN can support member states in establishing similar inter-sectoral committees or councils to coordinate water management.

Youth and Community Engagement

Engaging young people and communities in water conservation initiatives will foster long-term change. ASEAN could organize regional youth competitions or programs, such as a "Young Water Ambassadors" initiative, to involve the next generation in water conservation. Community-based programs, particularly in rural areas, can promote local stewardship of water resources, ensuring community involvement in conservation projects.

Box 6.7 National River Trail Project

Country: Malaysia

Period: 2016–2022

Goals and Approaches Used (alignment with ASEAN Water Resources Framework): Aligns with **Strategic Approach 6.2** (Ecosystem Conservation) and **6.3** (Public Awareness).

Outputs: Revitalized 15 urban rivers, improved water quality to meet recreational standards, and created community-friendly spaces.

Lessons Learnt: Combining ecosystem restoration with public engagement enhances the social and ecological value of urban waterways and increases community ownership of conservation efforts.



6.4 Water Quality and Sanitation

Ensuring water quality is a critical component of water conservation, as polluted resources cannot be used effectively or sustainably. Strategic measures include harmonizing water quality standards, controlling pollution sources, and expanding access to safe sanitation systems. These actions not only conserve water but also protect public health and ecosystem integrity.

Ensuring access to clean water and improved sanitation is critical for public health, economic productivity, and environmental sustainability. ASEAN can promote the harmonization of water quality standards, support sanitation infrastructure development, and provide capacity building for pollution control.

Harmonizing Water Quality Standards

Currently, water quality standards vary across ASEAN countries, making it difficult to assess and manage water resources consistently. ASEAN could work with member states to establish baseline standards for key water quality parameters, such as those for drinking water, recreational waters, and agricultural use. Aligning these standards with international guidelines, like those from the World Health Organization (WHO), will promote consistency and protect public health.

Sanitation Infrastructure Development

Access to safe sanitation remains a challenge in many ASEAN countries, particularly in rural areas. Cambodia's Clean City Initiative and the Philippines' community-based sanitation projects are examples of efforts to improve sanitation access. ASEAN could encourage member states to prioritize sanitation infrastructure investments, especially in underserved areas, and provide technical assistance for designing cost-effective sanitation solutions. Encourage the use of sustainable technologies, such as solar-powered water filtration and community water recycling systems.

Water Pollution Management

Managing pollution from industries, agriculture, and urban areas is critical to maintaining water quality. Indonesia's Clean River Program focuses on monitoring and reducing industrial pollution, offering a model for other countries. ASEAN could provide technical support for pollution control, including training on best practices for wastewater treatment, agricultural runoff management, and solid waste disposal.

Capacity Building for Water Quality Monitoring

Strengthening water quality monitoring across ASEAN will enable timely identification of pollution sources and improve response measures. ASEAN could establish a Regional Water Quality Monitoring Network to facilitate data sharing and joint assessments of cross-border water bodies. This network could include capacity-building programs for member states on monitoring techniques, data management, and reporting. Introducing citizen science initiatives to engage communities in monitoring water quality and quantity to empower local stakeholders to observe, collect, and contribute valuable data to water resources management efforts while fostering a sense of responsibility and ownership. Strengthening cooperation among ASEAN countries to share information on water quality parameters through the existing ASEAN Water Data Management and Reporting System to achieve ASCC.

Box 6.8 Citarum River Cleanup Initiative

Country: Indonesia

Period: 2018-Ongoing

Goals and Approach Used (alignment with ASEAN Water Resources Framework): Addressing pollution in river systems aligns with **Strategic Approaches 6.2** (Ecosystem Conservation) and **6.4** (Water Quality and Sanitation).

Outputs: Removal of 20,000 tons of waste, significant improvement in water quality, and creation of riparian buffer zones.

Lessons Learnt: A multi-stakeholder approach involving government, NGOs, private enterprises, and local communities is essential for large-scale river rehabilitation projects and ensures the sustainability of results.

6.5 Addressing Water-Related Disasters

Water-related disasters, such as floods and droughts, threaten the conservation and availability of water resources. Strategic approaches include integrating disaster risk reduction into water management practices, developing early warning systems, and promoting climate-resilient infrastructure. These measures conserve water resources while reducing vulnerabilities to climate impacts. It is important to develop and share early warning systems and telemetering stations to address flood and landslide risks.

The ASEAN region is highly vulnerable to water-related disasters such as floods, droughts, and typhoons. Integrating disaster risk reduction into water management will enhance resilience and protect both human populations and ecosystems.

Flood and Drought Management

Many ASEAN countries face frequent floods and droughts, which are exacerbated by climate change. Thailand's Integrated Flood Management Plan and Myanmar's National Action Plan for Disaster Risk Reduction include strategies to mitigate flood and drought impacts. ASEAN could support member states in developing and implementing similar disaster management plans, emphasizing a mix of structural measures (e.g., dams, reservoirs) and non-structural measures (e.g., zoning, early warning systems).

Box 6.9 Mekong Basin Flood Early Warning System

Country: Lao PDR

Period: 2014-2022

Goals and Approaches Used (alignment with ASEAN Water Resources Framework): Enhancing climate resilience aligns with **Strategic Approach 6.5** (Addressing Water-Related Disasters) and **Goal 5.3** (Strengthen Climate Resilience).

Outputs: Enhanced flood forecasting, installation of 50 monitoring stations, and reduced loss of life during annual floods.

Lessons Learnt: Regional cooperation through transboundary river management strengthens disaster preparedness and reduces vulnerabilities to flooding, particularly in shared water basins like the Mekong.



Early Warning Systems

Developing effective early warning systems is essential to minimize loss of life and property during extreme weather events. The Philippines has a sophisticated early warning system for typhoons and floods, providing timely information to vulnerable communities. ASEAN could facilitate the transfer of knowledge and technology to other member states, helping them build or enhance their own early warning systems for floods, droughts, and other water-related disasters.

Climate-Resilient Infrastructure

Building infrastructure that can withstand climate impacts, such as flood-resistant roads and water storage systems, is crucial for long-term resilience. Indonesia's investments in flood-resilient infrastructure in Jakarta offer insights into effective climate adaptation measures. The practice in Malaysia developed planning maps that must be integrated with environmentally sensitive zones, flood-prone areas, and water conservation plans, based on the Integrated River Basin Management and Urban Stormwater Master Plan documents to adapt to climate change.

ASEAN can encourage other member states to adapt climate change through structured and non-structured approaches, which include climate-resilient infrastructure designs, providing guidelines and technical support as needed.

Regional Collaboration on Disaster Risk Reduction

Since many ASEAN countries face similar risks from climate-related disasters, regional collaboration is essential for effective disaster response. ASEAN could establish a Regional Disaster Response Task Force that coordinates cross-border responses to water-related disasters, shares resources, and provides mutual assistance during emergencies.

Box 6.10 Water-Sensitive Urban Design in Metro Manila

Country: The Philippines

Period: 2018-2025

Goals and Approaches Used (alignment with ASEAN Water Resources Framework): Green infrastructure aligns with **Strategic Approach 6.1** (Water Demand and Supply Management) and **6.5** (Addressing Water-Related Disasters).

Outputs: Construction of rain gardens, permeable pavements, and bioswales, reducing urban flooding and improving groundwater recharge.

Lessons Learnt: Integrating nature-based solutions into urban water planning enhances resilience to flooding while promoting sustainable water management.

7. Regional Priorities and Collaboration Mechanisms

ASEAN recognizes the critical need for regional collaboration to address shared water challenges, strengthen resilience, and conserve water resources for sustainable development. The ASEAN Water Resources Conservation Framework provides a guiding platform for coordinated efforts, ensuring that member countries work together effectively while respecting their unique national priorities and capacities. ASEAN member countries recognize the interconnected nature of water conservation challenges and the need for regional collaboration to achieve shared goals. The strategic approaches outlined in Section 6 provide the foundation for implementing water conservation initiatives, while this section focuses on translating those strategies into actionable regional priorities and mechanisms. By aligning national efforts with regional objectives, ASEAN can ensure effective implementation while respecting each country's sovereignty and unique circumstances.

This section outlines key priorities and mechanisms to enhance regional cooperation, build mutual support, and drive collective action.

7.1 Regional Priorities for Water Resources Conservation

The regional priorities outlined below are closely tied to the strategic approaches described in Section 6. They aim to translate the overarching strategies into regionally coordinated actions, fostering synergy across ASEAN member countries.

1) Enhancing Water Use Efficiency Across Sectors

- Linked to **Strategic Approach 6.1 (Water Demand and Supply Management)**

Regional collaboration will focus on creating shared guidelines for optimizing water use in agriculture, industry, and domestic sectors. Member countries can share success stories, such as Vietnam's use of drip irrigation in rice paddy fields and Thailand's urban water-saving programs, to inspire scalable solutions across ASEAN.

2) Protecting and Restoring Shared Ecosystems

- Linked to **Strategic Approach 6.2 (Ecosystem Conservation and Restoration)**

Regional efforts will prioritize protecting transboundary ecosystems like the Mekong River Basin and shared coastal zones, such as mangroves in Indonesia and the Philippines. ASEAN will coordinate restoration projects that align with ecosystem-based management principles, ensuring sustainable benefits for all.

3) Strengthening Resilience to Climate Change

- Linked to **Strategic Approach 6.5 (Addressing Water-Related Disasters)**

Regional strategies for disaster risk reduction will include sharing early warning systems, such as those developed by the Philippines for typhoons, and promoting nature-based solutions like floodplain restoration in the Mekong Delta to mitigate flood impacts.

4) Improving Water Governance and Data Sharing

- Linked to **Strategic Approach 6.4 (Water Quality and Sanitation)**

Collaborative governance frameworks will facilitate sharing of water quality data and best practices in pollution control. For instance, member states can draw on Malaysia's experience in harmonizing industrial wastewater standards to develop regionally applicable guidelines. The establishment of a regional hydrological data and early warning center to support transboundary water management and disaster response should be explored.



7.2 Collaborative Implementation Mechanisms

The collaborative mechanisms described here are designed to operationalize the strategic approaches outlined in Section 6. They provide practical tools for member states to work together while ensuring flexibility for national-level adaptation.

1) ASEAN Working Group on Water Resources Management (AWGWRM)

- Link to **Strategic Approaches 6.3 and 6.4 (Public Awareness and Water Quality)**

AWGWRM will lead efforts to coordinate public awareness campaigns and harmonize water quality standards. For example, regional campaigns on water conservation, like the “Save Every Drop” initiative, will be supported by ASEAN-wide guidelines developed under the group’s leadership.

2) Regional Water Conservation Initiatives

- Link to **Strategic Approaches 6.1 and 6.2 (Water Demand and Ecosystem Restoration)**

Regional pilot projects, such as cross-border wetland restoration or shared irrigation modernization programs, will demonstrate the application of water-efficient practices and ecosystem restoration techniques.

3) Knowledge Sharing and Capacity Building

- Link to **Strategic Approach 6.3 (Public Awareness and Stakeholder Engagement)**

A regional knowledge hub will be established to centralize data, research, and case studies, supporting member countries in implementing strategic actions. Training programs will focus on topics like climate resilience, water-saving technologies, and ecosystem-based management, ensuring capacity building aligns with regional priorities.

4) Transboundary water management mechanisms

- Link to **Strategic Approaches 6.1, 6.4 and 6.5 (Demand Management, Water Quality and Sanitation, and Addressing Water-Related Disasters)**

Strengthen transboundary water management mechanisms to ensure sustainable water usage across ASEAN, focusing on reducing conflicts and integrating knowledge sharing to enhance collaboration. These mechanisms can include coordinated planning, real-time monitoring systems, and early warning mechanisms for disaster risk reduction across borders.

5) Public-Private Partnerships (PPPs)

- Link to **Strategic Approaches 6.1 and 6.5 (Demand Management and Addressing Water-Related Disasters)**

PPPs will facilitate the introduction of advanced technologies for water demand management, such as smart metering systems, and co-finance disaster-resilient infrastructure projects.

7.3 Voluntary Contributions and Respect for National Priorities

The success of the Framework depends on respecting national contexts and encouraging voluntary contributions that align with each country’s capacity and priorities. The collaborative mechanisms described in Section 6 will be adapted to ensure inclusivity and flexibility.

1) Respect for National Priorities

- Link to **Strategic Approaches 6.1, 6.2, and 6.5 (Demand Management, Ecosystem Restoration, and Addressing Water-Related Disasters)**

While water demand management and ecosystem restoration are regional priorities, implementation will be tailored to the unique challenges and opportunities of each member state. For example, drought management in Myanmar may focus on rainwater harvesting, while urban water conservation in Singapore emphasizes recycling and reuse.

2) Regional Support for Implementation

○ Link to **Strategic Approach 6.4 (Water Quality and Sanitation)**

ASEAN will provide technical and financial assistance for member states to develop and implement water quality improvement programs. Voluntary contributions from countries with advanced capabilities, such as Malaysia and Singapore, will help build regional sharing experiences in capacity development among ASEAN countries.

3) Balancing Regional and National Goals

○ Link to **Strategic Approach 6.3 (Public Awareness and Stakeholder Engagement)**

Regional campaigns and stakeholder engagement initiatives will be designed to complement national efforts, ensuring that ASEAN-wide actions enhance, rather than conflict with, local priorities.

7.4 Ecosystem-Specific Guidance for Interventions (Optional Focus Areas)

ASEAN's diverse ecosystems—ranging from groundwater reserves and river systems to coastal and urban areas—play critical roles in water resources conservation. These ecosystems face unique challenges and require targeted interventions tailored to their characteristics. While member states may prioritize different ecosystems based on national needs and capacities, this sub-section offers optional focus areas to guide conservation efforts in specific ecosystem types.

This guidance is presented as optional focus areas, allowing ASEAN member states to prioritize interventions based on their national ecosystems and resources. The flexibility ensures that no single country is compelled to implement actions beyond its capacity or priority areas, while still encouraging region-wide knowledge sharing and collaboration.

Groundwater Resources

- **Sustainable Groundwater Extraction:** Promote sustainable abstraction practices to prevent over-extraction and ensure long-term availability. For example, implement groundwater recharge projects, such as rainwater infiltration ponds, as seen in urban areas of Thailand and Indonesia.
- **Monitoring and Regulation:** Develop groundwater monitoring systems to track usage and quality, and enforce regulations to prevent contamination from industrial and agricultural activities.
- **Cross-Border Management:** For shared aquifers, such as those in Vietnam and Cambodia, encourage regional cooperation to establish sustainable extraction limits.
- **Integration of Conjunctive Use of Surface Water and Groundwater:** To improve water security, ecosystem sustainability, and socio-economic resilience. This approach supports a balanced use of water resources, particularly in areas where over-reliance on either source has led to depletion or environmental degradation.

Riverine Systems

- **Flow Management:** Protect and restore natural river flows by addressing upstream water diversion and dam management. For instance, improve flow regulation in transboundary rivers like the Mekong to support downstream ecosystems and communities.



- **Pollution Control:** Reduce river pollution by promoting wastewater treatment plants and implementing strict industrial discharge standards, as demonstrated in Malaysia and the Philippines.
- **Riparian Restoration:** Rehabilitate degraded riparian zones through afforestation and community-led conservation projects, enhancing water retention and biodiversity.

Wetlands and Lagoons

- **Wetland Restoration:** Restore degraded wetlands, such as Tonle Sap Lake in Cambodia, to improve water storage, flood mitigation, and biodiversity conservation.
- **Community-Based Conservation:** Engage local communities in wetland conservation efforts by promoting sustainable livelihoods, such as eco-tourism and sustainable fisheries.
- **Water Quality Maintenance:** Develop strategies to reduce nutrient loading and eutrophication in lagoons, particularly in coastal areas of Vietnam and Indonesia.

Coastal and Marine Ecosystems

- **Mangrove Conservation:** Protect and expand mangrove forests, which act as natural barriers against storm surges and coastal erosion. Countries like the Philippines and Indonesia have pioneered community-based mangrove reforestation programs that could serve as regional models.
- **Salinity Intrusion Management:** Address salinity intrusion in coastal aquifers by implementing dikes and nature-based solutions, particularly in the Mekong Delta.
- **Integrated Coastal Management (ICM):** Promote integrated approaches to manage the interlinkages between coastal ecosystems, fisheries, and urban development.
- **Water Quality Maintenance:** Develop community-based and nature-based initiatives to maintain water quality in coastal and marine ecosystems. These approaches leverage local knowledge and participation in Thailand to address pollution challenges effectively.

Urban Ecosystems

- **Water Recycling and Reuse:** Encourage the adoption of urban water recycling systems, such as Singapore's NEWater, to reduce dependency on natural sources.
- **Infrastructure Upgrades:** Modernize water distribution systems to reduce leakage and improve efficiency in rapidly growing cities like Jakarta and Bangkok.
- **Green Infrastructure:** Promote the development of green roofs, rain gardens, and permeable pavements to manage urban runoff and enhance groundwater recharge; for instance, Putrajaya Wetland in Malaysia.

7.5 ASEAN-Level Implementation Mechanisms

To successfully implement the ASEAN Water Conservation Framework, it is essential to establish robust regional cooperation mechanisms. These mechanisms will enable ASEAN member states to work together efficiently, align policies, and mobilize resources to achieve the overarching goals of water conservation and sustainable water management. This section outlines the key components of cooperation and implementation, including institutional arrangements, monitoring and evaluation, financing strategies, and adaptive management.

Institutional Arrangements

Effective institutional arrangements are critical to promoting regional cooperation in water conservation. ASEAN has an established foundation for dialogue and joint action, which can be leveraged to support the implementation of the Water Conservation Framework.

- ASEAN Working Group on Water Resources Management (AWGWRM)
- Regional Platforms for Dialogue
- Joint Initiatives and Programs
- Harmonized Policies and Guidelines

Monitoring and Reporting

To track progress and ensure accountability, ASEAN member states will implement a robust framework for monitoring, reporting, and evaluating the outcomes of the Water Conservation Framework. This will involve the use of common indicators aligned with the ASEAN Strategic Plan on Environment 2016-2025 (ASPEN) and Integrated Water Resources Management (IWRM) principles.

Strengthening the monitoring and reporting of IWRM implementation in ASEAN countries in the existing ASEAN IWRM website to ensure cooperation in conserving and restoring water and the environment for a safe ASEAN.

Financing and Resource Mobilization

Financing is essential for the successful implementation of water conservation initiatives, yet it remains a sensitive and challenging area. ASEAN will adopt a diversified approach to funding, leveraging a mix of public, private, and international sources.

- National Budget Allocations
- ASEAN Regional Fund for Water Conservation
- Public-Private Partnerships (PPPs):

ASEAN will promote public-private partnerships (PPPs) and multi-stakeholder engagement to support the implementation of water conservation initiatives. Partnerships with research institutions, NGOs, and private companies will help scale up innovative solutions and technologies for water efficiency and ecosystem restoration.

Adaptive Management

Water conservation requires flexibility and adaptability, especially in the face of climate change and evolving socio-economic challenges. ASEAN's approach to water conservation will incorporate principles of adaptive management, enabling continuous improvement and responsiveness to emerging needs.

- Regular Review and Updates
- Stakeholder Feedback Mechanisms
- Promoting Innovation and Learning
- Capacity Building and Knowledge Sharing



8. Future Consideration for ASEAN Taking from Global Examples

There are certain areas of water resources conservation and management that are not yet well addressed or lack prominent showcases among ASEAN member states. Below are key gaps identified potential showcases from countries outside ASEAN that could serve as inspirational models for the ASEAN Water Resources Conservation Framework:

8.1 Advanced Water Recycling in Agriculture

Gap in ASEAN

While some countries (e.g., Thailand and Vietnam) are improving water use efficiency in agriculture, there is little focus on advanced water recycling systems for agricultural irrigation. Most efforts rely on traditional methods like improving irrigation efficiency (e.g., drip irrigation).

Global Example

Name of Project/Initiative/Activity Israel's National Agricultural Water Recycling Program

Country Israel

Period 1985–Ongoing

Goals and Approaches

- Recycle 85% of wastewater treated for agriculture, aligning with water demand management and climate resilience.
- Use treated water for irrigating 40% of the country's crops.

Lessons Learnt

Strong governance and investment in wastewater treatment and distribution infrastructure enable water-scarce countries to support agriculture sustainably while conserving natural water resources.

8.2 Transboundary Water Governance for Groundwater

Gap in ASEAN

Transboundary river management (e.g., Mekong) is better established than transboundary groundwater management. ASEAN countries share aquifers (e.g., Cambodia and Vietnam) but lack structured governance for shared groundwater resources.

Global Example

Name of Project/Initiative/Activity Guarani Aquifer System Management Project

Countries Brazil, Argentina, Paraguay, Uruguay

Period 2003–2009

Goals and Approaches

- Collaborative management of one of the world's largest aquifers, aligning with transboundary governance principles.
- Established protocols for sustainable use, monitoring, and pollution control.

Lessons Learnt

Transboundary groundwater management benefits from strong scientific data-sharing agreements and shared legal frameworks to avoid over-extraction and contamination.

8.3 Payment for Ecosystem Services (PES) in Watershed Protection

Gap in ASEAN

Some ASEAN countries (e.g., the Philippines and Vietnam) have initiated small PES pilots, but large-scale programs linking upstream ecosystem protection with downstream water users are lacking.

Global Example

Name of Project/Initiative/Activity Costa Rica's Payment for Ecosystem Services Program

Country Costa Rica

Period 1997–Ongoing

Goals and Approaches

- Incentivize landowners to conserve forests in watersheds critical for hydropower, drinking water, and biodiversity.
- Funded by taxes on water and fuel use, aligning with ecosystem conservation and sustainable water management.

Lessons Learnt

PES programs create win-win scenarios for water users and ecosystem stewards by integrating conservation with economic incentives.

8.4 Floodplain Management and Wetland Conservation in Urban Areas

Gap in ASEAN

ASEAN countries like Thailand and the Philippines face challenges in urban floodplain management, often relying on hard infrastructure rather than conserving floodplains and wetlands for natural flood mitigation.

Global Example

Name of Project/Initiative/Activity Room for the River Program

Country Netherlands

Period 2007–2019

Goals and Approaches

- Restore natural floodplains to improve river flow capacity and reduce urban flood risks.
- Relocate infrastructure and communities from flood-prone areas.

Lessons Learnt

Integrating nature-based solutions into urban planning reduces flood risks while enhancing biodiversity and providing recreational spaces.

8.5 Integrated Coastal Zone Management (ICZM)

Gap in ASEAN

While ASEAN countries like Indonesia and the Philippines have initiated coastal restoration (e.g., mangrove reforestation), fully integrated approaches combining conservation, fisheries management, and community development are rare.

Global Example

Name of Project/Initiative/Activity Integrated Coastal Zone Management Program in Odisha

Country India



Period 2010–2021

Goals and Approaches

- Integrated mangrove restoration, fisheries co-management, and climate-resilient infrastructure development.
- Community-based participatory approaches to protect ecosystems while supporting livelihoods.

Lessons Learnt

ICZM programs effectively balance ecosystem protection and sustainable livelihoods when communities are engaged as equal partners.

8.6 Large-Scale Desalination for Water Scarcity

Gap in ASEAN

ASEAN countries with water-scarce regions (e.g., coastal Vietnam or islands in Indonesia) have not fully explored large-scale desalination projects as a solution to water shortages.

Global Example

Name of Project/Initiative/Activity Kurnell Desalination Plant

Country Australia

Period 2010–Ongoing

Goals and Approaches

- Provide a drought-proof water supply for urban Sydney by producing 250 million liters of water daily.
- Renewable energy offsets used to power the facility.

Lessons Learnt

Desalination plants, when combined with renewable energy, provide a reliable solution for urban water scarcity without increasing the carbon footprint.

8.7 Climate-Resilient Agriculture with Water Harvesting

Gap in ASEAN

Rainwater harvesting for agriculture is implemented at a local scale but lacks integration into national or regional strategies for climate-resilient farming.

Global Example

Name of Project/Initiative/Activity India's Watershed Development Program

Country India

Period 2001–Ongoing

Goals and Approaches

- Promote rainwater harvesting structures to support agriculture in semi-arid regions.
- Combine watershed development with crop diversification and community participation.

Lessons Learnt

Watershed-based approaches enhance agricultural productivity and resilience to climate variability when integrated with local community involvement.

9. Way Forward

The ASEAN Water Resources Conservation Framework represents a vital step forward in addressing the region's pressing water resource challenges. By enhancing water use efficiency, protecting and restoring aquatic ecosystems, fostering climate resilience, and strengthening regional cooperation, this Framework provides a comprehensive roadmap to ensure the sustainable management of water resources across ASEAN.

The guiding principles of Integrated Water Resources Management (IWRM), Ecosystem-Based Management (EBM), Sustainable Development Goals (SDGs) alignment, and Equity and Inclusion form the foundation of the Framework, ensuring that conservation efforts are inclusive, effective, and adaptable to diverse national contexts. Strategic approaches, such as demand-supply optimization, ecosystem restoration, public awareness, water quality enhancement, and disaster risk reduction, provide practical solutions to address shared regional challenges.

The strategic approaches outlined in the Framework provide actionable pathways for enhancing water use efficiency, protecting and restoring aquatic ecosystems, improving water quality, and strengthening resilience to climate change impacts. These approaches emphasize the role of collaboration, public engagement, and innovation in achieving the Framework's goals. Optional guidance for ecosystem-specific interventions further enhances the Framework's flexibility, allowing countries to prioritize actions based on their unique ecosystems and capacities.

Collaboration at the Heart of the Framework

Central to this Framework is the spirit of regional collaboration. The shared priorities and mechanisms outlined in this document emphasize the importance of pooling resources, sharing knowledge, and fostering partnerships among ASEAN member states. Through platforms like the ASEAN Working Group on Water Resources Management (AWGWRM) and regional initiatives, countries can work together to address transboundary water issues, share best practices, and build collective resilience.

The voluntary nature of the Framework ensures that each member state can contribute according to its capacity and priorities. This flexibility respects the diversity within ASEAN while encouraging all countries to align their efforts with regional and global goals, such as ASPEN's Strategic Priority 3 and the SDGs, particularly SDG 6 (Clean Water and Sanitation).

Path Forward

As ASEAN moves forward, the success of this Framework will depend on the commitment of member states to embrace its guiding principles, implement strategic approaches, and actively engage in regional collaboration. Strengthening institutional arrangements, enhancing technical capacities, and mobilizing financial resources will be critical to turning this vision into reality. Regular monitoring, evaluation, and adaptive management will ensure the Framework remains responsive to emerging challenges and opportunities.

By working together under this Framework, ASEAN has the potential to become a global leader in sustainable water resources management. This collective effort will not only safeguard water resources for future generations but also enhance the region's resilience, equity, and prosperity.



10. Appendices

Appendix A: Glossary of Specific ASEAN Terms

- 1. ASEAN Strategic Plan of Action on Water Resources Management (2005)**
A foundational document outlining ASEAN's shared vision, goals, and actions for managing water resources sustainably across member states. It provides a basis for cooperation and integration within the region.
- 2. ASEAN Strategic Plan on Environment 2016–2025 (ASPEN)**
A roadmap for enhancing sustainability and resilience in the ASEAN region, focusing on environmental management, including water conservation, climate adaptation, and disaster risk reduction.
- 3. Strategic Priority 3 (Water Resources Management)**
A specific focus area under ASPEN, emphasizing sustainable water management, water conservation, and resilience to water-related disasters across ASEAN member states.
- 4. ASEAN Working Group on Water Resources Management (AWGWRM)**
A technical body responsible for coordinating regional water resource initiatives and fostering collaboration among ASEAN member states.
- 5. Mekong River Commission (MRC)**
A transboundary organization involving Laos, Cambodia, Vietnam, and Thailand that focuses on the sustainable management of the Mekong River Basin.
- 6. ASEAN Agreement on Transboundary Haze Pollution**
A regional agreement addressing environmental issues, including water-related impacts of haze and land-use practices.
- 7. ASEAN Coordinating Centre for Humanitarian Assistance on Disaster Management (AHA Centre)**
A regional body supporting disaster risk reduction and management, including water-related disasters like floods and droughts.
- 8. ASEAN Framework on Climate Change Resilience**
A regional framework promoting climate adaptation measures, including ecosystem-based approaches and water-related resilience.
- 9. Tonle Sap Biosphere Reserve**
An ASEAN Heritage Park located in Cambodia, showcasing the integration of ecosystem conservation and community-based water resources management.
- 10. ASEAN Heritage Parks Program**
A regional initiative promoting the conservation of significant natural ecosystems, including wetlands and river systems critical for water resources.

11. **Integrated River Basin Management (IRBM)**
A principle promoted by ASEAN to manage river basins holistically, incorporating ecological, social, and economic considerations.
12. **Regional Knowledge Sharing and Capacity Building**
An ASEAN priority under AWGWRM to enhance technical expertise and knowledge sharing among member states on water conservation.
13. **ASEAN Water Quality Guidelines**
Regional guidelines for harmonizing water quality standards to ensure safe drinking water and sustainable ecosystems across member states.
14. **ASEAN's Climate Resilient Agriculture Program**
A program promoting climate-smart agricultural practices, including water-efficient irrigation and soil moisture management.
15. **Wetland Conservation in the ASEAN Region**
A regional initiative supporting the Ramsar Convention and conserving wetlands for water resources and biodiversity protection.
16. **ASEAN Coastal and Marine Environment Program**
A program addressing water quality, pollution control, and ecosystem restoration in coastal and marine areas.
17. **ASEAN Disaster Risk Financing and Insurance Program (ADRFI)**
A financial mechanism supporting disaster preparedness and response, including water-related disasters like floods.
18. **ASEAN Transboundary River Management Initiatives**
Collaborative programs addressing shared river systems, such as the Mekong and Salween, through equitable water sharing and conflict resolution mechanisms.
19. **Nature-Based Solutions in ASEAN**
Ecosystem-based approaches promoted in the region to manage water resources sustainably while addressing climate adaptation.
20. **ASEAN Groundwater Management Framework**
A nascent initiative to develop a framework for managing shared groundwater resources in the region.
21. **ASEAN Initiative on Rainwater Harvesting**
Programs promoting rainwater harvesting technologies to address seasonal water scarcity in rural and urban areas.
22. **Salinity Intrusion Mitigation in Coastal ASEAN Areas**
Regional efforts to address salinity intrusion in coastal aquifers, particularly in Vietnam and Indonesia.



23. **Urban Water Security in ASEAN**
Programs aimed at improving water distribution, recycling, and resilience in rapidly growing urban centers like Jakarta, Bangkok, and Manila.
24. **Regional Early Warning Systems for Water-Related Disasters**
Collaborative systems for monitoring and forecasting floods, droughts, and extreme weather events to improve preparedness and response.
25. **Community-Based Water Resources Management in ASEAN**
Programs encouraging local communities to manage and conserve water resources, often linked to livelihoods and ecosystem restoration.
26. **ASEAN Regional Environmental Education Action Plan**
Initiatives to raise awareness and educate communities about water conservation and sustainable management practices.
27. **ASEAN Guidelines on Public-Private Partnerships (PPPs)**
Framework for engaging the private sector in financing and implementing water-related infrastructure projects.
28. **ASEAN Biodiversity Outlook**
Reports that link water resources conservation with biodiversity protection and ecosystem resilience.
29. **Harmonization of Water Management Policies in ASEAN**
Efforts to align national policies with regional frameworks, ensuring consistent and collaborative water resources management.
30. **ASEAN Joint Declaration on Sustainable Water Management**
A declaration reaffirming member states' commitment to sustainable water management practices in alignment with regional and global goals.



Appendix B: List of Stakeholders Consulted

1)	Adib Rusli	Acting Senior Water Engineer	Department of Water Services, Public Works Department, Ministry of Development	Brunei Darussalam
2)	Wadhihah Binti Haji Zaini	Chief Lab Assistant	Department of Water Services, Public Works Department, Ministry of Development	Brunei Darussalam
3)	Norasilah Haji Nayan	Engineer	Department of Water Services, Public Works Department, Ministry of Development	Brunei Darussalam
4)	Ly Sophanna	Chief of Bureau	Ministry of Environment	Cambodia
5)	Farraz Theda	Officer	ASEAN Secretariat	Indonesia
6)	Aulia Nur Rahmawati	Officer	Directorate of Water Quality Protection and Management, Ministry of Environment	Indonesia
7)	Hani Afnita Murti	Coordinator	Directorate of Water Quality Protection and Management, Ministry of Environment	Indonesia
8)	Ari Roslina	Officer	Directorate of Water Quality Protection and Management, Ministry of Environment	Indonesia
9)	Oudomsack Philavong	Chairperson of AWGWRM, Director General	Department of Water Resources	Lao PDR
10)	Sengphasouk Xayavong	NFP, Deputy Director of Policy Division	Department of Water Resources	Lao PDR
11)	Aliya Mhd Zahir	Civil Engineer	Department of Irrigation and Drainage Malaysia	Malaysia
12)	Muhammad Akid bin Zaimi	Assistant Director	Department of Irrigation and Drainage Malaysia	Malaysia
13)	Larifah Mohd Sidik	Principal Assistant Director	Department of Irrigation and Drainage	Malaysia
14)	Norhidayah Binti Abu Hassan	Senior Assistant Director	Department of Irrigation and Drainage	Malaysia
15)	Chan Pyae Hein	Deputy Staff Officer	Environmental Conservation Department	Myanmar
16)	Thinn Thiri Aung	Assistant Director	Environmental Conservation Department	Myanmar
17)	Aye Htet Aung	Assistant Director	Environmental Conservation Department	Myanmar
18)	Aung	Assistant Director	Environmental Conservation Department	Myanmar
19)	Chan Pyae Hein	Deputy Staff Officer	Environmental Conservation Department	Myanmar
20)	Aye Htet Aung	Assistant Director	Environmental Conservation Department	Myanmar
21)	Thinn Thiri Aung	Assistant Director	Environmental Conservation Department	Myanmar



22)	Hnin Phyu Phyu Aung	Assistant Director	Environmental Conservation Department	Myanmar
23)	Heleena Claire Espina	Information Officer IV	National Water Resources Board	Philippines
24)	Bless-Baltazar	Engineer III	NWRB	Philippines
25)	Susan Abano	Chief Policy and Program Division	National Water Resources Board	Philippines
26)	Geraldine Ramos	OIC Deputy Executive Director	National Water Resources Board	Philippines
27)	Winnie Tan	Senior Assistant Director	PUB, Singapore's National Water Agency	Singapore
28)	YIN SU MAW	Senior Industry and Technology Manager	PUB, Singapore's National Water Agency	Singapore
29)	Yeow Chong Soh	Senior Deputy Director	PUB, Singapore's National Water Agency	Singapore
30)	Bunthida Plengsaeng	Director of Strategy and Planning Division	Department of Water Resources, Ministry of Natural Resources and Environment	Thailand
31)	Kanokwan Yoowong	Director of Foreign Affairs Sub-division	Department of Water Resources, Ministry of Natural Resources and Environment	Thailand
32)	Panporn Suwan	Director of Water-use Licensing Subdivision	Department of Water Resources, Ministry of Natural Resources and Environment	Thailand
33)	Komson Sadchawannakoon	Director of Survey and Design Subdivision	Department of Water Resources, Ministry of Natural Resources and Environment	Thailand
34)	Kullawat Kaewkao	Foreign Relations Officer	Department of Water Resources, Ministry of Natural Resources and Environment	Thailand
35)	Sarisa Prompojanart	Environmentalist	Department of Water Resources, Ministry of Natural Resources and Environment	Thailand
36)	Lalitta Silarak	Foreign Relations Officer	Department of Water Resources, Ministry of Natural Resources and Environment	Thailand
37)	Nonglak Sopakayoung	Environmentalist, Professional Level	Ministry of Natural Resources and Environment	Thailand
38)	Punyawee Thomas	Plan and Policy Analyst, Professional Level	Department of Groundwater Resources, Ministry of Natural Resources and Environment	Thailand
39)	Nguen Thu Phoung	Officer	Department of Water Resources Management, Ministry of Natural Resources and Environment	Vietnam

Appendix C: References and Resources by section

1. Introduction

- Key Global References:
 - United Nations Sustainable Development Goals (SDGs), particularly SDG 6: Clean Water and Sanitation.
 - UNEP (United Nations Environment Programme): Global Environment Outlook (GEO-6, 2019).
 - IPCC Reports on Climate Change and Water Resources (e.g., AR6, 2022).
- Regional References:
 - ASEAN Strategic Plan of Action on Water Resources Management (2005).
 - ASEAN Socio-Cultural Community Blueprint (ASPEN 2016–2025).
 - The Mekong River Commission's State of Basin Reports.

2. Water Resources and Distribution in ASEAN

- Key Global References:
 - FAO (Food and Agriculture Organization): AQUASTAT database on water resources.
 - World Bank: Water in Agriculture reports.
- Regional References:
 - Mekong River Commission Reports (e.g., Mekong State of Basin Report).
 - ADB (Asian Development Bank): Asian Water Development Outlook 2020.
 - Reports on groundwater use in Southeast Asia (e.g., studies by IWMI on groundwater management in the region).

3. Pressing Challenges for Water Conservation

- Key Global References:
 - UNESCO's The United Nations World Water Development Report (WWDR).
 - World Resources Institute (WRI): Aqueduct Water Risk Atlas.
- Regional References:
 - Reports by SEI (Stockholm Environment Institute) on water risks in ASEAN.
 - ADB: Water Security in Asia and the Pacific (2021).

4. Guiding Principles for ASEAN Water Resources Conservation

- 4.1 Integrated Water Resources Management (IWRM)
 - Global Water Partnership (GWP): IWRM Toolbox and Case Studies.
 - UN Water: IWRM Guidelines at River Basin Level.
- 4.2 Ecosystem-Based Management
 - CBD (Convention on Biological Diversity): Ecosystem Approach Guidelines.
 - Ramsar Convention: Guidelines for Wetland Management.
 - ASEAN Center for Biodiversity Reports on ecosystem-based adaptation.
- 4.3 Sustainable Development Goals Alignment
 - United Nations Development Programme (UNDP): SDG Water and Sanitation Targets.
 - FAO: Water Productivity and Efficiency Guidelines.



4.4 Equity and Inclusion

- UN Water: Equity and Inclusion in Water Resources Management.
- Reports on gender and water by IWMI (International Water Management Institute).

5. Overarching Goals for ASEAN Water Resources Conservation

- Key Global References:
 - World Bank: Water Security for Resilient Economies.
 - IPCC: Special Reports on climate resilience in water resources.
- Regional References:
 - ASEAN water-related strategies under ASPEN and the ASEAN Socio-Cultural Community.
 - SEI studies on regional water security challenges and solutions.

6. Strategic Approaches

6.1 Water Demand and Supply Management

- FAO: Water Demand Management in Agriculture.
- Singapore PUB: Reports on NEWater and Urban Water Management.

6.2 Ecosystem Conservation and Restoration

- Ramsar Convention Reports on wetlands in Southeast Asia.
- ADB: Wetland Management and Conservation in Asia.

6.3 Public Awareness and Stakeholder Engagement

- GWP: Case studies on public participation in water management.
- UNDP: Engaging Communities for Water Governance.

6.4 Water Quality and Sanitation

- WHO Guidelines on Drinking Water Quality.
- Reports on ASEAN water quality monitoring by UNEP and ADB.

6.5 Addressing Water-Related Disasters

- UNDRR (United Nations Office for Disaster Risk Reduction): Sendai Framework and Water-Related Disasters.
- Reports by ASEAN Coordinating Centre for Humanitarian Assistance (AHA Centre).

7. Regional Priorities and Collaboration Mechanisms

- Key Global References:
 - UN Water: Transboundary Water Cooperation Guidelines.
 - OECD: Water Governance Principles.
- Regional References:
 - Mekong River Commission: Transboundary Collaboration Initiatives.
 - ASEAN Framework for Climate Change Resilience.

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