

Examples of guidelines and measures for the conservation and restoration of rivers, canals, natural water sources, and wetlands in line with the River Health Index indicators

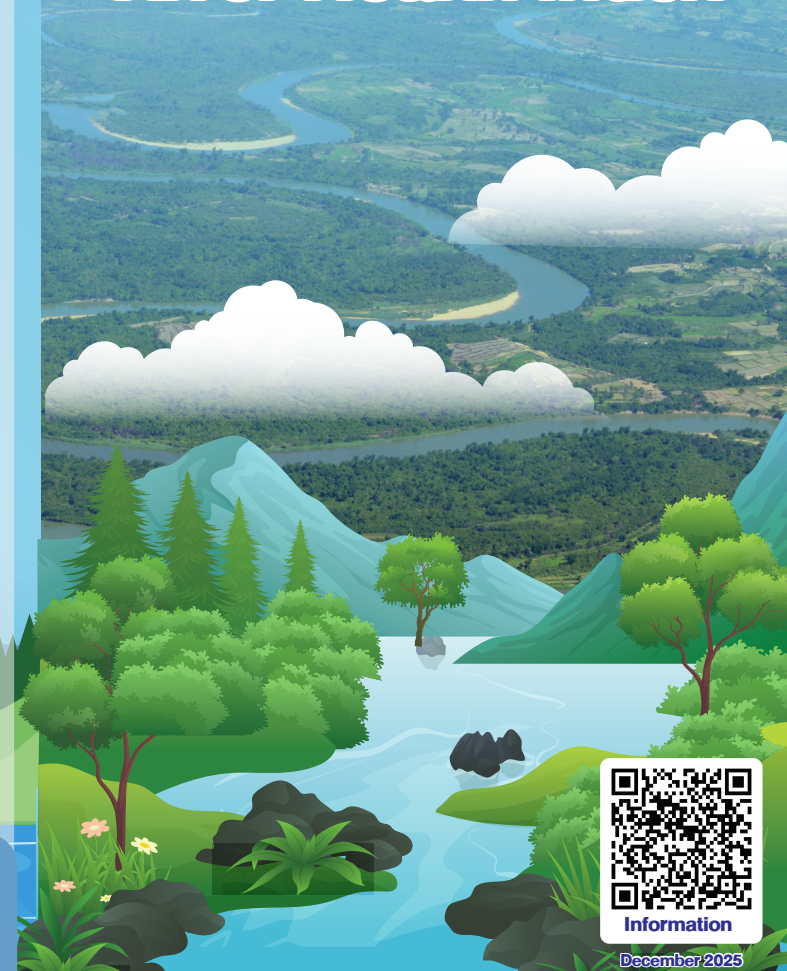
Dimension / Indicator	Examples of Non-Structural Measures	Examples of Structural Measures
Physical – Hydrological Dimension		
River Continuity Indicator	Use GIS and satellite imagery to monitor physical changes, analyze trends in rivers and wetlands, and support spatial planning.	Improve and modify infrastructure that obstructs water flow to enhance connectivity within the river basin system.
Riparian Vegetation Indicator	Promote native riverside vegetation to restore ecosystems, boost biodiversity, and support a community-friendly landscape.	Install riparian buffer zone signage to prevent encroachment and promote sustainable conservation of riparian vegetation and ecosystems.
Riverside Community Indicator	Establish guidelines for managing riverside land in urban communities, alongside public communication to foster understanding and participation.	Improve urban waterfront areas by creating public spaces or green buffers between residential areas and the river
Streamflow Quantity Indicator	Develop criteria for evaluating water management, such as analyzing water balance and demand.	Install water monitoring stations in drought-prone areas to track water levels and changes.
Streamflow Variation Indicator	Use satellite and drone technology to monitor changes in water volume.	Improve water structures that obstruct flow, such as check dams and sluice gates.
Environmental Flow in Dry Season Indicator	Maintain the minimum water level required to support ecosystems during the dry season, in order to preserve biodiversity and ensure the continuity of the river's natural flow.	Develop water infrastructure to store water for the dry season, such as small reservoirs, upstream check dams, and drainage systems.
Groundwater Quantity Indicator	Regulate groundwater extraction and use according to permits.	Improve upstream areas to enhance groundwater infiltration, such as by constructing infiltration basins, soak pits, and subsurface dams.
Sediment Quantity Indicator	Control land use and activities that cause soil erosion.	Install sediment traps or flow-retarding structures to reduce sediment before discharge into the main river.
Water Quality Dimension		
Water Quality Index (WQI)	Conduct regular water quality monitoring in industrial areas and river basins to assess status and trends.	Construct and improve wastewater treatment and pollution control infrastructure to prevent direct discharge into surface water.
Industrial Activity Indicator	Conduct regular monitoring and surveillance of water quality in river basins to assess trends in water quality changes.	Upgrade industrial wastewater treatment systems to enhance efficiency and comply with environmental standards.
Wastewater Treatment Indicator	Establish measures to control and monitor wastewater discharges, supported by law enforcement, system inspections, and public awareness.	Develop water infrastructure to support consumption, production, and sustainable environmental protection.
Ecological Dimension		
Forest Area Indicator	Designate upstream forests and riparian areas as conservation zones to preserve ecosystems and biodiversity.	Construct and improve infrastructure supporting forest conservation and restoration, such as firebreaks, check dams, and erosion control structures.
Conservation Area Indicator	Designate riparian and wetland conservation areas to preserve biodiversity and maintain ecosystem balance.	Install signage marking aquatic conservation areas with relevant information and regulations.
Agricultural and Livestock Area Indicator	Prevent and regulate wetland encroachment for agriculture to maintain ecosystem integrity and sustainable water resources.	Develop water management infrastructure, such as rainwater ditches and farm wastewater treatment systems, to control discharges efficiently.
Aquatic Species Conservation Area Indicator	Regulate and prohibit fishing during spawning seasons and control the use of fishing gear that disrupts aquatic ecosystem balance.	-
Water User Organization and Group Indicator	Implement local-level management, conservation, restoration, and improvement of water infrastructure with the participation of organizations and water user groups.	-
Socio – economic Dimension		
Population Density Indicator	Promote the redistribution of population and economic activities to suitable areas to reduce impacts on river degradation.	Improve and develop riverside public areas to ensure safety and support community use.
Water Resource Utilization Indicator	Promote and encourage efficient water use in households, agriculture, and industry.	Develop water infrastructure, such as rainwater harvesting, wastewater treatment, and drainage systems, to enhance water security in the area.
Average Income per Subdistrict Indicator	Establish a water conservation fund and provide financial and technological support to community groups or organizations involved in water conservation.	-



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River Health Index



Information

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Background

The River Health Index originated from the Asian Development Bank's (ADB) five dimensions of water security, specifically the Environmental Water Security (KD4) dimension. It began to be studied in 2016 to ensure a systematic, reliable, and standardized assessment for effective monitoring and evaluation of water resource management. Additionally, the RHI is an indicator under Dimension 4: Conservation and Restoration of Water Resource Ecosystems of the 20-Year Master Plan for Water Resource Management (2023–2037).

Objectives

- 1 To assess and monitor the health status of water bodies across physical, water quality, ecological, and socio-economic dimensions for the accurate identification of problems or risks
- 2 To serve as a tool for planning and formulating policies related to river conservation and restoration, thereby strengthening water security at both the national and local levels
- 3 To increase awareness and stimulate community participation in water resource management

Benefits of Developing the River Health Index

- 1 **Assessment of aquatic ecosystem status** The River Health Index assesses river health across multiple dimensions, including physical, hydrological, water quality, ecological, and socio-economic aspects, enabling the identification of ecosystem balance and potential risks from water degradation.
- 2 **Water resources management planning** Data from the River Health Index support water management policies focused on restoration, quality improvement, and sustainability.
- 3 **Monitoring and evaluation** The River Health Index helps monitor water resource management in sub-basins by tracking impacts from development or activities, such as construction or agriculture, ensuring that implemented measures achieve their intended goals.
- 4 **Awareness raising and stakeholder participation** The River Health Index fosters community and stakeholder engagement in water resource management, as it is easy to understand and provides clear information to all relevant parties.
- 5 **Promotion of sustainable development** Assessing the River Health Index and sub-basin conditions supports balanced and sustainable water resource development, taking into account potential environmental and social impacts of various activities.

Definition of the River Health Index

The River Health Index (RHI) is a composite index used to assess the ecological condition and sustainability of river basin systems. It integrates multiple factors and variables with the goal of evaluating a basin's capacity to support both natural ecosystem services and human demands. This assessment considers several key pillars, including water quantity, water quality, physical characteristics, aquatic life, the condition of riparian zones, and human-induced impacts.

The dimensions of the River Health Index.

1

Physical – Hydrological

They play a crucial role in supporting biodiversity and regulating water quality. If these physical characteristics are disturbed or undergo severe alterations, they may directly affect aquatic organisms, water quality, the resilience of the river basin system, and its capacity to provide ecosystem services.

2

Water Quality

It is a fundamental factor that influences the ability of aquatic organisms to survive, the river's capacity to maintain ecological balance, and the provision of ecosystem services. It also serves as a key indicator reflecting the potential of a water body to support human activities and the existence of living organisms, including domestic use, agriculture, and industry. Moreover, it reflects water quality conditions that are appropriate and safe for aquatic life.

3

Ecological

They play an important role in the diversity and interactions of organisms within the river, the diversity of habitats, and the support of living organisms, as well as in the connectivity between the river and its surrounding areas, which helps sustain the life cycles of aquatic species. A healthy river basin ecosystem requires biodiversity, the persistence of water bodies and conservation areas, and the control of invasive alien species.

4

Socio – economic

They are associated with various human activities, including water resource use, wastewater discharge, and economic activities, all of which directly affect water quality, water quantity, and aquatic ecosystems. This dimension also reflects the role of communities in the conservation and restoration of river basin systems, as well as the potential for public participation in the sustainable management of water resources.

Indicators of the River Health Index

Assessing river health requires a diverse set of indicators to comprehensively reflect and link the actual conditions of a river. Accordingly, the River Health Index has been developed across four dimensions, encompassing the physical characteristics of the physical-hydrological, water quality, ecological, and socio-economic aspects. These dimensions comprise a total of 19 indicators, as outlined below.

