

AQUIFER PROJECT: “Innovative instruments for an integrated management of groundwater in a context of an increasing scarcity of hydrological resources”

Deliverable 2.4.3 Diagnosis of water scarcity - DPSIR model

The DPSIR model is an environmental management framework that stands for "Driving forces, Pressures, State, Impacts, and Responses." It is commonly used to analyze and diagnose environmental issues, including water scarcity. Here's a diagnosis of water scarcity using the DPSIR model:

- 1) **Driving forces:** These are the underlying factors that contribute to water scarcity. Examples of driving forces for water scarcity are presented in Figure 1.

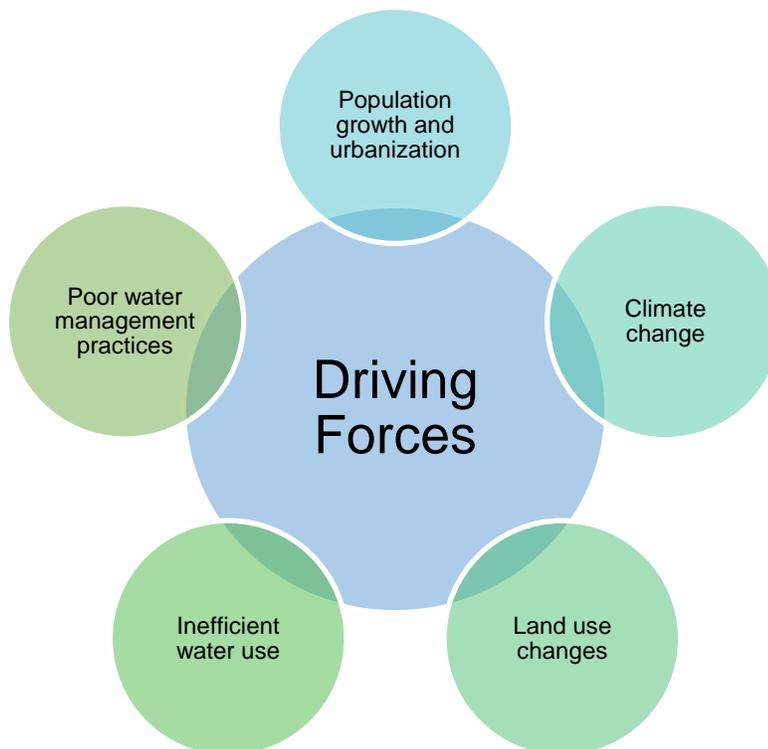


FIGURE 1: EXAMPLES OF DRIVING FORCES RELATED TO WATER SCARCITY

- 2) **Pressures:** Pressures refer to the human activities that directly impact water resources and contribute to water scarcity. Examples of pressures on water resources may include:
 - a) Increased water demand, exceeding the available water resources or the capacity of the water infrastructure.
 - b) Decreased water availability, due to natural or human-induced factors such as drought, pollution, or groundwater depletion.
 - c) Reduced water quality, caused by contamination from various sources such as sewage, industrial waste, or agricultural runoff.

- 3) **States:** State represents the current condition of water resources in the affected area. In the case of water scarcity, the state may include:
 - a) Insufficient water supply, leading to water shortages, rationing, or conflict over water resources.
 - b) Degradation of ecosystems, as water scarcity can affect the functioning of aquatic and terrestrial ecosystems, leading to biodiversity loss, soil erosion, or desertification.
 - c) Impacts on human health, livelihoods, and well-being, as water scarcity can affect access to safe drinking water, sanitation, and hygiene, leading to waterborne diseases, malnutrition, or social and economic inequalities.

- 4) **Impacts:** Impacts are the consequences of water scarcity on various aspects of society, economy, and environment. Impacts of water scarcity may include:
 - a) Economic impacts, such as reduced productivity, increased costs, and loss of income and jobs in sectors that depend on water, such as agriculture, industry, and tourism.
 - b) Social impacts, such as displacement, migration, and conflict over water resources, affecting vulnerable groups such as women, children, and indigenous people.
 - c) Environmental impacts, such as loss of biodiversity, degraded water quality, and ecosystem collapse, affecting the provision of ecosystem services such as water regulation, nutrient cycling, and carbon sequestration.

5) **Responses:** Responses refer to the actions taken or proposed to address water scarcity. Some responses to water scarcity are presented in Figure 2.

Responses			
Water conservation and efficiency measures , including water-saving technologies, pricing policies, and public awareness campaigns	Water allocation and management reforms , including integrated water resources management, stakeholder participation, and conflict resolution mechanisms	Water infrastructure investments , including water supply systems, wastewater treatment facilities, and irrigation systems, with a focus on sustainability, resilience, and equity	Policy and governance reforms , including legal frameworks, institutional arrangements, and capacity building, to ensure effective and equitable water management and governance.

FIGURE 2: EXAMPLES OF RESPONSES TO WATER SCARCITY

In summary, a diagnosis of water scarcity using the DPSIR model would involve identifying the driving forces and pressures contributing to water scarcity, assessing the current state of water resources, identifying the impacts of water scarcity on various aspects, and evaluating the responses and actions taken to address water scarcity. This comprehensive analysis can help inform strategies and policies to effectively manage and mitigate the impacts of water scarcity.