Assessment of Local Water Resources for Sustainable Development Goals

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Abstract: Under the framework of the SDGs it is fundamental to emphasize on water resources as a cross-cutting issue, particularly in relation to ensuring sustainable withdrawals and supply of freshwater to address water scarcity and integrated water resources management, being essential to count with local data on water resources availability at town and country levels.

Keywords: Water, resources, local, availability, sustainability, indicators.

1. Introduction to the Extended Abstract

Based on the framework of the Sustainable Development Goals (SDGs) – Targets - Indicators 2016-2030, the objective of this paper is to emphasize on water resources as a cross-cutting issue and at the center of sustainable development, presenting a specific analysis of the importance of a better knowledge of the hydrology - hydrometrics of country major and local basins as fundamental information for water resources sustainable management. This implies the review of specific indicators related to the information of water resources assessment and availability at town level, fundamental to life, health, food security, energy, the environment, and human well-being.

The insights presented contribute to the work that should be done at global and country levels on the structure of specific indicators to monitor the progress of the corresponding goals and targets, which should be monitored, specifically in relation to ensuring sustainable withdrawals and supply of freshwater to address water scarcity, and to the implementation of integrated water resources management at all levels.

There are limitations including the lack of accurate and complete data. Local sub-national variations in water resources and water withdrawal could be considerable, as at the level of local or individual river basins, besides the lack of account of seasonal variations in water resources. Regional values may mask huge differences within regions and within countries where people live in areas of serious water scarcity, although each country could have enough renewable water resources overall.

2. Methodology

One of the main bibliographic inputs for this paper is the information on trends in water withdrawal that reflect relatively slow patterns of change. Usually, three-five years are a minimum frequency to be able to detect significant changes, as it is unlikely that the indicator would show meaningful variations from one year to the other. See Figures 1 and 2 (United Nations. 2019; FAO. 2020).

An ecohydrological analysis of two case studies, i) Paute River Watershed and Guachapala County Land Use Plan, Ecuador (Habitierra, 2013), and ii) Climate Change impacts on available water resources for the city of Quito (DHI, 2012), produced valuable information regarding the importance to count with local data on water resources for watershed and local planning.

3. Targeting Local Data for Water Resources Assessment

In order to ensure sustainable withdrawals and supply of freshwater to address water scarcity, and to implement integrated water resources management at all levels (targets 6.4 and 6.5 of the SDGs), a fundamental baseline is the assessment of available and exploitable water resources at local level, as well as its development feasibility.

United Nations' documentation allow for an adequate distinction between different concepts regarding water resources, as renewable water resources, exploitable water resources, water withdrawals, water scarcity, water security, among others (Margat, J. et al., 2005).

Renewable water resources include all surface water and groundwater resources that are renewed on a yearly

basis without consideration of the capacity to harvest and use this resource. Exploitable water resources, which refer to the volume of surface water or groundwater that is available with an occurrence of 90% of the time, are considerably less than renewable water resources, but no universal method exists to assess such exploitable water resources.

4. From Local to Global Water Sustainability Indicators

Most water supply development projects, particularly to satisfy the needs and demand for drinking water and irrigation, are formulated based on local demand of towns and rural areas whose population lack of those services, which are required to improve their quality of life and be socially included. Large scale or regional developments are not always feasible, since most rural towns and communities are dispersed or sparsely populated, requiring high costs for infrastructure development.

Fundamental variables as the rate of water withdrawal/consumption and the available water supply produce a valuable indicator of relative water use and the ability of water resource systems to provide the services we need. Large uncertainties in current estimates of global water withdrawals complicate good assessments of relative water use (United Nations / UNESCO, 2019; United Nations / UNESCO, 2014).

5. Results and Discussion

Data on water resources availability is a key indicator that should be approached at local level, since i) most local and rural communities and towns do not count with the information regarding their water resources, ii) local information will contribute to improve the accuracy of information of renewable water resources at country level, iii) rural settlements are in general the most vulnerable, lacking services of drinking water and irrigation for food security, and iv) small variations on the estimation of available water resources would represent social, environmental and economic consequences on water resources management and sustainable development planning.

While data on precipitation – which can be measured with relative ease – is generally available for most countries, river runoff and groundwater levels are generally much more difficult and costly to monitor. As a result, trends regarding changes in the overall availability of freshwater supplies are difficult to determine in all but a few places in the world. However, it is clear that several countries face varying degrees of water scarcity, stress or vulnerability. See Figures 1 and 2.

The analysis of the two case studies mentioned (Guachapala County and City of Quito) demonstrates that there cannot be effective integrated water resources management (IWRM) at town level if there is a lack of information on water resources availability. The required knowledge of ecohydrological processes can only be achieved if we count with local information that can be processed at basin, sub-national and country levels. See diagram in Figure 3 and image in Figure 4, and the hydrometric stations network on basins for drinking water for the city of Quito, Ecuador, in Figure 5 (Guillen, G., Zapata, X., unpublished).

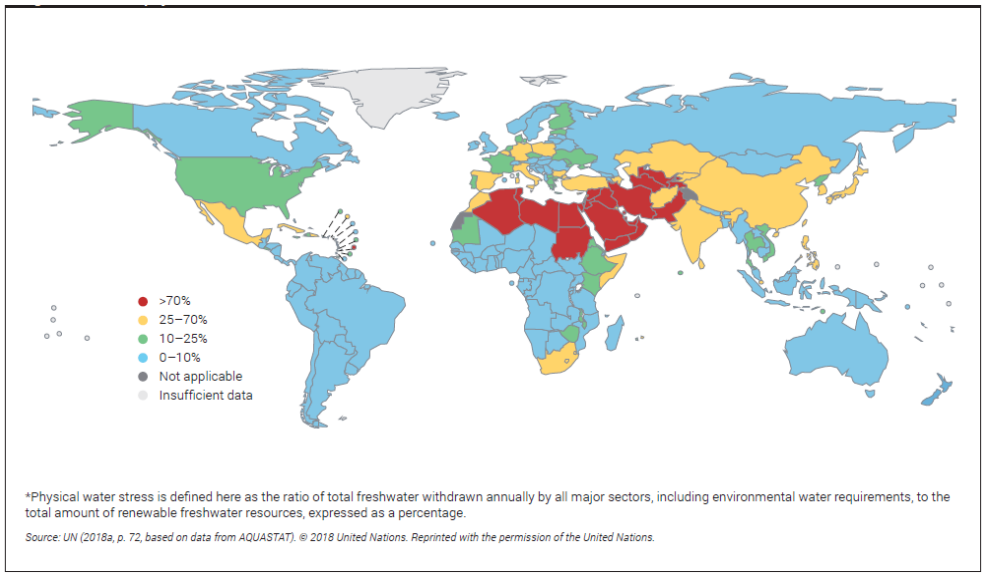

Figure 1. Level of physical water stress (From: UN World Water Development Report 2019)

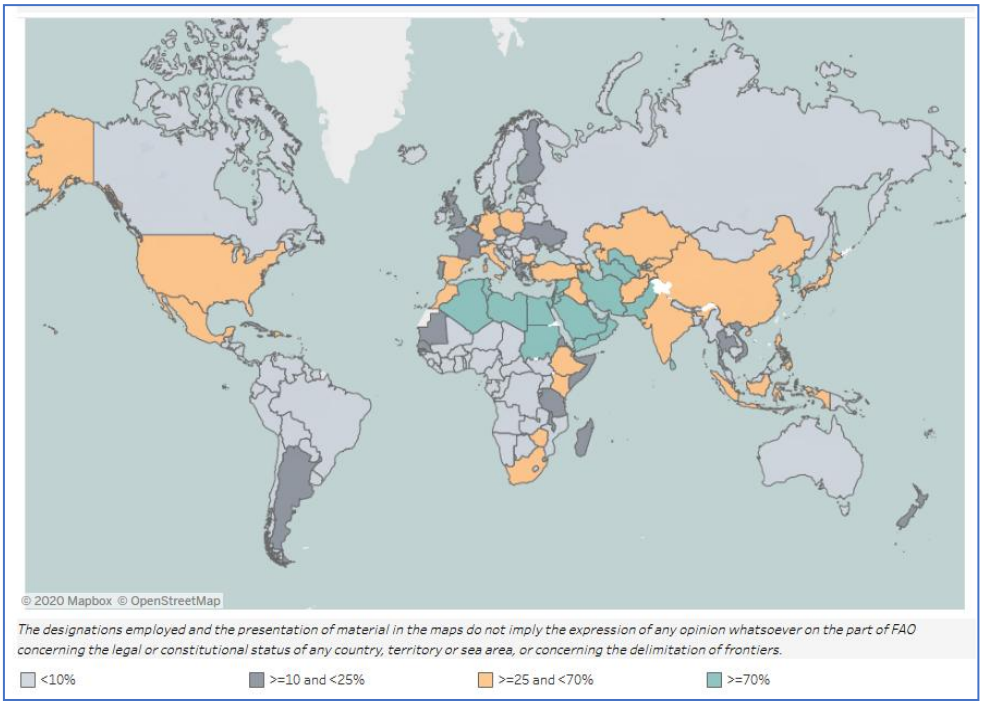

Figure 2. Level of water stress: freshwater withdrawal as a proportion of available freshwater resources (From: FAO, 2020, Sustainable Development Goals and Indicators)

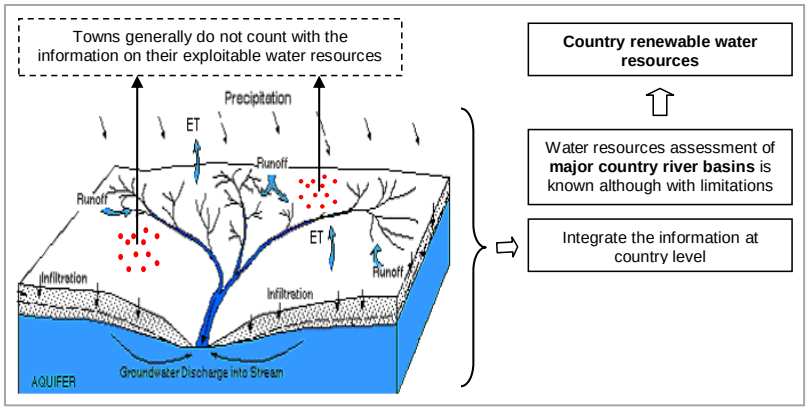

Figure 3. Water resources assessment at local and country levels

Figure 4. Paute river medium watershed upstream image with high lying towns

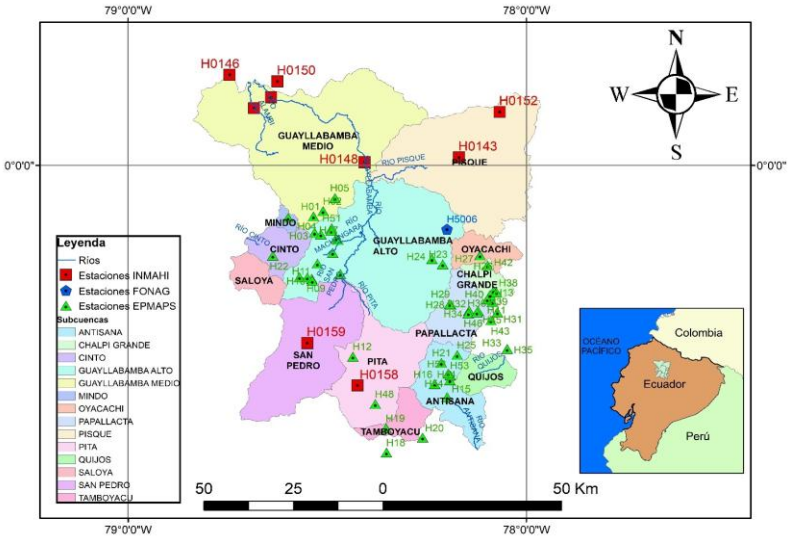

Figure 5. Hydrometric stations network on basins for drinking water for the city of Quito, Ecuador

6. Conclusions

In order to ensure sustainable withdrawals and supply of freshwater to address water scarcity, and to implement integrated water resources management at all levels (targets 6.4 and 6.5 of the SDGs), an essential baseline is the assessment of available and exploitable water resources at local level, as well as its development feasibility. Significant variables as the rate of water withdrawal/consumption and the available water supply produce a valuable indicator of relative water use and the ability of water resource systems to provide the services needed. Large uncertainties in current estimates of global water withdrawals complicate good assessments of relative water use.

Considering the limitations described in regard to goals-targets-indicators of sustainable withdrawals and supply of freshwater to address water scarcity, and the implementation of integrated water resources management, it is indispensable to count with adequate and reliable local hydrological - hydrometric data and monitoring systems that would contribute to partially control these limitations, assessing available water supplies for community planning.

In reference to Agenda 2030, countries must implement a complementary indicator, as the percentage of the population whose water sources are monitored by means of adequate measuring methods, providing information on surface water (flow and level) and ground water (recharge to ground) regimes that influence water availability.

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