WORLD RESOURCES INSTITUTE

# THE NEW AQUEDUCT WATER RISK ATLAS:

## WHAT'S NEW & WHY DOES IT MATTER TO YOU?

In August 2019, WRI released an updated version of the Aqueduct™ Water Risk Atlas (Aqueduct 3.0). This document provides information on what's new in Aqueduct 3.0 (Part I) and explains why it matters by comparing results with those available in the old version of the tool (Aqueduct 2.1) (Part II).

If you have used Aqueduct 2.1 in the past and are considering using Aqueduct 3.0, this document will help you understand how and why results might change.

If you have not used Aqueduct 2.1 in the past or you are interested in learning about Aqueduct 3.0, you should first read the Aqueduct 3.0 Technical Note (www.wri.org/publications/aqueduct-30) to understand the new indicators, underlying data and hydrological model.


Added
Removed
Updated
AQUEDUCT 2.1 INDICATORS
AQUEDUCT 3.0 INDICATORS
Baseline Water stress
Inter-annual Variability
Seasonal Variability
Flood Occurrence
Drought Severity
Upstream Storage
Groundwater Stress
Return Flow Ratio
Upstream Protected Land
Media Coverage
Access to Water
Threatened Amphibians
Baseline Water Stress
Baseline Water Depletion
Interannual Variability
Seasonal Variability
Groundwater Table Decline
Riverine Flood Risk
Coastal Flood Risk
Drought Risk
Untreated Connected Wastewater
Coastal Eutrophication Potential
Unimproved/No Drinking Water
Unimproved/No sanitation
Peak RepRisk Country ESG Risk Index

## PART 1: WHAT'S NEW?

Three things have changed in Aqueduct 3.0:

- The indicators in the Water Risk Framework,
- The hydrological model underpinning the indicators,
- The hydrological sub-basins.

### The indicators in the Water Risk Framework

Based on WRI's experience from extensive application of previous data available in Aqueduct 2.1, as well as improvements in hydrological models and data, WRI has made changes to the Aqueduct Water Risk Framework, specifically:

- Four indicators that provided limited value or were not directly actionable have been removed.
- Eight indicators that were used extensively and provided actionable insights to support decision-making have been updated and improved.
- Five indicators previously not available have been added to provide a more comprehensive overview of water-related challenges.

### The hydrological model underpinning most indicators

Six indicators in Aqueduct 2.1 and five indicators in Aqueduct 3.0 are calculated by WRI and its research partners using a global hydrological model. In Aqueduct 2.1, WRI used GLDAS-2, in Aqueduct 3.0, WRI selected a different hydrological model, called PCR-GLOBWB 2.0, which is different in the following ways:

- **Water supply estimates include both surface and groundwater resources.** One of the key improvements to the Aqueduct Water Risk Framework is the inclusion of groundwater resources when estimating available water supplies. This is important because groundwater is a critical resource for agricultural production, ecosystems, drinking water and industry.
- **Water supply and demand are calculated together.** In PCR-GLOBWB 2, water demand, withdrawal and available water suppliers are all connected and updated at every timestep. This is important because PCR-GLOBWB 2 can better identify when the lack of available surface water limits water withdrawals and when groundwater satisfies water demands.
- **The underlying model has much higher spatial resolution.** While Aqueduct 2.1 estimated water supply at a 1x1 degree grid (roughly 110x110 km at the equator), PCR-GLOBWB 2 uses a 5x5 arc minute grid (roughly to 10x10km at the equator). This is important because, while results are presented at a similar resolution, Aqueduct 3.0 estimates water supply at 144 times higher spatial resolution.
- **It has a more recent and higher temporal resolution.** PCR-GLOBWB 2 uses historic daily data from January 1960 until December 2014, aggregated to monthly scores. This provides higher temporal resolution than Aqueduct 2.1, which used a timeseries for water supply but only one year (2010) for water demand. This is important because Aqueduct 3.0 provides monthly scores for selected indicators offering a much higher temporal resolution.

### The hydrological sub-basins

The indicators in the Aqueduct Water Risk Framework are aggregated to three different geographic scales, depending on the nature of the data and intended use of the indicator, including:

- Country scale
- Aquifer scale
- Hydrological sub-basins scale (i.e. sub-catchment scale).

Aqueduct 2.1 relied on sub-basins as defined by the Global Drainage Basin Database, but Aqueduct 3.0 uses HydroBASINS level 6 sub-basins.

Because most of the indicators are at a hydrological sub-basins scale, using HydroBASINS level 6 sub-basins has several implications, most importantly:

- HydroBASINS sub-basins are **more commonly used**, hence driving greater alignment among water risk tools.
- HydroBASINS allows **for more flexibility when combining different datasets**, since it uses a hierarchical approach with 12 levels ranging from large basins to small sub-basins.
- HydroBASINS sub-basins have more **homogeneous sizes** than the sub-basins in GDBD, ultimately influencing the results displayed in the Aqueduct Water Risk Atlas.

## PART 2: WHY DOES IT MATTER TO YOU?

Understanding what's new in Aqueduct 3.0 is important because the changes described above all influence the results. Changes in the Aqueduct Water Risk Framework, changes in the hydrological model, and changes in the hydrological sub-basins all influence the result, which matters to you because:

- The results of your water risk assessment using Aqueduct 3.0 may or may not change; and
- Any one or combination of the changes described above can be driving the differences in results, so determining what is driving the change will requires in depth analysis of the local context in the area(s) of interest and close evaluation of the changes associated with the indicators values in question.

The rest of this document includes information for the two most widely used indicators available in both Aqueduct 2.1 and Aqueduct 3.0 for which WRI has compared the results: overall water risk and baseline water stress.

Detailed information on these indicators, including full definitions and calculations, can be found in the Aqueduct 3.0 Technical Note (https://www.wri.org/publications/aqueduct-30).

Practitioners are encouraged to use the information provided to:

- Learn more about the differences between Aqueduct 2.1 and Aqueduct 3.0; and
- Evaluate strengths and weaknesses of updating work previously completed with Aqueduct 2.1 with the information provided in Aqueduct 3.0, keeping in mind the information provided in the Aqueduct Water Risk Atlas is designed for screening social and environmental water-related externalities and is not suitable for site level risk assessments or to inform local water action plans.

## WHAT'S CHANGED: OVERALL WATER RISK

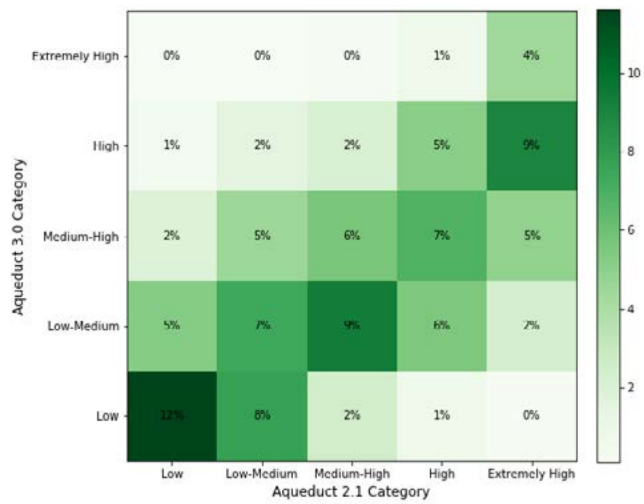
### AQUEDUCT 2.1

Overall water risk identifies areas with higher exposure to water-related risks and is an aggregated measure of all selected indicators from the Physical Quantity, Quality and Regulatory & Reputational Risk categories.

### AQUEDUCT 3.0

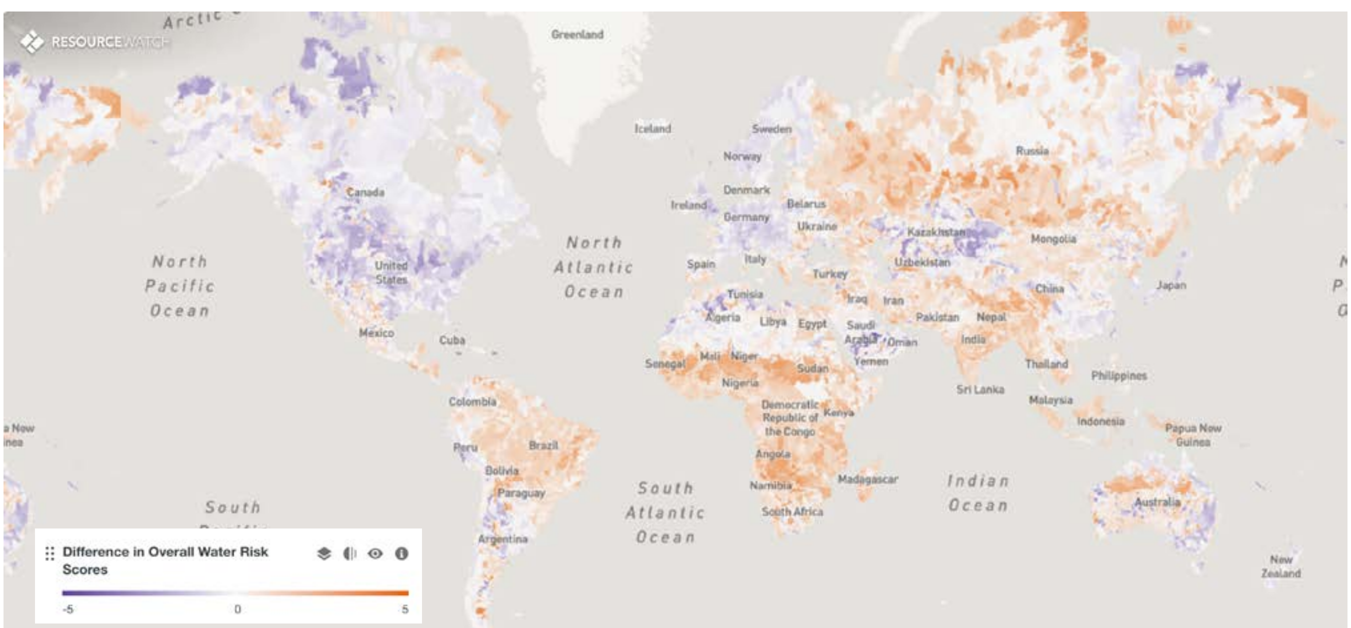
Overall water risk measures all water-related risks, by aggregating all selected indicators from the Physical Quantity, Quality and Regulatory & Reputational Risk categories. Higher values indicate higher water risk.

## Percentage of area where overall water risk scores have changed




We compared Aqueduct 2.1 and 3.0 at a pixel level and weighted by area. Pixels are 5x5 arc minute so the area depends on the latitude. For instance, 12% of area are classified Low in Aquecuct 2.1 (x-axis) AND Low in Aqueduct 3.0 (y-axis) whereas 8% of the area is classified Low-Medium in Aqueduct 2.1 but Low in Aqueduct 3.0.

## EXPLORE WHERE OVERALL WATER RISK SCORES HAVE CHANGED




CLICK HERE TO VIEW THE MAP

## WHAT'S CHANGED: BASELINE WATER STRESS

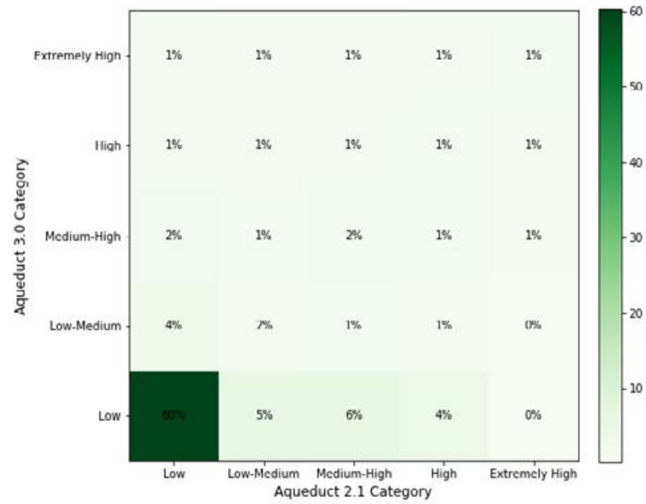
### AQUEDUCT 2.1

Baseline water stress measures the ratio of total annual water withdrawals to total available annual renewable supply, accounting for upstream consumptive use. Higher values indicate more competition among users.

### AQUEDUCT 3.0

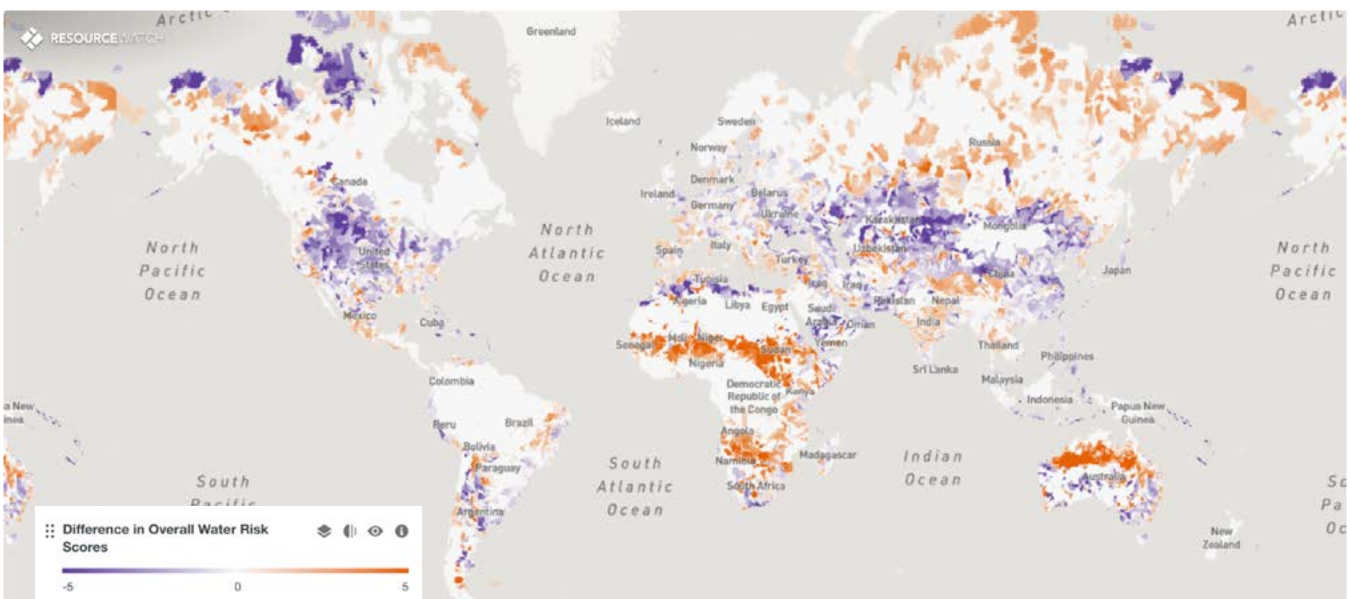
Baseline water stress measures the ratio of total water withdrawals to available renewable water supplies. Water withdrawals include domestic, industrial, irrigation and livestock consumptive and non-consumptive uses. Available renewable water supplies include surface and groundwater supplies and considers the impact of upstream consumptive water users and large dams on downstream water availability. Higher values indicate more competition among users.

## Percentage of area where baseline water stress scores have changed




We compared Aqueduct 2.1 and 3.0 at a pixel level and weighted by area. Pixels are 5x5 arc minute so the area depends on the latitude. For instance, 60% of area are classified Low in Aquecuct 2.1 (x-axis) AND Low in Aqueduct 3.0 (y-axis) whereas 5% of the area is classified Low-Medium in Aqueduct 2.1 but Low in Aqueduct 3.0.

### EXPLORE WHERE BASELINE WATER STRESS SCORES HAVE CHANGED

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