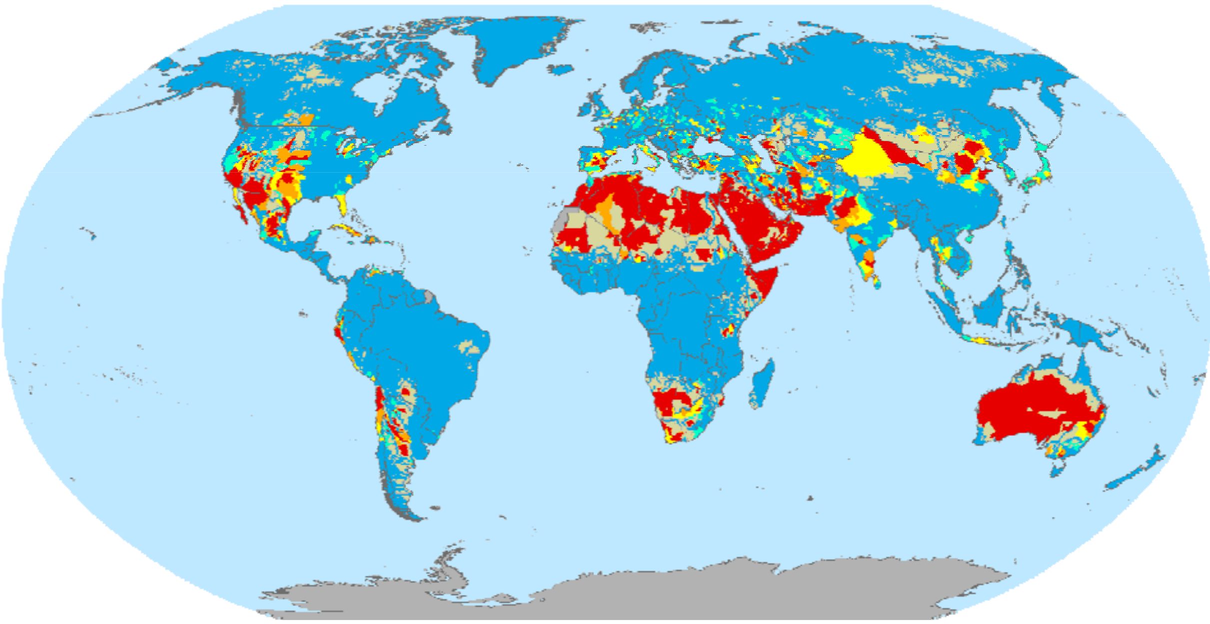
Freshwater Sustainability Analyses:



Interpretive Guidelines

Data provided by: The Coca-Cola Company
www.coca-cola.com

Hydrologic modeling performed by: ISciences, L.L.C.
www.ISciences.com

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FOREWORD

The Coca-Cola Water Risk Data were provided to the World Resources Institute by The Coca-Cola Company in support of the Aqueduct project. ISciences L.L.C. performed the hydrological modeling. The purpose of the *Freshwater Sustainability Analyses: Interpretive Guidelines* is to provide a high level description of the methodology and data inputs for the water risk data and associated maps. Additional technical documentation is forthcoming.

In 2012 and 2013, the World Resources Institute, in collaboration with ISciences L.L.C., plans to update the water risk data and associated maps (not including socioeconomic drought). Updates will include numerous improvements in source data and indicator estimation methods. We welcome comments and suggestions from interested parties about how these maps may be improved for use by corporate decision makers.

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Baseline Water Stress: Interpretive Guidelines

Objective: The baseline water stress indicator estimates the degree to which freshwater availability is an ongoing concern. High levels of baseline water stress are associated with increased socioeconomic competition for freshwater supplies and heightened political attention to issues of water scarcity.

Definition: Baseline water stress is defined as the ratio of total annual freshwater withdrawals for the year 2000, relative to expected annual renewable freshwater supply based on 1950-1990 climatic norms. This ratio provides an assessment of the demand for freshwater from households, industry, and irrigated agriculture relative to freshwater availability in a typical year. The projected change in water stress indicator for years 2025, 2050, and 2095 are described on page 13.

Interpretation: High levels of baseline water stress indicate that demand for freshwater approaches (or exceeds) the annual renewable supply, which leads to greater socioeconomic competition for freshwater and a higher risk of supply disruptions. The following table describes the categories, thresholds, and storylines that are used to interpret this indicator (UNCSD, 1997). Regions with baseline water stress levels of medium-high or higher should be assessed in more detail using local expertise and knowledge.

Water Stress Category	Description
Low	<10 % of available freshwater is used. There is sufficient renewable freshwater supply to meet current and near-term projected needs of households, industry, and irrigated agriculture without significant infrastructure (e.g., reservoirs, dams, aqueducts).
Moderate	10-20% of available freshwater is used. Renewable freshwater is a limiting factor for households, industry, and irrigated agriculture. Local infrastructure is needed to increase local supply (e.g., community reservoirs, cisterns, and aqueducts) and reduce demand through end-use efficiency.
Medium-High	20-40% of available freshwater is used. Limits in renewable freshwater supply create competition among water users. This competition needs to be carefully managed to ensure sufficient supply and maintain aquatic ecosystems. Regional infrastructure is needed to increase supply and/or reduce demand through end-use efficiency. Access to freshwater occasionally receives heightened political, legal, and regulatory attention.
High	40-80% of available freshwater is used. Renewable freshwater is scarce relative to demand. Access to water is a major on-going political, legal, and regulatory concern. Large scale water works (e.g., regional scale reservoirs, major dams, long range transfer systems, desalination plants) are needed to maintain reliable supply.
Extremely High	More than 80% of available water is used. Renewable freshwater is extremely scarce relative to demand. Supply disruptions are likely to occur as the result of natural phenomena, competition from other users, political pressure, or regulatory measures.
Arid and Low Water Use	Sparsely populated arid areas with very little annual renewable freshwater supply and very small annual freshwater withdrawals.
Missing Data	We were unable to compute baseline water stress due to missing data (e.g., reports of water withdrawals or runoff).

Caveats:

While global models tend to be correct in aggregate, they may not accurately reflect conditions at any specific place. We strongly encourage more detailed assessments based on local knowledge and expertise. We are also aware of the following systematic issues that exist in the current estimation methods:

- We may *overstate* the level of baseline water stress in large cities that are effectively administered as states or provinces. Examples include Bogota, Buenos Aires, and Manila. These cities are generally able to draw upon freshwater resources in the surrounding watersheds to meet demand.
- We may *understate* the level of baseline water stress in areas with long rivers where large portions of the watershed are arid and are in large states or provinces, for example the Ganges/Uttar Pradesh.
- These estimates provide a reasonable accounting for shallow groundwater, but do not account for withdrawals from aquifers. In general, high values of baseline water stress indicate overuse of such resources.

Computational Approach:

- Global water stress has been calculated using long term climatic norms for runoff (1950-1990) and water withdrawal statistics for the year 2000.
- Annual renewable freshwater supply is based on a global runoff map produced by the University of New Hampshire and the Global Runoff Data Center.
- Estimates of annual renewable freshwater account for upstream consumptive withdrawals.
- Annual freshwater withdrawals are spatially disaggregated from FAO reported national statistics for the year 2000 by sector (domestic, industrial, agriculture), using global maps of population density, lights at night, and irrigated lands.
- The fraction of total withdrawals rendered unsuitable for reuse in the same basin, via processes such as evapotranspiration and contamination, are based on regional estimates by sector produced by the Russian State Hydrological Institute.
- The results are then re-aggregated to watersheds intersected with country and state/province boundaries. HYDRO1K (USGS) 4^{th} level watersheds are used in Europe and 3^{rd} level watersheds are used everywhere else except Australia. 4th level watersheds were used for Europe due to artifacts in the 3^{rd} level delineations in HYDRO1K. The basins for Australia are from *Australia's River Basins 1997*, published by Geoscience Australia.
- The "Arid and Low Water Use" category is used for areas where both available water and use were too small to calculate a meaningful ratio.

Principal Data Sources:

- UNH/GRDC Composite Runoff Fields V1.0 (Fekete and Vörösmarty, 2002).
- Regional estimate of consumptive use ratios by sector (Shiklomanov and Rodda, 2003).
- AQUASTAT Information System on Water and Agriculture: Review of World Water Resources by Country (FAO, 2003).
- Global Rural-Urban Mapping Project (GRUMP): Urban/Rural Population grids (CIESIN, 2004).
- Version 2 DMSP-OLS Nighttime Lights Time Series (NGDC, 2006).
- Global map of irrigated areas version 4 (Siebert et al., 2006).

- HYDRO1K (Verdin and Greenlee, 1996).
- Australia’s River Basins 1997 (Geosciences Australia, 1997).
- VMAP0 (National Geospatial Intelligence Agency, 2007).

Objective: The socioeconomic drought indicator estimates the extent and severity of episodic drought conditions. Socioeconomic droughts occur when available freshwater supplies are insufficient to support normal water withdrawals in aggregate.

Definition: Socioeconomic drought is calculated as the ratio of current water stress to baseline water stress. Values above one indicate that there is more competition for water than in a typical year. Two versions of the indicator are computed. The one-year indicator is more sensitive to annual fluctuations in weather. The three-year indicator describes long term droughts that may persist even though the most recent year of weather is more typical.

Socioeconomic drought occurs when demand for freshwater exceeds supply. It more accurately characterizes drought for large point source users than other common drought measures; e.g., meteorological, agricultural, and hydrological indices. Meteorological drought indices typically only consider shortfalls in precipitation relative to long-term norms and do not account for transport through the surface water network or how demand compares to supply. Agricultural drought indices are designed to assess the impact of drought on rain-fed crop production, and typically focus on available soil moisture and the physiological requirements of plants for water. They do not account for surface water transport or the demand for water to support domestic and industrial users. Hydrological drought indices consider shortfalls in surface water flows relative to long term norms. They account for transport through the surface water network, but do not assess supply relative to demand (NDMC, 2011).

The socioeconomic drought indices presented here are designed to highlight regions experiencing temporarily elevated socioeconomic competition for freshwater among major point source users (irrigated agriculture, industry, and domestic).

Interpretation: Socioeconomic drought indices substantially above one indicate that there is significantly more competition for freshwater resources than would be present in a typical year with normal weather. The following table describes the categories, thresholds, and storylines that are used to interpret the socioeconomic drought indicators. Regions with severe to exceptional drought conditions should be assessed in more detail using local expertise and knowledge. The thresholds described below were selected by comparing the computed drought index values with press reports of drought impacts around the world in 2007 (the first year the drought index was computed).

Socioeconomic Drought Category	Description
Relatively Wet	There is more freshwater available than in a normal year to support the needs of households, industry, and irrigated agriculture.
Near Normal Conditions	Conditions are 1.0–1.7 times more stressed than normal, but they are well within the range of expected variation and do not pose significant added risk.
Low Impact Drought	Conditions are 1.7 times or more stressed than normal, but did not pose a significant problem for households, industry, or irrigated agriculture because such use accounted for a very small fraction of the available supply. Rain-fed agriculture may be stressed relative to a normal growing year.

Moderate Drought	Conditions are 1.7–2.0 times more stressed than normal. Planning agencies may be placed on alert. New restrictions on discretionary water uses may be discussed or implemented.
Severe Drought	Conditions are 2.0–2.8 more stressed than normal. Awareness of drought is likely widespread. Planning agencies may be placed on high alert. Some communities may face new restrictions on water use and/or occasional supply disruptions.
Extreme Drought	Conditions are 2.8–8.0 times more stressed than normal. Drought is likely among the foremost concerns of residents and planning agencies. New water use restrictions and/or supply disruptions are likely widespread and began to affect the core economy.
Exceptional Drought	Conditions are more than 8.0 times more stressed than normal. Basic services (e.g. power, drinking water distribution) are likely at risk and require significant intervention (e.g., use restrictions, supply disruptions, emergency imports, emergency exemption from regulations).
Missing Data	Unable to compute the drought severity indicator due to missing data.

Caveats:

- While global models tend to be correct in aggregate, they may not accurately reflect conditions at any specific place. We strongly encourage more detailed assessments based on local knowledge and expertise.
- Risk due to drought may be mitigated by local infrastructure. Such infrastructure is more likely to exist in areas with both chronic water stress and sufficient wealth/governance capacity.
- Areas with large amounts of annual snowmelt may be incorrectly displayed in drought categories due to a computational artifact.
- Areas with extremely high baseline stress are more likely to be categorized as facing exceptional drought than warranted.
- The drought indicators use observed temperature and precipitation data available at the time of the assessment. These data are then supplemented with six months of forecast data published by the International Research Institute for Climate and Society at Columbia University (IRI, 2011). The use of forecasts provides the ability to “look ahead” up to 6 months, but may also introduce error. An initial qualitative case-control validation based on a stratified random sample from three recent drought assessments demonstrated that the one year drought indicator is about 80-90% accurate.

Computational Approach:

- Baseline water stress values have been calculated using long term average hydrologic data (1950-1990) and water use statistics for the year 2000.
- The socioeconomic drought indices are based on a comparison between baseline water stress and present-day (recent past and near-term future) water stress. The calculation of present day water stress is based on estimates of present day water use and present day water availability. The drought assessments include six months of forecasted precipitation and temperature based on the Net Assessment forecasts published by the International Research Institute for Climate and Society at Columbia University (IRI, 2011).
- Present day water availability is calculated by first estimating runoff values at a monthly time scale and then aggregating them to annual values. These annual runoff values, along with updated water withdrawal values are run through a GIS water stress model (ISciences, 2007) to estimate present day blue water

availability.

- Annual freshwater withdrawals are spatially disaggregated from FAO reported national statistics for the year 2000 by sector (domestic, industrial, agriculture) using global maps of population density, lights at night, irrigated lands, and land use (see chronic water stress section). For the estimation of present day use, existing year 2000 values are updated based on observed and forecasted growth rates in each sector.

Principal Data Sources:

- Chronic water stress (see previous section) (ISciences, 2007).
- Precipitation (*Tropical Rainfall Measuring Mission (TRMM) Monthly (3B-43 V6)* (NASA, 2005).
- Precipitation (CPC PRECipitation REConstruction over Land (Chen, M., P. Xie, J. E. Janowiak and P. A. Arkin, 2002) as downscaled and distributed by NOAA "Leaky Bucket" model project.
- Mean monthly temperature AIRS *Level 3 Monthly Gridded Retrieval Product* **(**JPL 2007).
- CPC Global Land Surface Air Temperature Analysis - GHCN+CAMS (Fan, Y. & H. van den Dool, JGR 2008).
- Soil water holding capacity. (FAO, 2003 and Batjes, 2005).
- Soil moisture (Fan & van den Dool, 2004 JGR).
- Monthly Snow Melt and Accumulation. *Derived from AMSR-E/Aqua 5-Day L3 Global Snow Water Equivalent* (Tedesco et al., 2004).
- Seasonal Temperature and Precipitation Forecasts (IRI, 2011).
- Mean Monthly Climatology (New et al., 1999, Climate Research Unit, University of East Anglia).
- World Development Indicators, 2008-2011 (The World Bank Group, 2008-2011).

Water Reuse Index: Interpretive Guidelines

Objective: The water reuse index (WRI) estimates the fraction of renewable freshwater supply that has been previously withdrawn and discharged as upstream wastewater. It measures the degree to which water quality is an on-going concern. As with baseline water stress, the estimate of renewable freshwater supply accounts for upstream consumptive withdrawals.

Definition: The water reuse index is defined as the ratio of renewable freshwater that has been previously withdrawn and discharged as upstream wastewater. Estimates for available renewable freshwater supply are based on 1950-1990 climatic norms and consumptive withdrawals for 2000 as described for baseline water stress. High water reuse indicates water quality risk in the absence of local water treatment infrastructure. WRI can exceed one in situations where water is withdrawn, discharged, and reused multiple times as it travels downstream.

Interpretation: High levels of water reuse indicate that a large fraction of the renewable freshwater supply at a given location is someone else's wastewater. This water quality risk can be mitigated through the use of upstream wastewater treatment or local source-water treatment. The following table describes the categories, thresholds and storylines that are used to interpret this indicator. Regions with medium-high or higher water reuse should be assessed in more detail using local expertise and knowledge.

Water Reuse Index	Description
Low	<10 % of available freshwater has been previously used and discharged upstream. Water quality is good and does not require significant investments in drinking water or upstream wastewater treatment to maintain public and aquatic ecosystem health.
Moderate	10-20% of available freshwater has been previously used and discharged upstream. Water quality is a concern. Some infrastructure for drinking water and upstream wastewater treatment is needed to maintain public and aquatic ecosystem health.
Medium-High	20-40% of available freshwater has been previously used and discharged upstream. Water quality is a significant concern. Significant infrastructure for drinking water and upstream wastewater treatment is needed to maintain public and aquatic ecosystem health. Serious public and aquatic ecosystem health consequences are likely in the absence of such infrastructure.
High	40-80% of available freshwater has been previously used and discharged upstream. There are serious water quality issues and/or a high degree of dependence on drinking water and upstream wastewater treatment infrastructure. Absence of state-of-the art treatment systems results in serious public and aquatic ecosystem health consequences.
Extremely High	More than 80% of available water has been previously used and discharged upstream. Extreme vigilance is required to ensure that state-of-the-art treatment systems are operating as designed. Serious public and aquatic ecosystem health consequences are likely, absent this degree of investment and vigilance.
Arid and Low Water Use	Sparsely populated arid areas with very little annual renewable freshwater supply and very small amounts of upstream water use and discharge.
Missing Data	Unable to compute the water tress indicator due to missing data (e.g., missing reports of water withdrawals or runoff).

Caveats:

- While global models tend to be correct in aggregate, they may not accurately reflect conditions at any specific place. We strongly encourage more detailed assessments based on local knowledge and expertise.
- Water reuse may lead to risks due to water quality in the absence of local water treatment infrastructure. Such infrastructure is more likely to exist in areas with sufficient wealth/governance capacity.
- Calculations of freshwater supply do not include fossil groundwater sources. Consequently, we may *overstate* the level of water reuse or the level of treatment required for infrastructure located in areas that exploit fossil aquifers.
- The water reuse index does not take into account geologic sources of contamination. Consequently, we may *understate* the level of water reuse or the level of treatment required for infrastructure located in areas where aquifers contain geologic contaminants (i.e. high salinity or dissolved heavy metals).

Computational Approach:

- The water reuse index has been calculated using long term average hydrologic data (1950-1990) and water use statistics for the year 2000.
- Annual renewable freshwater supply is based on a global runoff map produced by the University of New Hampshire and the Global Runoff Data Center.
- The estimate of renewable freshwater supply accounts for upstream consumptive withdrawals.
- Annual freshwater withdrawals are spatially disaggregated from FAO-reported national statistics for the year 2000 by sector (domestic, industrial, agriculture) using global maps of population density, lights at night, and irrigated lands.
- The fraction of withdrawals rendered unusable for reuse in the same basin via processes such as evapotranspiration and contamination are based on regional estimates by sector produced by Russian State Hydrological Institute.
- The results are then re-aggregated to watersheds intersected with country and state/province boundaries. See the description for baseline water stress for more details (see page 2).
- The “Arid and Low Accumulated Water Use” layer is used to mask areas where both available water and flow accumulated use were too small to calculate a meaningful ratio.

Principal Data Sources:

- UNH/GRDC Composite Runoff Fields V1.0 (Fekete and Vörösmarty, 2002).
- Regional estimate of consumptive use ratios by sector (Shiklomanov and Rodda, 2003).
- AQUASTAT Information System on Water and Agriculture: Review of World Water Resources by Country (FAO, 2003).
- Global Rural-Urban Mapping Project (GRUMP): Urban/Rural Population grids (CIESIN, 2004).
- Version 2 DMSP-OLS Nighttime Lights Time Series (NGDC, 2006).
- Global map of irrigated areas version 4 (Siebert et al., 2006).

- HYDRO1K (Verdin and Greenlee, 1996).
- Australia's River Basins 1997 (Geosciences Australia, 1997).
- VMAP0 (National Geospatial Intelligence Agency, 2007).

Projected Change in Water Stress

Objective: The projected change in water stress indicator assesses future water stress arising from shifting patterns in climate, population, and level of economic development.

Definition: The projected change in water stress indicator is defined as the ratio of projected water stress during three eleven-year time frames centered on the years 2025, 2050, and 2095 to water stress in the year 2000. The analysis looks at three benchmark scenarios of economic and environmental change used by the Intergovernmental Panel on Climate Change (IPCC scenarios B1, A1B, and A2) in its Fourth Assessment Report. In general, the B1 scenario is the most optimistic, the A2 scenario is the most pessimistic, and the A1B scenario is somewhere in between.

The three benchmark scenarios are summarized in the table below (IPCC, 2007):

> **THE EMISSION SCENARIOS OF THE IPCC SPECIAL REPORT ON EMISSION SCENARIOS (SRES)[17]**
>
> **A1.** The A1 storyline and scenario family describes a future world of very rapid economic growth, global population that peaks in mid-century and declines thereafter, and the rapid introduction of new and more efficient technologies. Major underlying themes are convergence among regions, capacity building and increased cultural and social interactions, with a substantial reduction in regional differences in per capita income. The A1 scenario family develops into three groups that describe alternative directions of technological change in the energy system. The three A1 groups are distinguished by their technological emphasis: fossil-intensive (A1FI), non-fossil energy sources (A1T) or a balance across all sources (A1B) (where balanced is defined as not relying too heavily on one particular energy source, on the assumption that similar improvement rates apply to all energy supply and end use technologies).
>
> **A2.** The A2 storyline and scenario family describes a very heterogeneous world. The underlying theme is self-reliance and preservation of local identities. Fertility patterns across regions converge very slowly, which results in continuously increasing population. Economic development is primarily regionally oriented and per capita economic growth and technological change more fragmented and slower than other storylines.
>
> **B1.** The B1 storyline and scenario family describes a convergent world with the same global population, that peaks in mid-century and declines thereafter, as in the A1 storyline, but with rapid change in economic structures toward a service and information economy, with reductions in material intensity and the introduction of clean and resource-efficient technologies. The emphasis is on global solutions to economic, social and environmental sustainability, including improved equity, but without additional climate initiatives.

Interpretation: The following table describes the categories, thresholds and storylines that are used to interpret the projected change in water stress. Infrastructure located in areas projected to be severely to exceptionally more stressed should be assessed in more detail. Note that the thresholds used here are consistent with those used for the socioeconomic drought indicators.

Projected Change in Water Stress Category	Description
Exceptionally Less Stressed	Water stress is less than 0.125 times that during baseline conditions. Competition for freshwater resources has decreased dramatically.
Extremely Less Stressed	Water stress is 0.357-0.125 times that during baseline conditions. Competition for freshwater has decreased substantially.
Significantly Less Stressed	Water stress is 0.357–0.500 times that during baseline conditions. Competition for freshwater has decreased significantly.
Moderately Less Stressed	Water stress is 0.500-0.588 times that during baseline conditions. There has been a moderate decrease in competition for freshwater resources.
Wetter but still Extremely High Stress	Water stress is less than 0.588 times that during baseline conditions, but resulting water stress levels are still extremely high.
Near Normal Conditions	Water stress levels are within the range of expected variation and do not pose any significant added risk or benefit.

Drier but still Low Stress	Conditions are over 1.7 times more stressed than baseline, but do not pose a significant problem for households, industry, or irrigated agriculture because such use accounts for a very small fraction of the available supply. Rain-fed agriculture may experience some difficulty relative to baseline conditions.
Moderately More Stressed	Conditions are 1.7–2.0 times more stressed than baseline. Planning agencies may consider adaption measures including new restrictions on discretionary water uses and investments in infrastructure.
Severely More Stressed	Conditions are 2.0–2.8 times more stressed than baseline. Awareness of looming increases in water stress should be widespread. Planning agencies should actively consider adaption measures and associated investments. Without sufficient investment, communities may face new restrictions on water use and/or occasional supply disruptions.
Extremely More Stressed	Conditions are 2.8–8.0 times more stressed than baseline. Looming changes in water stress should be among the foremost concerns of residents and planning agencies. Without major investment, future supply disruptions may be widespread and affect the core economy.
Exceptionally More Stressed	Conditions are more than 8.0 times more stressed than baseline. Basic services (e.g. power, drinking water distribution) are likely at risk and require significant intervention and major sustained investments.
Missing Data	Unable to compute the socioeconomic drought indicator due to missing data.
Uncertainty in Direction: \\\\\\\\\\\\	The range of results across the ensemble of general circulation models includes both "more stressed" and "less stressed" categories.
Uncertainty in Magnitude: /////////	The range of results between the least and most stressed general circulation models is broad. More specifically, if each category above is normalized to span 1 unit, then, when the range of results between the least and most stressed models is greater than 1.7 units, an area has uncertainty in magnitude.

Caveats:

- While global models tend to be correct in aggregate, they may not accurately reflect conditions at any specific place. We strongly encourage more detailed assessments based on local knowledge and expertise.
- The scenarios for future water withdrawals are based on statistical assumptions that likely over amplify relationship between economic development and water withdrawals by sector. These relationships assume water withdrawals increase as a function of GDP/capita up to a point and then begin to decline after that. This may generate overly pessimistic results for relatively poor countries and overly optimistic results for relatively rich countries.

Computational Approach:

- Runoff and temperature estimates for 2025, 2050, and 2095 are produced by an ensemble of four premier general circulation models (GCMs) which are driven by the benchmark Intergovernmental Panel on Climate Change (IPCC) scenarios A1B, A2, and B1.
- Estimates of future water withdrawals and consumptive use ratios in 2025, 2050 and 2095 based on the same IPCC scenarios used above.
    - Establish relationships between country-scale water withdrawals by sector and key driving forces using data for 2000.
    - Use down-scaled IPCC scenario figures for key driving forces in 2025, 2050, and 2095 (population and GDP) to estimate future water withdrawals.
    - Use GCM temperature outputs to estimate additional change in agricultural withdrawals due to changes in potential evapotranspiration.

- Compute projected change in water relative to baseline period (1990-2000).

Principal Data Sources:

- UNH/GRDC Composite Runoff Fields V1.0 (Fekete and Vörösmarty, 2002).
- Regional estimate of consumptive use ratios by sector (Shiklomanov and Rodda, 2003).
- AQUASTAT Information System on Water and Agriculture: Review of World Water Resources by Country (FAO, 2003).
- Global Rural-Urban Mapping Project (GRUMP): Urban/Rural Population grids (CIESIN, 2004).
- Version 2 DMSP-OLS Nighttime Lights Time Series (NGDC, 2006).
- Global map of irrigated areas version 4 (Siebert et al., 2006).
- HYDRO1K (Verdin and Greenlee, 1996).
- Australia's River Basins 1997 (Geosciences Australia, 1997).
- VMAP0 (National Geospatial Intelligence Agency, 2007).
- Benchmark Socio Economic Scenarios A1B, A2, and B1 (Special Report on Emissions Scenarios (SRES) Intergovernmental Panel on Climate Change, 2000).
- General Circulation Models:
    - AOM3 (Goddard Institute of Space Science/NASA).
    - CCSM3.0 (National Center for Atmospheric Research).
    - CM2.0 and CM2.1 (Geophysical Fluid Dynamics Laboratory/NOAA).
- Downscaled socio-economic projections (population and GDP) from the IPCC scenarios (CIESIN, 2004).

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