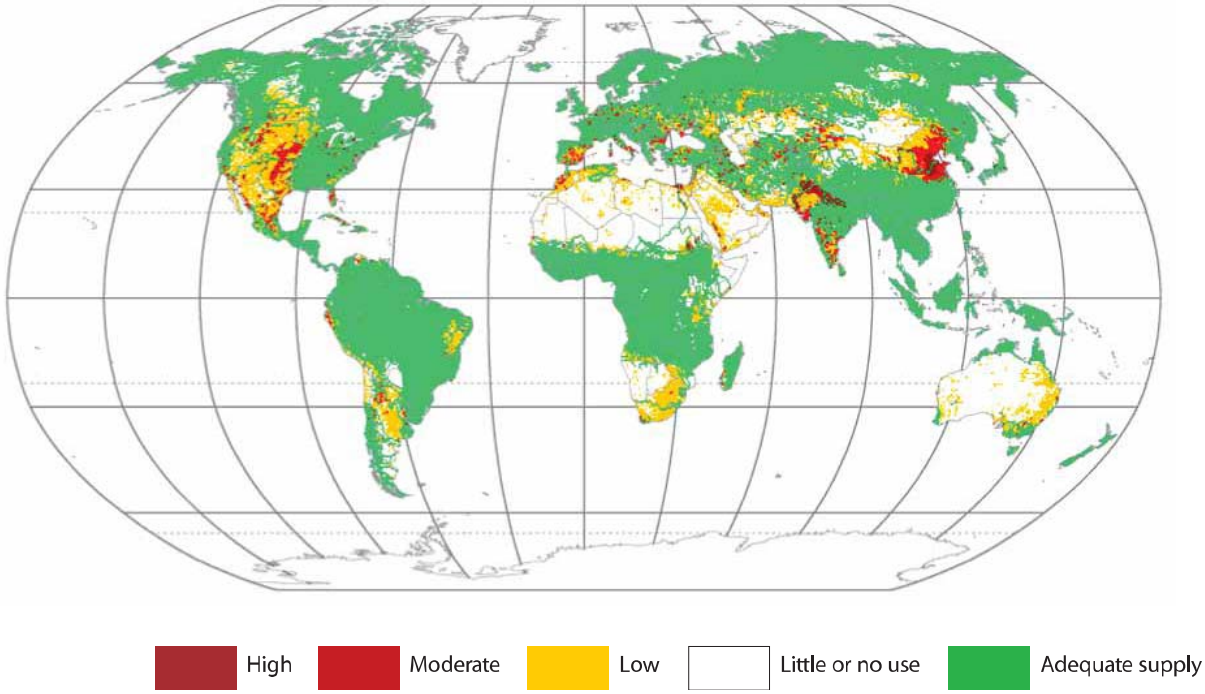
Indicator name	**Index of non-sustainable water use**
	
Prepared by	Water Systems Analysis Group, University of New Hampshire (UNH)
Example	**WWDR2, Section 1, Global Map 1**
Rationale	Comparison of total and agricultural water demands to renewable water supply, indicating areas where non-sustainable practices may be occurring.
Position in DPSIR chain	Driving forces, Pressure, State
Definition of indicator	Renewable freshwater resources (streamflow) minus geospatially distributed human water demand.
Underlying definitions and concepts	The indicator is based on the following definitions (all on a per grid cell basis): • Agricultural Water Demand: Volume of water required for agricultural use. • Total Water Demand: Sum of Domestic, Industrial and Agricultural (DIA) water use. Renewable Freshwater Resources: Volume of water supply (Q) available.
Specification of determinants needed	Population per grid cell Per capita country or sub national level domestic water demand Per capita country or sub national level industrial water demand Irrigated land extent per grid cell Country or sub national level agricultural water demand (irrigated water use) Digitized, topological river network Gridded discharge fields (volume of renewable freshwater per grid cell)
Computation	The indicator is computed as: $Q - DIA$ or $Q - A$ Where D = domestic water demand (km^3/yr); I = industrial water demand (km^3/yr); A = agricultural water demand (km^3/yr); and Q = water supply (km^3/yr).
Units of measurements	Volume / time (i.e., cubic kilometers per year)
Data sources, availability and quality	All data for this indicator is available from the Water Systems Analysis Group at University of New Hampshire: http://wwdrii.sr.unh.edu/download.html (Accessed 3 March 2009)
Scale of application	Local for basins exceeding 25,000 km^2 (within a city or community); regional

	(within a sub-national region); national (for a country); international (across several countries or globally).
Geographical coverage	Global, gridded dataset at 30-minute grid cell resolution Africa, gridded dataset at 6-minute grid cell resolution
Interpretation	This indicator provides a measure of the human water demand in excess of natural water supply (local runoff plus river flow). Areas with high water overuse tend to occur in regions that are highly dependent on irrigated agriculture, such as the Indo-Gangetic Plain in South Asia, the North China Plain and the High Plains in North America. Urban concentration of water demands adds a highly localized dimension to these broader geographic trends. These areas are dependent on infrastructure that transports water over long distances (i.e., pipelines and canals) or on the mining of groundwater reserves, a practice that is not sustainable over the long-term.
Linkage with other indicators	This indicator represents one in a series of indicators dealing with water pressures on available resources. Other indicators in this venue are: • Domestic Water Demand • Industrial Water Demand • Agricultural Water Demand • Relative Water Stress Index Water Reuse Index
Alternative methods and definitions	This indicator is currently based on country level estimates of water demand and can be improved by using sub-national (county/province) water demand statistics. Higher quality data on the extent of irrigated areas would also increase the quality of this indicator.
Related indicator sets	NA
Sources of further information	Charles J. Vörösmarty, Pamela Green, Joseph Salisbury, and Richard B. Lammers Global water resources: Vulnerability from climate change and population growth. *Science* 289: 284-288 (in Reports). Charles J. Vörösmarty, Ellen M. Douglas, Pamela A. Green, and Carmen Revenga. Geospatial Indicators of Emerging Water Stress: An Application to Africa, *Ambio*, 34 (3): 230-236, 2005. *Vörösmarty, C.J., C. Leveque, C. Revenga (Convening Lead Authors) Coordinating Lead Authors: Chris Caudill, John Chilton, Ellen M. Douglas, Michel Meybeck, Daniel Prager, 2005b. Chapter 7: Fresh Water. In:* Millennium Ecosystem Assessment, *Volume 1: Conditions and Trends Working Group Report. Island Press. In press.*
Involved agencies	Water Systems Analysis Group, University of New Hampshire (http://www.wsag.unh.edu/) Millennium Ecosystem Assessment http://www.maweb.org (Accessed 3 March 2009) World Resource Institute http://www.wri.org (Accessed 3 March 2009)