Transboundary Waters

Humanity's Water Heritage

Transboundary waters need sustained conservation to ensure the health and wellbeing of our planet and all its inhabitants. The Global Environment Facility International Waters focal area is enabling the Transboundary Waters Assessment Programme (GEF TWAP) to provide the first global-scale assessment and improve knowledge for informed decision-making, raise awareness and foster cooperation among all stakeholders.

UNEP gef TWAP TRANSBOUNDARY WATERS ASSESSMENT PROGRAMME

Transboundary Waters: The Global Commons

Credit: Raymundo José Santos Garrido

Transboundary waters extend across, or lie beyond, national boundaries. They include the open ocean and 55 large marine ecosystems (LMEs) covering almost 70% of the Earth's surface. They also include freshwater systems – about 445 aquifers, more than 1600 lakes and reservoirs, and 276 rivers – that occupy at least 40% of the world's land surface area. Together, they comprise the global commons, humanity's water heritage.

Transboundary waters provide essential ecosystem goods and services that support human wellbeing – including freshwater for domestic, industrial and agricultural use; fisheries, tourism, waste assimilation and climate regulation. Undeniable trends indicate a growing population, human activities, and a changing climate are modifying them. Without effective collaborative governance, the global commons are at risk.

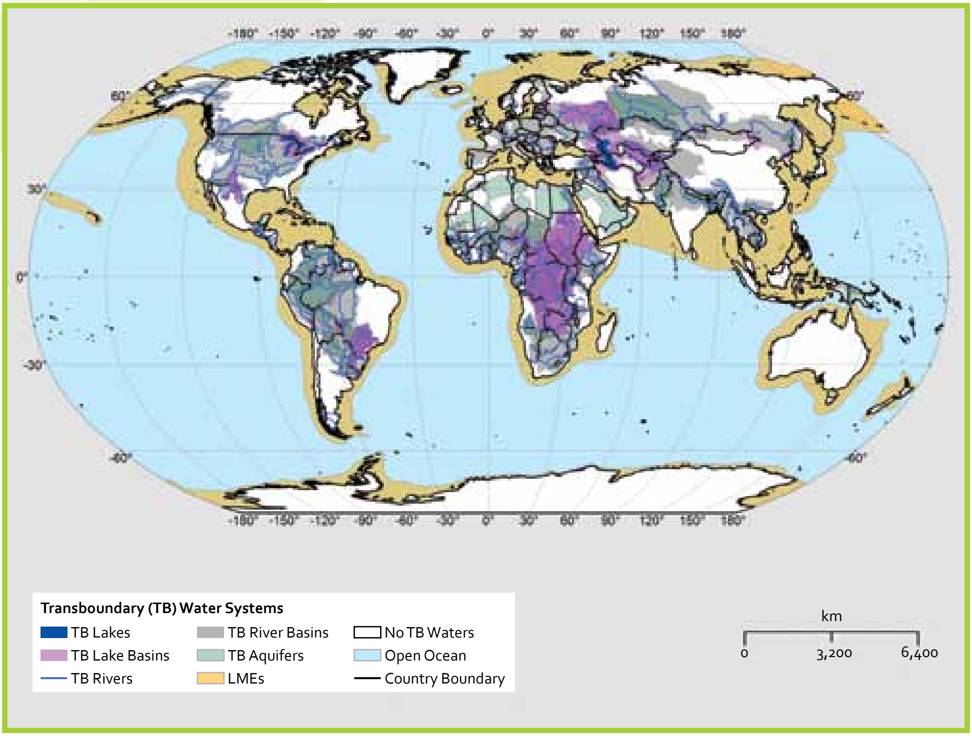

Figure 1: Transboundary Water Systems of the World. *Data sources: IGRAC 2012 for aquifers, Transboundary Waters Assessment Program Lakes Working Group, Naturalearthdata for rivers, NOAA 2007 for large marine ecosystems.*

At stake: Quality and supply of freshwater

Liquid freshwater sources include groundwater and surface waters, many being transboundary. Natural and artificial lakes contain over 90% of the surface freshwater. Lakes and rivers are easily accessible, can be readily diverted to address human and ecosystem water needs, but can easily get polluted. Groundwater is 100 times more abundant than surface water, often of excellent quality, and can be more reliable in dry climates (USGS 2010). However, some groundwater sources are beyond easy human access.

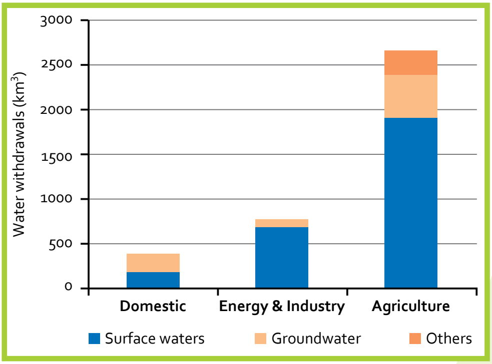

Figure 2: Water withdrawals (km³) in 2000 by source and sector. *Source: Data from Molden et al. 2007*

Surface waters contributed 73% of water withdrawals in 2000, with groundwater accounting for 19% (WWAP 2009). For domestic use, surface- and groundwater supplied nearly equal volumes (Figure 2).

Surface and groundwater (blue water) scarcity is evident in over half of 405 river basins (Figure 3). This occurs when blue water consumption exceeds the sustainable water available for human use and ecosystem water needs (environmental flows). A fifth of the global population today lives in water-scarce areas (WWAP 2012).

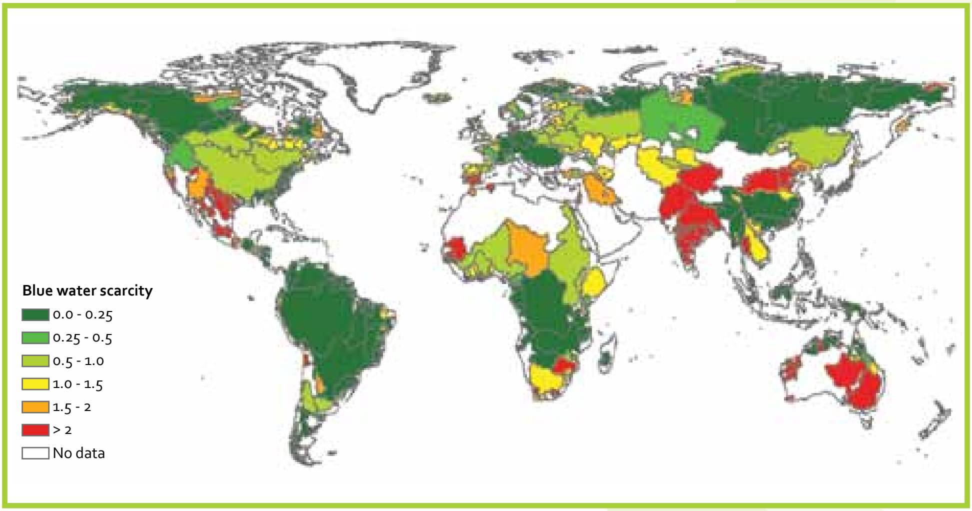

Figure 3: Annual water scarcity in major river basins, 1996-2005. Low index values (0.00-0.5) indicate low blue water scarcity and high values (1.5 to >2) indicate severe blue water scarcity. *Source: Hoekstra and Mekonnen 2011*

At risk: Food crops

Credit: *Nico Smit / Dreamstime.com*

About 70% of freshwater withdrawals are used to grow food and livestock. Aquifers provide 43% of this water, while surface waters contribute 57% (Siebert et al. 2010). Irrigated food production supplies 40% of our food (Portmann et al. 2010).

Growing populations, rising incomes, and increasing urbanization means food habits may also shift to high-value crops and livestock requiring more water. Major climate change impacts are predicted to affect the hydrological cycle. A 38% increase in drought events between the 1980s and 2000s, has seriously affected, in some locations, rain-fed agricultural production, which accounts for 60% of our food (UNEP 2012).

Threatened: Fisheries and food security

The yearly fish catch from the global ocean has leveled out and started to decrease over the last two decades, with the number of exploited and collapsed fish stocks in coastal and oceanic fisheries increasing. Overfishing is dramatically altering entire marine ecosystems by depleting large predatory fish, which are being replaced by less valuable, smaller-bodied fish (Pauly et al. 1998).

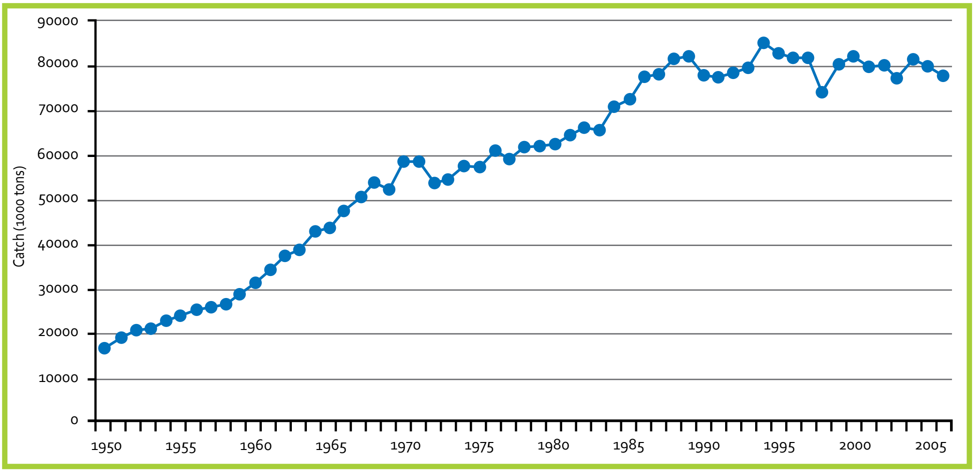

Figure 4. Total Annual Global Marine Catch *(data from The Sea Around Us Project)*

In jeopardy: Aquatic ecosystems

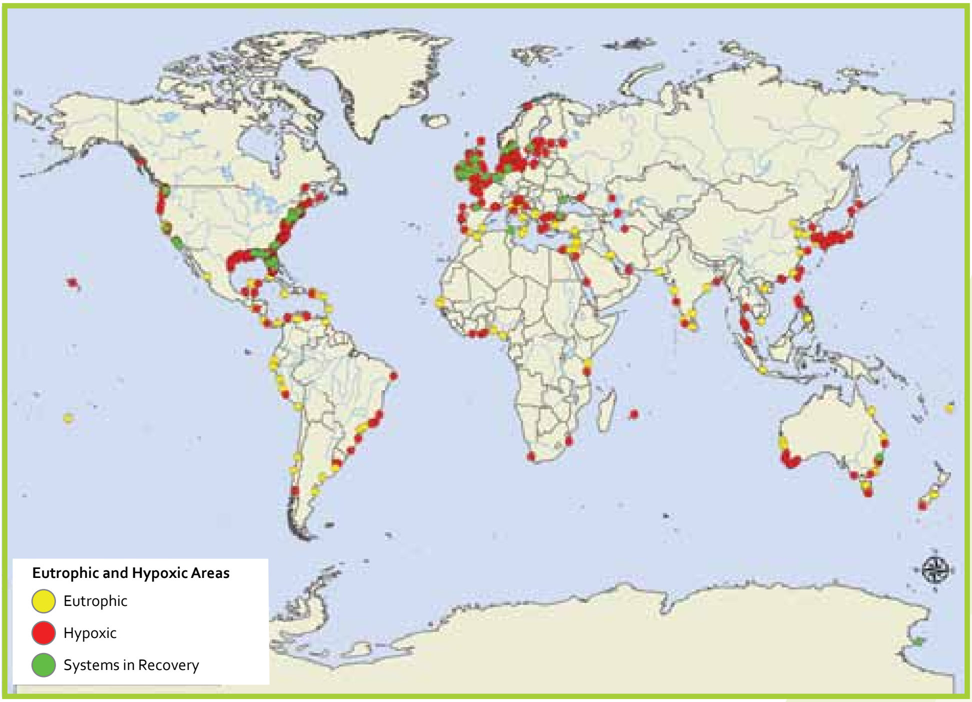

Figure 5: World Hypoxic and Eutrophic Coastal Areas. *Source: Diaz & Selman 2010/ World Resources Institute*

Many aquatic systems are being degraded. Freshwater ecosystems in the tropics showed the most drastic decline in biodiversity from 1970 and 2008 (WWF 2012). Nearly half of 276 transboundary rivers stretching over 62 million square kilometres are dammed (GEF TWAP unpublished data). By 2005, fragmentation has affected 8 of the most biogeographically diverse transboundary river basins (Nilsson et al. 2005). About 47 of the world's 66 LMEs are nitrogen-loading hotspots. Nitrogen reaching the coast, results in excessive algal blooms (eutrophication). Their decomposition depletes oxygen in the water (hypoxia), degrading coastal habitats (Seitzinger et al. 2008).

Human and natural pressures impair the protective functions of coastal ecosystems. An estimated 200 million people may benefit from risk reduction attributable to healthy coral reefs alone, and bear higher costs of coastal disasters if reefs continue to decline (Beck and Shepard 2012).

Figure 6: Areas of marine debris accumulation in the Pacific Ocean. *Source: NOAA Marine Debris Program 2012*

The open ocean has not escaped human impacts. Solid waste including plastic is being transported from land to gyres in the open ocean, where it poses grave danger to marine organisms (Donohue and Foley 2007, Law et al. 2010).

In danger: Earth's climate regulator

The open ocean, which maintains the global temperature and chemistry within livable ranges, may be changing. In response to increasing atmospheric greenhouse gases, the open ocean is warming at a rate of 0.19°C per decade since 1970 (Levitus et al. 2012). Its oxygen content is decreasing, causing expansion and shoaling of oceanic hypoxic zones, and potentially affecting many oxygen-breathing organisms (Keeling et al 2010).

It is also becoming more acidic from absorbing atmospheric carbon dioxide and damaging shell-bearing organisms, including shellfish and corals (Doney 2010).

Sea level is slowly rising because of melting land ice and increasing atmospheric temperature (Slangen et al. 2012). Resulting flooding episodes during extreme events, and slow permanent inundation threaten coastal populations, eco-systems and aquifers, and land uses including agriculture and built up areas (Hallegatte 2012).

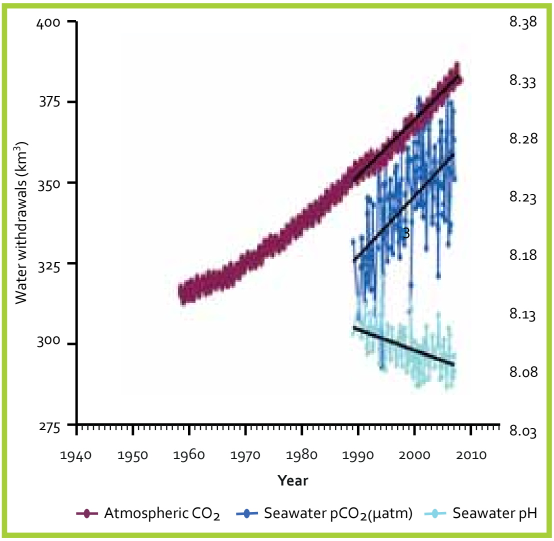

Figure 7: Change in Atmospheric CO_2 concentration, Seawater pCO_2 (partial pressure of CO_2) and Seawater pH. *Source: NOAA/PMEL modified after R.A. Feely 2008.*

The GEF International Waters: A Safety Net for the Global Commons

Transboundary waters are engines of economic development and population growth. They may serve as collaborative platforms or as contested waters at the same time. In degraded states, they impose limits to wellbeing. To sustainably manage them, policies at local to international levels need to: 1) Ensure and protect sufficient clean water for aquatic ecosystems; 2) Increase efficiency in water use for food production; 3) Mitigate and minimize sources of all waterborne pollutants; 4) Restore degraded habitats; 5) Rebuild overexploited and maintain healthy fish stocks; and 6) Drastically reduce greenhouse gas emissions that are changing Earth's climate buffer system.

The GEF6 International Waters (IW) Strategy is well positioned to mobilize nations to work together to address these issues for the Global Commons. The GEF IW has consistently followed a strategy of investments on: a) capacity building, and b) multi-state cooperation for managing transboundary aquatic ecosystems. Since 1992, the GEF IW has funded 220 transboundary water projects in 149 cooperating states, totaling US$ 8.5 billion and continues to strengthen regional collaboration in at least 54 transboundary waters (Duda and Hume 2013).

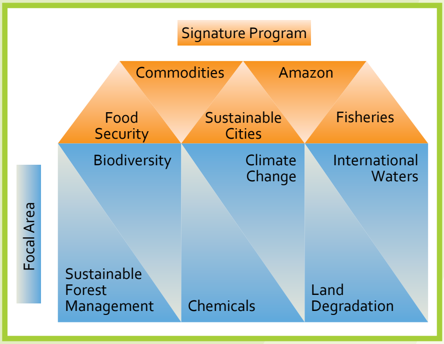

Figure 8: GEF Focal Areas and Signature Programmes. *Source: Modified after G. Fonseca*

GEF International Waters in the GEF6 period (2014-2018) will use a nexus approach, based on the linked relationships of water – food – ecosystem security in a changing climate to address transboundary waters problems. This builds strongly on the foundations of integrated management that GEF IW continues to support at international, national, provincial and municipal levels. This approach will allow GEF International Waters to partner with other GEF Focal Areas in addressing common concerns identified as signature programs (GEF 2013) (Figure 8).

The GEF6 International Waters Strategy needs enhanced and sustained support to conserve the Global Commons and the life-supporting ecosystem goods and services they provide – without which humanity's water heritage is under peril.

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Contact: GEF TWAP Project Coordination Unit , TWAP.PCU@unep.org

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