

# GROUNDWATER IN THE SUSTAINABLE DEVELOPMENT GOALS

## Including Groundwater in the Draft Goals

Position Paper No. 1



## GROUNDWATER IN THE SUSTAINABLE DEVELOPMENT GOALS

Position Paper No. 1

Including Groundwater in the Draft Goals

Author: Kirstin I. Conti, IGRAC and University of Amsterdam

*This position paper is the first in a three-part series. This series spans the Post-2015 Sustainable Development Goals (SDG) process and is designed to discuss strategic points of intervention prior to the development of the draft SDGs (Position Paper No. 1); after the release of the draft and during the negotiation of goals by UN member states (Position Paper No. 2); and after the entry into force of the final SDG text (Position Paper No. 3). The objective of this series to emphasize the critical role that groundwater has in the Post-2015 development agenda and ensure that relevant stakeholders make “the invisible resource”, visible in their policy, planning and monitoring activities over the next 15 years.*

### Colophon

*The mission of the International Groundwater Resources Assessment Centre (IGRAC) is to facilitate and promote global sharing of information and knowledge required for sustainable groundwater resources development and management. As an independent and non-profit centre, IGRAC operates under auspices of United Nations Educational, Scientific and Cultural Organization (UNESCO) and the World Meteorological Organisation (WMO). IGRAC is an in-house partner of UNESCO-IHE in Delft, the Netherlands, and receives financial support from the Government of the Netherlands.*



## INTRODUCTION: GROUNDWATER AND SUSTAINABLE DEVELOPMENT

---

Groundwater is the most abundant source of freshwater on earth, accounting for approximately 97% of non-frozen fresh water. Groundwater sustains ecosystems, maintains baseflow of rivers and stabilizes land in areas with easily compressed soils. Aquifers play an important role as natural storage for groundwater and can also buffer impacts resulting from long-term and short-term climatic variations. Consequently, groundwater is a very important natural resource and element of the environment, which greatly contributes to human development.

Approximately 50 percent of the world's population drinks groundwater every day.<sup>1</sup> Its role in sustaining rural populations that are located away from surface water and piped infrastructure cannot be understated. Further, groundwater is also vitally important for agriculture and is estimated to contribute to over 40 percent of the world's production of irrigated crops and to irrigating nearly 100 million hectares of arable land.

Over 200 times more groundwater water is abstracted from the earth than oil annually.<sup>1</sup> Overall, the economic benefits of abstracting groundwater exceed those of surface water per unit volume. This is because of local availability of the resource, reliability during droughts, and the fact that groundwater generally requires little treatment. Its importance is particularly pronounced in arid and semi-arid areas where groundwater is a significant source of fresh water. Some countries, such as Denmark and the Netherlands, source over 80 percent of their drinking water from groundwater resources. However, it is also important for the 1.7 billion people who live in overdrawn river basins and might rely on it for secondary supply.

## GROUNDWATER IN EXISTING RECOMMENDATIONS ON SDG'S

---

There are over 15 sets of recommendations regarding water in the Sustainable Development Goals (SDGs) provided by various stakeholders across the globe. The overarching areas of concern presented by these groups include [universal] access to drinking water and sanitation; sustainability of water resources; disaster risk management; climate resilience, adaptation and mitigation; management and governance; rights and equity; economic benefits of allocation; monitoring of water resources and SDG targets; and cross-cutting issues, such as the water-food-energy nexus. Only a few of the existing recommendations explicitly include or take into consideration the role of groundwater resources. Those that do are highlighted here.

High-level consultations and working groups such as the UN General Assembly Open Working Group on the SDGs, their Inter-agency Technical Support Team and the World Water Day 2013 High Level Forum have mentioned the role of groundwater in sustainable development. The Open Working Group makes the most direct proposal, suggesting a target for "sustainable development, management and use of surface and groundwater resources, respecting ecosystems requirements." Others mention the potential for increased stress on groundwater due to excessive use of surface water resources but fall short of tying this problem into a specific target or recommendation.

The UN-Water Working Group on SDGs recommends four key target areas with the proposed overarching goal of "Securing Sustainable Water for All." The report highlights the centrality of groundwater for sustainable development (p.7) as well as the costs of over abstraction (p.22). As a result, sub-target B1 "Bring freshwater withdrawals in line with sustainably available water resources to maintain ecosystem and human well-being" includes sustainable groundwater use as a key indicator. The recommendations from the Government of Switzerland propose an overarching goal of "A Water-secure World" with three key targets. One of these targets includes groundwater: "Groundwater and surface water is managed sustainably to satisfy human needs while respecting ecosystems requirements." Their recommendations also direct attention to the importance of governance and management, in particular transboundary water cooperation and dimensions of peace and security.

## THE ROLE OF GROUNDWATER IN THE SDGS

### *THE ROLE OF GROUNDWATER IN UNIVERSAL ACCESS TO DRINKING WATER, SANITATION AND HYGIENE*

According to official statistics, Millennium Development Goal 7.c of halving the number of people without sustainable access to safe drinking water has been met by reducing the number to 800 million people.<sup>2</sup> However, the United Nations Secretary General's Advisory Board on Water and Sanitation states that this number is significantly underestimated and that, realistically, between 2 and 4 billion people lack access to safe drinking water. The sanitation portion of this MDG is one of the furthest from being achieved with 2.5 billion people lacking access to improved sanitation.

Universal access to drinking water, sanitation and hygiene cannot be achieved without the development and proper management of groundwater resources...

Therefore, groundwater should not be viewed as a resource "of last resort" within the context of the SDG's, but rather an integral component for providing universal access to safe drinking water.

In IGRAC's view, universal access to drinking water, sanitation and hygiene cannot be achieved without the development and proper management of groundwater resources. Approximately half of the world's population already relies on groundwater as their potable supply. While groundwater is typically thought of in the context of rural water supply, numerous large urban areas rely on groundwater or are developing conjunctive use schemes to relieve stress on surface water sources. In places such as Denmark, Mexico City, and the United States, groundwater respectively composes 99%, 95%, and 38% of the water supply.<sup>3</sup> In India, agricultural irrigation has depleted

groundwater to the point that it is observable from space. The number of places relying on groundwater may substantially increase post-2015, given that the rate of extraction is rising by 3 percent annually and that surface water resources are increasingly polluted and/or overdrawn. Further, arid and semi-arid countries which rely primarily on groundwater resources may struggle to meet demands if groundwater resources are not carefully allocated and monitored. Therefore, we believe groundwater should not be viewed as a resource "of last resort" within the context of the SDG's, but rather an integral component for providing universal access to safe drinking water.

### *GROUNDWATER QUALITY AND SANITATION/WASTEWATER MANAGEMENT*

Given the close link between the availability of safe drinking water, groundwater quality, and sanitation/wastewater management, IGRAC believes the SDGs must adequately address each of these issues. Providing access to sanitation and hygiene cannot be implemented at the expense of the quality of groundwater resources, especially those which are used for drinking water supply. Groundwater quality can be affected by factors including mobilization of naturally occurring contaminants, anthropogenic pollution, and wellhead contamination. Groundwater contamination due to untreated sanitation and wastewater management is an increasing problem. It is a particular challenge in areas where wastewater quickly infiltrates into aquifers without natural attenuation of contaminants.

In addition to biological contaminants, emerging organic contaminants – which originate from food additives, pharmaceuticals, industrial compounds, synthetic hormones, stimulants, and veterinary medicines - are a growing area of concern. They can flow via industrial and commercial wastewater, agricultural runoff, and atmospheric deposition.<sup>4</sup> Problems of groundwater contamination can be exacerbated by the growing

Increased groundwater contamination can be seen as a form of groundwater depletion, which emphasizes the need for the SDGs to have an integrated and sustainable approach for the use and development of groundwater resources.

use of aquifers as disposal and remediation sites. Contamination resulting from the mining and petroleum industries is an additional threat. In particular, the unknown extent and consequence of hydraulic fracturing (fracking) for shale gas exploration is receiving significant attention. Increased groundwater contamination can be seen as a form of groundwater depletion. In our view, this emphasizes the need for the SDGs to have an integrated and sustainable approach for the use and development of groundwater resources.

### *SUSTAINABLE USE AND DEVELOPMENT OF GROUNDWATER RESOURCES*

IGRAC's experience has shown that the sustainable use and development of groundwater resources is a prerequisite for providing sustainable access to safe drinking water. The Integrated Water Resources Management framework has been put forth to facilitate sustainable management of fresh water resources which

Although groundwater is included in the original theoretical framework of IWRM, it remains largely outside of implementation efforts.

takes into account socioeconomic needs. Although groundwater is included in the original theoretical framework of IWRM, it remains largely outside of implementation efforts. Nevertheless, integrating groundwater into sustainable use and development schemes will determine the viability of the resource for human use into the future. A necessary first step in IWRM is having a baseline representation of the

groundwater resource. Unfortunately, there are severe data and capacity limitations with respect to groundwater. Further, issues such as equitable utilization and planned depletion of non-recharging aquifers demand special attention. The Post 2015 Water Thematic Consultation Report highlights this issue further. While global models which estimate the available quantities of groundwater exist, real data gathered and shared by nation states is requisite for ensuring the groundwater can continue to contribute to human security far into the future. Therefore, we propose that the SDGs call for the enhancement of these efforts to support sustainability in the long-term.

### *GROUNDWATER AND DISASTER RISK MANAGEMENT*

IGRAC posits that climate change resilience and decreased disaster risks can be enhanced by taking groundwater into account. Groundwater is intimately connected to global change phenomena and can play an important role in disaster risk management for both flooding and drought. The link between groundwater and climate change has been acknowledged by the Intergovernmental Panel on Climate Change and clear links between groundwater and ocean and/or atmospheric circulation have been made. Groundwater naturally buffers against climate variability.<sup>1,5</sup> Consequently, conjunctive use schemes are emerging in environments experiencing increased climate variability (especially drought) and/or reduced access to surface water resources. The buffering capacities of aquifers are also being used in techniques such as managed aquifer recharge. Using managed aquifer recharge can improve the sustainability of groundwater resources and mitigate disaster risk by augmenting the quantity or improving the quality of groundwater resources; reducing the effects of seasonal and climate variability; and managing excessive or unpredictable surface water flows. While these benefits are known, activities taking advantage of groundwater's buffering capabilities need to be increased in order to bolster climate change adaptation efforts. To this effect, IGRAC believes proper planning and preparedness schemes for climate change resilience and disaster risk management should be integrated into the SDGs.

## *GROUNDWATER GOVERNANCE, RIGHTS & EQUITY, PEACE & SECURITY*

Water governance is receiving increasing attention with the understanding that many problems related to lack of access are a result of poor governance rather than physical water scarcity.<sup>6</sup> Bringing attention to water governance within the context of the SDGs also allows the issues of rights and equity as well as peace and security to be addressed. In light of the International Year of Water Cooperation and the Post 2015 Thematic Consultation on Water, the peaceful management of transboundary waters is a critical contemporary issue. The discussion of groundwater governance is just beginning, as a result of data and capacity limitations at the national and sub-national levels as well as lack of a global governance framework at the international level. Nevertheless, proper groundwater governance based on sound hydrogeological data is necessary for developing equitable rights and allocation regimes as well as conflict prevention in the long term. Therefore, the SDGs should address these issues openly and directly.

Proper groundwater governance based on sound hydrogeological data is necessary for developing equitable rights and allocation regimes as well as conflict prevention in the long term.

## IGRAC RECOMMENDATIONS AND COMMITMENT

---

There has been much progress to date regarding the integration of water into the Post-2015 development agenda and the Sustainable Development Goals. As described above, groundwater has been included in this debate but, for the most part, in an auxiliary way. Consequently, IGRAC believes there should be a dedicated target for water that explicitly includes groundwater as a critical component to achieving sustainable development. Simultaneously, groundwater should be recognized as a cross-cutting issue relevant for targets developed in the areas of food supply/hunger eradication, and sustainable energy access.

IGRAC is committed to:

1. Synthesizing and making available the knowledge necessary to craft SDG targets, which take into account the role of groundwater in sustainable development;
2. Participating in collaborative actions leading up to the world water forum 2015 in Korea, where the development of an SDG water target will be further discussed;
3. Mobilizing the network of global groundwater professionals as required to meet the SDG targets; and
4. Working to improve capacity and the level of technical dialogue required for achieving the SDGs in an integrated way, with particular attention to issues of conjunctive use and management.

Leading up to the finalization of the SDGs in 2015, IGRAC is committed to synthesizing and making available the knowledge necessary to craft SDG targets, which take into account the role of groundwater in sustainable development. We will also participate in collaborative actions leading up to the World Water Forum 2015 in Korea, where the development of a SDG water target will be further discussed. Once the SDGs and targets are finalized, IGRAC will mobilize the network of global groundwater professionals as required to meet the SDG targets and satisfy the post-2015 development agenda. Additionally, IGRAC will work to improve capacity and the level of technical dialogue required for achieving the SDGs in an integrated way, with particular attention to issues of conjunctive use and management. Further, IGRAC proposes the following recommendations are taken into consideration during the development of targets for a dedicated Sustainable Development Goal on water.

Attachment 1. Example of Incorporating Groundwater into Indicators for SDGs

<b>GLOBAL GOAL ON WATER AS DETERMINED BY UNITED NATIONS MEMBER STATES</b>	<b>Target Area 1: Access to Drinking Water, Sanitation and Hygiene</b>	<p>Enhance the role of groundwater in sustainably providing water sanitation and hygiene</p> <hr/> <p>Insure that wells are built and maintained to provide long-term and safe access to groundwater resources</p>
	<b>Target Area 2: Improved Water Quality and Waste Management</b>	<p>80% of drinking water wells should be protected from contamination</p> <hr/> <p>Reduce by 25% the volume of contaminated groundwater</p>
	<b>Target Area 3: Sustainable Use and Development of Water Resources</b>	<p>Decrease by 30% the number of aquifers which are overexploited and/or severely contaminated</p> <hr/> <p>Increase by 30% the number of aquifers monitored for changes in quality and quantity</p> <hr/> <p>Utilize non-renewable groundwater in a socially acceptable manner</p>
	<b>Target Area 4: Disaster Risk Management</b>	<p>Enhance drought and flood preparedness by both including groundwater monitoring in early warning systems and groundwater wells in emergency water supply schemes</p> <hr/> <p>Utilize storage and buffering capacity of groundwater to increase resilience to natural disasters</p>
	<b>Target Area 5: Water Governance, Rights &amp; Equity, Peace &amp; Security</b>	<p>Include groundwater in integrated water resources management and planning, especially when implementing conjunctive use schemes</p> <hr/> <p>Equitably and transparently distribute rights to groundwater, taking into consideration traditional uses</p>

## REFERENCES

- 
- <sup>1</sup> Margat, J., & van der Gun, J. (2013). *Groundwater around the world: a geographic synopsis*. Leiden, Netherlands: CRC Press/Balkema.
- <sup>2</sup> United Nations Secretary-General's Advisor Board on Water and Sanitation. (2013). "Water and Sanitation for All: Securing our Future, Preserving our Planet – UNSGAB call for a Post 2015 Global Goal on Water, available at <http://www.unsgab.org/content/documents/UNSGABpost2015brief.pdf>(last accessed 23 January 2014);
- <sup>3</sup> Chilton, J. (2002). "Chapter 9 – Groundwater" in *Water Quality Assessments - A Guide to Use of Biota, Sediments and Water in Environmental Monitoring - Second Edition*, Chapman, D. (ed). UNESCO/WHO/UNEP; Kenny, J.F., Barber, N.L., Hutson, S.S., Linsey K.S., Loveland, J.K., Maupin M.A. (2009) "Estimated Use of Water in the United States in 2005. United States Geological Survey (USGS) Circular 1344.
- <sup>4</sup> Lapworth, D., Baran, N., Stuart, M., & Ward, R. (2012). Emerging organic contaminants in groundwater: a review of sources, fate and occurrence. *Environmental pollution*, 163, 287-303.
- <sup>5</sup> Taylor, R., Scanlon, B., & Döll, P. (2013). Ground water and climate change. *Nature Climate Change*, 3(4), 322–329. doi:10.1038/nclimate1744
- <sup>6</sup> Conca, K. (2006). *Governing water: Contentious transnational politics and global institution building*. Cambridge, MA: MIT Press.