

NEWSLETTER



International Association of Hydrogeologists
IAH TRANSBOUNDARY AQUIFERS COMMISSION



EDITOR'S MESSAGE

Alfonso Rivera
Chair, TBA Commission



Welcome to the 2022 first edition of the IAH-TBA Commission Newsletter. As I write this message, I am truly excited witnessing all those activities along the globe celebrating The Year of Groundwater: Making the Invisible Visible.

During this special year there are several national and international events celebrating the Year of Groundwater; among others:

- World Water Day, 22 March 2022
- The World Water Forum, 21-26 March in Dakar, Senegal
- World Water Week, 23 August – 1 September in Stockholm, Sweden
- The IAH World Congress, 18-23 September, Wuhan, China
- The Groundwater Summit, December 6-9, 2022 in Paris, France

In this Newsletter, we present short stories of the events already developed and those still to come in the following months; we are proud to mention that the IAH Transboundary Aquifers Commission is actively participating in many of those events throughout the year.

The Newsletter is complemented with many other news in the transboundary aquifers' domain, with usual sections covering the ISARM Networks as well, People in the News, Cooperation and Collaboration, Knowledge Capsules in TBA, upcoming meetings, webinars, conferences, and recent publications.

Our main story in this issue is the TBA Commission's participation and outcomes of the ISARM2021 International conference held in Paris, December 6-9, 2021.

Good reading!

WHAT'S INSIDE THIS ISSUE:

Participation and outcomes of the ISARM2021 International Conference

2022 Year of Groundwater

News from the ISARM Networks (Africa, Asia, Americas, Europe)

U.S. Supreme Court Decision in first ever dispute over interstate groundwater

New faces in the TBA Commission

Events

People in the news

Knowledge capsules on TBA

Recent publications



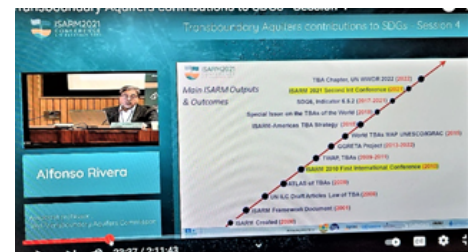
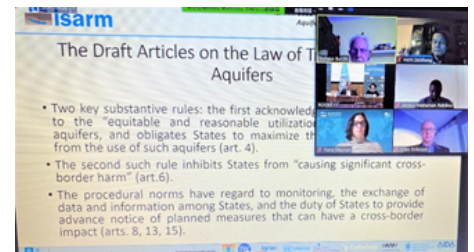
ISARM2021 CONFERENCE 6 - 9 DECEMBER 2021

Participation and outcomes of the ISARM2021 International Conference



This is a brief recap of TBA-Commission members participation in and the outcomes of the *ISARM2021* International conference held in Paris, December 6-9, 2021.

Nearly everyone in the TBA Commission participated in the ISARM2021 Conference, as rapporteurs, moderating sessions or panels, oral presentations in technical sessions, as panelists, and a keynote talk. Further, four of the abstracts submitted by members were selected to be extended as full-length papers, which will be published in a UNESCO's book by the end of 2022. An additional valuable outcome of ISARM2021 was the official launching of the 2021 edition of the Transboundary Aquifers of the World map by IGRAC, where two TBA Commission members work.



The ISARM2021 was a real success from various points of view, technically, diplomatically, politically, and of course scientifically. After a decade since the first ISARM international conference in 2010, we remarked the incredible progress made. There are so many valuable outcomes from where we can learn a lot; however, it is beyond this newsletter to list and describe all of them, but there will be an executive summary document published by UNESCO later this year, so stay tuned.

In short, after two decades, ISARM ensures the continuation of global TBA networks. UNESCO and the IAH have solidified ISARM and created a long-term legacy. ISARM has inspired countries to make progress on TBA mapping, in-depth assessment, and modelling; to develop TBA governance and shared management; to engaging nations in sharing TBA; and promoting the use of the UN Draft Articles as guidance.

All these have been possible thanks to the combined efforts and partnership between UNESCO-IHP, IGRAC and the IAH TBA-Commission.



Milk River Aquifer

- Southern Alberta (Canada) and northern Montana (USA)
- Semi-arid climate
- Water-short area
- Regional confined sandstone aquifer (26,000 km²)
- Livestock watering, municipal and domestic use, secondary oil recovery
- Shared by multiple stakeholders under six jurisdictions (e.g., federal, provincial/state, and local governments).

ISARM2021 | 2nd International Conference on Transboundary Aquifers: Challenges and the way forward

Thursday December 09, 2021 / 10:00 AM - 12:15 PM

“Advances in the assessment and mapping of TBAs and hydrogeological methods - ...”

Alexis GUTIERREZ

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ISARM2021 Live Streaming Day 3

Governance of TBAs: Strengthening Cooperation

Processus politique de dialogue régional

- **Février 2010**: Initiation du dialogue à travers une table ronde sur la collaboration transfrontalière sur le GTR
- **Octobre 2010**: 1^{er} réunion du GTR et validation des études diagnostiques
- **Décembre 2010 (Nairobi)**: 2^{ème} réunion du GTR pour créer vision commune et orientation de projet
- **Janvier 2011 - Septembre 2011**: conception d'un projet régional et discussion sur financement

EVENT

Participant as member of TBA-Commission

OPENING

Alfonso Rivera

Keynotes

Alfonso Rivera: *ISARM, History and Achievements*

Chairing technical Sessions and Panels

Christina Fraser: *Panel: Transboundary aquifer experiences across the world, what can we learn from each other?*

Alexis Gutierrez: Session: *Advances in the assessment and mapping of TBAs and hydrogeological methods*

Alfonso Rivera:
Session: *Governance of TBAs: Strengthening cooperation*
Panel: *Science/Policy interface*

Panelists

Laura Movilla: *Draft Articles on the Law of Transboundary Aquifers: Do they hold water?*

Rosario Sanchez on Panel: *Science/Policy interface in the TBA context*

Christina Fraser:
- *Transboundary Cooperation per Aquifer under Sustainable Development Goal Target Indicator 6.5.2*
- *Prioritizing and zoning TBA in Africa*

Marie-Amélie Pétré: *The hydrogeological assessment of the Milk River Transboundary Aquifer (Alberta, Canada – Montana, USA): a basis towards joint management plans*

Oleg Podolny:
- *Assessment, Diagnostic Analysis and Mathematical Modeling as a Basis for the Management of Shared Resources of the Pretashkent Transboundary Aquifer in Central Asia*
- *Hydrogeological GIS-Mapping as a Basis for Information Support of Transboundary Groundwater Resources Management*

Alfonso Rivera:
- *The Evolution and Success of ISARM, 2010-2020*
- *State of affairs of models and governance of transboundary aquifers along the Mexico-US border*

Rosario Sanchez: *Transboundary Aquifers between Mexico and the United States: the complete map*

Arnaud Sterckx: *Advancing transboundary cooperation in the Senegalo-Mauritanian Aquifer Basin.*

Han Zaisheng: *Asian Transboundary Aquifer for Sustainable Development*

Closing

Rosario Sanchez and Kevin Pietersen:
Rapporteurs on: *Summarizing ISARM2021 key messages, findings, recommendations & lessons learnt by ISARM2021 Technical Programme Committee*

Selected abstracts for full-length papers, A UNESCO book

Marie-Amélie Pétré, Alfonso Rivera, René Lefebvre, Attila J.B. Fohnagy, John LaFave, and Dan Palombi: *The hydrogeological assessment of the Milk River Transboundary Aquifer (Alberta, Canada – Montana, USA): a basis towards joint management plans.*

Alfonso Rivera, Christina Fraser and Alice Aureli: *The Evolution and Success of ISARM, 2010-2020.*

Alfonso Rivera and Randall Hanson: *State of affairs of models and governance of transboundary aquifers along the Mexico-US border.*

Rosario Sanchez and Laura Rodriguez: *Transboundary Aquifers between Mexico and the United States: the complete map.*

Theme for World Water Day 2022:

Groundwater: Making the invisible visible

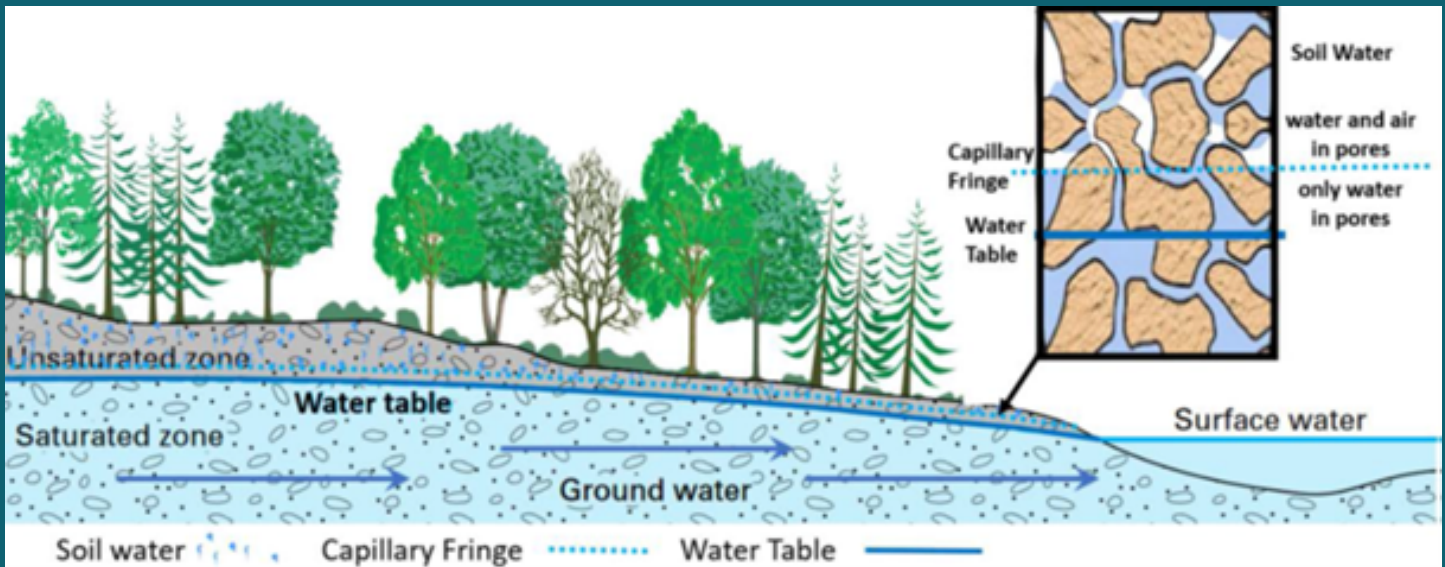
2022 is The Year of Groundwater, the visible/not visible part of it is intended as a metaphor.

Fortunately, the role of groundwater continues to gain importance on the global agenda. [Global Groundwater Sustainability – A Call to Action](#) – a statement calling for action to ensure that groundwater benefits society now and into the future.

In 2022 we are trying to make more visible something that is invisible, but of extreme importance: GROUNDWATER. Of course, this axiom is intended as a metaphor. We have already made groundwater “visible” ever since we began quantifying groundwater’s movement and related processes since the 1950s (e.g., Theis and others). Thanks to better knowledge of physical processes, advances in science and technology, increasing modeling capacities and, more recently, remote sensing with satellite imagery (optical, microwave, gravity), groundwater has become more “visible”.

Everyone knows what surface waters are, that is, rivers, lakes and reservoirs where these waters are captured and stored (dams) for the benefit of humanity: agricultural, domestic and industrial use. However, few understand what groundwater is, simply because groundwater is invisible to the human eye. We don't see it, but we know this resource is located under our feet in incredible quantities, stored for millennia (or longer) in formations called "aquifers."

Groundwater is much more abundant than surface water and generally of better quality. Let’s consider what follows. All the rivers and lakes of the world accumulate 1% of the fresh water of our planet; on the other hand, groundwater in the aquifers accumulate 99% of the fresh water of our planet. To better illustrate this, imagine the world (without the oceans) as if it were a pool containing 50'000 liters of water. Well, of these, 500 liters (1%) would be equivalent to surface waters (all the rivers and lakes in the world); the rest, 49'500 liters (99%) would be equivalent to groundwater.



For these reasons, the United Nations dedicated the year 2022 to groundwater.

The issue we try to promote, however, is to go beyond our peers and make this resource better known and appreciated to others working in related domains, such as social sciences, policy makers, decisions-makers, or simply water managers. Many of these people do not understand the jargon we (you and I) use to define groundwater and aquifers. They don't see groundwater as they see water in rivers and lakes; for example, to them it is easier to invest in building dams than invest in something they neither see, nor understand.

If one day the rivers start to dry, and they do not SEE the water anymore, then... So, we decided to dedicate 2022 to promote knowledge and understanding of groundwater in many different events throughout the year. It doesn't matter whether many scientists have already "made" groundwater visible.



ISARM Africa

TBA News

Contributed by Kevin Pietersen and Alexis Gutierrez

Big data analytics - Localizing transboundary data sets in Southern Africa: A case study approach

The project used machine learning algorithms to predict high-resolution groundwater-level changes, both current and future, in the Ramotswa TBA and dolomite aquifers extending into Botswana and South Africa. The approach integrated numerous satellite-based, land-surface-model, and hydrogeological datasets to train, calibrate and test the gradient-boosting decision tree models. The models were used to predict monthly groundwater-level changes in the dolomite aquifers of Southern Africa.

Groundwater management analysis of community resilience to climate change and drought of the borderland communities of the Horn of Africa

A groundwater analysis was conducted to identify the main uses of groundwater by borderland communities relying on TBA in the Horn of Africa (HoA) and examine changes in institutional responses and interactions and household and community strategies in response to shocks and over time. The case study areas included Tog Wajaale between Ethiopia and Somalia, Afar Triangle TBA on the border between Djibouti and Ethiopia and Moyale in the borderlands of Ethiopia and Kenya.

New Map of Groundwater resources in Western Africa.

On March 22nd, 2022, a new map, "Groundwater resources in the ECOWAS region" (West Africa) was presented at the World Water Forum in Dakar. This work is a



contribution to the World-wide Hydrogeological Mapping and Assessment Programme (WHYMAP) of the UNESCO Intergovernmental Hydrological Programme (IHP).

It was developed under the auspices of the African Ministers' Council on Water (AMCOW) Pan-African Groundwater Program (APAGroP), the Economic Community of West African States (ECOWAS) Water Resources Coordination Centre (WRCC), and the Niger Basin Authority (NBA). The map was produced by a consortium comprising the Federal Institute for Geosciences and Natural Resources (BGR), British Geological Survey (BGS), French Geological Survey (BRGM), Swiss Federal Institute of Aquatic Science and Technology (Eawag), and the International Groundwater Resources Assessment Centre (IGRAC).

This document has been developed to raise awareness of the potential and limitations of groundwater resources in Western Africa which shares many transboundary aquifer basins.

The map, the technical note, and the digital dataset of the expected aquifer productivity map are available for download on the WHYMAP-website (www.whymap.org).

ISARM Europe

TBA News

Contributed by Momčilo Blagojević

Two updated Management Plans for the **Transboundary River Basin Management Plan for the Danube River** have been endorsed in the ICPDR's first online Danube Ministerial Meeting is prepared and endorsed on the Ministerial meeting held in Vienna on February 8, 2022.

Ministers and Minister Representatives responsible for water management from the Danube River Basin countries Austria, Bosnia and Herzegovina, Bulgaria, Croatia, the Czech Republic, Germany, Hungary, Montenegro, Moldova, Romania, Serbia, Slovakia, Slovenia, Ukraine, and the European Union endorsed the Management Plans and adopted a ministerial “Danube Declaration” at the meeting in Vienna. The meeting included a panel discussion with experts from ICPDR Observer organisations on lessons learned from their own relationship and cooperation with the ICPDR.

The Management Plan set out measures for the coming six years to ensure cleaner, healthier and safer waters for everyone to enjoy – an objective as relevant and urgent today as in 2016, when the Ministers of the Danube Countries last adopted the Danube River Basin Management Plan Updates 2021. Plan has been prepared as stipulated in the EU Water Framework Directive, especially addressing climate change impact and groundwater vulnerability in the Basin.

The DRBMP Update 2021 offers rich and comprehensive information about water management issues for the most international river basin in the world. The 2021 Update identifies the priorities for joint water resources management throughout the Danube River Basin for the coming six years towards the achievement of “good status” of waters of the Danube River Basin by 2027. Prepared concurrently with the DRBMP Update 2021 outlines management measures to be taken in the Danube River Basin.

More information can be found: <https://www.icpdr.org/main/mm22>

ISARM Asia

TBA News

Contributed by Han Zaisheng and Alfonso Rivera

Asia, the largest and most populated continent on Earth, identified 129 transboundary aquifers in 2015, of which only a few of them have been mapped; so far, there are no political agreements and few scientific arrangements. The most recent update of the transboundary aquifers of the World, recently published by IGRAC ([2021](#)), added one more TBA to the Asia ISARM network by extending the region to Oceania, where one TBA was identified between Indonesia and Papua New Guinea, TBA AS155.

There has been progress on assessing and cooperating in TBA in some fronts, in central Asia between countries of the former USSR, and in China.

Some of the issues in Central Asia can be described as related to emerging – and looming, new political boundaries, which modify the jurisdictional borders. Thus, delineating transboundary aquifers, which are defined by States' borders is difficult (e.g., some countries of Central Asia are still struggling to divide some sections of their borders).

Statements heard in conferences, and a few publications indicate that Asia has an area of 9 million km² covered by TBAs ([Lee et al., 2018](#)). If proven, this may have immense consequences, it would mean that 20% of the whole Asian Continent (44.5 million km²) is covered with transboundary aquifers!

In China, efforts are underway to track groundwater management regulations, which took effect in December 2021, according to the China Geological Survey (Zaisheng, 2022). These set out specific rules for groundwater in surveys and planning, conservation and protection, over-exploitation treatment, pollution control, and supervision and management. Groundwater has important resource attributes and ecological environment functions. Groundwater development is mainly classified according to its quantity and quality besides other indicators.

Groundwater quantity is divided into two categories: groundwater recharge and in storage; both of which are further subdivided in two subcategories each: exploitable and no suitable for exploitation; and renewable and non-renewable.

Groundwater quality is classified according to its mineral degree, hardness, pH values, radioactivity, etc. The national standard for groundwater quality form the basis of groundwater pollution prevention and control and stablish strict control of groundwater pollution measures. The Groundwater Management Regulations refine the rules that prevent groundwater pollution caused by soil pollution, production and construction activities, thereby strengthen the control of activities polluting groundwater and water ecological restoration.

It is yet not clear whether those regulations will apply to the management of shared resources, as in the case of transboundary aquifers where groundwater may be shared with other countries.



The Permanent Forum of Binational Waters, a non-profit organization with autonomy to become a formal entity in the U.S.-Mexico border region, has developed a Binational Groundwater Task Force initiative (BGTF) since early 2021.

The BGTF includes a total of eighteen members from both sides of the border. The main purpose of this initiative is to create a factual set of baseline conditions and a clear set of objectives to guide diplomatic discussions that are accepted by all major stakeholders, governmental and non-governmental entities along the Mexico-US border. To that end, the BGTF is currently developing "Fact Sheets" for each of the 11 transboundary aquifers recognized by both countries that will contain strategic and basic data on the physical conditions of the aquifers, as well as on their socio-economic conditions and levels of vulnerability.

This information is designed to be presented in a practical, accessible, and understandable way following a homogenized methodology that can be replicated for other aquifers in the world.

Contributed by Rosario Sanchez and Alfonso Rivera

U.S. SUPREME COURT DECISION IN FIRST EVER DISPUTE OVER INTERSTATE GROUNDWATER - **Transboundary issues are real.**

Contributed by Alfonso Rivera



The Memphis skyline and the Mississippi River.

A clear example of the complexity – and misunderstanding, of transboundary aquifers relative to ownership has been recently exemplified by the ruling of the U.S. Supreme Court over a dispute between interstate groundwater. The state of Mississippi claimed that Memphis has “forcibly siphoned”, or effectively stolen, its water, which Mississippi frames as its “sovereign territory”. With this demand, one State is claiming that the other State has stolen “its water”.

Like surface water (rivers and lakes) but with very different velocities, groundwater is always in motion and may flow from beneath one city to the next, one state to the next, or one country to the next. There are no physical boundaries for groundwater movement; groundwater is ubiquitous, albeit at different time-scales. But there might be *jurisdictional boundaries*, which need to be taken into account when these types of issues emerge.

In fact, the dispute between the State and the City is just one of numerous lawsuits over the past 15 years between the eight states sharing the larger geological formation of multiple intermingling aquifers called the **Mississippi Embayment Aquifer System**, composed of six aquifers and two aquitards, including the *Sparta-Memphis aquifer and the Upper and Middle Claiborne Aquifers*. These aquifers are interconnected vertically and horizontally, but their vertical flow is somehow restricted within and between the aquifers. This creates a complex three-dimensional groundwater flow system of the ensemble.

Nonetheless, technicalities such as these were not considered (or at least not mentioned) in the Supreme Court’s decision. In other words, it seems as if no science (e.g., modeling of the full multilayered groundwater system) was included in the Supreme Court decision. Rather, the Supreme Court applied the same law they’ve used in other cases of surface-water disputes: **the equitable apportionment jurisprudence**. The Court acknowledged that “it has not before addressed whether equitable apportionment applies to interstate aquifers”. And that “Equitable apportionment of the Middle Claiborne Aquifer is sufficiently similar to past applications of the doctrine to warrant the same treatment”.

Thus, the Court applied the same rules as for surface water, but can we really consider the same rules for surface water and groundwater? We know these resources are quite different and move differently. Most hydrologists and hydrogeologists would agree that, when you dry up a river in its downstream part, it has little impact upstream. With groundwater, it can go both ways, you may deplete considerably the upstream part of the aquifer when pumping downstream; or deplete downstream when pumping upstream. Depending on the extent of pumping, the drawdown cones created by pumping are three dimensional and may extend large distances affecting downstream or upstream locations. These effects can only be quantified by thorough scientific studies and, ideally, considered in transboundary groundwater disputes.

Regardless, on November 22, 2021, the Justices' decision was unanimous with the Court dismissing Mississippi's case and holding that "*the waters contained in the Middle Claiborne Aquifer are subject to equitable apportionment,*" and that U.S. states may not "*exercise exclusive ownership or control*" over interstate waters flowing within their borders. According to international expert Gabriel Eckstein, "While the case involved an entirely domestic U.S. dispute, it is nonetheless an interstate dispute over cross-border groundwater resources. Thus, it could have a significant jurisprudential impact on the development of international law for transboundary groundwater resources."

This decision leaves us with interesting lessons on: sovereignty or ownership, equitable apportionment, conjunctive use, and water laws.

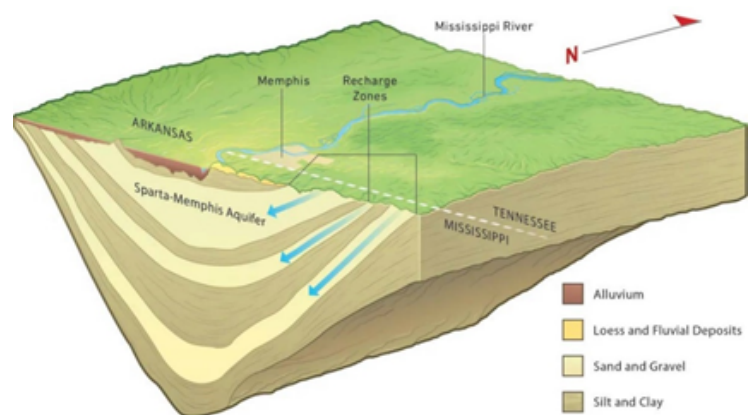
- The court thoroughly rejected Mississippi's sovereign ownership theory, emphasizing that states sharing a water resource must respect each other's interests in that resource. In contrast, "Mississippi's ownership approach would allow an upstream State to completely cut off flow to a downstream one, a result contrary to our equitable apportionment jurisprudence."

- By clearly subjecting both sources of water to the same legal doctrine, the court has also arguably allowed for states to trade one resource against the other.

- Conjunctive equitable apportionment is now at least theoretically possible. As the court itself noted, it has already considered groundwater pumping that affects surface water to be relevant to its interstate water decisions.

- As climate change and drought make interstate (and international) groundwater disputes increasingly likely in the future, states/countries now know that equitable apportionment is the background principle for sharing groundwater.

- In the surface water context, equitable apportionment has long been recognized to disadvantage the downstream state. In the groundwater context, in contrast, "upstream" and "downstream" are often not as clear, meaning that more states sharing groundwater may have incentive to negotiate agreements. Combining surface water and groundwater negotiations, moreover, could allow states to deal with hydrologically connected groundwater directly and to negotiate more creative trade-offs across resources. While *Mississippi v. Tennessee* is unlikely to spark a bold new era of interstate water compacts, a few states that share declining aquifers may take that opportunity now that the court has made clear the background principles against which they negotiate (Robin Craig, November 2021).



The Sparta-Memphis aquifer is one of several aquifers layered in a larger geological formation of multiple intermingled aquifers called the Mississippi Embayment. Sources: John Brahana, University of Arkansas; Danie Larsen and Brian Waldron, University of Memphis.

New faces in the TBA Commission

The TBA Commission welcome two new members in its team, increasing the commission's membership to 16 individuals from four continents. Welcome Lucía Samaniego and Momčilo Blagojević!



Lucia Samaniego has a degree in Geology from the University of the Republic of Uruguay. She is currently completing her master's thesis on the Guarani Aquifer System. She is part of the staff of the Regional Center for Groundwater Management (UNESCO Category II Center), which perfectly fits with our IAH-TBA Commission's activities. She has participated as a speaker in various courses on Groundwater Governance and Integrated Water Resources Management.

Lucia will be charged, and represent, our main contact with South America.

Momčilo Blagojević holds a PhD in Geological Engineering/Hydrogeology, with over 11 years of experience in water management, project management, groundwater and surface water resources management, implementation of the European Water Framework Directive and Flood Directive. He has more than 7 years of experience in negotiation with different national and international institutions (EU Commission, World Bank, KfW, UN, UNESCO, UNDP). Momcilo is the former General Director of the Directorate for Water Management responsible for the project negotiation with the European Commission, World Bank, KfW and other donors.

Momcilo's international experience within the International Commission for the Protection of the Danube River (ICPDR) and Sava Commission, and his work in the Drina River Basin and other River Basins, fits well with our IAH-TBA Commission's activities.

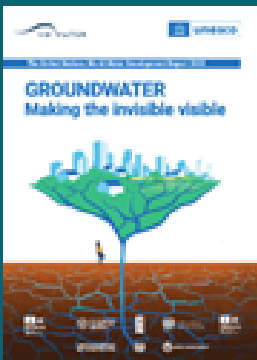
Momcilo will be in charged and represent our main contact with Eastern Europe.



EVENTS



As in every year, the World Water Day highlights a specific aspect of freshwater. The theme also sets the focus for the annual World Water Development Report. An annual theme is proposed by UN-Water Members and Partners two to three years in advance. For 2022, as proposed by IGRAC, UN-Water decided that “Groundwater: making the invisible visible” will be the theme for the World Water Day.



Thus, on March 22, 2022, the World Water Day was celebrated around the globe with many groundwater-related activities. One of which is worth mentioning: the release of the World Water Development Report 2022 “Groundwater - making the invisible visible” launched on 21 March 2022 at the opening ceremony of the 9th World Water Forum in Dakar, Senegal. Members of the TBA Commission contributed to three chapters of the WWD 2022 report.



During the 9th World Water Forum in Dakar, Senegal, the themes of transboundary aquifer assessment, management, cooperation and governance were discussed. On the first day a high-level panel was held that aimed to allow for an exchange of experience between the newly formed Senegal-Mauritania Aquifer Basin regional working group and two other transboundary aquifers where cooperative agreements exist; the Genevois and the Guarani aquifer. On the remaining days of the forum, UNESCO-IHP organized 3 technical sessions that focused on transboundary aquifers: (1) Promoting sustainable development by improving knowledge and governance of transboundary groundwater resources; (2) Promoting knowledge and tools for collaboration and benefit-sharing on transboundary water resources; and (3) Science and innovation for enhancing governance and management of transboundary aquifers and IWRM. All sessions were well attended and included interventions and presentations from multiple members of the IAH TBA Commission.



INTERNATIONAL CONFERENCE
GROUNDWATER, KEY TO THE SUSTAINABLE DEVELOPMENT GOALS
PARIS - May 18 -20, 2022

ORGANIZED BY IAH-CFH, UNESCO-IHP, THE FRENCH WATER PARTNERSHIP, UNDER THE PATRONAGE OF THE FRENCH NATIONAL COMMISSION FOR UNESCO AND WITH THE SUPPORT OF THE MINISTRY FOR ENVIRONMENT, SEINE-NORMANDY WATER AGENCY, AND SORBONNE UNIVERSITY

As member of the TBA-Commission, Marie-Amélie Pétré is organising a session on transboundary aquifers, with UNESCO-IHP and IGRAC at the international Conference “**Groundwater, Key to the Sustainable Development Goals**” to be held in Paris on 18-20 May 2022. The session (Topic4c) seeks to reflect experiences on assessment of TBA and illustrate through case studies the success stories and challenges of cooperation over TBA and how TBA are contributing to the Sustainable Developments Goals. Several members of the TBA Commission will participate to the conference and share their recent work. This is a hybrid event and registration (on site or remote) is still open!



TBA Commission is partnering with IGRAC and UNESCO as co-conveners for one of the seminars of the World Water Week, Stockholm.

Our session is titled: *Peace and international cooperation: what do transboundary aquifers have to offer?*

This session will try to address three questions:

1. Understanding TBAs and their role as promoters of international cooperation;
2. Understanding the benefits of surface-groundwater conjunctive management at the transboundary level; and
3. Assessing TBA cooperation and water security: Are we on track with the SDGs?



The UN-Water Summit on Groundwater will take place on 6-8 December 2022 at UNESCO, Paris, and is tentatively planned as a hybrid meeting with the most possible on-site presence.

The Groundwater Summit is envisaged as a major contribution to making the groundwater more visible in order to better manage and protect it. It will bring attention to groundwater at the highest international level. The Summit will use the World Water Development Report 2022 as a baseline and the SDG 6 Global Acceleration Framework as a guidelines to define actions towards more responsible and sustainable use and protection of this vital natural resource. The summit will unify the statements from all major water-related events in 2021 in one comprehensive groundwater message for the UN Water Conference 2023.

IAH EVENTS 2022



49th IAH Congress

The International Association
of Hydrogeologists

The 49th IAH Congress will be held in Wuhan, China, 8-23 September 2022 with the theme:

Groundwater Sustainability & Poverty Reduction

Abstract submission is open until June 30, 2022. Find out more:

<http://www.iah2022.com>

PEOPLE IN THE NEWS

The TBA Commission is very proud to honor John W. Hawley as one of the pioneers in transboundary aquifers research. This is a short story of John W. Hawley, Ph.D., Environmental Geologist (John).

The work of John is anchored on perseverance, high-quality high-resolution research, and attention to detail.

A native of Indiana, John graduated cum laude from Hanover College in 1954 with a B.A. degree in geology. After employment by the USGS-Ground Water Branch and overseas U.S. Army service, John attended graduate school at the University of Illinois, receiving a Ph.D. degree in Geology in 1962. Doctoral research was on the Quaternary and groundwater geology of Nevada's western Humboldt River basin. Most of John's subsequent career in research, public service, and consulting has dealt with a variety of environmental-geologic problems related to natural-resource development in arid and semiarid parts of the American Southwest.

John has been "retired" for a quarter of a century, but he has not stopped working. John is owner and principal investigator of HAWLEY GEOMATTERS, a consulting firm that specializes in the environmental and groundwater geology of the binational New Mexico region with many aquifer and groundwater-related projects both interstate (NW/AZ) as well as binational (US/Mexico).

He also continues to serve NM Tech as a NMBGMR Emeritus Senior Environmental Geologist and an



Earth & Environmental Sciences faculty adjunct; he has adjunct appointment at the NM Water Resources Research (Senior Hydrogeologist).

Over the years, John has been honored for published research and public service including: AAAS Certificate of Merit "for distinguished contributions [to] arid zone research (1987)," GSA-Engineering Geology Division-Distinguished Career Award (2005), and Quaternary Geology & Geomorphology Division: Kirk Bryan and Distinguished Career Awards (1983 and 2006). John is also co-recipient of the 2005 New Mexico Earth Science Achievement Award for "outstanding contributions in areas of applied science and education;" and he has received Alumni Achievement Awards from Hanover College (2001) and the University of Illinois (Geology- 2006). In 2007, the Santo Domingo Tribe honored John for "outstanding contribution to the improvement of [their] public water system."

More recently, John has been involved in the development of a very detailed hydrogeological framework of the binational Mesilla Basin region of New Mexico, Texas, and Chihuahua (Mexico); he contributed to the new Universidad Autónoma de Ciudad Juárez (UACJ) book on the Paso del Norte region. He provided a very detailed account of the historical background on transboundary groundwater-resource conservation in the Paso del Norte region.

OTHER SHORT NEWS



Among the many initiatives for the 2022 international Year of Groundwater, the IAH Executive Council, with the *Hydrogeology Journal* Editor-in-Chief Cliff Voss, launched the initiative to publish a special *HJ* Topical Collection with selected Essays dedicated to relevant topics and novelties in hydrogeology.

Our Transboundary Aquifer Commission was invited to submit one of those Essays and we accepted the challenge. A short group of seven members of our commission produced an Essay titled: **Why do we need to care about transboundary aquifers and how do we solve their issues?**

In this essay, we build on 20 years of TBA experience, using a three-pillar framework (assessment, cooperation-collaboration, shared management), to identified the key elements to solve TBA's issues. Our analysis includes a multidisciplinary approach, identification of hotspot zones, local vs border-wide approaches, appropriate funding models, and an increased recognition of the role and value of TBA.

Our essay is currently in peer-review, and, if accepted, should be published later this year.

KNOWLEDGE CAPSULES ON TBA

In previous issues of the Newsletter, we've defined terms such as aquifer, transboundary aquifer, groundwater age, zoning and sustainable use; we've discussed how to design groundwater management units and how to downscale hotspots along international borders.

In this issue, we add other interrelated terms to narrow the scope of our main goal on knowledge of TBA: the meaning of hydrogeological and hydrostratigraphic units under the transboundary context.

Hydrogeological Unit – HGU

A hydrogeological unit is defined as any soil or rock unit or zone that by virtue of its hydraulic properties has a distinct influence on the storage or movement of groundwater.

HGUs may exist at various scales: regional, contextual, unit, or as a single aquifer. One HGU may contain more than one aquifer. Thus, when delineating transboundary aquifers, HGUs should be clearly identified as a TBA, or as a hydrogeological unit, or a framework, where a transboundary aquifer or aquifer systems are present.

Hydrostratigraphic unit – HSU

Body of sediment and/or rock characterized by groundwater flow that can be demonstrated to be distinct under both unstressed (natural) and stressed (pumping) conditions, and is distinguishable from flow in other HSUs.

An HSU is distinguished and characterized by its porosity and permeability. Delineation of these units subdivides the geologic framework into relatively more or less permeable portions and thus aids in definition of the groundwater flow systems.

Hydrostratigraphic units may include aquitards, which should be included in the groundwater water flow system as they may pose significant barriers to the vertical flow of groundwater. This is an important aspect to consider when dealing with transboundary aquifer systems, which may significantly affect the regional flow of groundwater at the scale of the jurisdictional boundary.

Previous TBA-Commission's Newsletters can be accessed [HERE](#)

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