

International Association of Hydrogeologists
COMMISSION ON GROUNDWATER & CLIMATE CHANGE
CGCC

ANNUAL REPORT 2017

Chairs

Dr. Tibor Stigter, IHE Delft Institute for Water Education (the Netherlands)
Dr. Jodie Miller, Stellenbosch University (South Africa)
Professor Jianyao Chen, Sun-Yat Sen University (China)

IAH-CGCC website: <http://www.gwclim.org> (*currently offline, in process of updating*)

1. Renewal of Commission

The IAH Commission on Groundwater and Climate Change (IAH-CGCC) held its annual meeting at the 44th IAH Congress in Dubrovnik on Tuesday 26 September 2017. During the meeting it was announced that Tibor Stigter from IHE Delft (<https://www.un-ihe.org/tibor-stigter>) agreed to take over the role of Richard Taylor as Chair of the IAH-CGCC. In the same meeting Bridget Scanlon also asked if there were any volunteers to take over her role as co-chair, and following a few days of consideration, Jodie Miller (<https://www.sun.ac.za/english/faculty/science/earthsciences/staff-and-postgrads/academic-staff/dr-jodie-miller>) accepted to take over. Together with Jianyao Chen, Tibor and Jodie will continue to promote networking and dissemination around the topic of groundwater and climate change, a topic that is continuing to grow in importance.

During the meeting at IAH Dubrovnik, several key initiatives and ideas that came up in Montpellier last year were discussed for further follow-up:

Networking and experience sharing: knowing, among the commission members and beyond, who is doing what in the field of research and practice and evaluating the relationships between groundwater and climate change including both impacts and adaptations. The commission agreed that the easiest thing to do would be to use existing tools, such as those linked to social media, to promote the networking, so that all members could know from each other what they are working on. One of the commission members, Roland Barthel from the University of Gothenburg, is currently looking into this.

Access to literature: stimulate the access to both peer-reviewed publications behind firewalls and difficult-to-access grey literature reports in currently limited circulation, by expanding the list of accessible databases on the website and providing a service of posting literature provided by commission members. Also here the use of social media tools such as ResearchGate was considered as the most feasible. In addition, possible links to the KINDRA project led by Marco Petitta from Sapienza University of Rome, and the BGS grey literature database under the

African Groundwater Atlas project, were discussed. KINDRA (<http://kindraproject.eu/>) is conducting an EU-wide assessment of existing groundwater-related practical and scientific knowledge, so it would be very interesting to be able filter out the work specifically related to the area of groundwater and climate change. The Africa Groundwater Literature Archive is a searchable online database that so far catalogues nearly 7000 references for literature about groundwater in Africa (<http://www.bgs.ac.uk/research/groundwater/international/africaGwAtlasArchive.html>).

Linkage to the other commissions and relevant international networks: Besides looking at climate change impacts on groundwater, the importance of drivers such as population growth, development, urbanisation and changing dietary preferences in large emerging countries, which all lead to increased (ground)water demand, will also merit attention within the activities of IAH-CGCC, as will the role of groundwater in adaptation. For this reason, contacts will be established or strengthened with other relevant commissions within IAH, such as the Commission on Managing Aquifer Recharge, as well as with other international programmes (e.g. UNESCO GRAPHIC) and networks. One of the members of the commission, Luís Ribeiro from the University of Lisbon, mentioned the importance of ongoing research on techniques used by our ancestors, thousands of years ago, in recharging groundwater for instance in Central and South America (e.g. Schreiber and Rojas 2003, Yapa 2016). Understanding these techniques is extremely important to assess the feasibility of current practices of measures in adaptation to climate and global change. Palaeogroundwater of INQUA, led by Jianyao Chen might contribute to the commission with knowledge of global change from large aquifers.

To stimulate the networking and dissemination of our activities, close collaboration is also sought with the Early Career Hydrogeologists' Network (ECHN).

References

- Schreiber, K., Rojas, J.L. (2003) Irrigation and the society in the Peruvian desert: the puquios of nasca. Lexington Books, UK.
- Yapa, A.S. (2016) Nurturing Water: Ancestral Ground Water Recharging in the Americas. 7th RWSN Forum "Water for Everyone", 29 Nov - 02 Dec 2016, Abidjan, Côte d'Ivoire

2. IAH-CGCC Aims

The mission of the IAH Commission on Groundwater and Climate Change (IAH-CGCC) is: **to improve understanding of (1) the relationship between groundwater and climate change, and (2) the role of groundwater in adaptation to climate variability and change.**

The IAH-CGCC will seek to fulfil its mission by:

1. promoting related research and development to advance scientific and technical knowledge;
2. fostering inter-disciplinary, international collaborations with research institutions, water resource managers, and water policy makers;
3. fostering linkages with related research and development activities in climate, hydrological, agricultural and health sciences;
4. engaging with key international organisations, agencies and programmes (*e.g.* UNESCO-IHP, WMO, FAO, UNICEF, WHO, IAEA-WRP, GEWEX, GWSP)
5. working with the International Groundwater Resources Assessment Centre (IGRAC) to promote the development of a programme and facility for the collection, evaluation, archiving and sharing of groundwater data including both ground-based observations and satellite measurements;
6. identifying and evaluating a series of representative case studies illustrating the relationship between groundwater and climate change and the role of groundwater in adaptation to climate variability and change;
7. disseminating research and development outcomes to the global research community including specifically the IPCC, and global development community including governmental and non-governmental organisations and those specifically concerned with enabling adaptation to climate change; and
8. creating awareness of the IAH-CGCC among IAH members, related professions and wider water resources and water supply communities.

3. Progress on IAH-CGCC objectives during 2017 through:

3.1 Educational Initiatives

- Tibor Stigter is coordinator of the Joint MSc programme on *Groundwater and Global Change – Impacts and Adaptation (GroundwatCH)*. GroundwatCH seeks to offer a distinctive curriculum built on the cornerstones of hydro(geo)logy, climatology, impacts and adaptation, within a framework of human pressures, global change and feedbacks. Full partners are IHE Delft, TU Dresden and IST/University of Lisbon. A large number of public and private institutions are associated to the programme. For more information see www.groundwatermaster.eu. Students of the programme will be involved in updating the website of IAH-CGCC.
- As the palaeogroundwater IFG (International Focus Group) leader of International Quaternary Union (INQUA), Jianyao Chen submitted a proposal to organize an international training course on groundwater and age dating in 2017, and the proposal was accepted with a seed funding. The course will be organized in Guangzhou/Zhanjiang in the end of 2018. Five to six young researchers and researchers from developing countries with low income are to be invited with this funding.

2017, 10-12 Feb

Pan-African groundwater-level analysis and training workshop Morogoro (Tanzania)

- The IAH-CGCC supported the IAH/UNESCO-IHP Chronicles Consortium in a pan-African capacity-strengthening and knowledge co-production workshop at Sokoine University of Agriculture. 40 participants from 12 countries in Africa took part and analysed multi-decadal, groundwater-level data (“chronicles”) from 9 countries including Benin, Burkina Faso, Ghana, Niger, Senegal, South Africa, Tanzania, Uganda and Zimbabwe. Participants comprised PhD students and more experienced researchers (mentors & supervisors) as well as representatives from government ministries and the private sector. Training focused on the application of the water table fluctuation method for analysing groundwater-level records. In addition to addressing key capacity-strengthening goals, the workshop provided a platform for the co-production of knowledge. As a result, a collaborative, pan-African analysis of multi-decadal groundwater-level records is in preparation along with 5 papers submitted to an upcoming special section of Hydrogeology Journal.

<https://www.un-igrac.org/news/chronicles-consortium-groundwater-level-analysis-and-training-workshop>
<http://grofutures.org/article/pan-african-groundwater-level-analysis-and-training-workshop/>

3.2 Contributions to international conferences

2017, Sep **44th IAH Congress “Groundwater – Heritage & Sustainability”**
 (Dubrovnik, Croatia)
 Members of the IAH Commission on Groundwater & Climate Change (IAH-CGCC) co-authored and gave a number of oral and poster presentations at the 44th congress. The titles of a few of these presentations are shown in Table 1.

Table 1. Oral presentations given at the 44th IAH Congress in Dubrovnik in September 2017

TOPIC	TITLE	AUTHOR	
T2.2. THE ROLE OF GROUNDWATER IN REDUCING POVERTY	LARGE-SCALE MODELLING OF GROUNDWATER RESOURCES: INSIGHT FROM THE COMPARISON OF MODELS AND IN-SITU OBSERVATIONS IN SUB-SAHARAN AFRICA	RICHARD	TAYLOR
T6.4. MANAGEMENT OF GROUNDWATER RESOURCES OF COASTAL AQUIFERS	GROUNDWATER MANAGEMENT IN COASTAL ZONES AND ON ISLANDS IN CRYSTALLINE BEDROCK AREAS OF SWEDEN	ROLAND	BARTHEL
T7.3. GROUNDWATER AND TERRESTRIAL ECOSYSTEMS	STUDYING THE DEPENDENCE OF WETLANDS AND RELATED ECOSYSTEMS ON GROUNDWATER IN DIFFERENT CLIMATIC AND HYDROGEOLOGICAL SETTINGS USING MULTIPLE TOOLS	TIBOR	STIGTER
T7.2. GROUNDWATER AND ASSOCIATED AQUATIC ECOSYSTEMS	IDENTIFYING AND MODELLING SUSTAINABLE GROUNDWATER INFLOWS INTO THE VERLORENVLEI COASTAL ESTUARINE SYSTEM IN SOUTH AFRICA	JODIE	MILLER
T8.2. GEOTHERMAL RESERVOIRS AND THEIR POTENTIAL	REVIEW OF WATER RISKS RELATED TO UNCONVENTIONAL OIL PRODUCTION IN THE U.S.	BRIDGET	SCANLON

2017, May **JpGU/AGU Joint Meeting 2017 (Tokyo, Japan)**
 The IAH-CGCC contributed to a keynote presentation to a session, *Sustainable global groundwater management for human security*, entitled: *Large-scale modelling of groundwater resources: insight from a comparison of model data and in-situ observations in Sub-Saharan Africa*, given by Richard Taylor

2017, Sep **Keynote lecture on “Paleogroundwater research”**
 Jianyao Chen was invited by the working group of Hydrology and Applied Geoscience of Japan to give a keynote lecture on “Paleogroundwater research” in Tokyo in September 2017.

3.3 Projects and Publications

- The IAH-CGCC by way of The Chronicles Consortium is leading a special section of papers for publication in Hydrogeology Journal under the heading/focus, Observed Storage Changes in African Aquifers and their Implications for Sustainable Water Resources Management (<http://www.un-igrac.org/news/call-papers-special-issue-hydrogeology-journal>)
- A plan to publish a special issue on Groundwater and Global Palaeoclimate Signals in Quaternary International was accepted in 2017, and approximately 20 papers are to be published in the end of 2018.
- IAH-CGCC contributed to a Topical Collection in Hydrogeological Journal on “Climate-change research by early-career hydrogeologists”, a joint initiative initiated in 2017 by IAH-ECHN, UNESCO-IHP and IAH-CGCC; the introductory essay co-authored by Tibor Stigter, will be published in 2018.
- As the new chair of IAH-CGCC, Tibor Stigter was invited to give a keynote on Groundwater and Climate Change for the annual gathering of the German Chapter of IAH, to be given in March 2018.
- A proposal submitted to National Science Foundation of China (NSFC) on “Reconstruction of palaeoclimatic signals from groundwater in large aquifers - with a case study in Leizhou Peninsula” was accepted in 2017 and funded for four years from 2018 to 2021.

3.4 Engagement with international programmes and scientific agenda:

(i) UNESCO-IHP GRAPHIC Programme

- The IAH-CGCC continues to work closely with the GRAPHIC programme including the development of conference sessions and workshops.

(ii) GEWEX Project

- The IAH-CGCC is currently leading a large network of researchers in an inter-comparison of modelled and *in-situ* observations of groundwater recharge in Africa under *The Chronicles Consortium* forming a new contribution to the Global Energy and Water cycle Exchanges (GEWEX) project.

Tibor Stigter, Jodie Miller & Jianyao Chen
IAH-CGCC Co-Chairs