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United Nations  
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Cultural Organization



International  
Hydrological  
Programme





# IGRAC Report 2017

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Delft, February 2018



IGRAC (International Groundwater Resources Assessment Centre) facilitates and promotes international sharing of information and knowledge required for sustainable groundwater resources development and management worldwide. Since 2003, IGRAC provides independent content and process support, focusing particularly on transboundary aquifer assessment and groundwater monitoring.

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## LIST OF ACRONYMS

CCOP	Coordinating Committee for Geoscience Programmes in East and Southeast Asia
DIKTAS	Protection and Sustainable Use of the Dinaric Karst Aquifer System project
FREEWAT	Free and open source tools for water resource management
GEF	Global Environment Facility
GGIS	Global Groundwater Information System
GGRETA	Groundwater Resources Governance in Transboundary Aquifers project
GGMN	Global Groundwater Monitoring Network
GRIPP	Groundwater Solutions Initiative for Policy and Practice
GroFutures	Groundwater Futures in Sub-Saharan Africa
HLPW	High Level Panel on Water of the United Nations
HWRP	Hydrology and Water Resources Programme of the World Meteorological Organisation
IAH	International Association of Hydrogeologists
IGAD	Intergovernmental Authority on Development
IHP	International Hydrological Programme
IMS	Information Management System
ISARM	Internationally Shared Aquifer Resources Management
IWMI	International Water Management Institute
MAR	Managed Aquifer Recharge
MIM	Meta-Information Module (a GGIS component)
RIMS	Ramotswa Information Management System
SADC	Southern African Development Community
SADC-GMI	SADC Groundwater Management Institute
SAP	Strategic Action Plan
SDGs	Sustainable Development Goals
STAC	Strategic and Technical Advisory Committee
TBA	Transboundary Aquifer
TWAP	Transboundary Waters Assessment Programme
UN	United Nations
UNECE	United Nations Economic Commission for Europe
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
USAID	United States Agency for International Development
WMO	World Meteorological Organization

## 1. SUMMARY

This is the report of IGRAC's activities in 2017, conducted according to the Work Plan 2017 and in line with budgetary and personnel developments during the year. While 2016 was a transitional year for IGRAC, 2017 was a year of consolidation and groundwork for good prospects in coming years.

IGRAC entered the reporting year with a reduced staff and decreased budget but also with a new five-year period of cooperation agreement between UNESCO and the Government of The Netherlands and the related core-financing. IGRAC rounded off 2017 with the positive balance and reversed the staff reduction. The Memorandum of Understanding with WMO has been renewed too.

In 2017, UNESCO-IHP Secretariat and IGRAC increased joint activities. Cooperation with IHE Delft, IGRAC's hosting organisation (and another UNESCO water centre) also increased: IGRAC was for the first time substantially involved in a IHE Delft project. IGRAC also co-founded a new global groundwater network (GRIPP) and increased its participation in the UN-Water network.

The amount of external projects increased substantially in 2017 as a result of IGRAC's track record and a long-term investment in partnerships. Due to temporary staff reduction and core funding delay, the full merits of the increased activity budget will not become visible until 2018. Furthermore, IGRAC will need some time to consolidate the institutional memory after a staff departure in last two years.

In addition to assessment activities, IGRAC was engaged in several capacity building activities in 2017, carried out with use and further development of IGRAC products and services (such as information management portal and various methodologies). IGRAC continued to support transboundary aquifer assessment and governance, and embarked on new topics such as economic value of groundwater and integrated nature-based solutions. Thanks to good groundwork in 2017, the next year will see the revival of groundwater monitoring activities and further GGIS/GGMN developments.



## 2. ORGANISATIONAL/INSITUTIONAL ACTIVITIES

This chapter summaries the main IGRAC activities related to institutional positioning and organisational structure of the centre. In 2017, IGRAC has reconfirmed its position as a - very much required - global groundwater centre, affiliated to UNESCO and supported by the Netherlands. The second part of this chapter contains the review of project acquisition activities in the same year: 2017 was successful from that aspect as well.

### 2.1 INSTITUTIONAL POSITIONING

2017 started with the full legacy of 2016 including both the positive and les positive aspects of it. 2016 was a transitional year for IGRAC, both in terms of cooperation with UNESCO and financing of the centre. Completion of the long-term projects commissioned by UNESCO-IHP and reduction of the core financing (-20%) led to a substantial decrease of IGRAC turnover in 2016. IGRAC's efforts to compensate these setbacks through increased project acquisition were not successful enough, and reduction of staff and costs was unavoidable. From the positive side, the agreement between the Government of the Netherlands and UNESCO on IGRAC was renewed for the coming five years, including the core funding of the centre.

In 2017, UNESCO-IHP Secretariat and IGRAC substantially increased common activities. This has not been done through joint externally funded projects, but rather through coordinated activities related to implementation of the UNESCO International Hydrologic Programme (IHP) which is closely connected to IGRAC's mission. Examples of this cooperation are: IAH congress, SDG expert meeting, HLPW meeting, assistance to ISARM programme, TWAP, GGRETA, DIKTAS and FREEWAT projects, etc. There are many possibilities to further increase cooperation, also through the recently-awarded projects, often developed with contributions from IGRAC (see further in this chapter).

Cooperation between Paris and Delft also involves IHE Delft, IGRAC's hosting organisation and also a UNESCO water centre. In 2017, IGRAC was for the first time substantially involved in a IHE Delft -led project, to the satisfaction of all involved parties. IHE-Delft and IGRAC are exploring options to establish a programmatic cooperation, also as UNESCO water centres. National UNESCO-IHP (and WMO-HWRP) secretariat is supporting these efforts. In 2017, IGRAC continued contributing to the HWRP (Hydrology and Water Resources Programme) of WMO, although the major common initiatives are still pending (see further in the chapter on groundwater monitoring). Nevertheless, the Memorandum of Understanding between WMO and IGRAC has been updated and formally renewed, providing a broad framework for further cooperation.

IGRAC is a member of UN-Water, a mechanism that coordinates the efforts of UN entities and international organizations working on water and sanitation issues. As a UN-Water partner, and supported by UNESCO and several other UN-Water partners, IGRAC proposed preparing a UN wide groundwater overview in August 2017. The proposal was accepted and the overview is currently under the preparation (see further in the Thematic Assessment). IGRAC has joined three UN-Water expert groups as well. As the UN-Water mechanism is rapidly expanding, the UN-wide expert groups seem to be a promising way to secure involvement in global water-related activities.

In 2017 IGRAC continued its strategic partnership with International Association of Hydrogeologists (IAH), contributing to the IAH congress and the work of various IAH commissions. IAH and IGRAC are also partners in GRIPP (Groundwater Solutions Initiative for Policy and Practice). GRIPP is an independent open global partnership of partners set up to connect, strengthen, expand and connect groundwater-related projects and initiatives (further on GRIPP in the Chapter 3.4).

IGRAC has become engaged in the Sustainable Groundwater Management in Southern African Development Community (SADC) project of the World Bank, which has led to the setting up of the SADC Groundwater Management Institute (SADC-GMI). This engagement is a result of manifold IGRAC's contributions to the bank activities in last five years, IGRAC's good track record in the SADC region (since 2005) and communalities in the mandate of SADC-GMI and IGRAC. Last year, IGRAC also contributed to the World Bank validation event on groundwater in the Horn of Africa region. The intention is to develop long-term groundwater activities in the region, following the SADC example. Cooperation with the Asian Development Bank (ADB) has remained limited to some sporadic advisory by IGRAC.

IGRAC Governing Board had its regular yearly meeting already in October (rather than in December as usual) in order to synchronise with a new grant distribution schedule. The Governing Board decided to invite WMO and IHE Delft and (one-two) UNESCO Member States to contribute in the Governing Board. The Strategic and Technical Advisory Committee (STAC) still needs to be completed and its meeting (at UNESCO) is postponed to 2018. (For other decisions of the Governing Board see the annex).

The annual meeting of the IGRAC Foundation Board was held in September, rather than in April-May as usual, also due to changes in the composition of the Board. Since November, a representative of IHE-Delft is acting chair of the Foundation Board. In this way the arrangement with the hosting organisation from 2011 was restored, when the foundation IGRAC was set up to make functioning of the IGRAC as a UNESCO centre possible.

IGRAC started 2017 with 5 staff members, two fewer than the year before. In March, the staff was reduced to four (due to delay of the core funding) and in October even to three due to departure of a staff member who took a new job opportunity. This decrease in staff (from 7 in the beginning of 2016) has had serious repercussions to the institutional memory. By the end of 2017 IGRAC staff has been increased again to 5. The core budget is sufficient to cover costs of 4 staff members and software/office costs (without an activity budget). Due to successful acquisition, IGRAC will be able to have at least one additional staff member and some activity (travelling/software development) budget for the coming two years.

## 2.2 PROJECT ACQUISITION ACTIVITIES

Compared to 2016, the IGRAC team reduced project acquisition activities in 2017. The main reasons for this were the staff reduction and advice from the Governing Board. Yet, the amount of acquired projects was much higher than the year ago. This is not unusual, knowing that some projects have long acquisition trajectories (sometimes years, e.g. GEF projects). The largest project acquired was through SADC-GMI: "Capacity building for groundwater data collection and management in SADC Member States" with a total budget of 300k\$ over 19 months. The other acquired projects have a total budget of about 100k\$, some of them also spread over multiples years (more info on budgeting in the Chapter 4 and in the IGRAC financial report 2017).

The Adaptation Fund proposal (5M\$) was not awarded primarily due to lack of lobbying at decision-making level, whereas Dutch funds (Partners for Water and Sustainability Fund) appeared not to support IGRAC core activities. Joint acquisition with IHE-Delft seems to create new opportunities to participate in the international water programme of The Netherlands.

The list of UNESCO-related leads remained almost unchanged from last years, with the difference that many of the projects have been awarded in the meantime and some of them have commenced. On request of UNESCO, IGRAC is providing some input in preparation/execution of various project activities (without commissioning in 2017).

FUND / CLIENT	PROGRAMME / PROJECT	STUDY LOCATION	PARTNERS	STATUS FEB 2018
PADUCO II Programme	Impacts of Water Quality on the Water Resources Management in the Western Basin - Palestine.	Palestine	Birzeit Un. and Palestine Polytechnic Un. UNESCO-IHE	Proposal declined
USAID	Sustainable Water Management in the Limpopo Basin - Transboundary Ramotswa Aquifer Project	Botswana, South Africa	IWMI	Awarded
Adaptation Fund	Groundwater resources in the Greater Mekong Sub region; collaborative resource management to increase resilience	Cambodia, Lao PDR, Myanmar, Thailand, Vietnam	UNESCO, IWMI, Country agencies, CCOP	Not awarded, re-submission depends on UNESCO
Partners voor Water	Dropbox for Water	Global, emphasis on Vietnam and Kenya	Nelen & Schuurmans, GIZ	Proposal ready, submission depends on N&S
SADC-GMI (World Bank)	GGIS viewer for SADC Hydrogeomap	SADC region	-	Awarded
Ministry of Water and Irrigation of Kenya	Groundwater Mapping - Kenya Wajir County	Kenya	GTK (Finland), DMT (Germany), SWAS (Kenya)	Proposal in preparation
EU - INTERREG CE	Deepwater-CE	Central Europe	MBFSZ (Hungary) and several other European countries	Proposal submitted
SADC-GMI (World Bank)	Policy, Legal, and Institutional Development	SADC region	University of Strathclyde, FEI Consultants UNESCO	Proposal submitted
SADC-GMI (World Bank)	Capacity building programme data collection and management	SADC region	IGS	Awarded
IGAD World Bank	Managing landscapes, Groundwater, and Natural Infrastructure for Resilience, Ecosystem Services and Livelihoods	IGAD region	GRIPP	Proposal in preparation
WMO	Groundwater Monitoring – Guyana	Guyana	WMO	Proposal in preparation
SDC - UNEP	Strengthening State Strategies for Climate Actions, India	India	Antea, Adelphi, Taru	Proposal declined
IAP ESA	Groundwater monitoring in desert areas. Combining satellite communication and observation.	Middle East and Northern Africa	RENCOS, Springsmart	Awarded
NUFFIC	Tailor Made Training: Groundwater Monitoring in Benin	Benin	UNESCO-IHE, INE	Awarded
World Bank	IWRM over three Indian River Basins (Krishna, Godavari, And Mahanadi)	India	Antea group, UNESCO-IHE, unihornIndia	Proposal declined
Adaptation Fund	Groundwater resources in the Greater Mekong Sub region; collaborative resource management to increase resilience	Cambodia, Lao PDR, Myanmar, Thailand, Vietnam	UNESCO, IWMI, Country agencies, CCOP	Proposal declined
Partners voor Water	UMOJA - E-collaboration Platform	Kenya, Tanzania	TU Delft, Eijkelpark	Cancelled
<b>UNESCO related leads</b>				
GEF / UNDP	GEF IW:LEARN - Strengthening IW Portfolio Delivery and Impact	Global	UNESCO	Awarded, limited IGRAC participation
SDC	GGRETA II - Groundwater Resources Governance in Transboundary Aquifers	Southern Africa, Central Asia, Latin America	UNESCO	Awarded, limited IGRAC participation
GEF / UNDP	Determining parameters of the aquifer underlying Mt. Kilimanjaro for sustainable development and management, factoring in effects of climate change	Kenya, Tanzania	UNESCO	Proposal prepared
GEF / UNDP /	Strengthening the institutional capacity of African Network of Basin Organization (ANBO),	Africa (ANBO /AMCOW)	UNESCO	Awarded not commenced yet

<b>FUND / CLIENT</b>	<b>PROGRAMME / PROJECT</b>	<b>STUDY LOCATION</b>	<b>PARTNERS</b>	<b>STATUS FEB 2018</b>
ANBO	contributing to the improved transboundary water governance in Africa			
GEF / UNEP	Improving IWRM, knowledge-based management and governance of the Niger Basin and the Iullemeden-Taoudeni/Tanezrouft Aquifer System (ITTAS)	West Africa	UNESCO	No info
GEF / UNDP	DIKTAS - Enabling implementation of the Regional SAP for the Dinaric Karst Aquifer System	South East Europe	UNESCO	Awarded, no involvement yet
GEF / UNDP	SUMTAS - Fostering multi-country cooperation and conjunctive surface and gw management in the Bug River Basins and related aquifers	Eastern Europe	UNECE	Awarded, no involvement yet
GEF / UNDP	NSAS - Enabling implementation of the Regional SAP for the sustainable management of the Nubian Sandstone Aquifer System	Northern Africa	UNESCO	Awarded, no involvement yet
GEF / UNEP	Mediterranean Sea Program - Strategic actions for the protection of Mediterranean coastal aquifers	Mediterranean Region	UNESCO	Awarded, no involvement yet

IGRAC needs acquisition and additional funding if it wants to maintain similar levels of activities recognisable for the IGRAC's first funding period 2011-2016. In that period, the acquisition was carried out almost exclusively together with UNESCO, generating benefits for both the IHP Secretariat and the Centre. With adequate project management applied, this would still be the most favourable option for IGRAC. Nevertheless, IGRAC's broad network, GRIPP, IHE-Delft programmatic partnership and other alliances will also be utilised to acquire new projects and maintain IGRAC as a globally operating centre.

### 3. CONTENT ACTIVITIES

The content activities in 2017 were conducted in accordance with the Work Plan 2017 and resources (staff and budget) availability<sup>1</sup>. IGRAC investments (other than the staff time) in further software development (i.e. in GGIS) and IGRAC-led activities (particularly GGMN) have been limited in 2017 due to limited staff and budget in the most part of the year (IGRAC intends to increase these activities in 2018). Accordingly, most activities in 2017 were either related to external projects and/or to topics that did not require investments other than staff time. Transboundary aquifer assessment still played an important role among the activities but less than previous years. Interest in data and information processing and risk analysis increased. IGRAC paid more attention to knowledge sharing and strengthening of collaboration networks through GRIPP, IHP, WMO, UN-Water, etc. The main structure of IGRAC content activities remained unchanged:

- Global Groundwater Information System
- Global Groundwater Assessment
- Global Groundwater Monitoring Network
- Knowledge Sharing and Groundwater Governance

This chapter provides an overview of the main activities and their outcomes. Additional information is available in project documents and other IGRAC products and services, as referenced to in the overviews below.

#### 3.1 GLOBAL GROUNDWATER INFORMATION SYSTEM (GGIS)

*The GGIS is IGRAC's interactive web-portal to groundwater related information and knowledge. The main purpose of the GGIS is to assist in collection, storage and analysis of information on groundwater resources and its sharing among stakeholders such as water experts and decision makers. The system provides a global overview of aggregated information per country and per aquifer; detailed information for a selection of transboundary aquifers; and information sheets for 199 recently assessed transboundary aquifers. The map interface of the GGIS is complemented with a Meta-Information Module (MIM), where additional information and references are uploaded and linked to other data in the system. Software developed for monitoring within the GGMN application as well as IGRAC's other online databases are also considered a part of the GGIS.*

##### 3.1.1 Software development

In January 2017, a new hosting and support agreement was reached with developers of GGIS software. This agreement is for two years and in that period no major new development is foreseen. The GGIS was developed using the state-of-the-art technology, however ITC is developing very vast, limiting life-time of software applications to a few years. It is almost certain that GGIS will need substantial refurbishing in 2019/2020 or even new development from scratch. IGRAC closely follows developments of open source and free software and considers this as a serious option for future refurbishing of IGRAC's GGIS. IGRAC is already using open source and free software QGIS in GGMN and a FREEWAT (modelling software developed in the FREEWAT project) is also a QGIS plugin.

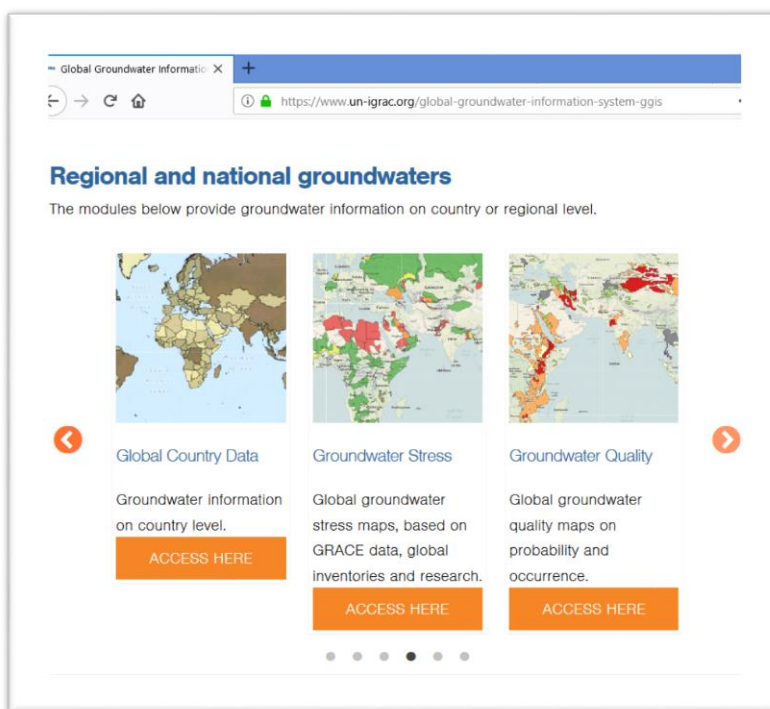
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<sup>1</sup> The staff was substantially reduced during this year and the core funding was received with eight months of delay; also, the merits of successful acquisition always come with some time lag (see the Chapter 4).

The GGIS overview has been substantially improved by further grouping the thematic maps and developing dedicated portals. Additionally, a new layer of user interface is embedded in the IGRAC portal, allowing the user direct and easy access to a requested part of GGIS, such as TBAs, MAR, MiM, etc.

In 2017, harmonisation/ complementarity with several other platforms was discussed, where IGRAC took initiative to connect GGIS and share the content of it. For instance, GGMN can serve as a building block of HydroHub of WMO, currently under conceptual development (see also the Chapter 4.3). IGRAC is seen as a potential custodian of the KINDRA and FREEWAT platforms and the modalities to fulfil this role are under discussion<sup>2</sup>.

Re-design of GGMN was completed in January 2017; since then the GGMN application was maintained and improved where needed for use of currently available functionality. Although no further development of the portal took place, some GGMN related software developments were discussed and prepared, such as development of a groundwater inventory /monitoring app (Marvi MyWell project) and implementation of satellite transmission for groundwater monitoring (Blue Desert project), as further described in the Chapter 4.3.



### 3.1.2 Content update

The main content update of the GGIS in 2017 was to various portals in the system, including project portals (Ramotswa-phase 2, SADC-Groundwater Information Portal), MAR data, various global data and references in the Meta Information Module. The GGIS content update will be addressed in more details along other content activities in the following chapter.

### 3.1.3 User support

In 2017 IGRAC obtained many requests for data and information, either from people following up on information from IGRAC publications or people requesting further information after querying the GGIS. Requests were often for data, maps (shape files) and downloads for a specific region or specific data combination. Most requests were coming from scientific research organisations (not always water-centred) and consultancy, but also from industry, journalists and public. Those who use GGIS are very positive about the application and the content (no single complaint received).

<sup>2</sup> KINDRA is a H2020 EU funded project on hydrogeology research inventory and classification aimed to make groundwater more visible. FREEWAT, also a H2020 project, is about on-line groundwater monitoring (see the Chapter 3.4).

## 3.2 GLOBAL GROUNDWATER ASSESSMENT

Historically groundwater assessment activities at IGRAC include country-based assessment, transboundary aquifer (TBA) assessment and various kinds of thematic assessments. For a number of years TBA assessment was a major focus, mostly due to large GEF funded projects. In the last year, various thematic assessments (ranging from data and information management to managing aquifer recharge and groundwater economics) have received more attention. Country-based assessment of aquifer characteristics made place for assessment of groundwater data and information management and related capacity building (see SADC project in the Chapter 3.4.2).

### 3.2.1 Global Country-based Assessment

The plans for country-based assessment in 2017 we mainly founded on promising brainstorming with the Water Footprint Network and with the Water Accounting research group of IHE Delft and a possible application of methodology to assess groundwater scarcity at subnational level. This methodology, based on withdrawal- and use data from countries (e.g. statistical offices) was developed and tested in 2016. The Water Accounting group did not make any commitment and the Water Footprint Network ceased to exist. Therefore no further investments have been made in country-based assessment nor in development of related methodology. Nevertheless, this topic could gain attention again in coming years as more data from SDG monitoring become available.

### 3.2.2 Transboundary Aquifer Assessment

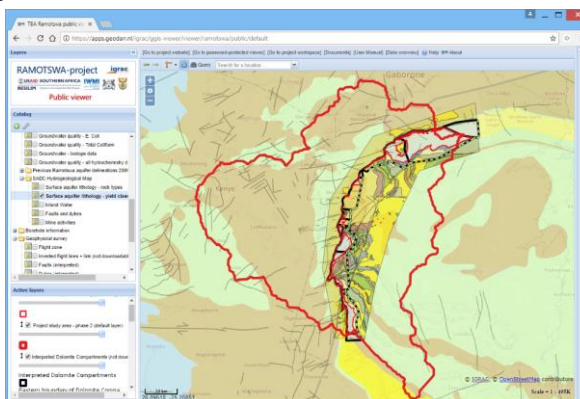
In 2017, IGRAC carried out one distinct transboundary aquifer project: The Ramotswa – phase 2 project. However, IGRAC contributed to preparation, execution or rounding off several other transboundary (project) activities, such as the 3<sup>rd</sup> UNECE Assessment, TWAP and GGRETA. Requested by UNESCO, IGRAC prepared an outline of activities (e.g. monitoring for Nubian Project) and intensified common acquisition (e.g. ANBO project). IGRAC is also involved in preparation of a major publication on transboundary aquifers.

#### Ramotswa Transboundary Aquifer Project

IGRAC is one of the partners in the project 'Ramotswa - phase 2: The Potential Role of the Transboundary Ramotswa Aquifer', led by IWMI and funded by USAID. Phase 1 of the project (2015-2016) focused on generating a solid base of knowledge on the aquifer in terms of hydrogeology and socio-economics. Phase 1 included setting up of the online Ramotswa Information Management System (RIMS) by IGRAC, as well as a baseline assessment and improved mapping of the aquifer through an airborne geophysical survey. Ultimately in phase 1 key issues for action and further research were identified, resulting in first preliminary drafts of a Strategic Action Plan (SAP).

Phase 2 of the project builds on these components, with the specific objectives being:

- A. Develop tools for joint and harmonized management and monitoring of the groundwater resources, aligned with national water resources management processes and taking into account present and future climate and demographic changes.
- B. Establish national and cross-border dialogue and cooperation on the Ramotswa Aquifer and encourage international cooperation on transboundary aquifers in the SADC region.
- C. Assess the feasibility and best options for MAR for securing the buffering capacity of the aquifer and controlling the water quality, using wastewater, flood and/or storm water.



- D. Assess the feasibility and best options for small-scale irrigation development (ag-water solutions).
- E. Develop human and institutional capacity for shared integrated management and monitoring of the groundwater resources.

IGRAC's role in the phase 2 focusses on further developing the Ramotswa Information Management System. An important component is to 'institutionalise' the RIMS. This includes developing capacity of the national RIMS-managers so that they will be able to manage the system after the lifespan of the project.

#### TWAP terminal evaluation and follow up analysis

The content TWAP (Transboundary Waters Assessment Programme) activities were rounded off in 2016, however in 2017 IGRAC assisted in the terminal evaluation process, a standard procedure in all GEF projects. IGRAC carried out a follow-up TWAP analysis using indicator based approach to prioritise transboundary aquifers at risk from development stress, pollution or climate change. This analysis was completed in beginning of 2017 and shared with UNESCO for commenting and improvements. The outcomes of the analysis were presented at the IAH Congress in September 2017. IGRAC has continued to host and maintain the TWAP data portal (<http://twapviewer.un-igrac.org>) and to assist in any enquiries related to the data in the portal and outcomes of the programme.

#### DIKTAS project

The first phase of the DIKTAS (Protection and Sustainable Use of the Dinaric Karst Aquifer System) project (<http://diktas.iwlearn.org>) was completed in 2015 and the proposal for the second phase is approved by the participating countries and granted by GEF. The DIKTAS 2 was planned to commence in 2017 but preparations are still under way. Invited by UNESCO, IGRAC moderated a DIKTAS plenary panel session during IAH Congress and participated in the meeting with the countries in September 2017.

#### The GGRETA project

Requested by UNESCO, an IGRAC representative participated in the Central Asian international conference held in Tashkent in November 2017. Also on request of UNESCO, IGRAC prepared a programme for a training of groundwater specialists from the Central Asian region to be held in Delft in 2018.

#### UNECE Third Assessment

In May 2017, UNECE Expert Group held a meeting on the 3<sup>rd</sup> assessment of transboundary watercourses, lakes and aquifers. IGRAC was actively involved in the 1<sup>st</sup> (2007) and 2<sup>nd</sup> (2011) assessment, preparing and producing the groundwater maps for the assessment reports. Based on the expert group discussions, a preliminary concept is developed to be discussed in consultations with potentially interested countries, joint bodies and partners. The final decision on 3<sup>rd</sup> assessment will be taken at the Meeting of the Parties towards the end of 2018.



#### Special issue journal on Transboundary aquifers of the world: lessons learnt

Within the framework of ISARM programme, a special issue journal on Transboundary Aquifers of the *Hydrology Journal: Regional Studies* is under preparation. The special issue will contain about 12 papers on TBA work of the past 15 years and is expected to be published early 2018. IGRAC took the lead in drafting a paper on TBA work in Africa: *Transboundary Aquifers of Africa: Review of the Current State of Knowledge and of Progress towards Sustainable Development and Management*. The paper has been developed with several partners based across Africa.

### Transboundary Aquifers of the World Map

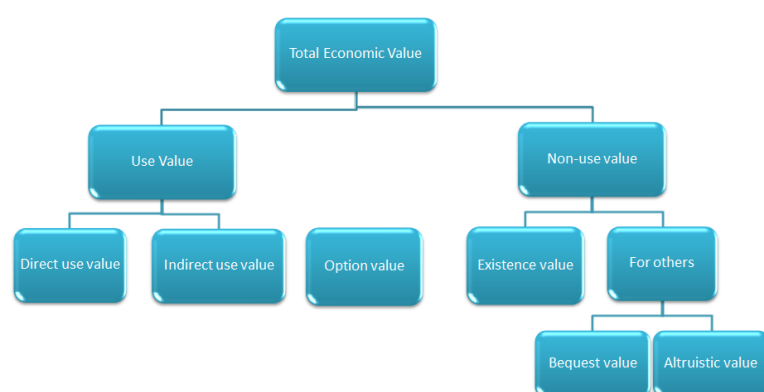
Some minor improvements of the map are made in the GGIS. The Guidelines for Multidisciplinary Assessment of Transboundary Aquifers still need to be upgraded from a draft to the final version.

### 3.2.3 Thematic Assessment

In 2017, IGRAC conducted a study on the value of groundwater and its connection with investor risk analysis. The other thematic study was on integrated, nature-based solutions build around groundwater storage, conducted in the framework of GRIPP. Thematic assessment also included preparation of MAR suitability maps and application of remote sensing in arid areas.

#### Investor Risk Analysis and value of Groundwater

Groundwater resources are extensively used in production processes by corporate business all over the world, but the knowledge about these resources is often insufficient. International companies face high exposure to the depletion or pollution of aquifers in situations where no

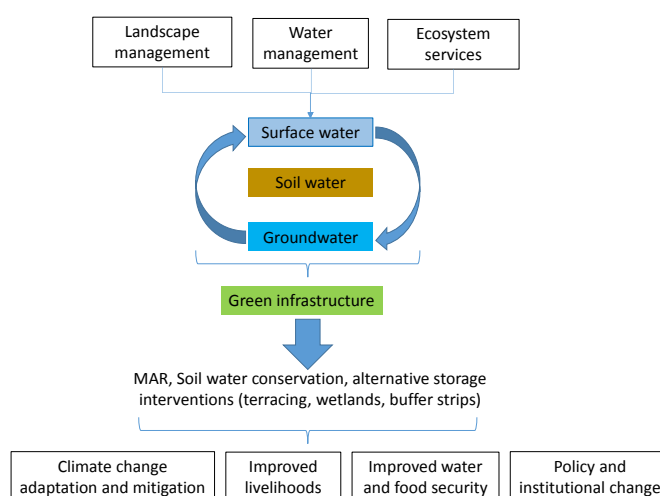


clarity exists about the state of the aquifer and related pressures, impacts and trends. They also run a risk of disrupting production and losing investments if they do see groundwater only as a production (use) value and not include it in their environmental policies and operational plans. To explain the multiple values

of groundwater to asset managers and corporate water policy to the groundwater community, a booklet "Investor Risk Analysis: Why Groundwater Matters?" was prepared and presented at the IAH congress and elsewhere. This topic is further discussed with the Pacific Institute (the organisation behind the CEO Water Mandate) and the European Water Stewardship. One of the necessary steps forward is improvement of risk assessment tools: At present, the vast majority of them do not include groundwater adequately or not at all.

#### Integrated Nature-Based Solution to increase Water Security

In the framework of GRIPP, several core partners led by IWMI and IGRAC suggested a new approach to management of water resources in semi-arid and arid areas. The novelty of this approach is that it applies an integrated landscape - water - ecosystem analysis, viewing the ground surface with its various land uses and vegetation cover, soil and subsurface storage as a manageable continuum with options for complementary solutions. By bringing in multiple water retention and storage options (surface and subsurface), the availability, replenishment, and access to water becomes less affected by seasonal rainfall variability. With the aim to increase the overall water security, the use of such green infrastructure complements built infrastructure and improves sustainability of groundwater-dependent communities.



A proposal is prepared to apply this approach in Eastern Africa: Managing Landscapes, Groundwater and Green Infrastructure to improve Climate Change Resilience, Ecosystem Services and Livelihoods in the Horn of Africa. This region is extremely vulnerable in terms of water and food security, with additional challenges including international disputes, poverty, and population growth. Water resources are not only limited, they also have a high spatial and temporal variability. Climate change is intensifying these challenges, all together raising concerns about the future development of the region.

The proposal is presented at the validation workshop “The role of Groundwater in Drought Resilience in the IGAD Region”, organized by the World Bank in Addis Ababa in July 2017. Hopefully suggested activities will be integrated in implementation of the World Bank “Regional Initiative in Support of the Horn of Africa” in coming years.

### Managed Aquifer Recharge

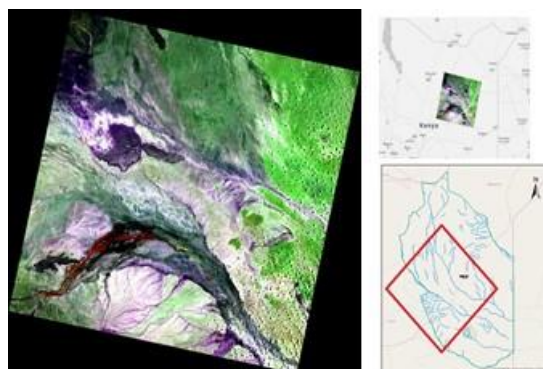
After having launched the MAR portal during the ISMAR conference in 2016, more organisations and individual researchers showed interested in including MAR data in the portal. The point data included in the global MAR inventory, that formed the basis of the MAR portal, were checked by TU Dresden and partners and subsequently updated in the portal by IGRAC. In addition, several MAR suitability maps were added to the portal. These suitability maps were produced by MAR researchers and are based on the methodology co-developed by IGRAC.



### Remote Sensing for Groundwater Assessment in Arid Areas

This (internship) study provided an overview of satellite and airborne remote sensing techniques for defining groundwater recharge/discharge potential zones and monitoring drought in arid and semiarid regions. Anticipating on the World Bank groundwater plans in the Horn of Africa, a case-study of Wajir County, Kenia was selected after consultation with the Kenyan Ministry of Water.

The application of satellite data to groundwater problem supports the general scientific trend towards “a big picture” view on groundwater issues. Various merging and integration techniques may be used to obtain information from remote sensing in a geographic information system (GIS). Remotely sensed data are most useful where they are combined with numerical modelling, GIS analysis, and ground-based information. However, there are limitations in using satellite imagery to understand groundwater dynamics: current satellite-based radar and radiometers can normally penetrate only a few centimetres into the ground. Therefore, interpretation of data should be done with caution, as highlighted in the IGRAC study.



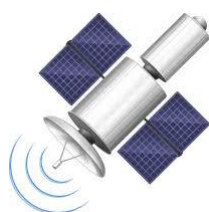
## 3.3 GLOBAL GROUNDWATER MONITORING

*The Global Groundwater Monitoring Network is a participative, web-based network of networks, set up to improve quality and accessibility of groundwater monitoring information and*

*subsequently our knowledge on the state of groundwater resources. GGMN is a UNESCO programme, implemented by IGRAC and supported by many global and regional partners.*

Unlike 2016, when IGRAC conducted three large scale GGMN workshops (Thailand, Fiji, Vietnam), groundwater monitoring activities in 2017 were quite limited. This is mostly due to budgetary situation at IGRAC in the first part of the year (delayed core funding and a limited staff). Mobilising extra-budgetary funding for GGMN remains very challenging.

Groundwater activities and IGRAC contribution were discussed with WMO on several occasions, also in the light of the renewed MoU. Envisaged involvement of IGRAC in IGAD-HYCOS have not materialised yet, the proposal requested by the Meteorological survey of Guyana is prepared and discussed but awaits implementation. IGRAC participated in the “Global Status and Outlook System Conference” in Uganda and the workshop “Innovation in Hydrometry - from ideas to operation”, held at WMO headquarters. It is emphasised that GGMN can serve as a building block of HydroHub (the Global Hydrometry Support Facility) of WMO, contributing directly to Hydrological Observing System (WHOS), online portal to near real-time and historical hydrological data made freely and openly available by National Hydrological Services around the world.



As an associate partner, IGRAC supports the Blue Desert project, awarded by European Space Agency. The project is about using sensor technology and telemetry to transfer groundwater monitoring data automatically and real time and provide those in custom made format to the clients. The state of the art satellite technology used in this project, is to be tested first in arid areas.

IGRAC is also exploring possibilities to develop/implement a mobile-phone application for inventory/monitoring of groundwater resources. The MyWell app, developed in the framework of the Marvi project ([www.marvi.org.in](http://www.marvi.org.in)) seems to be the only operational app at the moment. Talks with the developers of that app have been initiated to explore possibilities for direct data exchange with the GGMN.

A module on groundwater monitoring was part of the groundwater governance training programme in Benin (see the Chapter 3.4). A case study to illustrate practical application and possibilities of the GGMN still needs to be carried out, in Crete (as originally planned and postponed because of personnel change) or elsewhere.

## 3.4 KNOWLEDGE SHARING AND GOVERNANCE

Knowledge sharing is part of all IGRAC activities and involves creating networks of people and development of services for these networks. Some activities listed below can also be seen as thematic developments but they do not necessary include assessment. These activities are dedicated to knowledge sharing (and governance) beyond the usual management structure. In the chapter below, a distinction is made between project-based activities and dissemination and outreach through publications, social media, events, etc.

### 3.4.1 Governance

#### Sustainable Development Goals (SDGs)

During the reporting year, IGRAC provided inputs to final tuning of SDG6 indicators such as 6.3.2. (water quality) and 6.6.1 (wetlands), and, requested by UNECO, some additional input to 6.5.2. (transboundary waters). IGRAC actively participated in the “Global workshop for integrated monitoring of Sustainable Development Goal 6 on Water and Sanitation”. The purpose of the workshop was to provide a platform for countries and UN entities for sharing experiences and reviewing results from baseline data collection efforts, and for learning and

preparing for future monitoring. In the framework of the workshop, IGRAC prepared a presentation for delegates on groundwater in SDG6. The overall conclusion was that groundwater is not sufficiently represented in the proposed methodology for monitoring of reference base and water-related targets.

#### Tailor made training on groundwater governance for students and professionals in Benin

Together with IHE Delft and the Institut National de l'Eau from Benin, IGRAC organised a tailor-made training on groundwater governance in Cotonou, Benin in October 2017. The over-arching training objective was to learn how groundwater governance can contribute to sustainable groundwater management and how this may secure Benin's livelihoods under climate change and rising competing demands. The training was funded by the Netherlands Fellowship Programmes (NFP) of Nuffic and some additional funding through the Netherlands embassy in Benin. The training was attended by about 30 people from different organisations: MSc students, PhD fellows and professionals from the Direction Général de l'Eau (DG Eau) of the Ministry of Mines, Energy and Water and the Société Nationale des Eaux du Bénin (SONEB). The learning objectives for this 5 days tailor made training were to:

- Learn the basic concepts of groundwater management and governance
- Understand consequences of groundwater use for all stakeholders, including farmers and communities, and understand the range of tools and instruments available (technical, legal, institutional) to obtain sustainable and equitable groundwater use
- Analyse groundwater monitoring data using mainstream Open Source GIS software in education and administrations of the government;
- Translate (technical) groundwater monitoring data to policy relevant messages
- Apply tools that can be used for policy development to sustainable manage groundwater use
- Transfer this knowledge to stakeholders of all levels in the water sector in Benin.



#### PhD Thesis defence

Kirstin Conti rounded off the research project on “Norms in Groundwater Governance and Sustainable Development at Multiple Geographic Levels” and successfully defended her PhD thesis in July at the University of Amsterdam. A PhD project database which includes over 250 documents related to groundwater governance at various levels still needs to be included in the MiM to provide public access to this distinct collection of ‘governance’ references.

#### Groundwater Futures in Sub-Saharan Africa (GroFutures)

The GroFutures project is a four-year project that aims to develop the scientific knowledge and participatory processes by which groundwater resources can be used sustainably for poverty alleviation in Sub-Saharan Africa. Besides maintenance of the on-line project environment and user support, there was no other involvement in this project in the last year. Possible further development of serious Groundwater Game was discussed, with some prospects for development in 2018.

### 3.4.2 Knowledge Sharing and People Networks

#### Groundwater Solutions Initiative for Policy and Practice (GRIPP)

GRIPP is an independent open global consortium of partners set up to connect, strengthen, expand and connect groundwater-related projects and initiatives. GRIPP was initiated by the International Water Management Institute (IWMI) and embraced by many (about 25 at the moment) groundwater related organisations all over the globe. IGRAC is a core group partner next to IAH, IUCN, and a few others. GRIPP held its first meeting in Geneva, hosted by WMO, followed by regular telecons and the meeting at the IAH congress in Dubrovnik.



GRIPP has defined a set of values and guiding principles and developed a programme (Impact Pathway), containing basically four types of activities:

- Advocacy (e.g. High Level Panel on Water)
- Transfer of proven technologies, management tools and governance practices
- Development of new technologies through projects
- Capacity building

The plan for 2017 was prepared and IGRAC has contributed to all main activities, including the MAR portal, nature-based solution proposal for IGAD, Value of groundwater analysis and set up of GRIPP project environment. In advocacy, GRIPP paid a due attention to the High Level Panel on Water, preparing a distinct letter “Groundwater Benefits on the Threat” and contributing to the World Water Data Initiative in preparing a “Good Practice Guidelines for Water Data Management Policy”.

#### Free and open source tools for water resource management (FREEWAT)

FREEWAT (FREE and open source software tools for WATER resource management) is an HORIZON 2020 project. In 2017, IGRAC coordinated the trainings on FREEWAT platform conducted by 12 partners in various countries. IGRAC attended the closing meeting in Barcelona in September 2017.

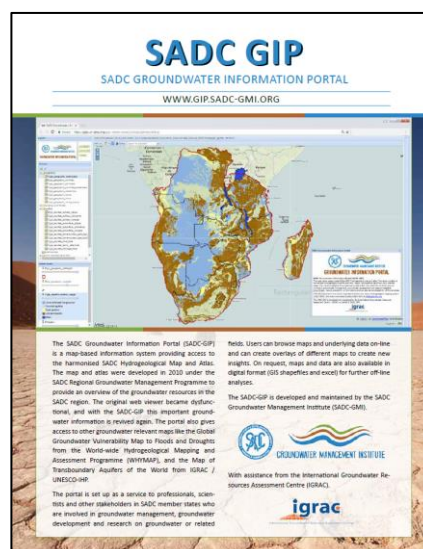
FREEWAT is an on-line QGIS -based modelling platform with a high potential to be broadly used (software was downloaded more than 1000 times so far. IGRAC joined the group of partners developing a business model for further development and promotion.



#### Resuscitating the SADC Hydrogeological map

IGRAC was contracted by the SADC Groundwater Management Institute (SADC-GMI) to recover the original data and information from the 2010 SADC Hydrogeological Mapping project.

At the launch of the SADC Groundwater Management Institute (SADC-GMI) many member states indicated that access to hydrogeological maps is a priority. Therefore SADC-GMI took the initiative to revive access to the results from the SADC Hydrogeological Mapping Project. IGRAC recovered all digital maps, underlying databases and reports from the original project and has made them available on-line again. For this purpose IGRAC set-up the SADC Groundwater Information Portal (SADC-GIP), which now gives access to the harmonised hydrogeological map for the SADC region, to the complete borehole database and associated information and reports. The portal also gives access to other groundwater relevant maps like the WHYMAP Global Groundwater Vulnerability Map to Floods and Droughts and IGRAC's Map of Transboundary Aquifers of the World.



IGRAC also provided training to staff of SADC-GMI in the use of the portal. SADC-GIP has been set up in such a way that it can develop into the major web-based information system for SADC-GMI and the SADC region at large, allowing them to add additional groundwater relevant information in the future.

#### Capacity building for groundwater data collection and management in SADC Member States

In 2017 IGRAC was contracted by the SADC Groundwater Management Institute for a 1½ year project on capacity building in groundwater data collection and data management in all 15 SADC Member States. IGRAC is implementing this project together with the Institute for Groundwater Studies (IGS) of the Free State University (Bloemfontein – South Africa).

In the first phase of the project (2017 to early 2018) IGRAC and IGS make an inventory of current practices related to groundwater data collection and management in the SADC Member States based on literature review and visits to relevant institutions in all 15 countries. In 2017 IGRAC started on the literature review and conducted visits to 7 of the SADC Member States.

In 2018, in phase 2 of the project, IGRAC and IGS will be organising and implementing 3 workshops / training courses to capacitate professionals in the region on groundwater data collection and data management. Furthermore 2 young professionals from each member state (30 in total) will be engaged in the project through individual assignments under supervision of IGRAC/IGS and several small-scale pilot activities will be initiated throughout the region.

#### High-level delegation from Thailand on Groundwater Governance and Monitoring Systems

In March IGRAC organised a two-day programme and excursions for a high-level delegation from Thailand, with managers from the Department of Groundwater Resources (DGR) and other related governmental departments & institutions. The programme covered a wide range of topics on groundwater governance and monitoring. IGRAC introduced the delegation to several partner organisations in the Netherlands who are working on groundwater: IHE-Delft, Deltares, Acacia Water, Dutch water board and drinking water company (Waternet) and province (Province of Utrecht) and concluded with a field excursion to the “Amsterdamse Waterleiding Duinen” to learn about a large scale managed aquifer recharge system used for public water supply of Amsterdam.



A potential follow-up from this cooperation with the Thai Department of Groundwater Resources to provide a tailor-made training course on groundwater governance and monitoring in Thailand (in pipeline for 2018; depending on budget from DGR).

#### IAH commission on Transboundary Aquifers

The IAH commission on Transboundary Aquifers was re-established in 2014 and IGRAC provides one of the co-chairs to the commission. IGRAC also provides additional support to the commission in terms of communications and maintains the commission's web-page and LinkedIn Group. Currently the LinkedIn Group has 169 members (status 21 February 2018) with regular postings from members with news on transboundary aquifer activities.

#### Capacity building and education

As an associate partner of the GroundwatCH programme, IGRAC has supervised an MSc student in his six months of thesis work "GIS multi-criteria decision analyses to identify the potential for managed aquifer recharge (MAR) in a karstic and semi-arid region. Case study on the Ramotswa Transboundary Aquifer Area", which lead to the development of a MAR Suitability map for the Ramotswa area.

IGRAC also contributed to the Groundwater Resources & Treatment module (a part of UNESCO-IHE's MSc Water Supply programme) and provided guest lectures on Groundwater Monitoring and on Internationally Shared Aquifers, as part of the GroundwatCH programme,

IGRAC was involved in the organisation of the 2<sup>nd</sup> International INOWAS Summer School on MAR, which was held in Dresden, Germany. IGRAC also provided one of the lecturers for the short course of two weeks.



Additionally, IGRAC developed and implemented a tailor-made course on Groundwater Governance for partners in Benin.

In 2017, IGRAC reviewed a number of papers for the prominent journals, such as Journal of Hydrology. IGRAC staff also reviewed a chapter for the recently published book "Advances in Groundwater Governance".

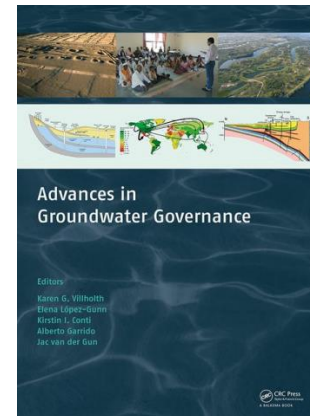
### 3.4.3 Publications and communications

#### Publications:

- Ansems, N. 'Managed Aquifer Recharge – A Global Perspective', Water Resources IMPACT Magazine
- Antoniou E.A. et al 'Quality assessment of deep-well recharge applications in the Netherlands', Water Science and Technology journal.
- Antoniou, A et al 'Indicator based approach to prioritise transboundary aquifers at risk from development stress, pollution or climate change, IAH Congress proceedings.
- Benedicto, D. et al 'The Groundwater Game', IAH Congress proceedings
- Conti, K 'Advances in Groundwater Governance' – co-editor and co-author.
- Conti, K. 'Norms in Groundwater Governance and Sustainable Development at Multiple Geographic Levels' University of Amsterdam.
- Kukurić, N. et al Groundwater and heritage, IAH Congress proceedings.



- Kukurić, N 'Investor Risk Analysis: Why Groundwater Matters? The Value of Groundwater' – IGRAC report.
- Nijsten, G-J, contribution to 'A Road Map for Building Drought and Climate Resilience Climate Change', South Asia Groundwater Forum proceedings
- Stefan, C. and N. Ansems 'Web-based global inventory of managed aquifer recharge applications. Sustainable Water Resources Management', Springer Journals
- Velis, M. et al 'Groundwater and human development: synergies and trade-offs within the context of the sustainable development goals', IR3S, Springer.
- World Karst Aquifer Map (WoKAM) - WHYMAP consortium with IGRAC contribution
- World Water Development Report 'Wastewater, the untapped resource', IGRAC contribution to Chapter 7.



### Communications

In terms of online communications, IGRAC has switched its focus from improving the website functionalities, to improving website content. A lot of time and energy was invested in optimising content for search engines and web statistics over 2017 indicate that this has paid off. The number of sessions that started from a Google Search, increased from ca 9,000 in 2016 to ca 23,000 in 2017. This statistic shows that IGRAC's website is performing significantly better in search engines than before.

Other parameters that show that the IGRAC website's overall performance has improved compared to 2016 are:

- The total pageviews increased approximately by 11%
- Average time per page increased by 52%
- Bounce rate (web visitors that leave the website from the same page they arrived at) dropped from 42% to 28%, which is an excellent development
- The number of unique users increased from ca 18,000 to ca 32,000, which is an increase of 76%
- The number of sessions increased from 27,000 to 45,000, which is a growth of 62%

Another interesting statistic is that IGRAC's website has been especially effective in the Americas. In 2016, most visitors were from Europe, but this year most were from Latin America (37% of all visitors). Another remarkable statistic is that the website is particularly popular among the age group 18-34 (64.32% of all visitors).

IGRAC produced some hard-copy (print) material in 2017 as well. However, most of this print material was project or research-related (see Value of Groundwater, GRIPP and SADC-GIP) and have already been mentioned earlier in this document.

### 3.4.4 Events

(only non-project events)

- The first GRIPP partners meeting Geneva, Switzerland
- Visit delegation Department of Groundwater of Thailand - Delft, The Netherlands
- WATERPROOF 2017 - Maarssen, The Netherlands
- UNECE 3<sup>rd</sup> assessment expert meeting -



- Geneva, Switzerland
- World Bank IGAD validation workshop - Addis Ababa, Ethiopia
- USAID-IBM workshop on big data – on line
- 27<sup>th</sup> UN-Water Meeting - Stockholm, Sweden
- High Level Panel on Water (HLPW) meeting - Geneva, Switzerland
- IAH Congress 2017 - Dubrovnik, Croatia
- INOWAS Summer school on MAR - Dresden, Germany
- WMO HydroSOS meeting - Entebbe, Uganda
- Global workshop for SDG6 monitoring - The Hague, The Netherlands
- Central Asian International Conference – Tashkent, Uzbekistan
- NGWA webinar on Serious Groundwater Game – On line
- Innovation in Hydrometry - from ideas to operation - Geneva, Switzerland



## 4. BUDGETING

The state of IGRAC's budgetary affairs at the end of 2017 is summarised in the table below. For comparison purposes, the overview for 2016 is provided as well. For each year, a Financial Statement Report (in Dutch) is produced by an external bureau for the IGRAC Foundation Board and it is available on request. Following the core funding requirements IGRAC has been financially audited by an independent accountant for 2016 and 2017 (the audit statements (in Dutch) are available on request).

Budgetary items	Year	
	2016	2017
<b>INCOMES</b>		
Core funding	400,000	400,000
Projects and services	62,179	95,508
Revenue	15,339	
Bank account interests		435
<b>Total incomes</b>	<b>477,518</b>	<b>495,943</b>
<b>EXPENCES</b>		
Direct project costs (exclusive wages)	154,043	25,220
Salaries and wages	319,948	233,992
Social security contributions	46,333	33,327
Pensions	36,918	34,225
Staff subcontracted (advisory, interns)	83,493	14,632
Other staff costs	-	13,622
Software & ITC costs	47,475	54,751
Office rent	17,744	17,922
Office costs	10,778	9,510
Depreciation	2,271	2,300
General costs (insurance, fin. admin, etc.)	23,953	25,205
Bank account costs	1,326	
<b>Total expenses</b>	<b>744,282</b>	<b>464,706</b>
<b>RESULT</b>	<b>- 266,764</b>	<b>31,237</b>
Previous year balance	559,331	292,567
<b>Equalisation reserves</b>	<b>292,567</b>	<b>323,804</b>

# **The Minutes**

## **from the eight meeting of the**

# **IGRAC Governing Board**

Held in Delft on 19<sup>th</sup> October 2017

### **Present:**

Ms. Elaine Alwayn, chair (Ministry of Infrastructure and the Environment, The Netherlands)

Ms. Alice Aureli, member (UNESCO-IHP)

Mr. Neno Kukurić, director IGRAC

Ms. Monique Berendsen, IGRAC liaison at the Ministry of Infrastructure and the Environment, The Netherlands)

The chair Ms Alwayn opened the meeting at 14.00, welcomed the participants and asked for adoption of the agenda.

Mr Kukurić informed the Board that the reason to hold this meeting earlier than previous years was because the regulations for the IGRAC grant distribution by the Government changed. According to the new grant distribution agreement, IGRAC needs to submit a request for the grant every two years accompanied by a biennial plan before November 1<sup>st</sup> (hence 1<sup>st</sup> November 2017 for 2018-2019).

Ms Aureli noted that this meeting of the Board is not extraordinary, like it was suggested in the working version of the agenda; this is a regular meeting, the first one after the Agreement (between The Netherlands and UNESCO) has entered in force. (Of course, the chair can request an extraordinary meeting any time, Ms Aureli added.) That was the reason for UNESCO to suggest amendments to the agenda (included in the draft agenda) about procedural decisions the Governing Board needs to take in this meeting.

Ms Aureli also noted that the Article 7 of the Agreement determines composition of the Governing Board; representatives of Member States could also become members of the Governing Board, following the procedure stipulated in the Article 10. According to Ms Aureli, Member States should be approached more actively than it was done so far. Further, the Governing Board needs to decide about participation of intergovernmental organizations and international organizations in the work of the Centre (Article 7.2.f) and about the form of the working relationship (e.g. to become a member of the Board or not).

Ms Aureli also requested clarity about connection between agenda items and meeting documents sent. A suggestion of Ms Alwayn to clarify that while addressing the agenda was accepted. After that, the agenda was adopted without changes:

## **Agenda**

14.00 - 14.05: Welcome, adopting the agenda

- 14.05 - 15.00: Undertake procedural decisions following the indications of the items in Article 7 Chapters 1, 2, 3, 4, of the Agreement signed 6<sup>th</sup> December 2016 having the Centre validated the "Entry into force":
- A- Set up of the new structure and rules of procedure of the Governing Board (Article 7- Chapter 1, items from (a) to (d)- Chapter 3 and 4)
  - B- Adopt rules and regulations for the Centre (Article 7, Chapter 2, items from (a) to (f))
- 15.00 - 15.15: Adoption of previously sent documents:
- Governing Board Minutes of the Meeting December 2016
  - IGRAC Report 2016
  - IGRAC Plan 2017
- 15.15 - 15.30: IGRAC State of Affairs (October 2017)
- 15.30 - 15.45: IGRAC Work Plan 2018-2019
- 15.45 - 16.15: Discussion on the State of Affairs & the Work Plan
- 16.15 - 16.30: Discussion on IGRAC future perspectives
- 16.30 - 16.45: Conclusions and agreements
- 16.45: Closing the meeting

### **Set up of the new structure and rules of procedure**

Ms Aureli explained that the Governing Board can work without elaborating the structure and rules of procedure; it can also search for examples elsewhere and adopt rules that suite IGRAC, or wait to extend the Governing Boards with additional members and then discuss this topic. Nevertheless, the Board should make some basic decisions like to (re)appoint a director of the centre, decide on frequency of Governing board meetings, etc.

Ms Berendsen noted that more members in the Board (as expected) will probably ask for more rules of conduct. Ms Alwayn underlined this.

Ms Alwayn reminded the Board that she is chairing the Board already for six years and that she can continue for maximal one year more doing so. Ms Aureli noted that - if the Government needs to change a representative in the Board -the credentials of the newly appointed representative ought to be sent to UNESCO via the Permanent Delegation of the Netherlands to UNESCO.

The Governing Board reappointed Mr N. Kukurić as director of the Centre.

In order to encourage membership of UNESCO Member States in the Governing Board, IGRAC director should attend the next UNESCO IHP Bureau in February 2018 where he could ask the Bureau to call upon Member States to participate in the Board.

The Board should not have too many members from Member States and the Board meetings should preferably remain face-to-face.

Ms Aureli suggested that the Board have a look at the *Rules of Procedure set up by the International Centre for Water Resources and Global Change in Koblenz* and perhaps of other centres and decide at the next meeting which of these rules are applicable/suitable for IGRAC.

Requested by Ms Aureli, Mr Kukurić explained the role and composition of the IGRAC Foundation Board. The IGRAC Foundation is set up to make functioning of IGRAC as a legally independent entity/UNESCO centre possible. The role of the Foundation Board is to control whether the IGRAC Foundation works according to the Dutch law and to advise the Foundation.

Requested by Ms Aureli, Mr Kukurić explained the procedure about submitting the IGRAC plans and reports for the grant purpose. For the period 2011-2015, IGRAC received the grant directly from the Ministry of Infrastructure and the Environment; for the period 2016-2021 the grant is distributed through the Netherlands Enterprise Agency (RVO). Since a few issues about distribution of

the grant and obligations of involved parties are not fully clear, the chair requested the IGRAC director to make an appointment at RVO and discuss the issues.

The Governing Board decided to invite the World Meteorological Organisation (WMO) again to the Governing Board as well as the IHE Delft (which is in procedure of becoming a UNESCO Category 2 centre). Ms Aureli also suggested a close cooperation with a UNESCO centre in Koblenz. Mr Kukurić informed the Board that IHE Delft is very keen to increase cooperation among UNESCO centra in the Region 1, including the centre in Koblenz. Mr Kukurić also informed that IHE and IGRAC already planned a meeting about content cooperation and that the rector of IHE Delft will soon join the IGRAC Foundation Board, in accordance with the Deed of Incorporation of IGRAC Foundation.

### **Adoption of previously sent documents**

The Board checked the actions agreed at the previous meeting (December 2016). Mr Kukurić informed the board that IGRAC engaged an advisory group to assist in analysis/revision of "IGRAC's leverage, complementarity and modalities". The findings of the group are presented in the *Advisory Group Memo* distributed for this meeting.

Mr Kukurić informed the Board that four potential members of the Strategic and Technical Advisory Committee (STAC) were contacted and all of them accepted the membership. The fifth member, a representative of the private sector is – in spite of efforts invested – still not identified. The members of the Board will keep looking for a suitable candidate. The first meeting of the STAC is envisaged to take place in Paris in 2018. For this meeting, a new version of the notes for the Strategic Planning will be prepared.

Mr Kukurić informed the Board that WMO and IGRAC took necessary steps required to renew the MoU. The final version is already agreed, the signing is expected in coming weeks.

The Board adopted the Minutes of the Meeting December 2016.

The Board adopted the final IGRAC Report 2016.

IGRAC Plan 2017 was discussed at the Governing Board meeting in December 2016 and the Board found the plan content-like acceptable but too ambitious regarding projected (extra budgetary) *project and services* incomes. The budgeting was revised in July 2017, prior submitting the plan to RVO for the grant distribution purposes. (The grant for 2017 was distributed in August 2017.)

Commenting on the revised IGRAC Plan 2017, Ms Aureli noted that nobody can guarantee extra budgetary incomes at IGRAC. It is positive if external projects are acquired and UNESCO is actively assisting in this process, but nobody should blame IGRAC if no extra-budgetary funds are acquired. IGRAC should concentrate on activities that are possible with the core-funding. If IHE Delft is keen to cooperate with IGRAC, perhaps the amount charged for the office renting (about 20.000 Eur/y) can be dedicated to common activities.

The Board adopted the revised version of the IGRAC Plan 2017.

### **IGRAC State of Affairs & the Work Plan**

Mr Kukurić presented the State of Affairs and Planning for 2018-2019.

Ms Aureli asked to mention in the agenda that the item State of Affairs is accompanied with a presentation, not with a document in the meeting material.

It was not clear which level of detail the biennial plan should have, being prepared for the first time (instead of yearly plan) and without special instructions. There was a suggestion that the first year should be more elaborated. However, that would leave second year always less elaborated. Mr

Aureli noted that the plan should be concise and not too ambitious, but the report needs to be elaborated. It is also not clear whether the report should be annual or also biennial like the plan. Mr Kukurić will check with RVO whether yearly reporting is required, audited or not.

The Plan 2018-2019 is adopted under condition to elaborate activities for 2018 within a week after the meeting. This should be done according to the presentation given during the meeting which describes activities in more concrete manner than as it is written in the plan.

### **Discussion on IGRAC future perspectives**

Discussion on IGRAC future perspectives is postponed until the Governing Board is extended with new members, including WMO and IHE Delft and hopefully some Member States as well. In meantime, IGRAC director will keep the Governing Board informed about activities to exploring closer cooperation with IHE Delft.

### **Conclusions and Agreements**

Ms Aureli noted that UNESCO is pleased with developments and prospects around IGRAC.

- The Governing Board will adopt additional rules and regulations for the Centre in the next meeting, if deemed necessary.
- Mr Kukurić is reappointed as director of the Centre
- The IGRAC Plan 2018-2019 is adopted but it needs to be elaborated according to instructions of the Governing Board within a week after the meeting.
- Mr Kukurić will make an appointment at RVO and discuss/agree the issues related to distribution of the IGRAC grant.
- Member States will be invited to join the IGRAC Governing Board. Mr Kukurić (with assistance of Ms Aureli) will make arrangements necessary to ensure his attendance (and intervention at) the next UNESCO IHP Bureau in February 2018.
- WMO and IHE Delft will be invited to join the IGRAC Governing Board.
- The members of the Board will keep looking for a suitable candidate to represent a private sector in the STAC. The first STAC meeting is envisaged to be held at UNESCO in 2018.

### **Closing the meeting**

The meeting of the Governing Board was closed by the chair Ms Alwayn at 16.30.



International Groundwater Resources Assessment Centre