

Dear reader!



Dr. Hubertus Schneider
Managing Director

Welcome to the summer issue of our biannual All About AHT GROUP newsletter. This issue will focus on modelling and its use in Integrated Water Resources Management (IWRM). In the years to come, donors will increasingly be confronted with the challenge of sustainably managing water resources given current trends in population growth and climate change. AHT GROUP AG has been implementing IWRM approaches, including the use of numerical models, in its projects for decades, acquiring a wealth of real world experience. The following pages offer an overview of some the AHT GROUP's projects, which have benefitted from modelling in IWRM.

The Business Year 2016

For the year 2016, the annual accounts of AHT GROUP AG were audited by Märkische Revision GmbH, Wirtschaftsprüfungsgesellschaft. The audit confirmed that AHT GROUP AG achieved a turnover of € 15.66 million and an operational result of € 611 000 for 2016.

Turnover by regions	in %
Germany, Central Europe	0.0
Central, East & Southeast Asia	22.0
Sub-Saharan Africa	52.0
South & Eastern Europe	6.0
Maghreb & Middle East	20.0

Turnover by sectors	in %
Water	37
Environment	26
Agriculture	21
Governance	12
Waste	4

The business year 2016 was marked by the acquisition of many new contracts, which totaled € 22 million and enabled us to increase our existing reserves. This has made it possible for us to further develop our business and to expand our activities. A major part of our growth for 2016 was achieved in three sectors namely, water resources management, irrigation and biodiversity. We are confident that this positive trend will continue in 2017!

The Water Resources Management and Irrigation department at AHT Headquarters in Essen, Germany, is composed of 16 staff members from various academic backgrounds such as agronomy and agricultural economics, civil engineering, environmental sciences, geography, hydrogeology, hydrology as well as political and social sciences. This ALL ABOUT issue presents a selection of assignments managed and supervised by the staff of this department.



Team Members of the Department for Water Resources Management and Irrigation

New contracts recently acquired by AHT:

Jordan: Consulting Services for the Implementation Concept Study of the Solid Waste Management Project (KfW) +++ **Uzbekistan:** Component 1 – National Policy Framework for Water Governance and Integrated Water Resources Management and Supply (GIZ) +++ **Indonesia:** Aligning Feasibility Study on Reforestation & IWM with KfW Guidelines (KfW) +++ **Tunisia:** Demonstration and promotion of good practices for the management of healthcare waste activities and polychlorinated biphenyls (PCB) in Tunisia: Organization of a study tour to optimize the management of chemical products and waste in the framework of an exchange of expertise in Germany and Belgium (ANGD) +++ **Pakistan:** Technical Consultancy Services for Rehabilitation of Small Community Infrastructure in the Federally Administered Tribal Area (FATA) (KfW) +++ **Rwanda:** Design of Planning Component and Additional LCF Functional Requirements in LODA MEIS (BTC) +++ **Madagascar:** Participatory Erosion Control Project III Extension (KfW) +++ **Pakistan:** Implementation Consultant for “Glacier monitoring network for energy and water safety” program (KfW) +++ **Mali:** Proximity Irrigation – Strengthening Irrigated Agriculture (IPRO-REAGIR) Component Dogon country, Koulikoro and Inner Delta (IPRODI) (KfW) +++ **Mali:** Proximity Irrigation – Initiative to support resilience through irrigation and the appropriate management of resources (IPRO-IRRIGAR) Component: Koulikoro and Sikasso, Technical Assistance to the Permanent Technical Secretary (PTS) of the National Programme for Proximity Irrigation (PNIP), and Component: Feed the Future Proximity Irrigation (FTFIP) (KfW) +++

Cover page:

Historic groundwater balance for the Haouz-Mejjate Basin, Morocco

Left: Arid zone, Palm Grove in Marrakech, Morocco © RESING 2015

Middle: Semi-aride zone, upstream of Lalla Takerkoust Dam, Morocco © RESING 2015

Right: Humid zone, upstream of Lalla Takerkoust Dam, Morocco © RESING 2015

Modelling, an essential Tool for Enhanced Integrated Water Resources Management (contd.)



*Dr. Jürgen Rambow,
Head of Water
Resources Manage-
ment and Irrigation*



*Rania Taha,
IWRM Expert*



Water diversion weir in Mount Kenya region, Kenya

To address the requirements of specific situations, different models have been developed and can be selected based on their operating principle (stochastic / probability based methods, deterministic or a combination of both), spatial structure (lumped, semi-distributed or distributed models), temporal distribution (event-based or continuous models), or other considerations as needed. Geographic Information System (GIS)-based modelling is one of the most versatile tools capable of serving numerous IWRM uses. GIS is used for capturing geo-spatial data, its structuring, storage, processing, analyses, and visualisation. It can deal with various data sources as inputs such as raster data from earth-observation/remote sensing, maps, geodetic measurements, vector data, digital topographic models, statistical data etc. This flexibility in input data sources broadens the scope of GIS applications for various aspects of IWRM. Additionally, GIS offers excellent tools for the visualisation of geo-spatial data, hence allowing the presentation of elaborate

and multi-layered information in comprehensible way. However, whilst models have proven invaluable for IWRM, they equally harbour limitations. The results of modelling are based on a series of assumptions that simplify complex processes for simulation, and thus contain a range of uncertainty. Furthermore, the quality of model outputs is determined by the quality of the input data (observed data). Insufficient or poor quality data increases model uncertainties, therefore producing misleading results.

Despite these limitations, the use of water resource models offers a solid basis for informed decision making by providing insights into probable future scenarios and the impact of different water use decisions. Additionally, through visualisation, modelling can facilitate the implementation of participatory decision making, and extend its reach to a non-technical audience. To reap these benefits, water resources modelling must be institutionalised and integrated into water governance. This in turn often requires capacity development to establish the skills and knowledge needed to employ the broad spectrum of tools which modelling offers and addresses its limitations.



Water level meter reading in irrigation canal in Niono, Mali

Since its establishment in 1960, AHT has been a leading firm in following and reflecting the evolution of IWRM, and integrating this into its services through the application of innovative tools. For example, AHT elaborated the Tunisian Integrated National Water Master Plan 'Eau 2000' in 1991, one of the first master plans to explicitly mention IWRM. Eau 2000 already integrated GIS-based modelling and delivered adapted institutional development and capacity building to the Ministry of Agriculture. Ever since, AHT has been continuously expanding its portfolio of similar projects in IWRM. At present, this portfolio includes over 150 projects in over 45 countries.

Tunisia: Feasibility study for Water Transfer from Northern to Central Tunisia



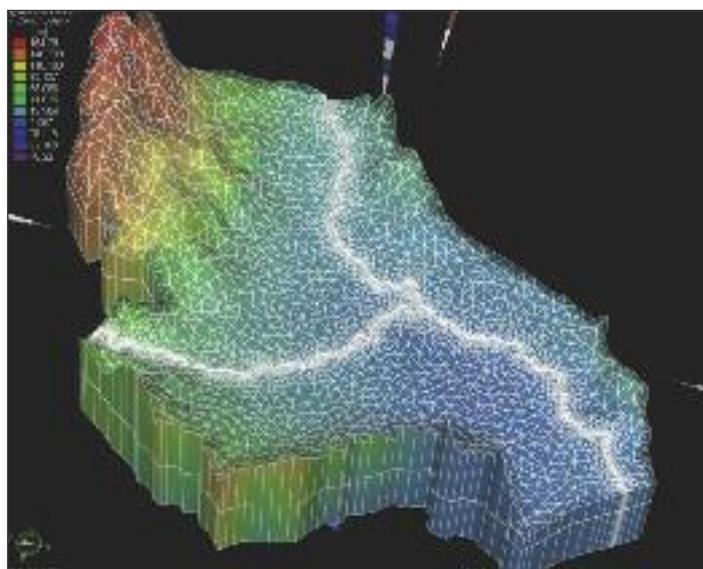
This study investigated the prospects of transferring excess water resources from Northern to Central Tunisia in 34 sub-catchments. Taking 2015 as reference, the study contrasts scenarios for 2050 considering climate change assumptions. It also presented prospects for the mobilisation of water resources through large dams, groundwater abstraction and recharge, and water transfer systems. 2050 scenarios were further examined using a volume-balance software

package in WEAP for monthly time steps to validate its findings based on annual water balances. These hydrological series (1960-2014 and 2040-2060) for climate change scenarios were used to test numerous infrastructure options for which the model provided a reasonably accurate assessment for the probability of supply reliability. Testing of over 40 scenarios concluded that, along with demand management measures, the transfer system can be significantly improved. Such improvement, would however entail considerable investment and operational costs, consequently ushering in greater reliability of services and climate change resilience. *Dr. Hubertus Schneider*

Tunisia: Groundwater Recharge on the Mornag Plain

On the Mornag plain, groundwater is being overexploited, with a range of risks including increasing seawater intrusion into the aquifer, the salinization of soils and the end of irrigation activities on the 12,500 ha currently being cultivated. Seawater intrusion is currently being held back by recharging the aquifer by using freshwater from the Canal Medjerda Cap Bon. With the use of Feflow, a 3D groundwater model (finite elements), several simulations on different infiltration scenarios have been calculated and compared (zero infiltration, infiltration by hydrographical network, infiltration basins, infiltration wells and stone quarries). Considering the available water resources, the optimal scenario for the time being is the erection of a hydraulic barrier to prevent seawater intrusion. The simulation shows that a total annual volume of 8.1 million m³ of water, infiltrated by 12 wells, would be needed to protect Mornag from seawater intrusion.

Dr. Hubertus Schneider



Groundwater model of Mornag

Mali: PAMOCP-ON Achieving Poverty Reduction and Food Sovereignty



*Pierre Pogorzelski,
Team leader / IT expert*

Mali is striving to achieve food sovereignty by utilising the irrigation potential of the Niger River. The EU's "Support Programme for the Implementation of the Office du Niger Contract Plan" (PAMOCP-ON) has

paved the way for AHT's intervention in one of the largest irrigation schemes in Sub-Saharan Africa, together with its partners BETICO and CES. The PAMOCP-ON aims to support the implementation of the Contract Plan for the sustainable development of the Office du Niger irrigation scheme and thereby increase agricultural production.

AHT implemented the first component of the programme, which entailed providing technical assistance to the Monitoring and Evaluation Department and the IT Management Department of the Office du Niger. Furthermore, various ON Directorates were trained in the use of models as well as the

analysis of their results. The consultant also delved into the use of simulation tools for water fees, with the end of facilitating decision-making.



Preparatory work session on the census of allocated plots with the farmers of the Office de Niger's Bewani area

Mauritania: Sustainable Management of Diawling National Park



Zihni Erençin,
GIS/Remote Sensing expert

AHT is part of a Germano-Mauritanian consortium, which has been tasked with implementing a coastal and marine protection project. The main goal of this KfW project is to ensure the efficient and sustainable management of the

Diawling National Park, which is located on the south-western coast of Mauritania and is characterised by rich biodiversity, particularly in terms of avifauna. While the park's landscapes are striking – a blend of sand dunes, floodplains, lakes and river beds- the park's hydrological regime has suffered in recent decades due to human interference, owing to the construction of the Diama dam and the corresponding water irrigation infrastructure. To deal with these challenges, AHT has developed a hydrological/hydraulic model, which has been integrated into an overarching GIS. The necessary hydrological and geographical base data was obtained through field surveys and Remote Sensing,

which included the deployment of drones. Inundation scenarios computed with the hydrological/hydraulic model will now be

employed to facilitate the recovery of the park's natural hydrological conditions and thereby ensure its sustainability.



Training of national park personnel in hydraulic modelling (software PCSWMM)

Morocco: Estimation of Volume of Groundwater Used for Irrigation in the Chichaoua Sub-Basin

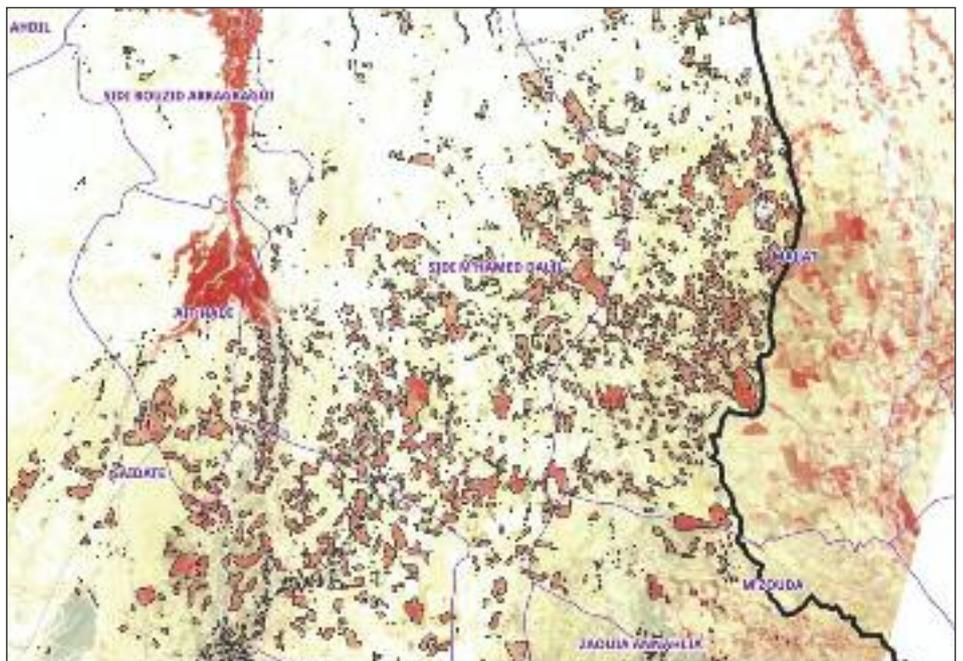


Dr. Devaraj de Condappa,
Hydrological modelling expert

In Africa and Asia, the volume of groundwater used for irrigation purposes is generally unknown as withdrawal often occur on a private and unorganized basis. In Morocco, private groundwater extraction has increased dramatically over the last 20 years, resulting in the overexploitation of aquifers. AHT, together with its local consortium partner RESING, carried out an estimation of groundwater withdrawals in the Chichaoua region as part of a larger IWRM planning process. This was carried out on behalf of the Tensift Hydraulic Basin Agency and with the financial support of KfW.

SIM cards. The field survey contained those questions and measures needed for the identification of pumping volumes, which made it possible to compile a list of specific

farms to be visited. The results of the field survey were then extrapolated with Landsat images to estimate groundwater withdrawal for irrigation in the Chichaoua sub-basin.



Marking of groundwater irrigated areas (thin black lines) on a Landsat image to later extrapolate the results of the field survey

AHT used satellite imagery combined with a targeted field survey. Google Earth images were initially analysed to define the spatial sampling of the field survey, which was conducted with tablets equipped with 3G

Morocco: Production of Cartographic Material for IWRM Convention in the Haouz-Mejjate Basin



Christian Jung,
Expert SIG/Hydrologue

AHT GROUP AG is developing an Integrated Water Resources Management (IWRM) convention for the Haouz-Mejjate basin in cooperation with its local partner RESING in the framework of GIZ's "Appui à la Gestion Intégrée des Ressources en Eau" programme. As part of the assignment, the consultant developed an atlas of the entire basin and its 10 sub-basins. This product contains over 20 thematic maps on IWRM issues including the historic water balance for 2001 to 2013 (see front page image). At the same time, it depicts available water resources in the basin as well as the long-term impacts of various water use scenarios (climate change considerations included). The atlas is based on data from government authorities, which was processed using specific GIS databases designed for IWRM. While institutions involved in water resource planning and management in the basin remain the main target group, AHT has also catered for non-technical stakeholders by producing an adapted map ("carte vulgarisée"), which schematically illustrates

the various water resources and consumers within the Haouz-Mejjate basin in Morocco.



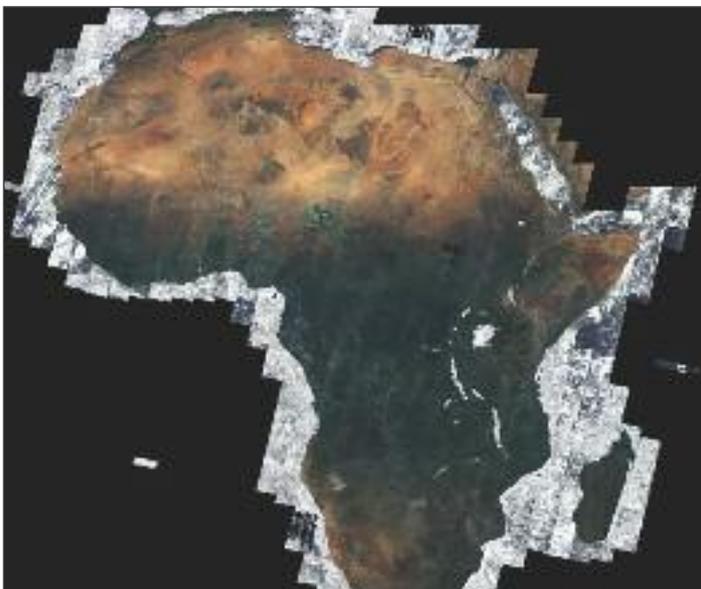
Schematic presentation of the basin's water resources and users

Tunisia: Supporting the Inclusive Development of a Decision-Making Model in Nebhana

AHT has supported the development of a decision-making tool for Nebhana's hydraulic system in the framework of GIZ's "Support to Integrated Water Resources Management" programme (AGIRE). To this end, the Stockholm Environment Institute's Water Evaluation and Planning (WEAP) model was employed. A multidisciplinary WEAP team - composed of representatives from a range of administrations including the Office of Planning and Hydraulic Balance and the Regional Office for Agricultural Development in Kairouan - was selected for this endeavour. Several workshops were conducted with the team to lay the ground for the inclusive and iterative development of the model. During these workshops, team members were trained to (i) identify and collect inputs, (ii) complete the necessary steps for model construction, (iii) identify the various scenarios for sustainable management of water resources (iv) understand the results and (v) present the results to decision makers. *Dr. Devaraj de Condappa*



WEAP team (granting of certificates after the successful completion of the WEAP training)



Sentinel-2a satellite imagery 2016 – Full coverage of Africa

The GMES & Africa Initiative– Earth Observation for Sustainable Development

Earth Observation contributes to sustainable development by providing information, measurements and quantifications of natural or men-made phenomena, which can then be used as input for modelling to help make informed decisions. The GMES & Africa Initiative was called into life by the EU and the African Union Commission (AUC) to foster the development and implementation of Earth Observation (EO)-based services. The technical assistance team – composed in part by AHT - is assisting the AUC in strengthening its dialogue with implementing partners, end-users and other EO data providers. At the same time, the team is providing capacity building training for decision-makers to familiarise them with EO techniques and environmental issues. This should ensure that EO-derived information is considered in decision-making on natural resource management in Africa.

Zihni Erençin

News from the Russian Companies of the AHT Group

Restructuring of Companies

The Deutsche Projekt Union Essen (DPU GmbH Essen) has bought 100% of the shares of PRO Management from AHT GROUP AG. As PRO Management holds 49% of the shares of MPS, Samara, the Russian companies are no longer part of the AHT GROUP AG, but controlled by DPU Essen which now holds 51% of the MPS. The MPS Group, Samara and the AHT GROUP AG, Essen are now sister companies, both controlled by the

DPU GmbH Essen. The MPS Group has also been restructured. MPS currently holds 51% of Orlovka-Agro, which in turn owns 3600 ha of agricultural land used by the agricultural production company Orlovka-AIC. Orlovka-Agro originally held 100% of the shares of Orlovka-AIC. To ensure access to long-term loans from the MPS Group, MPS obtained 70% of the shares of Orlovka-AIC through an increase in capital. Thus, the new sharehol-

ding of Orlovka-AIC is now 70% MPS, Samara and 30% Orlovka-Agro (in aggregate MPS holds 85% of the shares of Orlovka-AIC). Regarding Eurotechnika MPS, the shareholders agreed to a management buy-out by the Managing Director Vladimir Orlov, who now owns 100% of shares.

The Financial Year 2016

The consolidated balance of the MPS Group shows an increase in shareholder equity of € 235 000, nevertheless, the MPS Group made a consolidated loss of € 426 000 due to the negative performance of Orlovka-AIC. Orlovka-AIC witnessed operational losses of € 617 000 due to storage losses and climatic factors.

Prospects 2017

For 2017, the MPS group of companies expects to make an accumulated turnover of 350 million roubles, with a profit before taxes of 65 million roubles. The MPS share of the profits is expected to be 25 million roubles (€ 400 000).

Wild Boars and Mice on the fields of Orlovka-AIC



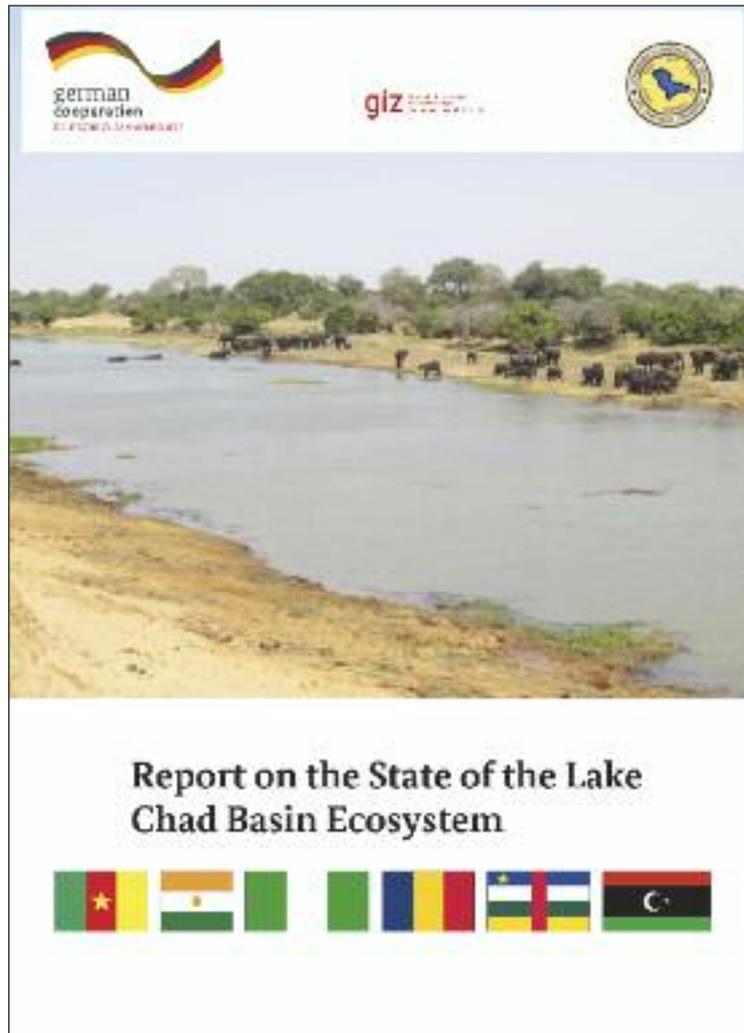
Wild boar herd © Jausa/Shutterstock

Wild boars, originally living in large numbers in the northern part of Orlovka-AIC, have increasingly been having a negative impact on the state of the soil there. Direct seeding technologies have resulted in a surge in the earthworm population. Wild boars like eating these worms and dig up the soil looking for them, which ruins the fields. On some fields 30 to 40% of the surface is dug up to a depth of 40 cm.

Mice have also been causing some problems. We originally planted 80 apple trees around the new houses built for our staff. While they did very well during the summer, we later noticed that mice had been eating the bark of our apple trees below the snow in the winter. Once the snow had melted we realised that all trees were dead.



Apple tree attacked by mice



First Report on the State of the Lake Chad Basin Ecosystem

Lake Chad is a large, shallow freshwater lake in central Africa, with the basin home to more than 30 million people in Cameroon, Central African Republic, Chad, Niger and Nigeria. One step to address unavailability of reliable data on the basin's ecosystem was the publication of the first State of the Lake Chad Basin Ecosystem report in December 2016, with regular updates of the report planned in the coming years. The process of report drafting was initiated by the Basin Observatory of the Lake Chad Basin Commission and supported by GIZ, with process facilitation and expert support provided by AHT. The main purpose of the report is to raise awareness of what is happening in the basin by granting decisions makers, donor organisations and a broader public with access to information that can encourage improved transboundary management of water and other natural resources in the basin. The first report considers data from the early 1950s to 2012 and should serve as a baseline for subsequent reports.

IMPRESSUM

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