

Report on

Young Scientists Programm 2006

3 April 06 – 7 April 06

Trade Fair and International Conference “Water Berlin 2006”



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Introduction

This 5th "Young Scientists Programme" led 50 participants from 29 nations through the following programme:

Sunday, April 2	Arrival
	Meeting of all participants with their guides and DWA-representative
	Opening festivity „Water Berlin 2006“
Monday, April 3	Technical excursions in and around Berlin: Wastewater Treatment Plant Ruhleben, Surface Water Treatment Tegel, Water Works Tegel Riesefeld Karolinenhöhe etc.
Tuesday, April 4	"Water Berlin" "International Projects" - Workshop organized by the Federal Ministry of Education and Research, Germany Environmental Foundation DBU: Presentation of the institution and their international projects
	DBU-Booth at the "Water Berlin"
	DWA and its international activities - DWA Booth at the fair
Wednesday, April 5	"Water Berlin" DWA International Symposium "Water Resources Management in Agriculture" DVGW-Workshop "Membrane Technology"
Thursday, April 6	"Water Berlin" "Research in Water Technology" - Workshop organized by the Federal Ministry of Education and Research <i>ITT</i> Institute for Technology in the Tropes, Cologne: "Integrated Water Ressource Management in Africa, Asia, Latin America"
Friday, April 7	"Natural way to drinking water ressources" 14.00 – 16.00 h Sightseeing Tour in Berlin with bus and boat 19.00 h: Farewell
Saturday, April 8	Individual returns back home

Participants were divided into 5 groups, each group reported on one or more of the programme topics.

The participants reported on the programme in a chronological sequence and were asked to compare - if possible - lessons learnt with the situation in the water/wastewater field in their home country.

Each group was asked to work individually on their presentation during the course of the tour. Group members were involved in the presentation of their group work's results. Presentation of the Groups' work follow.

Berlin, 03.04.2006

Excursion to the Tegel and Ruhleben Water Treatment Plants

Reporters: *Tserashchuk Maryna, Ilesanmi Ibiyemi, Shao Haibing, Shrestha Geeta, Souvignet Maxime, Svojitka Jan, Tatomir Alexandru-Bogdan, Trappe Jörn, Tuhtan Jeffrey A. and Yeboah-Forson Albert.*

Our first journey of Young Scientist Program starts with the excursion to Water Treatment Plant Tegel.

1. The Tegel water treatment plant

The Tegel water treatment plant is one of 9 treatment plants supplying drinking water to Berlin. The original plant was built in 1877, and it is no longer in existence now. The current building is constructed in 1968.



1.1 Water source of the plant

The city of Berlin has a population of 3.4 million people. Its daily demand of drinking water is 121 Liters per capita, that means 573000 m³ per day for the whole city. The water comes from more than 900 wells with a depth arranging from 30 to 170 meters depth.

These wells are located in a series of 3 protection zones. The first zone consists of the strictest requirements, 10 meters from the centre of the

well. The second zone is 100 meters and the 3rd zone is 2.5 km.

1.2 The technology and production processes

The treatment of water functions as following: After pumping from the wells, the water passes to the aeration chamber. This serves to oxidize the manganese and iron, which form flocs in oxidized form. These flocs are removed in the subsequent filtration tanks. There are 20 rapid sand filters in the plant, of which only ten of them are functioning, due to the decrease of water consumptions in Berlin.

The filter material is quartz sand, with a particle size of 1.5mm and a depth of 2 meters. After that, the water then goes into water storage tanks, where it is stored until being used.



The length of the water distribution is 7800 km long. The majority of the network consists of approximately 6300 km pipelines. The main has a average diameter up to 1.4 meters. The average age of the pipe system is 52 years. The oldest one might be 120 years. The new types of pipe are made of ductile iron up to a diameter of 30 cm, larger pipes are made of steel.



1.3 The distribution network system

In Berlin, there are about 254,000 house connections, 62000 hydrants. The pressures range between 4.5~5.5 bars. Interestingly enough, Berlin has no water towers, and therefore relies on a series of pressure busters to supply enough pressure to its high-rise buildings. To distribute the water to every consumer, approximately 140 pumping stations are running everyday.

The whole system is controlled by a central control system, regulating the flow during day and night.

1.4 Quality control of the water

The Manganese and iron provides the two biggest water quality problems. This is dealt with by aeration and flocculation. Disinfection is provided naturally through the aquifer. The network of pipes is periodically flushed with chlorines, to ensure the pipe lines are in a sanitary condition. Sampling is conducted throughout the network and the wells, annually over 32000 samples are analyzed.

2. The Ruhleben treatment plant

2.1 Brief introduction of the plant

We consider the waste water treatment plants in Berlin, which provides treatment and disposal for 3,4 Million inhabitants and industry and storm water. The Ruhleben treatment plant was constructed in 1963 with a dry flow capacity of 75 000 m³/day. Today with its current upgrades they can treat a maximum of 240 000 m³/day.

2.2 The collection system

The collection system is over 9000 km long and consists of a combined sewer with diameters of 3.5 m. Some of them are over 100 years old. The network is a pressure system consisting in 150 pump stations over 1000 km linking a total of 6 waste water treatment plants and creating the ability to treat 233.5 Million m³/year.



The breakdown of waste water before it is treated in Berlin is as follows:

- 68% domestic
- 10% city surrounds
- 10% industrial
- 12% offices, schools, pools, etc...

The volume of waste water decreased to 90% after unification of Berlin. However, the loading remains the same because the waste water is more concentrated as the drinking water consumption is reduced.

2.3 Technologies and processes

The waste water is cleaned using mechanical and biological methods. The mechanical part of the technological train consists of an inlet plant, a screening plant, grit chamber and primary sedimentation tanks.

There are two groups of primary sedimentation tanks, which remove the primary sludge. After that the water passes from the former stage to the biological treatment stage. Here the suspended solids, dissolved organic, as well as dissolved inorganic substances are removed from the waste water by various micro-organisms. The biological stage consists of three types of tanks, which are the anaerobic, anoxic, and aerobic zone. This configuration enables the nitrogen removal by nitrification and denitrification as well as enhanced biological phosphorous removal. The treatment efficiency for most parameters is higher than 95%, e.g. the discharge concentrations reached are lower than 12mg/l of total N and 0,35mg/l of total P.

The next stage is the secondary settling, where the activated sludge is separated from the cleaned water.

The sludge treatment includes dewatering using centrifuges and incineration in a fluidised bed oven. The energy is used for heat and electricity production.

3. Thanks

Our group has really enjoyed this journey in Tegel and Ruhleben as well as the rest of the program. We want here to especially thank the DWA association and the Head office and staff of the two plants for organizing and receiving us.



Berlin, 04.04.2006

Water Research funded by the Federal Ministry of Education and Research (BMBF)

Reporters (YSP-Group 3): *Daniela Schmitz, Mulugeta Fekadu and Mohy Omar*

The programme was started by the welcome address of Min.Dir. Grübel from the International Postgraduate Studies in Water Technology (IPSWAT) Programme. In his opening speech he described the main focus of IPSWAT towards co-operation with developing countries divided into three main areas:

1. promoting new technological values,
2. integrated water resource management (IWRM) and
3. educational scholarship projects.

A "Summary of Co-operation with Vietnam in the Fields Water and Environment" was given by Prof. Dr. Harro Stolpe from Bochum University. Vietnam faces problems related the growth in population. Currently ongoing programs are, SANSED for water and mineral management, IWRM for integrated water resources management and RAME for mining and environment. Current co-operation should not only be kept but be extended even more in the future.



Prof. Dr. Franz Netzman from Karlsruhe University referred about "Water Quantity Management at Wolga and Rhein – the Russian-German Network Project". Having a large catchment the Wolga River is a source of water for a large amount of the Russian population. As a consequence, IWRM has to be build up along with a co-operation and transfer of technology with Russia.

The paper presented by Prof. Dr. Franz Bischof from HUBER AG was entitled "Adapted Technologies of Wastewater Treatment". It is possible to adapt technologies developed in Germany such that they can be applied for use in other countries with respect to the climatic, social and economical conditions there. Some of the current projects are Ground Water Replenishment in Palestine and MECHEM, mechanical and chemical solution and coarse and micro-screening in Turkey.

"Integrated Water Resources Management Shown in the Example Model Region of Mongolia" was presented by Dr. Dietrich Borchardt from Kassel University. While on the one hand, there is sparsity of water, on the other hand, floodings occur in Mogolia. A further problem is the increasing mining activity all of which leading to the establishment of an IWRM model due to political reasons.

Prof. Dr. Heinz Hötzl from Karlsruhe University provided information about a multilateral network project: "Effective Utilisation of Aquifer Systems in Jordan Rift" being a joint research project of

institutions from Jordan, Israel, Palestine and Germany. Problems to overcome are scarcity as well as salinisation of the near-eastern region. The water supply of the River Jordan is not sufficient to fulfil the demand for water, so the presented project aims to use the resource water most efficiently by use of IWRM and desalinisation.

The project “Ecological Recycling Management at the Valley View University in Accra / Ghana“ was presented by Dipl.-Ing. Gunther Geller the Ingenieurökologische Vereinigung Augsburg. The focus here relies upon the recycling waste water from the university campus for agricultural re-use.

The “Serbian Co-operation in the Regional Water Supply of Vojvodina“ was introduced by Dipl.-Ing. Stefan Stauder from DVGW Technologiezentrum Wasser (TWZ). The survey of water bodies is of great importance here because this area has a relative high amount of arsenic (As) and bicarbonates (HCO_3). As a consequence, the removal of both of these are most important which, unfortunately, can only be realised using complicated and therefore expensive technologies like fluctuation and reverse osmosis.



Report on Deutsche Bundesstiftung Umwelt (DBU)

Reporters (*YSP-Group 5*): *Sinan Özden, Alper Acar, Erel Tolga, Ozgur Özdemir, Ilknur Turan, Meltem Ünlü, Josef Maca, Julie Wagener, Canan Yildiz, Özge Yilmaz*

Introduction

As a part of “Young Scientists Program” held on April 3 – 7, 2006 attendants were invited to “Messe Berlin” on occasion of “Water Berlin 2006”. This event comprised of several symposia, workshops and introduction of Die Deutsche Vereinigung für Wasserwirtschaft, Abwasser und Abfall (DWA) and Deutsche Bundesstiftung Umwelt (DBU) and also provided the chance to meet with representatives of firms offering innovative solutions in the field of water and wastewater treatment. Attendants of YSP Program were kindly invited to the stand of DBU to acquire a general understanding of this foundation. This report aims to summarize the understanding gained as a result of presentation of DBU representative and staff from several firms whose projects were funded by DBU. In the context of the report, general information about DBU followed by summaries of projects presented in DBU stand is given. At the end of the report a brief conclusion is included.

Information on Deutsche Bundesstiftung Umwelt (DBU)

Deutsche Bundesstiftung Umwelt (DBU) was established in 1990, with an aim to support innovative projects on environmental protection. DBU was decided to use the amount of € 1.3 billion from privatising the former steel group Salzgitter AG for an environmental foundation. The income from its assets is used for the promotional activities. Main focus is given to small and medium sized enterprises. DBU is a non-profit organization. It is beyond state programs but can supplement these. Main promotional activities of DBU include environmental technology, environmental research, nature conservation and environmental communication and cultural assets.

In DBU a statute defines the structure, tasks of the different functional areas, procedure and capital management. Committee is the board of the foundation and the secretary-general is responsible for the implementation of the foundation's tasks.

Projects funded by DBU are not only on the national scale but many international projects are also funded by DBU in the past including projects from member states of European Union particularly from Central and Eastern Europe.

These projects involved coordination of DBU with ministries, associations, scientific institutions as well as other internationally active foundations. Emphasis is given to projects dealing with environmental education and communication; two-thirds of all supported projects were related to these subjects.

DBU's previous projects in the formerly communist part of Germany, provided valuable information for international projects realized later in Eastern Europe. In pursuit of adaptation of the innovation concept it is important for DBU that the project of concern fulfils a pilot function within the partner country and demonstrates its ability to act as an outstanding model. Moreover, the proposed project needs not to be a large-scale project; DBU is inclined to distribute financial backing on small but effective projects.

Two further interest areas of DBU are worth mentioning:

First one is the international scholarship program which covers financial support given to university graduates and up-and-coming scientists regarded to be future decision makers. Apart from financial support all scholarship holders are supervised and supported in Germany. Scholarship holders are also supported at local universities in their countries. Main idea behind international scholarship program of DBU is to establish a network of experts which would serve to strengthen the knowledge transfer and the extension of contacts between scholarship holders and German partners.

Second topic to be considered is DBU's being an active participant in the Bellagio Forum for Sustainable Development (BFSD). The Forum is a collaborative network of 28 grant-making organizations from Europe, Latin America and the United States. Bellagio Forum's goal is to foster and implement innovative and unique projects and programs around the world.

Regarding the projects, the fields of support of DBU can be categorized under nine headings, which again can be put together in three groups:

- 1 Environmental Technology
 - 1.1 Ecological and health friendly procedures and products
 - 1.2 Climate protection and energy
 - 1.2.1 Climate protection
 - 1.2.2 Energy efficiency and renewable energies
 - 1.3 Architecture and building and construction
 - 1.3.1 Integral planning and land protection
 - 1.3.2 Resource-saving building methods and products
- 2 Environmental research and nature conversation
 - 2.1 Applied environmental research
 - 2.1.1 Scholarship programs
 - 2.1.2 Sustainable chemistry- procedures and products
 - 2.1.3 Biotechnological procedures and products

- 2.2 Ecological land use
 - 2.2.1 Agricultural procedures and produce
 - 2.2.2 Sustainable forest use
 - 2.2.3 Re-growing raw materials
- 2.3 Nature conservation
 - 2.3.1 Nature conservation in cultivated landscapes
 - 2.3.2 Regeneration of degraded habitats
 - 2.3.3 Nature conservation in populated areas
 - 2.3.4 Nature conservation in natural landscapes and protectorates
- 3 Environmental communication and protection of cultural assets
 - 3.1 Communicating of environmental information
 - 3.1.1 Methods and instruments
 - 3.1.2 Testing and use of new media formats
 - 3.1.3 Electronic media
 - 3.1.4 Eco-management systems for small and medium-size enterprises
 - 3.2 Environmental education
 - 3.2.1 Interdisciplinary exchange and communication of knowledge about environment and nature
 - 3.2.2 Education for sustainability
 - 3.2.3 Professional environmental education and environmental consulting
 - 3.3 Environment and cultural assets
 - 3.3.1 Protection of cultural assets under environmental aspects
 - 3.3.2 Protection of historic cultural landscapes and nationally important gardens
 - 3.3.3 Co-operation in protection of cultural assets and nature conservation

About the projects

The Deutsche Bundesstiftung Umwelt (DBU) is one of Europe's largest foundations and promotes innovative and exemplary environmental projects. A few of them that are exhibited during the fair are summarized below.

1. *Natural Baths Optimally Managed*

The company EKO-PLANT GmbH developed a 'computer-based hydro -dynamic current model' and the support for this project was given by DBU. This model guarantees purity and secures the perfect bathing in natural baths.

In order to calculate the optimal currents of the basin and to visualize them on the computer a procedure was formed in the planning phase. This project provides the natural baths of the EKO-PLANT with the complete exchange of the entire water by means of the instrumentation and the control technology installed in these baths.

This innovative model has been tested successfully. By means of the support of the engineering this model gives a rise to the safety in natural baths and helps to minimize the overheads.

2. *UV-Reactors Eliminate Pharmaceutical Residues*

The A.C.K. Aqua Concept GmbH from Karlsruhe develops an innovative procedure based on UV oxidation. UV light deteriorates antibiotic and x-ray contrast mediums in the sewage before the discharge into the sewer. There are two appliance types for this project.

First one aims to reduce the antibiotic and x-ray contrast mediums in the pharmaceutical industry. 50% reduction in these components is aimed. The second appliance is the use of this technology in hospitals and doctor's surgeries.

UV oxidation supports the mineralization of the antibiotics and x-ray contrast mediums completely or changes them into harmless or biodegradable compounds so that they do not cause any harm in the

purification plants or natural waters. By means of this technology avoidance of these undesirable materials directly at the source will be provided.

3. GIS

Information management on small partial catchment areas are of great concern in relation to EC Water Framework Directive. SYDRO Consult GbR (Darmstadt) developed a Decision Support System (DSS) to be utilized in related occasions. With this tool integrated water-economic planning can be shaped essentially more effectively.

The DSS comprises Geographical Information System (GIS), administration of time series as well as modeling and evaluation of the applications. As a result of simulations, effects of different scenarios can be evaluated.

This project developed for three different catchment areas can be transferred to all catchment areas and is a practical and efficient work basis for water protection planning.

As can be seen, DBU supports projects which use new technologies or different from the previous ones conducted. There are also other projects which are not explained below. More information can be gained from the website of DBU 'www.dbu.de'.

Conclusion

The main observations, remarks and benefits of visiting the DBU stand by the Young Scientist Programme 2006 attendees of Group 5 are as follows:

- According to the explanations of the representatives of the organizations / companies, whose projects are funded by DBU, the funding procedure is a proper tool for formulation and application of innovative solutions to environmental protection, specifically in water sector.
- The grant scheme is a proper tool for the promotion of innovative technologies.
- The presentations of the representatives were comprehensive and mostly satisfying.
- The attendees discussed with these representatives diverse issues regarding their technological solutions and were compensated.
- The attendees had the opportunity to make contacts for possible future cooperation with these organizations.

In conclusion, the YSP 2006 was a good and satisfying opportunity for the attendees in meeting the experts, organizations and new technologies in the field of water protection. The attendees therefore appreciate to be invited to the YSP 2006 and wish the continuation of similar training courses.

April 2006, Turkey / Czech Republic

Report on German Association for Water, Wastewater and Waste (DWA)

Reporters (YSP-Group 5): *Sinan Özden, , Alper Acar, Erel Tolga, Ozgur Özdemir, Ilknur Turan, Meltem Ünlü, Josef Maca, Julie Wagener, Canan Yildiz, Özge Yilmaz*

Introduction

As the participants of the Young Scientist Programme Berlin 2006, one of our tasks was to write a report concerning one of the events which took place at the Programme. As Group 5, one of the reports that we decided to prepare was about the German Association for Water, Wastewater and Waste (DWA) due to our special interest to establish a similar organization in Turkey.

We visited the DWA booth during the Water Berlin International Fair. Thanks to the presentation of Mrs. Lang and several documents provided, we had the opportunity to get detailed information about the activities of DWA. This report is a summary of the information and the impressions about the DWA that we obtained during the Programme.

DWA at a glance

The DWA is politically and economically independent organisation of which activities comprise the fields of water management, sewage, wastes and soil conservation.

As the representative of specialists working in aforementioned fields, the DWA has 14.000 members from municipalities, universities and polytechnics, engineering offices, public and local authorities and industry.

Aims and Objectives

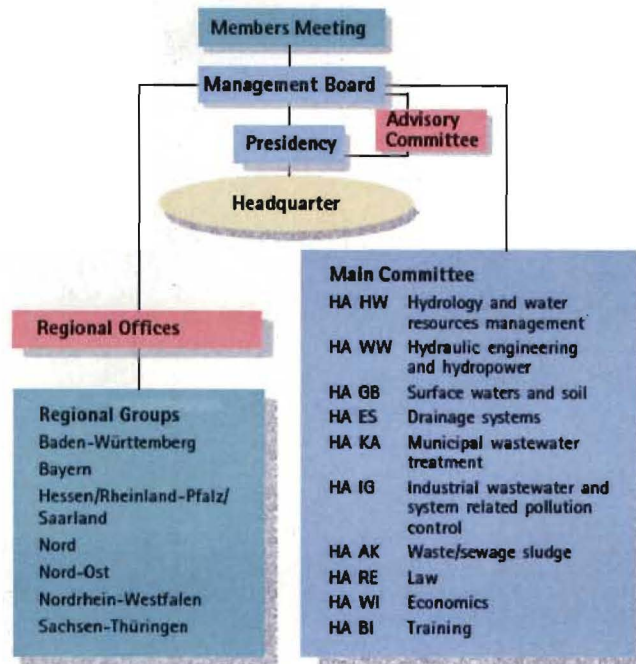
Towards the aim of 'developing safe and sustainable water management', the DWA carries out the following tasks:

- ▶ Elaboration, updating and publication of DWA Standards
- ▶ Professional training
- ▶ Encouragement and support of research projects
- ▶ Exchange of knowledge and information
- ▶ Numerous publications on the subjects of water management, wastewater and solid waste
- ▶ Public relations

"Technical standards" and "Training" constitutes the main services provided by DWA. Technical standards are an important factor in efficaciously and economically protecting the environment and material goods and in promoting quality assurance. The DWA therefore incorporates into its standards the most recent findings on time-tested procedures. "Technical standards" consist of work sheets and advisory leaflets and are prepared by almost 1500 specialists, who are working in more than 250 working groups.

In the framework of "training"; there are offered professional certificate programmes, further qualification trainings for engineers, scientists and other specialists and many special programs for operational staff with a large pool of experienced lecturers.

Organisational Structure



Conclusion

The structure and operation model DWA developed for itself is impressive especially from the following points of view:

- The number of its members (14.000) makes the DWA one of the largest organizations in this field in Europe.
- Committees and working groups of the DWA bring together the specialists from different institutions who are active in the fields of water, wastewater and waste,
- DWA standards are widely used and accepted as a sign of efficiency and quality assurance in environmental projects, although they are not legally binding,
- Not only engineers and managers, but also personnel at all levels in Environment-Technologies (ET) Professions constitute the target group of the professional trainings.

Within the framework of a GTZ Cooperation Project, an Interinstitutional Professional Network for municipal services has been established in Turkey; the "Platform for Municipal Environmental Services" (PMES). Members of PMES are the experts from different municipalities and institutions working in the field of water, wastewater and solid waste. The platform stands in co-operation with the DWA, which has constituted a model for the PMES. Experience gained through the Programme will increase the level of participation of group members in PMES activities and contribute to the further activities.

The Young Scientist Programme provided us the opportunity for meeting and exchanging experiences with other young scientists from all over the world who have similar professional interests.

April 2006, Turkey / Czech Republic

Berlin, 05.04.2006

International DWA Symposium: Water Resources Management in Agriculture

Reporters: (YSP-Group 2) *Kampini Stayford, Kral Pavel, Christelle Schuhler, Isabel Mallea, Golam Mortuza, Darius Cvaci*

Water, the oil of the future, is an important resource and should be protected and conserved in all countries especially in the developing countries. Management of Water resources is essential for the successful agricultural implementation especially in the developing countries with a big growth of population. On the other hand agriculture also influences water resources. Thanks to the DWA young scientists program we assisted to the International DWA Symposium on Water Resources Management in Agriculture.

The conference took place during the exhibition "Wasser Berlin 2006" on the 5th April. The conference was divided into 3 thematical parts concerning climate and land use effects in water management, irrigation, and nutrient problems connected to the agriculture.

After a short opening from LBD Dipl.-Ing. Arndt Bock, Prof. Dr. Konrad Migel presented the first paper named: The impact of climate and land use on the regional water balance. He explained that the climatic balance is a very complex phenomenon (evapo-transpiration, precipitation) and can be hardly separated from influence of land use. Therefore prognoses of water balance changes require the usage of a model allowing a better simulation of changes.

The second presentation was Integrated River Basin Development and University Co-operation the AWTI Project/Ethiopia presented by Prof. Dr.-Ing. Gerd Förch. The summary concentrated on aspects of soil erosion, sediment transport and sedimentation in a quasi endorheic basin, the Lake Abaya Chamo Basin in south-eastern Ethiopian with limited water resources but intensifying land use with expansion of agriculture to marginal areas. He put in focus the increase of water, soil and energy consumption with environmental impacts.

Prof. Dr.-Ing. Bernd Diekkrüger presented the Land use and means of controlling the water cycle in Western African watersheds. The aim of the study was to analyse the effects of land use change on the hydrologic processes and soil physical properties. The results revealed the importance of the land use for the hydrological processes. He pointed out that bad agriculture causes bed infiltration and water run off and therefore is also important the education of the farmers.

In the second part Prof. Dr. rer. Hort. Heinz Sourell presented the effective use of Water with controlled irrigation in arable crop farming. To improve the irrigation technique he presented his solutions for soil moisture measurement, for the climatic water balance and for machinery management.

The specialist Mr. Qabas Bshara showed some examples from Palestine about special adapted irrigation measures in dry areas. He presented a linear mathematical programming model to optimize the vegetables farming to maximise the profit.

Dr.-Ing. Bernd Heinzmann presented an article named: Advanced treated wastewater as an important resource for supporting and improving the water situation in rural areas dealing with a reuse of treated waste water coming from WWTP Waßmannsdorf in Berlin for irrigation and support of agriculture. He summarised positive impacts of this application which is for example: closing of the water cycle and returning nutrients to soil with no negative effects on the ground water or surface water quality.

At the beginning of the third part "Nutrient Problems" Prof. Dr. habil Bernd Lennartz showed the Influence of drainage systems on hydrology and hydro-chemistry of small watersheds in Northern Germany. His ideas indicate, firstly, the importance of artificial drainage on the larger catchments hydrology and, secondly, a heavy nitrate-nitrogen enrichment of the soil which often exceeds the drinking water limits.

Dr. Richard Beisecker presented the reduction of diffuse entries from farmland in a catchment in Thuringia. He presented tree strategies to reduce the nitrogen pollution of rivers. The first strategy promotes the extensification of grassland. The second strategy focuses on the optimisation of the fertilisation practice. The third strategy deals with the development of new modern fertiliser.

The last presentation of Prof. Dr. Meißner called "PROWATER- Program for the prevention of diffuse pollution with phosphorus from degraded and re-wetted peat soils" shows phosphorus like problematic compound in water (because it can cause eutrofisation) and so laboratory and fields experiments are necessary to identify processes of P release during re-wetting . It was shown that redox dynamics is an essentially regulator.

The presentations were very interesting and educative and we are grateful to DWA for giving us an opportunity to participate in the Young Water Scientists Berlin 2006.

The program gave us many possibilities to international networking and sharing ideas with new friends form the entire world and other experts in the water industry.

We are also grateful to Mr. Heidebrecht whom we interacted with at a social level and stressed the importance of the Young water scientists program as on opportunity to us as young scientists.



6th April 2006 –

BMBF Water Research and DVGW Water Research

Reporters: (YSP-Group 1) *VIKTORIA BONDARETS, MING ZHU, RANA AL-KATAN, EDWARD AMANKWAH, AMAR CHAND, ANTHONY EWUSI, STEFAN FREIDEL, TESFALEM IDRIS, GONZALO ALBERTO JOO HERRAN, YEVGENIYA SHAMATULSKA, PATRICK KAMINSKY*

(BMBF: Bundesministerium für Bildung und Forschung, DVGW: Deutsche Vereinigung des Gas- und Wasserfaches e.V.)

The morning of the 6th of April 2006 started for the Young Scientists at the grounds of Messe Berlin with a brief introduction of the main topics in the field of water research BMBF is currently undertaking. The ministry in pursuing two main goals: (1) further research and development of new technologies and (2) adaptation of the existing technologies and transfer of knowledge to other countries.



GROUP 1

VIKTORIA BONDARETS

MING ZHU

RANA AL-KATAN

EDWARD AMANKWAH

AMAR CHAND

GONZALO ALBERTO

ANTHONY EWUSI

STEFAN FREIDEL

TESFALEM IDRIS

JOO HERRAN

YEVGENIYA SHAMATULSKA

PATRICK KAMINSKY

The first presentation was given by Prof. Dr. S. H. Eberle from TZW Karlsruhe, who talked about the project "Percolation water prognosis". The objective of the project was (1) to predict and quantify pollutants at the point of compliance between the saturated and unsaturated zone and (2) to determine the source strength. The reference materials for the project were the contaminated soil, demolition waste and waste from incineration plants. In case the concentration of hazardous substances in these materials does not exceed the threshold value, they can be reused, which might lead to the amendment of the existing Soil Protection Act in Germany.

The second speaker was Prof. Dr. V. Franzius from Umweltbundesamt Dessau and the topic of his presentation was "Natural and enhanced natural attenuation". The main objective the KORA project (Kontrollierter natuerliche Rueckhalt und Abbau von Schadstoffen bei der Sanierung kontaminierter Grundwaesser und Boeden), which consists of more than 70 individual projects, is to elaborate branch guidelines for future planning and recommendations on decontamination of soil, aquifers and landfill sites with specific focus on natural attenuation.

Prof. Dr-Ing. W. Kueh from TZW Karlsruhe gave a presentation on „Adaptation of available drinking water technologies to regional conditions” in counties other than Germany. One of technologies which could be best adapted to different regional parameters is bank filtration. Germany has long experience in this field and could share the knowledge and expertise with other countries. The audience could especially benefit from the research results which were distributed in a form of a book.

The forth speaker was Prof. Dr. habil. S. Kaden from Wasy GmbH, who presented "Sustainable water concept and wastewater reuse for the Olympic park in Beijing 2008". This project is related to the previously made projects in the northern part of China and is using the most modern technologies from those available today. It uses an integrated perspective to deal with different aspects of water management.

Dr Oberle gave an overview of integrated water resource management in Indonesian carst systems. In this project, which is the first of its kind, underground caverns are used in order to store water and obtain the necessary water head so that enough electrical energy can be produced for pumping up the water and its further use for domestic purposes. In an outlook he presented the possibility for the use of wooden pipes in a similar project.

The last speaker of the morning was Dr J Braun from Stuttgart University who presented the results of the 10 years of research and development to protect ground water and soil (VEGAS). One of the projects he presented was the washing out of contaminants using alcohols. The second project was on the use of steam in order to remove heavy pollutants, e.g. diesel oil.

ITT: Integrated Water Resource Management in Africa, Asia and Latin America

Reporters (YSP-Group 3): *Thorsten Schuetze, Martina Nemcova, Eva Pokorna*

The lectures today are all held by Professors of the Institute for Technology in the tropics (ITT).



From 9:00 to 9:50 am Prof. Dr. Hartmut Gaese is introducing the work of the institute and the necessity of integrated water resource management as well as the harmony of nature and the world which has been and will be modified by humans. In the following discussion the referents

From 10:00 to 10:30 o'clock Lars Ribbe gives an overview about the transboundary water management in the Nile river basin. The lecture is describing the Nile Basin, its hydrology, the water demands of the

surrounding countries and their cooperation. The longest river of the world has a comparably low discharge of $84 \text{ km}^3/\text{a}$ (Rhine: $1.584 \text{ m}^3/\text{s}$,

Amazon: $180.000 \text{ m}^3/\text{s}$), but it has a significant importance as a water resource for the transboundary countries with arid climates, which do have a very low internal renewable water resource. Egypt is the country with the highest water dependency of nearly 100% compared with other countries in the upper water shed. It has the lowest precipitation ($15 \text{ mm}/\text{a}$ compared with an average of 615 mm in the whole basin). Egypt it is the richest country with the highest average income. Egypt, Sudan and Ethiopia have a significant growing population with linked rising water demand. Half of the water resources (lakes and rivers) are getting lost by evaporation. Concerning the irrigation potential, not the land but the water is the limiting factor in all above mentioned countries. The 1990 started "Nile Basin Initiative" (NBI) is a transitional arrangement until a permanent arrangement is in place.

From 10:30 Prof. Sturm is talking about the development of land and settlements as well as the related water use in the region. The main content of his lecture is the water supply, waste water management. He also describes the related problems and perspectives to solve these. 20 to 30 liters per capita and day are supplied by tank trucks which bring the water to the villages. There it is stored in tanks which function as a central water tap for the villagers. Prof. The suggestions to enhance the water supply vary from central water treatment and the installation of central supply systems to decentralized water treatment units in the single villages. Presently the waste water is decentralized infiltrated in the ground. It is suggested to treat the sewage from small villages or clusters of house with constructed wetlands in future. In the following discussion the problem of rising water demand and the need of limiting measures by the installation of central water supply systems is discussed.

From 11:00 Dr. Linus A Mafor gives an introduction to the situation of the Lake Chad Basin (LCB) as a typical complex transboundary water resource. The main problems are the sharing of limited water resources. In future a significant shrinking of the lake is predicted, based on the already measured shrinking since 1973. An international commission which has been founded in 1964 is managing the use and distribution of the water resources. The necessary data is not available yet in desired quantity and quality. With remote sensing applications these data (vegetation, recharge and demand, soil moisture, paleo-hydrology) could be generated. Problems should be solved by global, South – South as well as North – South cooperation. GIS systems could solve the water management problems.

11.15-11.30 coffee break



From 11.30 Mr. Lars Riblle's group (three scientists, each one from Vietnam, Laos and Cambodia) are introducing transboundary water management of the Lower Mekong River Basin. The Mekong is one of the major river in South-East Asia (lower Mekong River area is 666 000 km²). They are talking about environment of Mekong River and use of the water. Afterwards they mentioned the problems of area – hydropower development (cause decline in water quality, loss of fishery and biodiversity), deforestation, floods, saline intrusion in delta region, pollution by nutrients, pesticides and arsenic risk in ground water. As last they talked about the role of

Mekong river commission.

From 12.00 to 12.30 Dipl. Ing. Schmid M.Sc. is presenting the Water supply in Himalaya.

First he is describing the region, its hydrology and effect of climatic changing. Water resources are not sufficient in region during whole year. 40 % of water is soaking in the sand during supplement to the rice fields.

Proposed possibilities of technical improvement – decrease of mouth of water which is soak, pumping river water or other alternatives – hot houses which are problematic because of specific microclima which is linked to specific crops.

From 12.30 Dr. Schluter gives an introduction of motivation and participation in irrigation management in Thailand. She points that irrigation management problems are partly causes of administration, insufficient directions, etc. Afterwards she mentions importance of farmers motivation. Dr. Schluter is concluding with talk about nonfunctional water user groups on tertiary level and farmers self-organizations.

ITT II. part

Reporters (YSP Group 3): *Reneta, Ina & Juliana*

1. Introduction

This report summarizes the second part of the seminar presented by the Institute for Technology in the Tropics (ITT) during the "Wasser Berlin 2006".

It took place on the 6th April 2006 from 2 to 4 pm and includes presentations concerning cases of water resource management in Latin America and a Round Table-Discussion. Those officiating were Prof Gease, Prof. Sturm, Prof. Roehrig of the ITT and Prof. da Costa from a cooperating scientific institution in Brazil.

The first presentation "Institutional and Legal Aspects and Organisational Models in the Water Sector of Latin America" and the second "Potentials and Problems Related to the Water Use in the Guarani-Aquifer in South America – Consequences of Transboundary Water Management" were held by Prof. Roehrig of the ITT. Prof. da Costa of COMPESA in Pernambuco, Brazil presented the third and last presentation "Management knapper Wasserressourcen in Pernambuco, Brasilien" followed by a Round Table-Discussion. Prof. Gaese chaired the Round Table-Discussion.

2. Presentations and Panel Discussion

The first presentation "Institutional and Legal Aspects and Organizational Models in the Water Sector of Latin America" was directed on national water policies, legal frameworks and river basin associations in Chile, Brazil and Mexico based on already accepted concepts of water resources management.

After a short introduction defining the principles of integrated water resources management, Prof. Roehrig described the general importance of the water user sectors in Latin America. He emphasized that the hydropower sector is the most powerful sector in Latin America and the agricultural sector with 75% of the water use in Latin America stands out as the highest consumer of water.

In terms of legislation Prof. Roehrig elaborated that in Brazil, Colombia, Costa Rica, El Salvador and Mexico water laws already exists and that many other Latin America countries are developing institutional and legal frameworks to manage water at the regional level by creating river basin authorities.

Various ministries were traditionally responsible for water management whereby each represented one water user sector. Institutional reforms allocated national water management in form of agencies of councils at ministries of environment.

The implementation of an integrating multi sectoral approach created controversial effects during and after the creation and introduction of water laws. The policies are the role of the state committee and the form of the agency and its financial and political autonomy.

In the second presentation "Potentials and Problems Related to the Water Use in the Guarani-Aquifer in South America – Consequences of Transboundary Water Management" Prof. Roehrig first explained the hydro geologic characteristics as well as basic information on availability, quality and management efforts. After that the strategic importance of the transboundary aquifer underlying four countries (Argentina, Brazil, Paraguay und Uruguay) in South America emphasizing the reason for a joint research project initiated by these four neighboring countries aiming for sustainable management and preservation of the aquifer.

The last presentation "Management knapper Wasserressourcen in Pernambuco, Brasilien" by Prof. da Costa gives information about the legislation, the institutional framework and the management system existing in Brazil and in Pernambuco a northeastern region of Brazil. In Pernambuco only 3% of the total available water in Brazil is available for the population which is an amount of 27.6% of the total population in the country. This explains the fact that water is very scarce in the region. Proposals were made to solve the problems and to increase the water resources management on the regional and national level namely

- Control and reduction of water losses
- Recovery and modernization
- Implementation of new management models
- Planning and new multi sectoral projects
- Building a new water supply system.

Finally a Round Table-Discussion was set up where many questions were asked by the audience and answered by the presentators.

7th April 2006

Kompetenz Zentrum Wasser Berlin: Bank Filtration and Artificial Groundwater Recharge

Ludwig Pawlowski opened the seminar Bank Filtration and Artificial Groundwater Recharge - A natural process for drinking water production -, talking about the long tradition of bank filtration in Germany and rich experience this country could offer. He introduced the project group NASRI (Natural Artificial Systems for the Recharge and Infiltration), which has been examining the processes occurring during the different phases of infiltration.

The first speaker to take the floor was Prof. Dr.-Ing. Jekel from the TU Berlin who posed the question "Is bank filtration an effective barrier against organic substances and pharmaceutical residues?" During his presentation he discussed this question using the results obtained during his studies. These results showed that the transport of organic matter strongly depends on the redox potential in the soil and other factors (e.g. temperature). He concluded that the only alternatives to bank filtration are a "Mülheimer process" consisting of at least seven treatment stages, including ozonation, or expensive nanofiltration with pre- and post treatment and an unclear disposal of concentrates.

Dr I. Chorus from the UBA Berlin gave a presentation on the composition of cyanobacteria (blue-green algae) toxins during infiltration. Cyanobacteria pose a big problem for Berlin lakes during the summer months. In the course of research three types of toxins potentially harmful for human health were examined. Among the processes considered such as biodegradation, adsorption and desorption, the first mentioned was found to be the most dominant elimination factor. Within the first meter most of the toxins were shown to be eliminated. In conclusion he underlined that cyanobacteria toxins pose no danger to the people of Berlin, however improper usage of bank filtration might cause adverse effects.

The third presentation of the morning was given by Dr Lopez-Pila from the UBA. The topic he covered was "Elimination of viral pathogens during bank filtration". In a short introduction he stressed the importance of eliminating viruses in drinking water due to their pathogenic potential in relation to bacteria. The removal of viruses from contaminated water in slow sand filtration is mainly a performance of microorganisms which must be taken in consideration during modelling. He also said that E. coli is a limited indicator for viruses due to its larger size.

The next presentation of the seminar was given by Prof. Nützman from the "Leibniz Institute für Gewässerökologie und Binnenfischerei" on the modelling of the reactive transport processes in the artificial recharge of ground water. He first explained that during the modelling physical, biological and chemical processes should be integrated. A nonreactive transport modelling was performed to calibrate the reactive model. He stated that the dynamics of redox processes in the aquifer is mainly determined by seasonal differences of temperature and oxygen content.

Mr. Pawlowski summed up the main activities undertaken under the framework of the NARSI project. He mentioned the possibilities of application of bank filtration in different regions of the world enabled by the results this study. Furthermore he explained the difficulties of this research and gave an overview of main research topics for the future.

Participants

Young Scientists Programme zur Wasser Berlin 2006

Nr.	Name	Nationalität
1	Acar, Alper, Ankara	Türkei
2	Al-Katan, Rana, Düsseldorf	Irak
3	Amankwah, Edward, Tübingen, IPSWaT	Ghana
4	Bondarets, Viktoria, Cottbus, IPSWaT	Ukraine
5	Chand, Amar, Köln, IPSWaT	Nepal
6	Cvaci, Darius, München	Rumänien
7	Dreger, Iara, Köln	Brasilien
8	Ewusi, Anthony, IPSWaT	Ghana
9	Freidel, Stefan, Karlsruhe	Deutsch
10	Idris, Tesfalem, Bergheim	Eritrea
11	Ilesanmi, Ibiyemi J., IPSWaT	Nigeria
12	Joo Herran, Gonzalo Alberto, Hürth	Peru
13	Kaminsky, Patrick	Deutschland
14	Kampini, Stayford, Köln	Malawia
15	Kral, Pavel, Prag	Tschechisch
16	Lay, Winson Chee Loong, Singapur	Singapur
17	Lestari, Ratnaningtyas Budhi, Köln, IPSWaT	Indonesien
18	Maca, Josef, Prag	Tschechisch
19	Mallea Romero, Maria Isabel, Köln	Bolivien
20	Medellin Govea, Margarita, Stuttgart, IPSWaT	Mexiko
21	Mischke, Peggy, Hamburg	Deutschland
22	Mortuza, Md. Golam, Köln, IPSWaT	Bangladesch
23	Nekovarova, Jana, Pisek	Tschechisch
24	Nemcova, Martina, Valaske Mezirici	Tschechisch
25	Ngha, Reneta Mbong, Köln	Kamerun
26	Nidam, Mulugeta Fekadu, Suberburg, IPSWaT	Äthiopien
27	Omar, Mohie, Suderburg, IPSWaT	Ägypten
28	Özdemir, Ozgur, Kayseri	Türkei
29	Özden, M. Sinan, Ankara	Türkei
30	Pokorna, Eva,	Tschechisch
31	Polenthon, Ina, St. Augustin	Deutsch

32	Pontes Machado de Andrade, Juliana, Köln	Brasilien
33	Schmitz, Daniela, Aachen	Deutsch
34	Schuhler, Christelle, Karlsruhe	Frankreich
35	Schütze, Dr. Thorsten, Hamburg	Deutsch
36	Shao, Haibing, Tübingen, IPSWaT	China
37	Shamatulska, Yevgeniya, Cottbus	Ukraine
38	Shrestha, Geeta, Köln	Nepal
39	Souvignet, Maxime, Köln	Frankreich
40	Svojitka, Jan, Dobris	Tschechisch
41	Tatomir, Alexandru-Bodgan, Stuttgart	Rumäne
42	Tolga, Erel, Samsun	Türkei
43	Trappe, Jörn, Meinerzhagen	Deutsch
44	Tserashchuk, Maryna, Bochum, IPSWaT	Weißrussland
45	Tuhtan, Jeffrey Andrew, Stuttgart, IPSWaT	US-Amerikaner
46	Turan, Ilknur, Balikesir	Türkei
47	Ünlü, Meltem, Ankara	Türkei
48	Wagener, Julie	Deutsch
49	Yeboah-Forson, Albert, Tübingen	Ghana
50	Yildiz, Canan, Ankara	Türkei
51	Yilmaz, Özge, Ankara	Türkei
52	Zhu, Ming, Cottbus, IPSWaT	China