

# Report of the Third International Workshop on "Innovations in Water and Wastewater Technology"

The Third International Workshop on "Innovations in Water and Wastewater Technology" was held in Berlin and Dresden, Germany, 28<sup>th</sup> November – 1<sup>st</sup> December 2005. This event was co-organized by the Regional Centre on Urban Water Management (RCUWM – Tehran) and the Federal Ministry of Education and Research (BMBF – Germany).

The supporters of this International event were:

- a) WETECH Institute as the BMBF coordinator for arid and semi-arid regions;
- b) Project Agency for Water Technology;
- c) Berlin Water Services;
- d) Water and Wastewater Company of Berlin and Dresden.

The workshop was opened by the Director General for Health, Life Sciences and Sustainability of the German Federal Ministry of Education and Research (BMBF), Mr. Reinhard Junker, representative of the Regional Centre on Urban Water Management, Mr. Ali Reza Salamat (on behalf of the Director of this Centre, Dr. Reza Ardakanian), Chairman of the Board of Berlin Water Company, Mr. Jrg Simson and the Undersecretary of the Minister of Municipalities, Environment and Water Resources, Sultanate of Oman, H.E. Abdulla Al-Bakri.

After the opening addresses, Mr. Ali Reza Salamat submitted his presentation on the conclusions of the first and second technical workshops which was held in Tehran, 2003 and Muscat 2004 respectively. He first briefed the participants on the workshop sessions, number of participants and papers presented in each session, etc. Mr. Salamat finally came to the conclusions of the first and second technical workshop as follows:

- There is a significant need to develop research and development capacity in desalination in the region through education, research funding and technology transfer.
- The desalination market is increasing rapidly and there are significant opportunities for the local industrial sector. These opportunities must be highlighted to encourage entrepreneurial activity in the field.
- Local industry should be encouraged to benefit from the regional research efforts in the field.
- Experience exchange in the field of privatization, plant performance, operation and maintenance and research and development should be encouraged between countries in the region.
- There is a need to promote awareness programs for the public about saving water





- Evaluation must be carried out in the pipeline network and methods to reduce leakage should be investigated
- Capacity building and training should be considered as a top priority
- All strategies should implement water reuse plans with safe and health protection issues
- Water quality requirement in different sectors should be well considered
- Supplying safe water and implementing water reuse strategy of wastewater to reduce the dependency on the fresh water
- Reuse of gray water can be implemented in new houses, apartments and public buildings and can have high financial returns
- To consider historical development wastewater treatment methods reuse activities, regional policies and strategies
- To carry out awareness programs through schools, media, posters, etc. on water saving methods
- Methods of water resources integrated management in urban areas with the consideration of the social, environmental and economic constraints
- Harmony between the programming and executing regulations of urban development plans and water resources planning and management
- Consideration of the demand management as a prior strategy in urban water management plans
- Supporting the modern technology propagation in order to reduce wastewater in urban water distribution systems, water harvesting in urban areas, reusing wastewater, etc.
- Promotion of governance in urban water services
- Supporting promotion of the civil societies role in urban water management
- Promoting financial recourses supply methods through modern approaches and water pricing

After the powerpoint presentation made by RCUWM's representative, Dr. J. Heidborn as the Head of Division "Sustainable Concepts for Productions and Consumption of BMBF presented the introduction to the Third International Workshop by briefing the participants on the objectives, sub-themes and the workshop schedule. During the 2<sup>nd</sup> session an overview on drinking water in Germany was presented by Prof. Dr. Ing. Habil Rolf Gimbel from the University of Duisburg-Essen. He briefed the participants on the population, water consumption, and average rainfall and presented a general overview on drinking water in Germany.

Prof. Dr-Ing Uwe Neis as the second lecturer presented an overview on wastewater in Germany which included the following sections:

- a) Organisation of the wastewater sector in Germany
- b) Performance of the water sub sector in Germany
- c) Outlook

During the first part of his speech, Dr. Neis pointed out the number of communities, water supplies, wastewater disposers and the sewage treatment plants (STP) in Germany. He explained about the entrepreneurial



forms of wastewater disposers in Germany with a comparison to other countries in Europe. He also pointed out the sewage fees and total costs of sewage disposal systems by presenting the distribution of costs among different sections. He then explained about the raw wastewater performance and finally came up with the following conclusions:

- Today in Germany the quality of most receiving water (rivers, lakes) is ranked as very good or good.
- Water quality w.r.t organic substances and nutrients cannot be improved much more by better performance of the STP
- Most of the organic load in surface waters is due to combined sewer overflows
- Communities actually undertake costly measures to reduce the overflows by constructing new large sewerage infrastructures (retention basins or channels, ...)
- The majority of the nutrient load in the receiving waters is due to diffuse agricultural runoff
- Major concern of operators today: sludge handling and disposal
- At some STP there is potential to optimise the overall treatment chain
- New treatment technologies are emerging (membranes, ultrasound, ...)
- Future problems: xenobiotic organic substances (drugs, hormones, ...) in receiving surface waters

Mr. Saeed Al-Saadi as the Director of the Undersecretary office for Water Resources Affairs presented his work on Water Resources Supply and Reuse of Wastewater in Oman. He first explained about the location and climatic situation of Oman including: precipitation, evaporation and mean temperature. He pointed out the strategy of Water Resources Management in his country and its objectives. He also explained about challenges facing the water resources sector. The lecturer then pointed out the regulations and policies in the field of water. Some of the under operation and under construction wastewater treatment projects were also introduced by Mr. Al-Saadi. The final conclusions of his speech were:

- As an arid country, Oman recommends that special supports is given to governments in this part of the world to overcome water shortage problems. Technical and financial support is of high priority
- Development of water sector require large cooperation between countries in data exchange at a regional and international scale
- Water conservation is a highly recommended issue in arid and semi arid regions as well as development of existing water resources
- Use of water technology will give better benefits for future development plans
- Water should be considered as a national resource and should be utilized to permit longer and good management plans and for the use of the new generations

Messers Abbas Haj-Hariri and Ali Ghasemi from Tehran Province Water and Wastewater Company presented an overview on Tehran Water and Wastewater. Mr. Haj-Hariri explained about the area, coordinating population



and boundaries of Iran. He then came to wastewater situation in Iran by figuring out various relevant information and subsequently focused on Tehran Province. Mr. Haj-Hariri explained about the Water Resources in Tehran province by pointing out the rainfall, per capita water, renewable water resources, etc. He then briefed the participants on the demand and consumption management. Mr. Haj-Hariri finally made a presentation on the outlook for the next 20 years and he pointed out the main challenges. Mr. Ali Ghasemi also briefed the participants on the general overview of the world's water resources, average rainfall comparison, the world and mega-cities population comparison. He then explained about Tehran's history and the means for distributing drinking water in the past. The lecturers also presented the water consumption and demand in Tehran and he finally pointed out a quick overview on Tehran's different water resources.

The third technical session started from 14:30 – 18:30 and Dr-Ing Bernd Heinzman briefed the participants on the water supply in Berlin, including the following subjects:

- Water bodies and their use
- Conditions and principles of water supply
- Water situation in Berlin with partial water cycles
- Extraction, treatment and distribution
- Service and maintenance
- Development of the drinking water consumption
- Quality and tariff

Mr. Oluf Hoyer presented his speech on the modern treatment and monitoring of surface and reservoir waters by explaining about the following sections:

- Destabilization of particles by ultra flash mixing
- Untrasound inactivation of motile plankton, that cause penetration of micro-organisms into the filtrate
- Compact collision and shear optimized flocculation
- High performance dual media direct filtration
- Water saving build up backwash technology
- Disinfection with DVGW-W294 challenge tested UV-Systems

Mr Claus Mertes as the president of German Declination Society (DME) presented his work on the perspectives of sea water desalination till 2015. He briefed the participants on the historical background starting from the first MSF design in 1934 and followed with concepts of desalination and its requirements. He then pointed out figures related to the marketing procedure and followed with DME's role in seawater desalination. Mr. Mertes pointed out some figures related to the world freshwater supplies, population costs of desalted water. He also briefly went through the technological dimension of seawater desalination. As the final part of his speech he explained about new things to do in the area for technical solutions and environmental issues.

Prof Stefan Panglish from IWW institute affiliated to the University of Duisburg-Essen as the last lecturer of the first day presented his paper on "Nitrate Elimination from Raw Waters an Iranian German Joint Cooperation Projects". He pointed out the following subjects during his speech:

- Cooperation partner in the research projects
- The project goals and objectives
- Facts and figures about the project in Mashhad
- Water supply in Mashhad
- Nitrate removal technologies
- The results gained from different plants

He then came to the following conclusions:

- The Nitrate removal project in Mashhad delivers very useful results for the design of full-scale treatment plants for similar sites as Mashhad
- All 3 processes can be operated effectively. Best process depends on special conditions. Each process has advantages and disadvantages.
- Pilot investigations will be finished by the end of 2005
- An application for extension in 2006 is submitted
- Focus is then set on
  - o further process optimization
  - o the development an integrated concept to minimize the amount of waste water
  - o the Investigation of Electrodialysis as alternative process
- The Nitrate removal project is a good example of a very effective and friendly co-operation between Iranian and German Engineers

During the second day of the workshop on the 29<sup>th</sup>, November, Ms. Gunda Rostel and Mr. Johannes Pohl from the Dresden treatment plant briefed the participants on an interesting example in the sanitation sector which was followed by Ms. Hoffman's paper on reconstruction and renovation of old sewers. She first provided some information on the sewage system in Dresden as well as investments made during 2000 – 2010.



Ms. Hofmann briefed the participants on the technological process for cured in place pipes as well as the principle of pipe relining process. She also described the technical steps for repairing the sewer invert.



Mr. Robert Lucke as the third lecturer of the second day of the workshop presented a fruitful paper on "Supervision of Industrial Polluters – Request on Wastewater Quality and Statutory Resolutions". His paper explained the following subjects:

- Regulations regarding quality and treatment industrial wastewater;
- German demands on municipal wastewater treatment plant;
- Demand on industrial sewage on the spot of its discharge into water;
- General demands on non-domestic sewage;
- Guideline for industrial wastewater for sewage disposal;
- Strategies of supervision and monitoring.

A visit to Dresden Wastewater Treatment plant was arranged for all the participants which was highly received.



After lunch the organisers arranged a sightseeing tour to Dresden. All old monuments, buildings, opera houses, museums, etc. were shown which took around 2:30 hours.



In the afternoon session, Mr. Joachim wolf, the managing director of Siemens AG/Water Sector presented his paper on modern wastewater management and control systems.

He first presented an overview on Siemens, background, number of employees, annual sales, etc. He then came to the general remarks about water / wastewater. Mr. Wolf then explained the objectives of a typical process control system and stated that Siemens offers products, systems, solutions and services for the entire process. Siemens water management systems were described by the lecturer and he then came up with Siemens philosophy and pointed out example of projects and systems carried out.

Dr Wido Schmidt presented his paper on Drinking Water from Algal loaded Raw Water Strategies for Disinfection and Against Toxin Flavor outbreaks. He covered the following topics in his paper:

- Disinfection process
- Algal metabolites
- Barriers against cyanotoxins in drinking water
- Early warning systems

He finally came to the following conclusions:

- Demand of disinfection agent
- Potential of disinfection by products
- Knowledge concerning the occurrence and behaviour of Algal metabolisms
- Early warning

Dr Jurgen Wummel as the final lecturer of the second day presented a paper on Transformation of a municipal water services, provider in an economically viable enterprise, the example of Leipzig.

On the third day of the workshop in Berlin Ruhleben Wastewater Treatment Plant, Dr. Jose Alberto Tejada Guibert presented a report on UNESCO-IHP activities explaining about the different phases of UNESCO-IHP and its goals.



Mr. Hubertus Soppert as the Managing Director of P2M Berlin GmbH presented the results of the Iranian German cooperation on water management in Tehran. He explained about situations of the water supply in Tehran, analysis of the current water supply situation in Tehran, water resources, drinking water treatment, distribution and storage, monitoring control of drinking water quality and consumption and tariff management.

Mr. Holger Schilliger presented his paper on sewerage sludge treatment including the following topics:

- Organization Chart of GmbH
- Alternatives of sludge dewatering
- Sewage sludge treatment in reed beds
- Different sewage sludge treatment systems

- A comparison between mechanical sludge dewatering and sludge treatment in reed beds
- Economical advantages of the reed bed system
- Ecological advantages of the reed bed system
- Examples of sewage sludge treatment plants

A visit to Wastewater Treatment plant of Ruhleben was well organized by the organisers and the participants found the chance to visit different parts of this plant.



Dr Ing Habil Holger Scheer from Prack Consult Ltd. presented his paper on sewerage sludge treatment. He covered the following items during his presentation:

- Short Introduction of Emscher Wassertechnik
- Methods of wastewater treatment
- Industrial wastewater treatment

Prof Dr Ing Peter Cornel from Technical university of Darmstadt submitted his presentation on wastewater reuse by covering the following topics:

- Global shortage of water resources
- Reuse options
- Quality standards for irrigation water
- Treatment options for reuse in agriculture and irrigation
- Heiminths and heimintheegs



Dr Ing Hans Peter Uffmann from Bohrtec Ltd presented a brief report on the Iranian – German cooperation projects, construction of sewer systems. He covered the following topics in his paper:

- Machines and process technology
  - o Non-directionally controlled drillings
  - o Directionally controlled drillings
- Special developments for small tunnels in Tehran
  - o Current situation in Iran
  - o Working target of the project

- Course and time schedule

- Outlook

During the last day of the workshop, 3 presentations were made by Mr. Norbert Gaston from KfW Group on financing of water infrastructure systems, Mr. Andreas Koch from Gauff Engineers on Development of Master Plans for water and wastewater networks and Mr. Gerhard Zimmerl from financing from SETEC Engineering on work loss minimization and leak detection.

Mr. Gastein briefed the participants on KfW's activities and performance as a worldwide financing of projects in the water and wastewater sector.

Mr. Gerhard Zimmer explained about the following items in his speech:

- Problem situation in water supply systems
- Objective and targets
- Approach and methodology of supply systems and costs of loss reduction measures
- Benefits for utilities and costumers

Mr. Andreas Koch from Gauff Engineers Company explained about the existing situation in Kabul city and the need for sanitary improvements. He then demonstrated some slides on the existing on site systems, tradition vault toilets, main problems to be solved and the strategy and proposed solution, priorities of sewerage connection systems and proposed solutions, priorities of sewage connection systems were finally presented during his speech.



It is well worth mentioning that the experts from Bangladesh and Afghanistan presented their country papers on water supply and sanitation in Bangladesh and water supply system in Afghanistan respectively.

A general report on the papers presented throughout the workshop was submitted by Mr. Soppert and Mr. Al-Alfy. The report included a summary to all presentations made as well as the conclusions and recommendations.



The closing session was held from 11:00 – 13:00 Thursday, 01 December 2005 and Mr. Junker, Mr. Heidborn, Mr. Ardakanian, H.E. Chakaborty, State Minister of Water Resources of Bangladesh presented their closing addresses.

