



International Conference on Water Resources and Environmental Management

## **Abstract Book**

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## ICWRE-2013 General Program

**Tuesday, April 09<sup>th</sup>**

### **Opening Remark:**

Dr. Nidal Salim, Director and Founder GIWEH- Global Institute for Water Environment and Health.

### **Introduction:**

- **Water, Food, Climate and Energy.** Prof. Szöllözi Nagy, Rector of the UNESCO-IHE Institute for Water Education in Delft- The Netherlands
- **Water Management and Food Security: A Fragile Equation.** Ms. Ann Tutwiler, Special Representative of the Director General to the UN-Geneva and the World Economic Forum, Director FAO Liaison Office
- **Water related technologies: the role of intellectual property, innovation promotion and technology transfer.** Mr. Christian Wichard, Deputy Director General, Global Issues Sector, and World Intellectual Property Organization (WIPO)
- **World Water Forum/2015,** His Excellency Mr. Hyo-sung Park, Ambassador and Deputy Permanent Representative at Korean Mission in Geneva

### **Session I: Regional Challenges to Water Security**

**Keynote Speaker:** Dr Thomas Fitschen, Ambassador, Deputy Permanent Representative, Permanent Mission of Germany in Geneva.

### **Panel discussion:**

- **The water sector in Morocco – status and strategic vision,** Eng. Mohammad Alaoui, Head of small and medium dams- Directorate of Hydraulic Works, Ministry of Energy, Mines, Water and Environment Morocco.
- **Assessment of institutional and asset-related functions in the urban water sector in Libya,** Dr. Khaled Rashed, University of Tripoli, Department of Civil Engineering Tripoli, Libya.
- **Intérférences naturelles et anthropogéniques sur les eaux du lac Fetzara, lac appartenant aux écosystèmes humides,** Ms. Sameh Habes, Université Kasdi Merbah Ouargla, Laboratoire Ressources en Eau & Développement Durable, Algeria.

### **Session II: Alternative Approaches to Water Security**



**Keynote Addresses: Coupled Land Use and Hydrological Modelling for Management of Ecosystem Services**, Dr. Johannes van der Kwast, UNESCO-IHE, Institute for Water Education, the Netherlands.

**Panel discussion:**

- **WWF – Water footprint**, Dr. Lifend Li, Director Freshwater Program, (WWF).
- Mr. Kees Van Der Ree, Coordinator Green Jobs Program, International Labour Organization (ILO).
- **An Anthropological Approach to HEPPs in Eastern Anatolia**, Mr. Pervin Yanikkaya Aydemir, Program at Anthropology Department, Yeditepe University, Istanbul, Turkey.
- **The role of Water in shaping the image of rural life in Fadak area-Saudi Arabia**, Dr. Ahmed Alshabban, Department of Geography, Qassim University, Buraydah, Saudi Arabia.

**Session III: Wastewater Treatment and Reuse Methods and Concerns**

**Keynote speech: Hazardous Waste Disposal and Drinking Water Quality**, Prof. Walter Wildi, Professor in geology, University of Geneva.

**Panel discussion:**

- **Application of High Rate Anaerobic Reactor Technology for decentralized wastewater treatment and reuse systems**, Mr. Nanchoz Zimmermann, Autark Engineering AG, Switzerland.
- **Using Treated Wastewater as an Adaptation Measure of Water Scarcity and Climate Change in Gaza Strip**, Dr. Jamal Y. Al-Dadah, Water Authority, Planning Department, Gaza Strip, Palestine.
- **The Feasibility of Water Hyacinth in Treating Wastewater**, Ms. Radwa Bakr, Water Research Institute, Egypt.
- **Synthèse d'un matériau mesoporeux de type mcm41 et son application dans la depollution des eaux usées textiles**, Mr. Abdelhafid Barca, Université des sciences et de la technologie d'Oran Mohamed Boudiaf, Algerie.

**Wednesday, April 10<sup>th</sup>**

**Session IV (1): New Technologies (Information and Innovation)**

Accessing technological information in the area of water related technologies: the role of patent information and WIPO available technical assistance and tools in this area.

**Speaker: Ms. Irene Kitsara**, Project Officer, Patent Information Section, Access to Information and Knowledge Division, Global Infrastructure Sector, WIPO.



## **Session IV (2): Innovation promotion and technology transfer of water R&D results and technologies: the role of intellectual property (IP) and WIPO available tools and capacity in this area building**

Innovation Division, Innovation and Technology Sector, WIPO.

**Speaker: Ms. Olga Spasic**, Head, Innovation Structures Section, Innovation Division, Innovation and Technology Sector.

WIPO Green, Global Challenges Division, Global Issues Sector, WIPO.

**Speaker: Ms. Yesim Baykal**, Senior Program Officer, Climate Change and Food Security, Global Challenges Division, Department for Traditional Knowledge and Global Challenges WIPO.

## **Session V: Water Governance and Security**

**Keynote Speaker : L'eau : un élément fédérateur de la coopération transfrontalière**, Mr. Charles Stalder, Département de l'intérieur, de la mobilité et de l'environnement, Canton de Genève, Switzerland.

### **Panel Discussion:**

- **Sustainable Development In Iraqi Provinces According To Agenda 21 Indicators**, Assist. Prof. Salah F. A. Sharif, University of Technology, Building and Construction Department, Iraq.
- **Community-Based Water Management: The Oasis of Figiog, Morocco Recent Extensions and Transformations**, Mrs. Hasnaa El Jamali, Graduate Institute of International and Development Studies, Switzerland.
- **Land Grabbing/ Water Grabbing in Shared Water Basins: The Emergence of New Actors**, Ms. Emel Zerrouk, Kyoto University, Graduate School of Global Environmental Studies, Japan/UK.
- **An Anthropological Approach to HEPPs in Eastern Anatolia**, Ms. Pervin Yanikkaya Aydemir, Program at Anthropology Department, Yeditepe University, Istanbul, Turkey.
- **The long empty canyon: a study of the old/new legal problems of the Nile Basin**, Judge Shams El Din El Hajjaji, Public Prosecutor, Public Prosecution Bureau- Ministry of Justice, Egypt.

## **Session VI: Contemporary Water Quality Concerns**

**Moderator: Prof. John Pote, F.-A, Forel Institute- University of Geneva**

### **Panel discussion:**



- **A Modeling Approach Towards Improving Compliance Of Treated Water Quality To Reduce Manpower And Chemicals**, Assist. Prof. Alaa Husaeen Wadie, University of Babylon, Head of Environmental Engineering Department, Iraq.
- **Bacterial Quantification in Sharjah's Home Water Storage Tanks**, Dr. A. Al Amiri, Dr.R. Alkendi, Biology Department, United Arab Emirates University, UAE.
- **Salinity of drinking water and its association with Renal Failure in Gaza Strip Palestine**, Dr. Khalid Qahman, Ministry of Environmental Affairs, Palestine.
- **Biological Treatment of textile Effluent and its reuse in Irrigation: Encouraging Water efficiency and Sustainable Development**, Dr. Senthil Kumar Sadasivam, National College, PG and Research Department of Biotechnology, India.

## Session VII: New Technologies: Modelling and Simulation

**Keynote Speaker: 3D Groundwater Flow Model for a semi-arid region of Tafilalet Oasis System (South East of Morocco)**, Prof. Abdelkader Larabi, Ecole Mohammadia, Morocco

**Panel discussion:**

- **Environmental Impact of Seawater Desalination Plants. Case Study in Algeria.** Prof. Kamal Mohammedi, LEMI, M Bougara University, Algeria.
- **Groundwater Simulation System Study on Physical and Climatic properties on Kuwait Group Aquifer**, Dr. Emad Al Ali, Kuwait Institute for Scientific Research, Kuwait.
- **Feasibility Study of AL-Masab AL-Aam Water Drainage in Thi Qar and Treatment for Irrigation**, Dr. Kadhim Naief Kadhim, College of Engineering, University of Babylon, Iraq.
- **Contribution des systèmes d'informations Géographiques à la gestion des ressources en eau. Cas du complexe aquifère de la plaine de Mascara (Algérie)**, Mr Baghdadadi Boukerma, Université des Sciences et de la Technologie d'Oran, Département d'Hydraulique, Algeria.

**Thursday, April 11<sup>th</sup>**

## Session VII – Roundtable Discussions:

**Special Session IX: The Nile Basin**

Closing Session: Geneva statement on Water, Food, Energy and Climate Change

## Session X: Conclusion and Recommendations

### Posters' Session

- **Interactive website with Systems Analysis Environment for Prefeasibility Studies of Small Scale Water and Power Production Units Integrating Renewable Energy**, Mr. Djamel Boudieb, M'hamed Bougara University, Boumerdes, Algeria.





- **The Geomorphological Effects of Urbanization of the city of Karak-Jordan**, Prof. Ali Ananzeh, Director, GNRD in Amman, Jordan.
- **Integration of Renewable Energy to Tala-Oulili Desalination Plant in Algeria. Energy and Exergy Performances Analyses**, Mr. Abdelkader Bouzaine, MESO team, LEMI, M Bougara University, Boumerdès, Algeria.
- **Effect of Alpha-cypermethrin on morphological parameters in tomato plants (*Lycopersicon esculentum* Mill.)**, Mr. Karim Chahid, Laboratoire LAMEC, Faculté des sciences Dhar El Mehraz, Fès, Morocco
- **Modeling and Simulation of Reverse Osmosis system with Renewable Energy**, Mr. Belkacem Absar, Département de Génie des Procédés, Faculté des Sciences et de la Technologie, Université de Mostaganem, Algeria
- **Legal Regulation on Dam Construction on International Rivers: The compliance of Nile Basin upstream States of the Regulations**, Dr. Mosaed Abd ElAtty Shetewy. PhD in International Law, Egypt.
- **Securing the Water Environment from Pollution, “A Study on the Domestic and the International levels”**, Judge Dr. Mohamed Salah Abou Ragab A holder of a Ph.D. entitled "The International Criminal Responsibility of the Heads and Leaders of States", Egypt.
- **Etude de la Contamination par les Eléments Traces Métalliques Plomb (Pb) Et Zinc (Zn) des Sédiments de l’Oued Aissi (Tizi Ouzou, Algérie)**, Ms. Rouibet Boubkeur, Faculté des Sciences Biologiques, Université des Sciences Technologiques Houari Boumediene (U.S.T.H.B), Alger, Algeria.
- **Evaluation des variations climatiques thermiques : cas de Constantine pour la période (1978-2007)**, Ms. Zekri Jihane, Université El Hadj Lekhder Batna, Algeria.



## Abstracts

Abstracts are arranged according to the Program presented in this Abstract Book. In each session, abstracts in English go first, abstracts in French go after them.

### Session I: Regional Challenges to Water Security

#### Water Sector in Morocco: Situation and Perspectives

Eng. Mohammad Alaoui<sup>1</sup>

<sup>1</sup>Ministry of Energy, Mines, Water and Environment, Head of small and medium dams, Directorate of Hydraulic Works, Morocco.

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**Keywords:** *Urban water supply, Institutional functions, Asset-related functions*

#### Abstract

Water availability has been not an obstacle to socio-economic development of Morocco in the past as result of implemented management measure but can pose major challenges for the future demand in the future if nothing is done. Several major challenges and problems are now faced by the water sector relate mainly to the increasing water scarcity of pressured economic development and its impact, exacerbated by climate change, deterioration of water quality due to pollution and, the unsustainable exploitation of groundwater resources, and the waste of consumption trends.

The natural renewable water resources is estimated 22.8 billion m<sup>3</sup>/year(BCM of with the contribution of 18 MCM from surface water and 4.8 BCM of groundwater recharge resulting in 730 m<sup>3</sup>/capita/year which is below the commonly accepted threshold of 1000 m<sup>3</sup>/capita /year. Despite the success of the past water policies initiated in the sixties, the future water sector management challenge of the water availability and demand must address the most urgent problems and make water a decisive factor in its sustainable development.

The new water strategy, implemented in 2009, is expected to support the development of the water needs for the development until 2030 through the implementation of integrated policy combining water conservation and resource mobilization in conventional and unconventional water while respecting the environment and the rights of future generations. The strategy will focus on three components; water demand management and water valuation, supply development and management and preservation and protection of the water sources and the environment. Demand management measures is expected to save 2.4 BCM with contribution of 120 MCM to domestic, construction of 50 dams with additional capacity of 1.7 BCM, water



transfer of 800 MCM, 400 MCM of desalinated water, 300 MCM of wastewater reuse and increased recharge wastewater. In addition, implementation of all provisions of Law 10-95 on water, preservation of wetland, drought and flood risk management and enhance information system. These measures is expected to achieve sources sustainability and meeting water requirement.

### **Assessment of institutional and asset-related functions in the urban water sector in Libya**

Dr. Khaled Rashed

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**Keywords:** *Urban water supply, Institutional functions, Asset-related functions*

#### **Abstract**

The total urban water supply in Libya is about 600 million cubic meter per year, of which more than 90% came from groundwater. Surface water resources are minimal and Libya relies on wells, desalination and transported water for urban water supply. Transported water supply is essentially targeted towards the agricultural sector; however, the share of the urban sector has been increased to cope with increasing demand. This paper focuses on the organization of urban water sector concerning institutional level and asset level, trying to high light the problems facing urban water sector and proposes solutions. In addition to the newly re-established Water and Wastewater Company, six main players in the urban water sector today duplicate institutional and asset-based functions. Three of them deal with supply side (Desalination Company, Water Authority, and Man-made River Authority) and the other three deal with demand side (Ministry of Utilities, Project Execution Authority, and Environment Authority).

After assessing the current situation of the urban water sector mainly around organizational consideration, one can conclude that in terms of institutional setup there is no clarity around supply/demand decisions. On the asset-related side, water and wastewater operations have been confused by frequent re-organizations. Apart from fragmentation, overstaffing of Water and Wastewater Company is significant, especially in light of the level of service provided to consumers. In order to build a professional urban water sector, in terms of institutional and asset-related levels, clear key functions for both levels have been proposed.

### **Interférences naturelles et anthropogéniques sur les eaux du lac Fetzara, lac appartenant aux écosystèmes humides**

Ms. Sameh Habes<sup>1</sup>, Ms. Larbi Djabri<sup>2</sup>



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**Keywords :** *Ecosystèmes, facteurs naturels et anthropiques, lac, pollution*

### **Abstract**

La conservation des écosystèmes des zones humides est essentielle non seulement pour l’approvisionnement en eau douce mais aussi pour la préservation de la biodiversité et pour assurer des services indispensables pour la santé et le bien-être des populations. C’est le cas du lac Fetzara, qui a été classé Zone Ramsar, donc sa protection s’impose, il s’étend sur une superficie d’environ 18600 ha et il est alimenté soit ; par trois affluents : Oued El Hout, Oued El Mellah et Oued Zied, soit par les eaux du ruissellement et les eaux traversant les formations géologiques environnantes. Ces eaux avant leur arrivée au lac, traversent des zones agricoles, industrielles et urbaines, dont les eaux rejetées atteignent le lac sans pré-traitement, lui conférant ainsi une modification de sa composition chimique. Donc, le but de notre travail est de montrer les différentes origines de pollution des eaux du lac Fetzara.

D’après l’étude géologique de la région du lac, deux formations géologiques caractérisent la région, l’une métamorphique et l’autre sédimentaire. Et l’étude pédologique nous a permis de faire ressortir quatre classes de sols: les sols peu évolués, les vertisols, les sols hydromorphes et les halomorphes.

Sans pour autant oublier, que la région d’étude appartient à un climat de type méditerranéen, caractérisé par deux saisons, l’une chaude et sèche, et l’autre froide et humide.

Dans l’étude hydrochimique plusieurs méthodes d’interprétation ont été utilisées, telles que : l’ACP, Diagrammes de Piper, Rapport Sr/Ca sur une période d’analyse allant de 2004 jusqu’au 2010.

La matrice argileuse tapissant le fond du lac va influencer la composition chimique de l’eau, la minéralisation des eaux serait également due : au climat, aux apports dus aux terrains traversés qui sont différents (gneiss, calcaires, sables, marnes), aux industries environnantes et une certaine pollution causée par les rejets urbains des villages limitrophes au lac.

En conclusion la minéralisation des eaux du lac Fetzara se trouve modifiée par rapport à deux facteurs importants d’ordre naturel et anthropique.



## Session II : Alternative Approaches to Water Security

### A Framework for Coupling Land Use and Hydrological Modelling for Management of Ecosystem Services

Dr. Johannes van der Kwast<sup>1</sup>, Seleshi Yalew<sup>1</sup>, Chris Dickens<sup>2</sup>, Julia Reinhardt<sup>3</sup>, Stefan Liersch<sup>3</sup>, Marloes Mul<sup>1</sup>, Masoom Hamdard<sup>1</sup>, Wim Douven<sup>1</sup>

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**Keywords:** *Integrated water resources management, Spatial planning, Land-use modelling, ecosystem services*

#### Abstract

It is well known that land-use changes influence the hydrological cycle and that those changes in the hydrological cycle influence land use. The sophisticated spatial dynamic planning tools that have been developed in the last decades to support policy makers in the decision making process do not take into account the mutual feedbacks between land use and hydrology. In this study, an integrated spatial decision support system is developed where the feedbacks between land use and hydrology are taken into account by coupling the SITE (Simulation of Terrestrial Environments) land-use model to the ACRU hydrological model. This framework enables policy makers to assess the impact of their planning scenarios on ecosystem services using a web-based tool that interactively presents trends in space and time of spatial indicators derived from both models.

This approach is tested for an area located along the northern areas of the Drakensberg Mountains that form the border between Lesotho and South Africa. The region is extremely important for its watershed-services as water derived from it is pumped into the Vaal River supplying water to the city of Johannesburg. Because of poor management of ecosystem services, less water is produced by the catchment more erratically, siltation levels are increasing and less carbon is retained in the soil. Biodiversity is threatened by grazing livestock, alien plants and other poor land management practices. In addition, overstocking, frequent burning and lack of soil protection measures have caused rill and gully erosion in areas of communal ownership where an overall management policy is lacking.

Results show that simulations of land use and hydrology improve by coupling models including mutual feedbacks. It can be concluded that the evaluation of spatio-temporal trends in indicators derived from these models are valuable for the assessment of strategies for the better management of ecosystem services.



## **An Anthropological Approach to HEPPs in Eastern Anatolia**

Ms. Pervin Yanikkaya Aydemir

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**Keywords:** *Anthropology, water, development, HEPPs, Eastern Anatolia*

### **Abstract**

Both water and development have very important functions in human life. Throughout the history, people have designed and constructed dams, reservoirs and irrigation systems to supply agricultural lands with water as well as converting water into energy as part of development projects. While water resources development projects are mostly preferred as they are cheaper and clean compared to other alternatives, impacts of such projects on people, their livelihoods and nature have been particularly devastating in many parts of the world such as Asia, Africa and Latin America. Recently, with an argument of increasing energy demand and reduction in dependence on imported energy, Turkish government has initiated some sort of “mobilization” for small hydroelectric power plants (HEPPs) to be run by private companies, particularly in the Eastern Anatolia and Black Sea regions. Despite recent initiatives, there is no established water policy in Turkey. Outsourcing control over free-flowing streams out of local representational structures into the hands of private companies has resulted in social movements and protests against these projects. I conducted a fieldwork in one of the valleys in Eastern Anatolia where two HEPPs have been constructed. Methods used during the 8-week fieldwork included participant observation, focus group studies and in-depth interviews. Privatization of the water resource in the Aksu Valley (formerly Salaçor) not only gave the entire control of water to the contractor company for 49 years, but also left all the public services in the valley to the mercy of the company while use of water has been historically well-managed by the local community, who was in control and distribution of the water. This paper discusses outcomes of the HEPP project in daily life of the local people in Aksu Valley, asserting that users of water resources should have been considered as participants in water management, planning, and decision-making of development projects.



## **Session III: Wastewater Treatment and Reuse Methods and Concerns**

### **Using Treated Wastewater as an Adaptation Measure of Water Scarcity and Climate Change in Gaza Strip**

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**Keywords:** *Climate change, Gaza aquifer, wastewater reuse, Organic matter, ROTHMASTED.*

#### **Abstract**

The use of wastewater is one of the most sustainable alternatives to cope with water shortage in Gaza Strip (GS). It would have a number of advantages that include closing the gap between supply and demand, alleviating the pollution of fresh water resources, providing sound solution to water scarcity and potentially cover half of the total agricultural water demand in GS. Wastewater reuse could provide a mitigation solution to climate change through the reduction in green house gases by using less energy for wastewater management compared to that for importing water, pumping deep groundwater, seawater desalination, or exporting wastewater, and enrich the deteriorated soils in GS with more organic matter which lowering the application of chemical fertilizers.

This paper investigated the effects of wastewater application on the level of organic matter and soil carbon sequestration which demonstrated by many experiments in Gaza Strip, which induced the possibility of wastewater as a mitigation measure of climate change.



## **Session V: Water Governance and Security**

### **Community-Based Water Management: The Oasis of Figuig, Morocco, Recent Extensions and Transformations**

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**Keywords:** *Community, Water Management, Oasis, Common-Pool Resources, IWRM, Free-riding*

#### **Abstract**

The Oasis of Figuig, Southeast of Morocco, is an intrinsic case for water management. Two water management models shape the oasis: Community management inside the oasis and private initiatives established outside opting for new technologies. The research illustrates the conditions under which people collectively manage the commons and the reasons behind peoples' free riding. Discourses and theories of the Integrated Water Resources Management approach (IWRM) and Common-Pool Resources (CPR) have been embraced in water management models. However, these discourses reveal shortcomings as they foster equilibrium models for water management. The study demonstrates that both community and private models of water management are relevant, complementary and possibly reinforce each other. The case for "the death of the oasis" is not vindicated by current facts. The present research concludes to the enduring validity and viability of oases as they undergo renewal. Securing their long evolution, however, requires efficient and effective water management. These should focus on correcting the inequalities within community management and effectively monitoring free riding.

### **Land Grabbing/ Water Grabbing in Shared Water Basins: The Emergence of New Actors**

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**Keywords:**

#### **Abstract**

Land grabbing by foreign governments and international companies is on the rise. Faced by population growth and an ever decreasing availability of useable/affordable land in populace





States, many are looking to buy land where it is available, predominantly for agricultural and industrial purposes. Nevertheless, land alone is not sufficient for either of these uses. The availability of useable water resources is also a prerequisite to each land purchase. To buy land is to own its green water and have access to any blue water available to it. The development of hydropower projects, however, endeavors to buy the use of blue water, and must come with a purchase of the surrounding lands. Thus, it can also be seen as a type of water grabbing. Where the locally affected, vulnerable, pre-existing stakeholders are against the project and the loss of livelihood and rights it engenders, a hydropower project may be labelled as a vehicle for water and land grabbing. For an international river, a part of a shared basin, the water grabbing affects stakeholders living under different political regimes and with disparate local power relations. The effects of the projects on both sides of a border may be the same; however, the manner in which the two governments handle the effects will be difficult. Here in lies an opportunity for increasing dialogue and equity across the impacted area of the basin. The Case of the Hatgyi Dam development on the Salween River, a joint project between China, Myanmar and Thailand, is an example of the above. As a controversial dam being built on an international, border river, the Hatgyi Dam case study exemplifies many of the issues to be found in similar developments across the developing world.



## Session VI: Contemporary Water Quality Concerns

### A Modeling Approach towards Improving Compliance of Treated Water Quality to Reduce Manpower and Chemicals

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**Keywords:** *Coagulation; feed forward control; Model definition, turbidity, pH, temperature, total dissolved solids, plant flowrate.*

#### Abstract

In water treatment processes, the individual unit operations are complex, non-linear and poorly understood. Whilst many models have been developed to improve process understanding, these are rarely in a form easily exploited by the control engineer. Attempts to improve the performance of water treatment works through the application of improved control and measurement have had variable success. This paper discusses investigations into the application of feed forward control on the clarification process of a small-scale pilot plant. The application aimed towards maximizing the efficiency of the chemical coagulation process. To achieve this, a simple computer program written in Visual Basic version 6 models to a chief the process operating conditions. Mathematical models based on historical plant data covering 18 months analyzed by stepwise multiple regression analysis. The following parameters were important determinants of coagulant dose and pH control reagents: river turbidity, pH, temperature, total dissolved solids, and plant flowrate. A predictive equation developed from the data, of the form:

$$\text{Al}_2(\text{SO}_4)_3 \text{ (mg/L)} = a*Q + b*\text{Turb} + c*\text{TDS} + d*\text{pH} + e*\text{Temp} + f$$

The aim of this model is to provide water treatment operators with a tool that enables prediction of chemical reagents and treatment conditions for selected removal of turbidity, based on raw water quality data. While for adjusting pH, whether lime or soda ash are added, the pretreatment of water supplies involves the use to decrease the acidity, to soften, and to clear drinking water, calcium oxide (CaO), commonly known as quicklime or burnt lime. The addition of lime is with the form:

$$\text{CaO (mg/L)} = j + k * \text{pH}$$

And for soda ash sodium percarbonate Na<sub>2</sub>CO<sub>3</sub> the addition form is:

$$\text{Na}_2\text{CO}_3 \text{ (mg/L)} = m + n * \text{pH}$$



The advantages of software program are significant in the operation of water treatment plant. The program designed as an aid, so the user can still customize and optimize the computer suggested design. Users are able to move forward in adjusting or optimizing the design in minutes, which is difficult for manual system. This system was an initial system, many new features and functions have to be added to the program to enhance the functions and make it commercially robust.

It concluded that this system is very powerful tool in improving compliance of treated water quality to reduce labor and chemicals and to facilitate the organizations and individuals with better understanding on how their actions can have a direct impact on the treatment.

### **Bacterial Quantification in Sharjah's Home Water Storage Tanks**

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**Keywords:** *Microbiological, quality, Total bacterial count, total coliform, fecal coliform, E.coli, Membrane filtration, storage tanks, water*

#### **Abstract**

Maintenance of the microbiological quality of water has been used as an important means of preventing waterborne disease. The household water storage tanks lack regular maintenance and may remain years without cleaning and/or disinfection. Therefore, the quality of water may get affected overtime, which may pose a health risk to household members. The objective of this research is the examination of the microbial quality of water storage tanks by using Membrane Filter Technique. This paper reviews microbial standards for Total bacteria, Coliform bacteria, and Escherichia coli in the water storage tanks available in different homes in Sharjah by using Membrane Filtration (MF) method. The MF method decides on the presence or absence of bacteria within 24 hours. Twenty-two samples of water were collected from both tank levels (ground and roof top) located in each household. The results showed that all of the tested samples were free from E.coli bacteria, which indicate no fecal contamination. However, more than half of the samples collected for this study (72.7%) showed higher Total Bacterial Count (>10CFU/100ml). Exceeding the standard level is not an indicator of pathogenesis unless otherwise analyzed for bacterial identification. Also, the presence of total coliform which generally does not imply an imminent health risk but does require an analysis of all water systems facilities and their operation to determine how these organisms entered the water system. In addition, this result implies that there might be other contaminants present in the water coming from the same route as total coliform bacteria.

### **Salinity of drinking water and its association with Renal Failure in Gaza Strip Palestine**

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**Keywords:** *Gaza aquifer, Groundwater, Drinking water quality, Salinity, Renal Failure*

### **Abstract**

Gaza aquifer is the only natural water source for domestic, agricultural, and industrial purposes in Gaza Strip with a population of about 1.7 million. Current rates of the aquifer abstraction are unsustainable and deterioration of groundwater quality is documented in many parts of the Gaza Strip. The overall aim of this study was to determine salinity of drinking water and its association with renal failure in the southern part in Gaza Strip. Another aim was to explore the relationship between renal failure and socio-economic demographic variables. Descriptive, analytic design was used with survey samples from renal failure patients. A face-to-face questionnaire for renal failure patients was developed. The sample size for patients was 194 subjects, with response rate of 70%. This rate was proportional with respect to its size. Reliability was approved by Cronbach alpha test, and validity was approved by content and face validity method. Analysis of the four quantitative extracted domains that reflected subjects perception for drinking water salinity level in their localities. All water chemical tests of the southern municipal domestic wells have been reviewed since 1987. The tests were fluoride, chloride, nitrate, TDS, and sodium levels in all groundwater wells, which reveal a general trend of increasing from north to south in the southern part. The results show that only 8% of the municipal wells meet the WHO drinking standards in chloride level. Chloride, nitrate, TDS, fluoride and sodium concentration exceed 2-9 times the WHO standards in 92% of the southern wells. The study findings show that there was no association between renal failure prevalence and chloride level, sodium level, TDS level and nitrate level and showed only association with fluoride level, with which there was strong and positive association. There is an urgent need to modify the mixing process according to fluoride level, and initiate public information and awareness programs.

### **Biological Treatment of textile Effluent and its reuse in Irrigation: Encouraging Water efficiency and Sustainable Development**

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**Keywords:** *Textile wastewater; Biodegradation; Comamonas sp.; Water efficiency; Phytotoxicity; textile wastewater*

### **Abstract**

The present study focused on the isolation of potential bacteria from contaminated soil of textile industries and subsequent employment of those organisms in treatment of textile waste-water. Wastewater was treated by novel isolates and the biologically treated wastewater was used for the irrigation (phytotoxicity evaluation) of two important edible crop plants (*Brassica nigra* and *Cyamopsis tetragonolobus*). For this, plants were grouped as I, II, III and IV that received the tap water, raw effluent, chemically treated and biologically treated wastewater respectively. 46 bacterial isolates were obtained and optimization of parameters revealed that one strain, namely UBL-27 (*Comamonas* sp. UBL 27) decolorized the wastewater to a max. of 80% in static (anoxic) condition at pH 8 in 24 hours at 32°C. There was a remarkable performance in the germination percentage under biologically treated wastewater to about 83.6% when compared to that of Control Group producing 92.9%. In contrast to this, the germination percentage was significantly too low ( $p \leq 0.05$ ) in the other cases with the raw wastewater and chemically treated wastewater. The wastewater had marked effect on the growth of the *Brassica nigra*; the height of the plant was higher in the biologically treated effluent ( $11.2 \pm 0.4$  cm) and control group ( $12.1 \pm 0.2$ ) than Group II ( $8.9 \pm 0.17$  cm) and Group III ( $9 \pm 0.2$  cm). Weight of the plant was  $1.95 \pm 0.35$  g and  $1.68 \pm 0.47$  g in Group I and Group IV. It was significantly lower in case of Group II and Group III. In *Cyamopsis tetragonolobus*, heights of the plant among the four groups at the end of 80 days were  $102.3 \pm 3.4$ ,  $52 \pm 7.6$ ,  $45.3 \pm 4.9$  and  $92.8 \pm 5$  cm respectively. Similarly, no. of leaves/plant among the four groups was  $49.2 \pm 3.2$ ,  $26.8 \pm 4.5$ ,  $32 \pm 2.4$  and  $47 \pm 4.5$ . Total yield of the plant under the experimental area for Group I was  $3.15 \pm 0.09$  kg while that of the Group IV was  $2.92 \pm 0.09$  kg. The yield was significantly lower in the Group II and III such as  $1.67 \pm 0.17$  kg and  $2.06 \pm 0.22$  kg respectively. To consolidate, the raw effluent has decreased the yield by more than 45% ( $p \leq 0.05$ ) while that of the chemically treated group by more than 30%. However, biologically treated wastewater may not be fit for drinking purposes or for recycling in dyeing processes, it is proved from this, that the eco-friendly alternative can be used for the irrigation purposes beside abatement of water and soil pollution.



## Session VII: New Technologies: Modelling and Simulation

### 3D Groundwater Flow Model for a semi-arid region of Tafilalet Oasis System (South East of Morocco)

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**Keywords :** *Plain of Tafilalet, Oasis, Arid, Groundwater, Agriculture, Three-dimensional model, Calibration*

#### Abstract

The plain of Tafilalet contains an important oasis located in the Southeast of Morocco in a pre-Saharan area, characterized by an arid climate with a large deficit water budget. It has a behavior of a large depression resulting from erosion of a set of geological coverage during the Quaternary period. It also forms a small Mesopotamia crossed by two main rivers from the mountains of the High Atlas: Ziz and Rheris. The oasis of Tafilalet is an area of old traditions irrigation where agriculture is the main activity of the region that represents approximately 37% of the total area (637 km<sup>2</sup>). Agricultural land and date palms are covering the center of the plain and forming the largest palm grove in the Maghreb. The area is irrigated mainly by 82% of the surface waters dropped by the Hassan Addakhil dam reservoir into the Ziz river bed, located at 26 km north of the plain. Other part of the oasis is also irrigated to 18% by the diversion small dams flood located on the Rheris wadi, but these contributions are very irregular and random, from 0 to 6 times per year, and at short-term. The water situation of Tafilalet is fairly precarious, although in a normal year the water resources from Hassan Addakhil do not cover the totality of its need (about 90M m<sup>3</sup>/year). Indeed, for 56% of time series (1971-2008) the endowments are lower than the average (49M m<sup>3</sup>/year), and can even be zero in case of prolonged drought such as the periods of 1982/85 and 2000/02.

Under these conditions, groundwater is therefore playing an important role to satisfy the water demand in the Tafilalet plain. Groundwater is exploited by artificial traditional drains called 'khetaras', traditional wells and pumping stations that provide a total extracted groundwater volume estimated to 35 Mm<sup>3</sup>/year. Surface water is well controlled and managed for a long time by large dam reservoir and the small dams of deviation of floods, however groundwater in the Tafilalet plain is less controlled and exploited in a personal way on all the area of the plain.

In this study, a three-dimensional model of groundwater flow was developed for the aquifer system of Tafilalet, to assist the decision makers as a "management tool" in order to assess alternative schemes for development and exploitation of groundwater resources in the Tafilalet



plain, using Modflow2000 code. It is the first mathematical model performed for this oasis plain, taking into account the most possible real hydrogeological conditions and using the geographical information system (GIS) for the organization and treatment of data and applying a multidisciplinary approach combining geostatistical and hydrogeological modeling.

The conceptual model, in terms of hydrogeological modeling was therefore considered as a monolayer model and the aquifer system is mainly heterogeneous with lateral different hydraulic conductivities, which are ranging from  $3.10^{-7}$  to  $5.10^{-2}$  m/s, but most of them are located between  $2.10^{-4}$  and  $8.10^{-3}$  m/s. The results of the model calibration under steady state (1960) and transient state conditions, starting from this time, show reasonable agreement between observed and simulated water levels for the observation wells. After calibration, the model contributed to better groundwater characterization, the hydrodynamic parameters obtained from the model are much representative of reality. As a management tool, this model can help the manager to take exploitation measures by applying future alternative future schemes of exploitation of the aquifer system in conjunction with surface water.

The results from this numerical investigation of the Tafilalet unconfined aquifer shows that: (1) the groundwater regime appears to be closely linked to atmospheric and hydrological conditions (Ziz and Rheris wadis) as well as to the periods of irrigation; (2) The number of fluctuations and their amplitude vary significantly according to the years and more than the season, especially after the Hassan Addakhil dam reservoir design in 1971, and these are very noticed in the irrigated areas than in the rest of the plain; (3) About 88% of the most water exchangers are vertically between the water table and the surface; (4) The idea of lowering water table by pumping wells is not exactly true, as well the development of groundwater abstraction has not prevented the wound of water table in 2011, the pumping wells accompanied more than it triggers the lowering of water table and it is mainly the succession of dry periods causing the decreases of the piezometric level. This situation confirms the important role of groundwater is playing as "buffer" during drought periods.

### **Environmental Impact of Seawater Desalination Plants. Case Study in Algeria**

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**Keywords:** *Desalination, Environment*

#### **Abstract**

Water shortages, whether cyclical or structural, are a fact known to worsen in the future, while nearly one billion people still lack access to safe drinking water and demand on resources exceeds the renewable supply. In the EUMENA, irregular and declining rainfall situation combined to the rapidly increasing needs for irrigation, industry and the population incompressible needs pushed authorities to mobilize more groundwater and surface resources and use water desalination. Desalination is nevertheless a potential threat to the environment



by inducing damage to the environment. The research devoted to the assessment of impacts of desalination on the flora and fauna are so far limited. We present a case study on the environmental impacts of Cap Djinet (Algeria) seawater desalination plant. These impacts are mainly due to brine discharge but also to a lesser degree the chemicals used in the cleaning of various modules, thermal pollution, etc. We perform the measurement of four parameters (temperature, pH, salinity and conductivity) and a numerical simulation to visualize the effects of rejection. Measurements of temperature and pH are compliant Algerian liquid discharges indicated in the legislative knowing that there are no limits imposed on the conductivity and salinity. Overall, there is no impact even if there is a local minimal impact due to the relatively small size of the resort of Cap Djinet (500 m<sup>3</sup>/day). We propose to extend this study to the desalination reverse osmosis 200,000 m<sup>3</sup>/day of Hama (Algiers), then the entire Algerian coast (1600 km) and initiate an initiative across the western basin Mediterranean.

### **Groundwater Simulation System Study on Physical and Climatic properties on Kuwait Group Aquifer**

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**Keywords:** *Groundwater, Treated wastewater, Reverse osmosis, Total power consumption*

#### **Abstract**

In Kuwait, natural resources of fresh water are very limited. Kuwait is situated in an arid coastal region characterized by high temperatures, low humidity, sparse precipitation rates, and high evaporation and evapotranspiration rates with no rivers or lakes. Therefore, Kuwait has always relied on other sources to secure freshwater to meet its growing demands. The aim of this study was to design a conceptual system to provide a sustainable water source at a feasible cost. The conceptual design system was developed to address the problem of water scarcity and sustainability in general, and specifically to represent the Kuwaiti water quality and quantity limitation problem. The conceptual design system consists primarily of utilizing brackish groundwater in conjunction with treated wastewater augmentation and a reverse osmosis unit for plant production, the simulation was chosen to represent the quasi-Kuwaiti environment data. The study considered two types of simulation models for the conceptual design system approach. These models are the lump model approach and the areal distribution model approach. The lump model approach was carried out through the construction of a simplified model approach utilizing the Visual Basic model. On the other hand, the areal distribution model approach was carried out through the utilization of the Visual MODFLOW and MT3D simulation model approach. This paper present a part of the study that directed to test the physical and climatic performance, and the durability of the conceptual design system, Visual basic, lump, model simulation approach was simulated for different ranges of hydrologic, hydrogeological, and climatic parameters to determine the total power and treated wastewater





consumption. From the performance test results, the increase in evapotranspiration had the highest increase effect on the system total power consumption per unit area and the highest increase effect on the treated wastewater consumption per unit area. On the other hand, the increase in the aquifer porosity had the least increase effect on both the total power consumption and the treated wastewater consumption by the system. In contrast, the hydraulic conductivity increase had no direct effect either on the total power consumption or on the treated wastewater consumption per unit area.

## **Feasibility Study of AL-Masab AL-A'm in Thi Qar and its Treatment for Irrigation**

### **Purposes**

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**Keywords:** *Feasibility Study, Al-Meseb Al-A'm, Treatment, Irrigation Purposes*

### **Abstract**

This study is concerned with assessing suitability of drainage water of AL-Masab AL-Aam for irrigation with or without treatment. The chemical and physical properties of drainage water and the nearest rivers water was studied , Included study the water of Al Gharraf river in the AL-Fajr city northern of Nassiriyah, And the water of Euphrates river southern of Nassiriyah .

The strategy adopted for treatment drainage water it is the blending strategy with fresh water of nearest river. Water samples were monthly taken from four locations, two from drainages water and two from rivers over the period from June 2011, to July 2012. These 48 samples were physically and chemically analyzed for EC ,TDS , PH , Ca<sup>++</sup> , Mg<sup>++</sup> , Na<sup>+</sup> , K<sup>+</sup> , Cl<sup>-</sup> , SO<sub>4</sub> , NO<sub>3</sub> , Turb. , PO<sub>4</sub> and T.H.

It is concluded that the Sodium Adsorption Ratio (SAR) for drainage water its less than 12 and this value its acceptable for irrigation.

In case of salinity the drainage water of AL-Masab AL-Aam it is acceptable for irrigate the halophytes were the electrical conductivity (EC) its less than 8000 Micro Siemens/cm. The blending between the drainage water and the fresh water of Al Gharraf river showed that the blending ratio (R7) result good water for irrigation where the (EC) its less than 3000 Micro Siemense/cm.

**Contribution des systèmes d'informations Géographiques à la gestion des ressources en eau. Cas du complexe aquifère de la plaine de Mascara (Algérie)**



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**Keywords :** *Gestion, Ressources, Eau, SIG, Mascara*

### **Abstract**

La plaine de Mascara confine une ressource en eau souterraine énormément sollicitée et très exploitée pour les besoins de la population locale, de l'industrie et particulièrement de l'agriculture.

Cependant cette ressource est souvent menacée de par sa qualité, comme elle est sujette à de fortes pressions compromettant sa durabilité.

La dégradation de la qualité de l'eau provient des rejets des eaux domestiques non épurées, des rejets industriels et surtout de l'utilisation irrationnelle d'engrais et de pesticides dans l'agriculture.

La diminution des réserves s'explique par les effets d'une surexploitation intensive et des pompages illicites.

Diverses études ayant trait aux ressources en eau du sous-bassin d'oued Fékan (y compris la plaine de Mascara) ont généré une masse de données très importante (hydrogéologie, géologie, hydrologie, pédologie, etc.).

Dans la plupart des cas, ces données sont disparates au niveau de différents organismes relevant de ministères différents (Ressources en eau, environnement, etc.). Les données en question se trouvent souvent consignées dans des documents papiers, difficilement exploitables.

Les managers des ressources en eau, entre autres, se trouvent ainsi confrontés à la gestion de ces données, lesquelles nécessitent un système d'organisation, de stockage, de disponibilité et d'analyse.

Ce pourquoi il était indispensable d'avoir recours à des techniques nouvelles et fiables en l'occurrence, les systèmes d'informations géographiques (SIG).

La mise en place du SIG de la plaine de Mascara (avec extension sur l'ensemble du sous-bassin versant d'oued Fékan) doit permettre d'organiser ces données et de les transformer en informations, en permettant d'analyser aisément les jeux des données au travers de leurs liens à l'espace.



L'intégration, le croisement et la superposition des données avec d'autres variables peut contribuer à générer des cartes thématiques très importantes pour les gestionnaires respectifs des ressources en eau et de l'environnement.

La mise en place du SIG constituera un outil très efficace d'aide à la décision en ce qui concerne la gestion, l'exploitation, la préservation et la protection de la ressource en eau.

Les possibilités d'exploitation du SIG sont multiples, variées, directes ou indirectes. On cite à titre d'exemple le couplage avec un modèle d'écoulement souterrain, pouvant faire l'objet de travaux complémentaires.



## Special session IX: the Nile Basin

### The long empty canyon: a study of the old/new legal problems of the Nile Basin

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***Keywords: Nile Basin, Egypt, Ethiopia, Sovereignty, Cooperation, Equitable and Reasonable Utilization, no harm***

#### Abstract

The Nile River Basin witnesses a long history of tension and negotiation among riparian states. There are two legal frameworks govern the Nile Basin. Firstly, the private legal framework reflected in legal history on the Nile. The most legal active period among Nile Basin states was the period between 1890th and 1930th. The legal solutions to the Nile Basin problems came to an end with the end of the colonization in Africa, especially the Nile riparian states. During this period, the tension among liberal states took a different shape. Harmon and Nyerere doctrine were introduced among the riparian states. This led to the refutation of most of the private legal framework from most of the independent states. Thus, riparian states started to explore new legal ground to regulate their relationship. On the other hand, the public legal framework represented in the work of the International Law Association, which started with Helsinki rules in 1966, and the 1997 UN Convention. Many scholars argue that the legal solution is the best one for the Nile question, based on the previous frameworks. However, this note argued that the international legal framework governing the international rivers generally and the Nile specifically cannot offer a solution to the disputes over the water of the Nile. This note discusses both the legal frameworks of the Nile on one hand. On the other hand, it highlights the points of indeterminacy of both frameworks to solve the Nile dilemma. It argues that the solutions of the present and future disputes through legal tools are not enough. This note goes beyond the most proposed recommendation to form a comprehensive treaty as the solution to the riparian problems. It asserts that the law is not a tool to end the states tension, rather than it is a tool to persevere good faith and prevent future dispute. A main role of the extra legal solutions must be played. It based its argument on substantive and formulate dilemma in the previous frameworks.



## Posters' Session

### **Interactive website with Systems Analysis Environment for Prefeasibility Studies of Small Scale Water and Power Production Units Integrating Renewable Energy**

Mr. Djamel Boudieb<sup>1</sup>, Prof. Kamal Mohammedi, Dr. Abdelkader Bouziane, Dr. Youcef Smaili  
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**Keywords:** *Desalination, renewable energy, co-generation, performance, systems analysis*

#### **Abstract**

This paper focuses on RESYSproDESAL systems analysis environment (SAE) for the prediction of technical, economic and ecological performance of water and power point systems including desalination (e.g. membrane and thermal processes), renewable energy sources for power (e.g. wind energy and photovoltaics) and conventional power supply (e.g. Diesel GenSet). This tool was developed within EU FP6 projects in cooperation between EU-MENA countries.

The SAE is applied to a small scale container system for 10 m<sup>3</sup>/day seawater reverse osmosis desalination powered from Diesel and photovoltaics. Starting from a reference design case three alternative configurations and size are developed and analysed for comparison.

The results show a considerable potential for economic improvement of the plant concept, bringing the project closer to affordability for the target population: Optimized Diesel and battery sizes reduce levelised water cost by about 15 %. Up-sizing the whole system from 10 to 50 m<sup>3</sup>/d and power recovery reduce specific power consumption by about 45 % and integration of water production with village power supply may meet user needs better and increase reliability of back-up.

### **Integration of Renewable Energy to Tala-Oulili Desalination Plant in Algeria. Energy and Exergy Performances Analyses**

Dr. Abdelkader Bouziane<sup>1</sup>, Prof. Kamal Mohammedi, Mouloud Fellahi, Dr. Essaid Slaouti

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**Keywords:** *Desalination, Renewable Energy, Reverse Osmosis*

#### **Abstract**

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This paper focuses on the integration of renewable energies to the simultaneous sustainable production of water and energy for the desalination plant Tala-Oulili in Algeria. The exergy performances analysis has revealed the most destructive components of exergy (52.99% in membranes, 24.95% in pumps, 16.4% in the decanter, mixing chamber 3.08% and expansion valve 2.38% of the total exergy). These results provide key guidance points to design and optimize the installation. The exergy destroyed in the expansion valve can be recovered by replacing the expansion valve with a pressure exchanger (PX) which allows recovering up to 90% of the exergy lost in this component. Installing more efficient pumps and membranes will also reduce these losses. The proposed alternative hybrid renewable energy system (PV, wind turbine, hydraulic turbine, diesel genset and batteries) is integrated to the Desalination plant and optimized using HOMER software. Exergy analysis of the hybrid system shows that the hydraulic turbine seems more appropriate for this site, with an efficiency of 76.82%. It is therefore technically advisable, to consider the increase of hydropower installed capacity in order to optimize the production of energy as much as the brackish water will be used in the desalination station.

### **Effect of Alpha-cypermethrin on morphological parameters in tomato plants (*Lycopersicon esculentum* Mill.)**

Mr. Karim Chahid<sup>1</sup>, Amin Laglaoui<sup>2</sup>, Said Zentar<sup>3</sup>, Abdeslam Ennabili<sup>1</sup>

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**Keywords :** *Insecticides, Tomato, Seed germination, Plant growth*

#### **Abstract**

Devastating insects are responsible of losses in quantity and quality of agricultural production. To overcome this problem, farmers use pesticides, obtained by chemical synthesis and representing the major cause of agricultural contamination of soil and groundwater. Thus, pesticides may present important risks because of their persistence, biodisponibility and mobility, in spite of their correct application. In our research, we study the effect of alpha-cypermethrin (pyrethroids class), largely used in tomato (*Lycopersicon esculentum* Mill.) treatment in the Northern area of Morocco. The effect of alpha-cypermethrin on seeds germination and seedlings growth of tomato has been studied based on morphological parameters and by using four dilutions of the normal concentration used in agriculture (100%, 75%, 50%, 25%) for germinating seeds, and only the recommended concentration in agriculture for growing plants. Our results show that alpha-cypermethrin induced a delay of germination and growth process. The germination rate of treated seeds was generally 20% lower compared to control, and the length of roots and shoots in treated seeds and plantlets was significantly reduced.



## **Modeling and Simulation of Reverse Osmosis system with Renewable Energy**

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**Keywords:** *Reverse osmosis, Orthogonal collocation, Finite element method, Wind energy, Weibull*

### **Abstract**

The objective of this work is to study the possibility of substituting conventional electrical energy by a renewable energy such as wind energy. For that purpose, the meteorological data of some coastal regions of Algeria are studied to determine their wind potential.

Two mathematical models are developed to describe the operation of reverse osmosis modules. The two most used modes of circulations are studied: co-current and counter-current circulation modes. The resolution of the mathematical models developed for the counter-current flow pattern is subjected to the split boundary value problem. To solve this problem, a robust and efficient procedure based on orthogonal collocation on finite element method was developed.

Two checkings of both developed mathematical models, with their variants (with and without polarization concentration phenomenon), were carried out. The first checking was done with a real case which is the sea water desalination plant of Bousfer, Oran, situated in the west of Algeria. The second checking was carried out with previous work using reverse osmosis in a closed loop (concentration system). The results obtained in both cases show a good adequacy between the values obtained by both developed mathematical models and real ones.

The second part of this work was the assessment of wind resources of coastal areas for the study of a possible substitution of the electrical energy, produced by power plants, by electrical energy produced by wind turbines.

Statistical analysis begins with the study of time variation of wind speeds in the monthly, annual and multiannual scale. It is followed by the determination of the parameters of Weibull distribution. For that purpose, two methods were used: linear and non-linear regression. The Weibull distribution parameters enabled the calculation of the available specific powers at the level of every studied site.

## **Securing the Water Environment from Pollution “A Study on the Domestic and the International levels”**

Judge Dr. Mohamed Salah Abou Ragab<sup>1</sup>

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### **Abstract**

Public authorities play, on the domestic level, a significant role in securing the water environment from pollution. In addition to this, on the international level, many efforts are being exerted on the part of international scientific bodies and international judiciary to protect the water environment from pollution.

Research topic and its importance

This research study focuses on the means of securing the water environment from pollution at the domestic and international levels.

This research topic has a theoretical and scientific importance for several reasons, most importantly are the following:

- The literature on Public Law is in need for such specialized studies in the field of protecting the water environment, and protecting the population from environmental risks that are harmful to the health and endangers human life.
- Enhancing the role of public authorities in the protection of human rights from the risk of water environment contamination, since the environment, in general, and the clean water environment, in particular, are deemed inalienable human rights as framed within the so-called third generation of human rights, such as the right to a healthy environment, and the right to development, the right to peace.
- Clarifying the international stance from legal protection of the water environment.
- Strengthening the rule of law in states which recognize the fundamental human rights and seek to elevate and protect them from arbitrary management. The right to a healthy water environment pertains, also, to future generations. Thus, it is mandatory that the natural resources are manipulated effectively.
- Confirming the important role of national and international judiciary in the protection of the water environment from pollution, and protecting citizens from the dangers of water pollution and the consequent damage that endanger not only the present generations but also future generations.

### **Etude de la Contamination par les Eléments Traces Métalliques Plomb (Pb) Et Zinc (Zn) des Sédiments de l'Oued Aissi (Tizi Ouzou, Algérie)**

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**Keywords :** *Oued, Sédiments, Eléments traces métalliques, Pollution*

### **Abstract**

La pollution des eaux par les métaux est un problème d'actualité qui nécessite une prise en charge pour la protection des écosystèmes aquatiques. Les sédiments sont une composante fondamentale de ces écosystèmes et contribuent à leur diversité et à leur fonctionnement. Ils jouent un rôle de puits et peuvent stocker des quantités importantes de contaminants (métalliques et autres).

L'objectif de la présente étude est d'évaluer le niveau de contamination par les éléments traces métalliques, plomb (Pb) et zinc (Zn), des sédiments de l'Oued Aissi et ses affluents. Les sédiments superficiels ont été prélevés, en quatre campagnes de Mai 2008 à Février 2009, dans 21 stations choisies de l'amont en aval des cours d'eau. Les métaux ont été évalués dans la fraction inférieure à 45µm et dosés par Spectrophotométrie d'Absorption Atomique à flamme.

Les teneurs moyennes en mg/kg ms des métaux dosés sont de  $35,2 \pm 13,3$  pour le Pb, et  $123 \pm 65$  pour le Zn. Par analogie à la moyenne de fond géochimique mondial (40 mg/kg ms pour le Pb et 240 mg/kg ms pour le Zn), la première teneur est similaire à celle-ci alors que la deuxième est largement en dessous de cette moyenne. Les variations temporelles des teneurs en Pb et Zn des sédiments de l'oued Aissi révèlent des variations saisonnières importantes avec des teneurs élevées au printemps pour le Pb et en été pour Zn.

Le Pb et le Zn ont souvent une origine commune qui est due à l'action anthropique par les différents rejets domestiques et industriels. La fréquence du Zn pourrait être aussi attribuée à la nature de la roche mère (abondance des argiles).

### **Activation chimique de quelques argiles naturelles en vue de leur valorisation industrielle pour le traitement des eaux de rejets textiles**

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**Keywords :** *argile, caractérisation, adsorption, colorants textile, activation, traitement des eaux.*

### **Abstract**

Notre travail s'inscrit dans de le cadre de la valorisation des ressources naturelles en Algérie, particulièrement les argiles par leur utilisation pour le traitement des eaux de rejets industriels chargées en colorants synthétiques. A cette fin, nous avons effectué plusieurs essais de décoloration des effluents par adsorption en utilisant deux argiles naturelles issues de deux gisements différents ; l'un situé à Ain-témouchent (symbolisée par A46), et l'autre dans la région d'El Bayadh (symbolisée par A32). Les essais d'adsorption ont été effectué sur le vert



remazole 6B ; un colorant réactif très utilisé dans les ateliers de teinturerie de l'usine textile « SOITEX » de Tlemcen.

Les argiles ont fait l'objet d'une caractérisation minéralogique et physico-chimique par différentes techniques d'analyse : diffraction des rayons X (DRX), analyse chimique, analyse thermique (ATG/DTG) et spectroscopie infrarouge (IR).

Les résultats obtenus montrent que les deux argiles se présentent sous forme d'un mélange de plusieurs phases phylliteuses. L'argile A32 est essentiellement illitique avec présence d'une phase kaolinite et une phase interstratifiée (illite/smectite), par contre la kaolinite constitue la phase principale de l'argile A46 mélangée avec de l'illite, de la chlorite et de la smectite.

Les argiles ont été ensuite testées, sous leur forme naturelle et sous leur forme activée par un acide fort, pour l'extraction du vert remazole 6B en phase aqueuse. Différents tests d'adsorption concernant la cinétique, la capacité d'adsorption des argiles, le pH des solutions, ont été réalisés. Les résultats obtenus après optimisation des quantités de ces supports (les argiles) ainsi que les paramètres de traitement (temps de contact, pH...) ont montré des rendements d'élimination maximale à pH acide avec un taux de décoloration de 40% à 60%. L'isotherme d'adsorption du vert remazole 6B, pour les différentes argiles, est décrite par le modèle de Freundlich.

### **The Geomorphological Effects of Urbanization of the city of Karak-Jordan**

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#### **Abstract**

This study examined the effects of geomorphological urbanization of the city of Karak, where it was found and there is a clear role for the population increase, and increase the number of buildings and digging foundations in rock layers, and the expansion of land use, and geomorphological processes of it, that was interpreted to (44.1%) of the variance in the dependent variable (change in the forms of the earth's surface), change forms of the surface in the city of Karak, and the occurrence of landslides. 75% of the population of the city noted that, three of the biggest collapses occurred in the years 1987, 1993 and 1999 respectively. Also, different land uses, and cuts in the rock layers to create buildings or roads, frequent cesspits and repeat of the process of wetting and drying, and interference factors of the climate elements and special pattern of rainfall, sudden and thunderstorms, which reached in 1990/1991 to more than 200 mm in one day, contributed a clear role in the occurrence of landslides.

In addition, the nature of the rock formations of Karak area that fall within the faulty edge adjacent to the Rift valley of Jordan, which consists of sandy sediments weak back to the time of the first geological and calcareous sediments and Cretaceous softball dating back to the third geological time has also contributed to the occurrence of landslides. Also the steep slope location of the city, which is surrounded by many of the dry and deep valleys, make them susceptible to cutting contributed to the impact on water drainage and create the conditions for the occurrence of landslides.



## **Legal Regulation on Dam Construction on International Rivers: The compliance of Nile Basin upstream States of the Regulations,**

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### **Abstract**

There are many legal rules, which govern and organize the use of riparian states to realize consensus and harmonization between the considerations of sovereignty "principle" on its territory and the consideration of the interests of other states, sharing in this natural source.

The international philological associations have exerted many efforts to codify the customary practices of the riparian states. The most important one of these institutions are the Association of international law that codified the important legal rules in this field. Known as Helsinki Rules for 1966, the rules of Berlin 2004.

The International Law Institute has contributed in this scope with the Madrid declaration 1911 and Saltsburg declaration 1961. Meanwhile, the United Nations has deployed many efforts on codifying the rules governing the use of international rivers for non-navigation as evident in the convention on the non-navigational uses of international watercourses 1997, which are the fundamental legal base of future conventions related to International rivers.

It is evident that, if the riparian states are entitled to build water projects such as barrages and dams, these states are restricted and confined by certain legal limits; the obligation of not causing damages or harms to the other states of the river basin. This drainage is grave at the economic, environmental, social, ecological levels. Thus, a state wishing to construct dams shall abide by prior notification of planned measures with all studies and data related to the project concerned. The state shall also be pledged not to eventually build a dam until receiving an official prior consent in writing from the states affected or potentially affected by the project concerned.

In case of construction of dams on the river, the states is bound by the "Bona Fida" principle, good faith principle, the good neighborhood and the obligation to settle the disputes peacefully.

The current study tackles dam projects in up-stream states, and the extent of the application of International Law regulations governing on the use of water courses.

### **Effect of citric acid dipping solutions on decontamination of shrimps**

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## Abstract

Shrimps are one of the most important and expensive marine products. Increasing of seafood consumption like shrimps can contribute to a more healthful diet. Shrimp like any other seafood is a highly perishable product that provides favorable conditions for the growth and proliferation of various pathogenic and spoilage microorganisms. Serious attention has to be given to the aquaculture industry as fish can act as a source of human pathogenic bacteria. Accordingly, to prevent food borne pathogen illness from shrimp, pathogens in shrimp must be eliminated or reduced to a safe level and the pathogen growth in shrimp must be controlled. The aim of this research was to evaluate the impact of using organic acid by dipping in 1 or 3% citric acid solution for 3 minutes on decontamination of unpeeled shrimp. Decontamination of shrimps can led to extension of shelf life and preservation of shrimp quality. Shrimps were purchased from the Central Fish Market, Saudi Fisheries Company, northern Dhahban district of Jeddah, and fishermen. The effect of dipping shrimps in 1 or 3% citric acid solutions for 3 minutes on total viable bacterial count and total coliform count was studied. Results Show that dipping of samples in 3% citric acid solution for 3 minute led to decrease of the log. cfu of total viable bacterial count and coliform bacteria at least by one logarithmic cycle. The observed initial high log. cfu of total viable bacteria and total coliform before dipping may indicate the possibility of fishing regions contamination with sewage and lack of refrigeration during transport.



## Off Sessions' Abstracts

In this part of the Abstract Book, the abstracts of those authors who had applied for participation in the ICWRE-2013 but could not come to Geneva because of different reasons or withdraw their participation are collected. The abstracts are presented in the alphabetic order of the abstracts' titles.

### **An Evaluation of Samarra City Drinking Water Treatment Plants**

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**Keywords:** *Treatment plant, Turbidity, Samarra City, Raw water, Filtered water*

#### **Abstract**

Global population increases specially in developing countries such Iraq requires more effort and investment in water and sanitation facilities to enhance the welfare of people in meeting the MDG objectives. The competition for water resources coupled with the generation of wastewater is creates additional pressure on the available supplies and increasing pollution level. To address such challenges it has become necessary to build new or enhance existing treatment systems.

In different part of Iraq, including in Samarra City effort is being made to enhance the water quality concerning its physical, chemical, and biological characteristics as well as the minerals and organic substances that may produce adverse physiological effects.

In order to evaluate different aspect of water quality this study focused on evaluating the drinking water quality and also the performance of the two treatment plants in Samarra City located on the left bank of Tigris River to the north of Baghdad City. The investigation covered the period of December 2004 to May 2005. The first is the main conventional water treatment plant with a capacity of 2400m<sup>3</sup>/hr. and the second is a compact unit with a capacity of 200m<sup>3</sup>/hr. The collected water data cover some of the important physical and chemical parameters of water quality; covering temperature, TDS, turbidity, pH and residual chlorine. While the bacteriological parameters covered total plate count (TPC) and E-coli for stages of treatment plants.

The results show that turbidity of raw water is not high (3.84-425) NTU compared with Al-Karkh water project in Baghdad City (6-1400) NTU, because the intakes of WTPs are located in the downstream of Samarra barrage which serves as a pre-sedimentation tank. Low clarifiers turbidity removal efficiencies of (48.323 %) and (32.09 %) were obtained for treatment plant and compact unit respectively, while for filters removal efficiencies were (63.2 %) and (39.05



%) respectively. The monthly average turbidity of supplied water for conventional water treatment plant and compact unit were (4.3 and 18.2) NTU, the percent of violation to Iraqi Specifications were (29.4 % and 64.7%) respectively. Not always, increasing in raw water turbidity result in an increase in turbidity removal efficiency. pH values and TDS concentrations of supplied water are within Iraqi, EPA and WHO Specifications. Low amount and interrupted chlorination in WTP and CU, so, irregular chlorination results in frequent outbreak of waterborne diseases.

It can be recommend to improve the water quality monitoring program through the application of; coagulant aids to overcome the high turbidity of raw water during the rainy season, the hexagonal tube settler in the sedimentation tank of the compact unit to get the designed SOR and anthracite with sand as a dual porous media to increase the filtration rate to overcome the shortage in hot seasons. In addition, periodic systematic maintenance for different units of treatment plants is required.

### **Seepage Phenomenon for Wadi Megenin Dam**

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**Keywords:** *Seepage, GPR, Dam, Megenin*

### **Abstract**

Most of the recorded dam failures around the world are related to seepage problems. Therefore, to avoid failure of earth dams due to seepage, settlement, and piping, continuous field observations are essential.

The Megenin dam is a 38 m high rock fill dam located 75 Km south of Tripoli. A concrete cut-off wall and grout curtain were constructed below the dam body to prevent reservoir seepage through the foundation. The dam was constructed in 1972, for two main purposes; first to control floods for the cultivated fields downstream and to protect Tripoli city, secondly to collect water for irrigation.

On 15<sup>th</sup> May 2003 during the 3<sup>rd</sup> filling, the water level in the reservoir reached the level +271.86 m, while seepage water was observed in the wadi bed downstream of the main dam. These phenomena were also observed in previous times. The Piezometric water level was much higher compared to that previously measured. To assess the seepage phenomena and its impact on dam safety, a study was carried out applying the technique of ground penetrating radar



survey (GPR), piezometric analysis, and temperature field evaluation. In addition, a flow net model was constructed for the dam. The results of the study showed that:

- GPR profiles describe critical zones in the dam site.
- Identify the water seepage paths from the reservoir to the downstream side of the dam.
- Determine the amount of total water seepage capacity through the dam foundation ( $Q=0.08 \text{ l / s}$ ).
- The essential points to avoid any problem that may occur in the future in Megenin dam due to seepage problems.

### **The Use of SCADA System in Water Resources Management. Management of Shatt Al-Hilla in Iraq as a Case Study**

Asst. Prof. Dr. Najm Obaid Salim Alghazali<sup>1</sup>, Rafid Mustafa Alkhaddar<sup>2</sup>, Humam Amer Hadi<sup>3</sup>

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**Keywords:** *SCADA, PLC, Routing, HEC-RAS, Shatt Al-Hilla*

#### **Abstract**

The operation of hydraulic structures needs the presence of a number of specialists to make decisions to instantaneous takes actions at an appropriate time through controlling, monitoring, and giving a suitable warning for any undesirable cases like increasing water level higher than the normal level, stopping of any device. One of the monitoring tool is SCADA system which can allow the water manager to continuously compare the actual hydraulic state of the system with its optimal hydraulic state, and to take appropriate corrective steps as required. The proper application of the system in irrigation districts, can lead to improved water delivery service to farm, more effective operations, and in some cases a reduction in costs (less labor, less energy).

In order to demonstrate the suitability of monitoring system such as the SCADA system, it was applied at Shatt Al-Hilla situated in Hilla city, 100 Km south of Baghdad city in Iraq. It is the main channel that is branched from the left side of Euphrates River, just upstream the Hindiya Barrage. The system was applied at a 33 Km reach from station (0+000) to station (33+000) and simulating the controlling of the head regulator at station (0+000).

SCADA system components consisted of a computer server as a master station, interface field data devices usually RTUs, or PLCs to allow interface between field sensing devices and local control switchboxes and gate actuators, communication system to transfer collected data and



appropriate standards and or custom software. The hardware architecture of SCADA system was established for this reach and the controlling of the head regulator of Shatt Al-Hilla at sta. (0+000) is simulated. The head regulator of Shatt Al-Hilla was run for three cases with six scenarios. The first case is for the daily discharges supplied to the head regulator for the year 2011, the second case is for the monthly water demanded to the head regulator (2011), and the third case is for the daily discharges that can be supplied to the head regulator for 2012 summer season. All cases and scenarios simulation produced good results except scenario (6) for the three cases because there are deficits in supplying the discharges in many days through the year, Also for case (2) there are deficits of 1.57%, 16.67%, 18.46%, and 14.04% of the total demanded discharges for Mar., Apr., June, and July respectively.

### **Evaluation du Degré de la Pollution Organique des Eaux de Surface : Cas des Barrages Hammam Grouz et Beni Haroun**

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**Keywords:** *Eau de surface, barrage, pollution organique, MO, DBO5, DCO.*

#### **Abstract**

La présente étude vise à évaluer la qualité physico-chimique ainsi que le degré de pollution organique des eaux de deux grands barrages importants dans l'est algérien ; Hammam Grouz et Béni Haroun, à travers la mesure de certains paramètres de la physico-chimie (T°, pH, CE) et la détermination des teneurs de six éléments paramètres révélateurs : (DCO, DBO5, MO, NH4, NO2 et NO3). Ces deux barrages sont alimentés par l'oued Rhumel important cours d'eau dans le Constantinois. Deux points de mesures ont été sélectionnés en des lieux stratégiques, et échantillonnés une fois par mois durant l'année 2009. La détermination de ces paramètres s'est effectuée selon des méthodes standardisées à l'échelle mondiale. Les résultats obtenus montrent des mesures et des teneurs assez élevées enregistrées surtout pour les eaux du barrage Hammam Grouz. Les moyennes et écarts-type des paramètres de pollution exprimés en mg/l pour les barrages Hammam Grouz et Béni Haroun sont respectivement: T [°C] (18±7.5 ; 20±7), pH (7.9±0.15 ; 7.7±0.21), CE [µS/cm] (956±43 ; 1114±44), MO (8±10 ; 8±5), DBO5 (7±4 ; 5±2), DCO (78±77 ; 39.75±6.27), NH4+ (0.48±0.53 ; 0.09±0.13), NO2- (0.25±0.11 ; 0.15±0.14), NO3- (15±3 ; 6.5±3.2). Ces teneurs préfèrent une qualité passable aux eaux de Béni Haroun et une qualité passable à mauvaise à celles de Hammam Grouz où la charge organique est élevée traduisant par voie de conséquence la présence de la pollution organique.





## **Scheduling Pumped Hydro Power Storage Systems under Price and Flow Uncertainty**

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***Keywords: Pumped Hydro Storage Systems, Electricity Price, Optimization, Scheduling***

### **Abstract**

Hydroelectric power plants are important energy resources as they are environmentally friendly, have low level of potential risks and they are relatively cheap. If properly utilized, it can replace some thermal power plants and hence decrease the harmful effects to the environment. A Pumped Hydro Storage System that is a special type of hydroelectric power plant can be used to store energy and to use the water more efficiently. When the energy demand and the energy price are high (peak hours), the water at upper reservoir is used to generate electricity and the water is stored in the lower reservoir. Revenue is gained from the power sale to the market. When the demand and the energy price are low (off peak hours), the water at lower reservoir is pumped back to the upper reservoir. Cheap electricity is used to pump the water. The hourly market price and water inflow are uncertain. The main objective of a company is to find an operation schedule that will maximize its revenue. In this paper, we develop a model that includes hourly inflow and power price data and delivers an operation schedule. Historical water inflow and power price data are used to generate scenarios. A real case study is developed to validate the model based on the historical river data and electricity prices.