ICWRE

International Conference
For Water Resources &
Environment

GIWEH

Marrakech– Morocco,
20–24 November 2011

GIWEH - ICWRE

ABSTRACTS

GIWEH, 3, rue de Varembé- CP 116, 1211 Genève 20 - Suisse,
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ICWRE 2011

International Conference For Water Resources & Environment

Water and Environment in a Changing World

Global Innovation Outlook – Morocco 2011

Preface

*The Global Institute for Water, Environment, and Health (**GIWEH**), Geneva - Switzerland and the International Center for Remote Sensing and GIS, Amman – Jordan, in partnership with the University of Geneva - F.-A. Forel Institute, Geneva – Switzerland, the University of Sidi Mohamed Ben Abdellah (USMBA), the Faculty of Sciences and Technology of Fez- Morocco (FST – Fez), the University of Abdelmalek Essaadi - Morocco, University Cady Ayyad, the Faculty of Sciences Semlalia of Marrakech, the Faculty of Sciences and Technology Gueliz, the University of Abdelmaled Essaadi, of Tetouan and in collaboration with the United Nations Environment Program (UNEP), the World Intellectual property (WIPO), the United Nations Institute for Training and Research (UNITAR), will hold the first of GIWEH's Water Series conferences that will address multidisciplinary issues across all areas of the global water and environment sector and will also focus on the issue of the "Future prospective – Global Innovation Outlook on Water and Environment," on 20th November 2011 at the conference center in Marrakech- Morocco, devoted to **Sustainable Water Use and Management: Leading and Learning.***

The future adequacy of freshwater resources in the global scale is difficult to assess, owing to a complex and rapidly changing geography of water supply and use. Water resources in arid and semi arid regions face globally the greatest pressure to meet growing needs. The Middle East is "the most concentrated region of (water) scarcity in the world and of vulnerability to water shortages". Water scarcity becomes most acute when considering demand and supply in the context of future socio-economic and natural changes that may occur. The socioeconomic factor with the greatest potential impact is population growth; the natural factor of greatest concern is climate change.

Environmental threats and challenges are continuously becoming a fact evident and alarming. The global environmental crises affect every one of us. No one can escape the global consequences of the environmental challenges.

Water security is not only a challenge of physical scarcity of water, but it is deeply rooted in power, poverty, and inequality. There is a major difference in these two concepts of an actual physical scarcity of water compared to lack of access to water due to economical, political, social and environmental reasons. Beyond the challenges related to the management of resource scarcity there are hydro - political and trans - boundary considerations. The cycling of water exerts an important control on climate variability as a result of its complex feedbacks and interactions with other components of the climate system.

This conference aims to address challenge and inspire the water and environmental community by sharing knowledge and best practice, which is at the heart of meeting key global challenges. GIWEH - Environment conference is a series of continuous cycle of symposiums, workshops and conferences aimed at bridging the gap between policy and science in water and environmental management. The conference will be held at Marrakech – Morocco from 20 to 24 November 2011 at the conference Congress palace of Marrakech by stressing the need for leaders to innovate in different but interrelated dimensions of water and environment management. The objectives are to identify patterns of effective leadership for positive change through success stories.

There will be a mix of keynote speakers, offered papers, exhibitions and networking opportunities that will make this the key event for water and environment professionals.

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Themes of the Conference:

1. Water and Environment Technology

- Environment Technology
- The promise of Technical Solutions
- Green technologies as Future Growth Engines (Investment in Green Economy)
    - *Renewable Energy,*
    - *Transport, cities and fuel energy,*
- Emerging water technologies
    - *Waste treatment technology,*
    - *From drip irrigation,*
    - *Water recycling,*
    - *Reclamation,*
    - *Wastewater reuse,*
    - *Water and sanitation rechnology,*
    - *Desalination,*
    - *Water harvesting.*

2. Water and Environment Security and Diplomacy

- Global, regional and local challenges (Transboundary issues),
- Strategies and policies (Local and regional),
- Assessing Needs vis-à-vis Rights,
- Hydropolitics,
- Negotiations and agreements,
- Third party role.

3. Environmental and water Management (Multidisciplinary aspects)

- Socio-economic constraints,
- Environmental Legisltion and its application,
- Physical material,
- Socio-centric vis a vis techno-centric solutions.

4. Geomatics, Remote sensing and GIS Technology in Water and Environment Management.

- Applications of space-borne sensors for hydro-meteorological extremes,
- Water resources management and climate change studies,
- Improve international collaboration on scientific and technical research.

5. Climate Change and Global Warming.

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Relation Climate – Hydrology in the Mikkes basin (Morocco)

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This work studies the drought and its effects on the flow of the stream Mikkes during the period 1968-2009. Mikkes basin is located at the northern center of Morocco. It is limited on the North by Prerif and Prerif Ridges, on the South by the Middle Atlas Tabular. The yearly approach of the P<2T ratio reveals a bad monthly distribution of precipitations and a seasonal drought which is being observed especially after the Eighties of the last century. Analysis of monthly medium flows between 1968 and 2009 shows a rough oceanic system which is characterized by two hydrological seasons. First a period of high waters in winters which is conditioned by the pluviometric contributions and a second is a low water in summer which is conditioned by an evapotranspiration. The mode of this River can be a pluvio-evaporal type. The positive correlation and proximity of temporal fluctuations curves between the River flow and the piezometric level of Saïs phreatic aquifer outside flood periods, suggests the assumption of a supply - drainage relationship between the aquifer and the River. The high deficit of the stream Mikkes (between 1968-1979 and 1980-2009) is about 76% and could be the combined effect of drought and exploitation of groundwater.

Key words: Mikkes basin, drought, pluviometry, evapotranspiration, flow, deficit.

Hydrogen of Wadi Turbah, Saudi Arabia

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Wadi Turbah is located 130 km south east of Taif City, Saudi Arabia. The area of study encompasses 19 km^2. The Wadi Turbah catchment basin, covering an area of 2,480 km^2, ranges in elevation between 1,260 and 2,400 m above sea level. Wadi Turbah consists of three major wadis (Wadi Aridah, Wadi Shuqub, and Wadi Buwwah). The average precipitation is 337 mm/yr. Based on 18 years of data, total average runoff is 7.6 x 10^6 m^3, which is about 10 percent of the precipitation.

The aquifer in this area is alluvium along wadis. The aquifer which supplies Taif City is unconfined and the average thickness of alluvial deposits is 14 m. Aquifer parameters of the city area indicate the average transmissivity at Well Field A is 10,600 m^2/day; specific yield averages 0.17. For Well Filed B, the average transmissivity is 10,400 m^2/day and specific yield averages 0.10. Annual water consumption of Taif City from Turbah Basin is approximately 50 percent of the safe yield. About 60 percent of the extraction of Taif City is from Well Field A.

Resistivity and seismic studies exhibit general agreement with water-table measurements. The resistivity method indicates relatively good agreement in predicting bedrock depth, with a 2- to 4-m difference when compared with lithologic data.

Water quality in the study area is good at the present time. Measurements taken before and after flooding indicate a substantial decrease in sulfate concentrations, indicating that water which infiltrated into to the aquifer after the flood caused a dilution of sulfate.

Water demand for Taif City in 1999 will reach 1.04 x 10^6 m^3/yr, causing an imbalance in ground-water storage. The construction of retaining dams in the wadis could trap 7.56 x 10^6 m^3 of runoff per year, extending the time available for infiltration and increasing the recharge to the aquifer to compensate for the increased pumping rate.

Harvest Water by Using Remote Sensing and GIS Techniques in Nineveh governorate / Iraq

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For many years, peoples trying to speculate water to improve their civilized and comfortable life. Rainfall considers as one of the most important source of water in drought and semi-drought regions, sometimes it is the only source in these regions. During the past years, human beings tried hardly to develop strategies for harvesting water, utilizing all their gained experiences and knowledge. Also many branches of sciences are employed for this purpose. In this project, three scientific tools have been integrated and conducted to accomplishing harvest water. These tools were: *Remote Sensing (RS), Image Processing (IP)* and *Geographic Information System (GIS)*. Each of these tools has been directed to perform certain required part of the project.

In Iraq, there are large regions suffering water scarcity and water shortages. For example, *Nineveh governorate*. It is almost plain land with few small valleys and few plateau or highland. This region is regarded as to be semi-dry or drought region. Thus, harvesting seasonal rain sources seem to be possible solutions for future demands for water supply.

Digital Elevation Model (DEM) and topographic map (scale 1:100000) for the studied region have been coupled with natural satellite ETM+ and SPOT scenes to buildup the required database for GIS environment and analyses which is include; *Spatial Analysis, Attribute Analysis, Terrain Analysis, 3D Analysis beside Watershed Analysis*. The result of these analyses are getting forbidden regions (i.e. to be avoided) and permitted regions for locating sites of water's reservoirs. As an example, three locations of water's reservoirs are suggested. Basin characteristics are calculated for these suggested reservoirs. Also, the drainage quantity and max flow runoff of water for these basins are calculated depends on rainfall quantity and soil texture of study area.

Dynamic expansion and urban style of Greater Cairo Metropolis, Egypt

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Since 1980th, rapid population growth and urbanization have become issues in big cities in developing countries like Greater Cairo. As a consequence of explosive growth, the living conditions of Cairo Metropolis deteriorate. Development trends of the last twenty years have increased general wealth and modernization, at a time of a high rate of population growth, thus creating an increased demand for land combined with environmental degradation.

Planning a sustainable development of urban areas requires understanding of growth dynamics of urban systems. This talk will be concerned with monitoring and analysis of dynamic environment to capture and refine the urban patterns in Greater Cairo Metropolis on the basis of pixel-based and object-based classifications. Satellite images (TM, ETM, & Spot) of different points in time and resolution, and ground truth data were collected from available maps, field observation, and personal experience were used to execute the image segmentation analysis to reveal urban patterns and expansions.

By using geographic information system (GIS), thematic multi-temporal maps were constructed, which showed regimes and trends in urban growth change.
The results maps based on object segmentation have more accurate results than the results maps based on pixel classification module.

Two main types of urban styles could be detected (passing from center to periphery). The first one is informal and the second one is formal building. The informal type mainly comprises slums and urban encroachment on arable land. The formal one mostly consists of new cities and legal houses. Moreover, a rate of urbanization growth during the last three decades would be described as geometrical progression.

Allelopathy and planting geometry an alternative for weed management and enhancing corn yield

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Synthetic herbicides cause threats to the human health and ecosystem. There is a need to search for alternatives for weed control. Allelopathy and planting geometry are the possible alternatives for weed management and maximum grain yield. The aim of this study was to evaluate the response of corn to allelopathy and planting geometry. Corn was planted in 75, 85 and 95 cm apart rows at New Developmental Farm, Khyber Pakhtunkhwa Agricultural University Peshawar during 2006. Two allelopathic crops i.e., sorghum (*sorghum bicolor L.*), sunflower (*Helianthus annuus L.*) and one leguminous crop i.e., mungbean *(Vigna radiata Wilczek)* were intercropped in corn rows along with sole corn with no weeding and sole corn with hand weed control. Row spacing and allelopathic crops significantly affected number of grains ear^{-1}, 1000 grain weight and weeds dry weight. Corn planted in 75 cm apart rows produced maximum grains ear^{-1} (440), 1000 grain weight (282.5 g) and grain yield (3497kg ha^{-1}), whereas in allelopathic treatments, maximum grains ear^{-1} (417, 1000 grain weight (292 g) and grain yield (3938 kg ha^{-1}) were produced by hand weed control treatment. Sorghum intercropped in corn rows suppressed weeds dry weight more effectively compared with other treatments. It is concluded that corn planted in 75 cm apart rows intercropped with sorghum performed better in suppressing weeds and producing higher grain yield of corn.

Key words: Allelopathy, geometry, weeds dry matter, grain weight, yield, maize

Evaluation de la contamination metallique des effluents urbains par les effluents de l'hôpital Mohamed V de meknès, Maroc

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Dans les pays en développement les eaux résiduaires sont très sollicitées à l'état brut par les agriculteurs pour l'irrigation des diverses cultures et ce en raison de la pénurie en eau, son coût élevé et le prix élevé des engrais chimiques. La ville de Meknès, au Maroc, occupe la seconde place en ce qui concerne la superficie des terrains agricoles irrigués par les eaux usées. La gravité s'accentue beaucoup lorsque ces eaux usées comportent d'autres effluents spécifiques à savoir par exemple des effluents industriels, hospitaliers etc...

Ainsi les eaux résiduaires urbaines du quartier Ain Choubbik sont largement réutilisées par les riverains pour l'irrigation des cultures maraîchères, céréalières et arboricoles. Ces eaux résiduaires sont réceptacles des effluents de l'hôpital Mohamed V qui se dote d'une importance régionale et nationale immenses.

Par conséquent les effluents de cet hôpital pourraient avoir des impacts néfastes sur les effluents urbains et en fin de compte sur la santé des consommateurs. Ils comportent divers types de pollutions; microbiologique, physico-chimique, minérale et métallique.

L'objectif de la présente étude est de caractériser la pollution des eaux résiduaires du quartier Ain Choubbik par les éléments traces métalliques toxiques et de déterminer les impacts des effluents hospitaliers pollués par ces éléments traces, sur ces eaux résiduaires urbaines réceptacles de ce quartier. Ces analyses ont été faites par la spectrométrie d'émission atomique par plasma à couplage inductif (ICP-AES).

Les résultats confrontés et comparés à ceux des effluents bruts hospitaliers ont révélé que ces effluents ne présentent pas d'impacts néfastes sur les eaux résiduaires réceptacles.

Mots clés : Eaux résiduaires, pollution, environnement, santé, éléments traces métalliques toxiques, ICP-AES.

Ebauche de simulation de la recharge par les eaux de surface de la nappe phréatique plio-quaternaire du N'Fis (Haouz- Maroc)

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La surface piézométrique de la nappe phréatique plio-quaternaire au niveau du bassin versant N'Fis a enregistré un abaissement préoccupant de l'ordre de 20m entre 1986 et 2006. Ce décrochage de la nappe résulte de l'augmentation de la demande en eau douce dans tous les domaines: consommation des ménages, agriculture et industrie. Ainsi, et face à cette situation, il a été primordial de faire appel à la modélisation mathématique régionale grâce au logiciel GMS 6® dans le but de proposer un aménagement hydraulique adéquat. Après le calage du modèle en régime permanant, les simulations en régime transitoire à pas mensuel, ont montré un équilibre hydrique de la nappe durant la période 2001-2006 (déstockage de 1,2%). Le scénario d'une alimentation « artificielle » de la nappe par un débit de 350 l/s durant 15 jours, a induit une remontée piézométrique maximale de 6,87 m.

Ces résultats prouvent l'existence réelle d'une interaction immédiate entre les eaux de surface et les eaux souterraines à travers oued N'Fis. Toutefois, il serait intéressant d'utiliser le modèle régional N'Fis pour une future étude afin d'affiner le maillage et étudier la recharge de la nappe à travers des différents scénarios d'exploitation pour les années à venir.

Mots clés : Nappe phréatique plioquaternaire- modélisation mathématique-bassin versant N'Fis- GMS 6

Apport du SIG à l'affinement des études hydrologiques : Cas du bassin versant de Rheraya (Maroc)

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Pour approcher la relation possible entre eau de surface et eau souterraine dans le piémont du Haut Atlas, au contact de l'oued Rheraya avec la Plaine du Haouz (Maroc), une approche spatialisée par l'utilisation des Modèles Numériques de Terrain (MNT) sous SIG a été tentée. L'objectif était la délimitation des sous-bassins ainsi que les lignes de drainages couvrant la zone zone. Les MNT existent sous plusieurs types selon leur mode de capture, la version ainsi que la résolution en pixels. Le choix du meilleur MNT a été opéré entre trois types, en l'occurrence l'ISTAR, le SRTM et ASTER avec une résolution de 100m, 3 arcs seconds (90 m) et 30 m respectivement. Ce choix est établi à partir de l'application d'un ensemble de formules statistiques qui sont la RMSE, la $RMSE_{(V/RH)}$, l'écart-moyen et le coefficient de détermination.

Les 437 points géodésiques de calage de la carte topographique de Tahanaout pris comme référence pour estimer statistiquement l'erreur que fait le MNT avec la réalité. Ces points sont bien dispersés sur la carte topographique, digitalisés sous ArcGIS 9.3®. Afin que la comparaison soit bien estimée, on a séparé la zone en deux parties par un seuil arbitraire de 900m d'altitude isolant l'aval et l'amont chacun d'eux contient respectivement 218 et 219 points. Les formules sont appliquées sur chaque partie et par la suite sur toute la zone confondue. Les résultats montrent que le SRTM est le plus adéquat à notre étude (Tab. 1) puisqu'il montre les plus basses erreurs RMSE = 12,51m, RMSE.(V/RH) = 15.64m, l'écart moyen = 8,32m. Sous Arc Hydro Tools version 1.4, le SRTM a servi pour atteindre notre objectif qui est la détermination des sous-bassins dérivant du bassin versant de Rheraya ainsi que les lignes de drainage.

Mots clés : SIG, MNT, hydrologie, bassin versant, sous bassin, ligne de drainage.

Tableau 1 : L'estimation de l'erreur sur les MNT de la région de Tahanaout (Maroc)

MNT	RMSE	$RMSE._{(V/RH)}$	Ecart moy	R^2
ASTER	14,41	48,04	9,59	0,999
ASTER réduit	14,72	18,39	9,98	0,999
SRTM	12.51	15,64	8,32	0,9997
ISTAR	39,92	39,92	19,25	0,9945

Elaboration d'un SIG pour orienter les decisions de planification de l'alimentation en eau potable des ecoles rurales, province de Settat

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Au Maroc, bien que les domaines d'application du SIG soient nombreux et divers, l'intégration des données spatiales comme outil d'aide à la décision dans les processus de programmation et de planification de l'alimentation en eau potable reste plus ou moins limitée. Ainsi, l'action du la présente recherche vise à soutenir et assister les différents opérateurs et intervenants dans ce domaine, à intégrer de façon opérationnelle toutes les données concernant les ressources et les ouvrages d'eau dans le processus de gestion et de planification. Cette contribution consiste d'une part à la production de produits cartographiques et thématiques à valeur ajoutée et d'autre part à la formation et la sensibilisation des institutions concernées sur l'utilisation et l'apport des technologies spatiales en matière des ressources en eau.

Le système développé fait appel aux données sur l'AEP existant et programmé, à la carte de productivité qualité des eaux souterraines et aux données des écoles rurales. Le processus de planification se base sur l'utilisation de la base de données spatiale comme outil d'aide à la décision sur les localités d'intervention. Ce processus débute par la superposition, la « symbology », l'analyse, le croisement, les sélections pour arriver à la programmation et le choix des zones d'intervention.

L'outil développé dans le cadre de cette recherche, a trouvé ses premières applications, dans la cadre du Projet PAGER/Settat-phase II, à travers l'identification des sites d'intervention projets d'alimentation en eau potable des écoles publics ruraux dans la province de Settat.

Mots clés : Settat, SIG, Ressource en eau, AEP rural, PAGER Settat, Ecoles rurales.

Assessment of E-Waste Management in Dhaka City: Issues and Strategies towards Sustainable Development

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During the last decade the electronic industry has flourished throughout the world as the largest and fastest growing manufacturing industry and eventually it has become a driving force to the socio - economic and technological growth to a greater extent. Subsequently the revolutionary turn-over of Information and Communication Technology (ICT) has resulted a fast-growing surplus of electronic waste not only in industrialized but also is gravitating towards developing countries. The challenge of e-waste is of greater concern in developing countries like Bangladesh because most of these countries lack the capacity for handling and recycling the hazardous materials from e-waste. This leads to disposal of both e-waste and municipal waste without segregation in dumpsites hence posing threat to the environment as well as health risks to the population at large. The existing practices of e-waste management in Bangladesh is facing a number of drawbacks such as difficulty in segregation, lack of pertinent recycling, inadequate legislation, public unawareness and absence of overall waste management. It is an emerging problem as well as a business opportunity of increasing significance, given the volumes of e-waste being generated and the content of both toxic and valuable materials in them. The study mainly focuses on the related issues and strategies to mitigate this emerging problem in context of Dhaka city by proposing a waste management system with shared responsibility for the collection and recycling of electronic wastes amongst the manufacturers/assemblers, importers, recyclers, regulatory bodies and the consumers. This study also delineates an overview of the e-waste landscape in Dhaka city through a baseline study focusing mainly on computers and other IT equipment including mobile phones and TVs. This was done by acquiring data and analysis of the e-waste through literature review, interview with stakeholders, field study questionnaires and on-site assessment.

Keywords: Hazardous material, Health risk, Recycling, Sustainable development, Environmental impact.

Impact of desalination of seawater on the environment in the station MAINIS. Chlef, Algeria

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Desalination of seawater possible in particular to increase the freshwater resources available to provide a solution to drought and to cope with shortages and crises. Still several drawbacks: negative environmental consequences (of brine discharge, chemical effluents ...), the high energy demands (and therefore impact on climate, plants are mainly powered by fossil fuels) and a high selling price of water and produced.

Despite the many advantages of desalination's Its advantages and disadvantages should be assessed in terms of costs and benefits, societal and environmental, and compared to other methods of producing fresh water environmental impact remains a major concern.

Keywords: desalination of sea water, brine, impact, energy, chemical effluent.

Desalination through nanotechnological *FO* membrane

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Forward osmosis (FO) using a semi-permeable membrane may be a viable alternative to reverse osmosis as a lower cost and more environmentally friendly technology in desalination water treatment plants. The driving force in the described FO process is an osmotic pressure gradient that is used to induce a net flow of water through the membrane into the draw solution, thus effectively separating the feed water from its solutes. In contrast, the reverse osmosis process needs hydraulic pressure as a driving force for separation. An additional distinction between the reverse osmosis (RO) and forward osmosis (FO) processes is that the water permeating the RO process is in most cases fresh water ready for use. In the FO process, this is not the case; the membrane separation of the FO process in effect results in a "trade" between the solutes of the feed solution and the draw solution. Depending on the concentration of solutes in the feed and the intended use of the product of the FO process, this step may be all that is required. The forward osmosis process is also known as osmosis or in the case of a number of companies who have coined their own terminology 'engineered osmosis' and 'manipulated osmosis'. Areas of current review in FO involves the direct removal of draw solutes by thermal means. This process is typically referred to as the "ammonia – carbon dioxide" FO process, as the draw solutes are salts formed from the mixing of ammonia and carbon dioxide gases in water. A second area of current review in FO also involves direct removal of draw solutes, in this case by means of a magnetic field that Nanoscale magnetic particles are suspended in solution can creating osmotic pressures sufficient for the separation of water from a dilute feed. Once the draw solution containing these particles has been diluted by the FO water flux, they may be separated from that solution by use of a magnet. Another key area in FO process is Membrane characteristics that can be improved by the use of nanoparticles. The application of nanoparticles in membranes can thus decrease the energy demand, the use of chemicals for membrane cleaning, and cost. Forward osmosis is a brilliant physical principles rule that need more researches' focus to lessen it limitation.

Pre-ozonization of drinking waters of the town of Algiers (Algeria)

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The city of Algiers is supplied with drinking water by the Boudouaou treatment station, which draws its raw water from the Keddara dam reservoir (150 million cubic meters capacity). The treatment process is a conventional one: prechlorination, coagulation-flocculation using alum, settling (superpulsator), rapid sand filtration, and final chlorination.. The results of process monitoring show that the total organic carbon (TOC) content remains high and that the AOX content increases due to interaction between NOM and chlorine.

This aim of this paper is the substitution of the prechloration by an pre-ozonization . This substitution showed that ozone was more effective than chlorine. Indeed, for an ozone concentration of 0.93 $mg.l^{-1}$, and after a coagulation-flocculation, the AOX are eliminated perfectly. A very good elimination of the organic matter (88 % measured by absorptance UV to 254 Nm) is obtained. Comparatively under the same working conditions, the prechloration carried out to a concentration of 1.5 chlorine $mg.l^{-1}$, allowed a reduction of the organic matter of 64 % (measured by absorptance UV to 254 Nm) and a production of organohalogen compounds (AOX) a concentration of about 200 µg.l-1.

Ground Water Quality of Ninevah Plain NE of Mosul

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Water quality is an important issue in ground water studies and is just as important as its quantity. The main objectives of this study are to determine the chemical and physical characteristics of ground water and to asses its quality for determining its suitability for domestics and irrigation purposes. Ground water samples were collected from 20 drilling wells, during field work in Aug. 2010, for the analysis of their chemical composition of major cations and anions. The analysis comprises physical and chemical parameters of ground water such as; Ec, pH, TDS, Na, K, Ca, Mg. HCO3, CO3, SO4, Cl and NO3.

Basement rocks of the studied area are represented by Al-Fatha Formation of Middle Miocene age which consist of gypsum, clay, anhydrite and lime stone. It is overlain by Quaternary sediments which are characterized by highly permeable beds and wide geographical distribution.

Hydrochemical parameters are analyzed graphically by Piper diagram using Rockwork 2006 software, to show the suitability, type and geochemical evolution of the ground water. Richard and Wilcox classification are also used to show the suitability of ground water for irrigation.

Some of the groundwater samples show high concentration of NO_3 which is more than the permissible level of the WHO guide line, and this become more risky for human life.

According to the results of chemical analysis of ground water samples, types of water are of $CaSO_4$, Na_2SO_4 and mix Ca-Mg-Cl. More over ground water samples are of high TDS, high TH and generally low alkaline in nature. High to very high salinity hazards shows that this kind of ground water can be used for plants having good salt tolerances.

The over all quality of ground water samples of the studied area in most chemical constituents is on the higher side due to dissolution between infiltrated rainwater, ground water and host rocks and also due to agricultural and domestic activities.

Diagnostic de la qualité des eaux de surface et souterraine du bassin versant de l'oued Soummam, Algérie

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Le présent travail, réalisé dans le cadre des programmes Tassili et AUF, propose un diagnostic de la qualité physico-chimique et de l'état de pollution des eaux de surface et souterraines de la vallée de la basse Soummam, en Algérie.

Ce travail repose sur des mesures ponctuelles de paramètres physico-chimiques (température, pH, MES, DBO, DCO, O dissous, potassium, magnésium, calcium, chlorures, nitrates, sulfates, métaux lourds…) sur : 4 stations situés le long de l'oued Soummam en période d'étiage de 2002 à 2004 pour les eaux de surfaces ; 17 forages/puits répartis le long de la vallée de la basse Soummam en hautes et basses eaux de 2002 à 2006 pour les eaux souterraines.

Les eaux de l'oued présente une forte charge polluante d'origine organique, exprimée par des concentrations moyennes en MES, DCO et DBO_5 dépassanrespectivement 100, 75 et 50 mg/l. Les analyses physico-chimiques ont montré également une mauvaise qualité des eaux souterraines et l'existence d'une pollution se traduisant par un excès des teneurs de la majorité des éléments analysés.

Que se soit pour les eaux souterraines ou de surface, on constate un gradient croissant de la pollution allant de l'amont vers l'aval. Cette charge est due essentiellement au volume important des rejets urbains et industriels vers l'oued, mais également pour les eaux souterraines, aux processus géochimiques naturels liés à la nature des substrats. L'oued Soummam a été classé comme extrêmement pollué par comparaison avec d'autres rivières à l'échelle du globe.

Il s'agit d'une des premières études sur la variabilité spatiale à la fois des eaux souterraines et de surface en Algérie, combinant plusieurs paramètres physico-chimiques. Cette première investigation pourra servir de base et de référence pour de futurs travaux et une meilleure compréhension de la qualité de l'eau en Afrique du Nord et sur le bassin méditerranéen.

Inactivation of *E. coli* by pulsed electric field and dielectric barrier discharge plasma

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Energy efficiencies of pulsed electric field (PEF) treatment and dielectric barrier discharge (DBD) processing for inactivating *E. coli* were compared with several sets of experiments. The PEF system was operated in different modes according to the methods of working gas injection into biologically contaminated water: gas injection through tubular high voltage electrode and gas injection at the bottom of the reactor vessel containing the water. Effects of operating parameters including type of working gas, pulse frequency and direction of gas injection on the PEF inactivation were examined. The experimental results indicated that the DBD processing showed much higher energy efficiency compared with the PEF treatment in case of using oxygen as working gas, but the energy efficiency was reversed with nitrogen. With nitrogen as a working gas, inactivation level was identical at the same delivered energy, regardless of pulse frequency. On the other hand, in case of oxygen as a working gas, lower frequency resulted in higher inactivation efficiency, when compared at the same delivered energy. The direction of working gas injection relative to the electrical discharge propagating downward significantly was found to significantly affect the inactivation performance. Argon and oxygen gas showed better inactivation efficiency than nitrogen gas during gas injection from the bottom.

Keywords: Energy efficiency; *E. coli*; pulsed electrical field (PEF); dielectric barrier discharge (DBD).

The impact of climate change on water resources management

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In the face of limited water resources, the Arab has to be re-structuring and management of water resources to match what was expected to increase pressure on those resources due to the direct impact of climate change, where you must activate the principle of integrated management of all water resources up to reduce water losses and maximize the return from a unit of irrigation water concept of national security and economic demonstrating that harnessing the political relations to serve this purpose. Should also review the policy of distribution and consumption of water and change the crop structure commensurate with its economic feasibility from the standpoint of water, in addition to the establishment of a regional numerical model to modify the structures to control the crop in the effectiveness of the exploitation of water resources.

In general, Arab countries are developing countries, which is highly vulnerable to the effects of climate change because climate is dry. If the temperature rose or fell in the area of rain, intensified pressure on natural systems and physical. According to studies of climate models that the Arab region will increase by 5.5 degrees Celsius in the surface temperature at the end of the twentieth century and the atheist. And this increase will be associated with an expected drop in rainfall from zero to 20 per cent; these changes will make the expected shorter winters and drier summers, warmer, and raise the heat waves and increase the frequency and occurrence of volatile weather events and extremes. These effects are an increase in evaporation from water bodies and natural and artificial soils, thereby reducing the available water supply. , The effects will increase the rate of evapo - transpiration products of crops and natural vegetation. That climate change will increase in future demands on the irrigation potential by 6 to 16 per cent due to the increase in transpiration with the end of the twenty-first century.

And lead to changes in climate due to global warming to changes in the distribution of insects (locusts) and other vectors that transmit human and animal pathogens. The atmosphere warmer, with accompanying climatic instability growing, will increase the risk

of floods and droughts are likely to increase drought-affected areas, and likely to increase in cases of rainfall is extreme, in terms of frequency and intensity, and will worsen the risk of flooding and there will be floods and droughts and a water shortages, the main obstacle in most countries in the Arab region.

The piece that incorporate measures to mitigate climate change and adaptation strategies and policies in the development of water management strategies that strengthen and increase efficiency.

Modélisation hydrologique pour la détermination des débits de projet: Application au bassin versant de l Oued Anseghmir, haute Moulouya

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À l'heure actuelle, la plupart des prévisions de crues des rivières sont faites au moyen d'une méthode en deux étapes. Tout d'abord, un calcul de la propagation des crues est effectué, normalement à l'aide de modèles hydrologiques. Les débits de pointe de crue qui en résultent sont ensuite convertis en des prévisions de niveau d'eau à l'aide d'un modèle hydraulique à écoulement permanent ou transitoire.

L'évaluation des risques de crues extrêmes a toujours été un problème important pour l'aménagement d'un pays, en raison de la concentration des activités humaines et des grandes voies de circulation dans les vallées.

L'objectif de cette étude est la définition des crues de projet par la détermination des débits de pointe et de l'hydrogramme de crue. Vu le nombre important des méthodes pour l'étude des crues, une méthode jugée satisfaisante a été choisi pour le présent travail. Il s'agit de la méthode du Gradex.

L'analyse des données climatiques a permis de définir les entrées et les sorties du système hydrologique. L'application de la méthode du Gradex a permis de calculer les débits de temps de retour de 2, 5, 10, 20, 50, 100. Ces valeurs constituent des données d'entrée pour les modèles hydrauliques qui peuvent servir a estimer la hauteur des eaux et a aider les travaux d'aménagements.

Mots cles : modelisation hydrologique, Gradex.

Etude d'impact des projets de développement et d'aménagement sur l'environnement de la baie de Dakhla

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Dans l'élan du plan du développement que connaît la province de Wad Addahab (Maroc), la baie de Dakhla constitue de plus en plus un pôle attrayant pour la réalisation de différents types d'investissements ayant trait à la pêche, l'aquaculture, au tourisme et aux activités récréatives. La baie de Dakhla est la plus étendue des écosystèmes littoraux semi-fermés des côtes marocaines. Elle présente un grand intérêt tant sur le plan scientifique, car elle possède de nombreuses originalités géomorphologiques, hydrologiques, sédimontologiques et biologiques, que sur le plan socio-économique, car elle est toujours un site de pêche privilégié. Ses caractéristiques géomorphologiques et sa position stratégique en font une cible favorite pour les aménagements portuaires et ses potentialités biologiques élevées en font un pôle d'insert pour l'aquaculture.

Dans ce présent travail nous allons présenter la localisation des projets de développements tels que les projets touristiques, les projets portuaires et les projets aquacoles ainsi que l'intensité d'impact sur l'environnement de chaque type de ces projets sur l'écosystème étudié.

Récemment nous avons entrepris une étude pluridisciplinaires au sein du laboratoire d'Aquaculture et des Ressources Littorale de l'INRH-Dakhla, dont nous allons essayer la détermination de l'état actuelle du milieu et ce par un suivi mensuel des paramètres du milieu (Oxygène dissous, température…) ainsi qu'un suivi des polluants chimiques et biologiques dans les organismes marins et dans l'eau de mère.

Cette étude sert à définir des indicateurs, simples et clairs, de la santé de cet écosystème comme outil d'aide à la décision pour le développement durable de la baie de Dakhla.

Mots clés: Baie de Dakhla, Environnement, projets de développement, Abondance.

Hydrologie du bassin versant de Tensift : Approche spatiales et approche par simulation (Tensift- Maroc)

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Le bassin versant de Tensift est un hydrosystème qui couvre une superficie d'environ 18500 km^2, il est vulnérable à n'importe risque naturel sous différentes aspects tel que : les événements extrêmes (étiage, crue), l'érosion,….

Dont le but d'améliorer les moyens existants pour la gestion de différents risques naturels et de faire une actualisation de l'hydrologie du bassin versant de Tensift, notre étude va s'intéresser d'élaborer une large base de données hydrologiques. Elle va permettre de gérer les données de manière dans le but de réaliser une géo visualisation afin de les traiter par la réalisation des cartes, des diagrammes…etc.

Ces recherches hydrologiques sont améliorées par l'exploitation des méthodes indispensables dans la plupart des outils de prévision et de gestion des événements hydrologiques tels que le Système d'Information Géographique (SIG), la télédétection, les modèles hydrologiques). Le fonctionnement hydrologique d'un bassin versant est complexe pareillement le modèle hydrologique permet une représentation partielle ou totale du cycle de l'eau. Ces modèles sont multiples, et permettent de simuler l'impact d'aménagements anthropiques sur l'hydrologie d'un bassin versant.

Il existe dans la littérature plusieurs types des modèles, le choix entre eux dépend de l'objectif et des moyens disponibles, et passe par l'analyse et la comparaison de leurs domaines de validité et d'application (Ambroise, 1999).par conséquent, dons notre sujet on va choisir les modèles hydrologiques déterministes de type distribués comme CEQUEAU (Morin Guy, INRS Eau Québec Canda), le Modèle ATYS (L'ATelier HYdrologique Spatialisé développé par IRD) et le modéles GR4J(modèle du Génie Rural à 4 paramètres Journalier) est un modèle global conceptuel (perrin,2002 et perrin et al , 2003).

Les modèles distribués ont une particularité de pouvoir s'appliquer à une gamme variée de bassins (KOUAMÉ et al, 2007), et ils sont plus flexibles et réalistes.

Mots clés : Hydrologie, base de donnée, SIG, modélisation hydrologique, modèles distribués, Tensift, bassin versant.

Valorisation of incineration residues in industrial wastewater treatment

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Despite a considerable portion of incineration residues is used in relevant industry, such as construction or soil amendment, there is still a large portion that is directly disposed to the environment. Such disposal is not economic and has a direct impact on the environment. The application of low cost and easily available materials in wastewater treatment has recently attracted great interest. The valorisation of incineration residues of expired pharmaceutical products to removal phosphates in industrial effluents is led.

The present study has the purpose to determine phosphate sorption capacities in batch agitated and closed system. P sorption is affected by many experimental factors such as shaking rate, pH, sorbent concentration, initial phosphorus ion concentration.

The variability of these factors in real wastewaters makes it necessary to know how they influence sorption performance. The optimal conditions of sorption have been found: sorbent concentration of 20 g. L^{-1}, particles size between 100- 250 µm, an equilibrium time of 30 min and a shaking rate of 200 rpm. The P sorption capacity of these residues increased with increasing initial P concentration and mechanisms of P sorption were influenced by the equilibrium pH.

The data of P sorption were best fitted to Langmuir equation, and the calculated sorption maxima of phosphate (q_m) was 7.83 mg.g^{-1}. The removal percentage of phosphate in the first 30 min reached 99% of the maximum removal of phosphate.

The application on a dairy effluent confirms the results gotten with the P synthetic solution, which gave 97.5% of phosphate removal corresponding to 0.54 mg P.L^{-1} that is below the admissible norm in Algiers of 2 mg P.L^{-1}.

The results suggested that the use of these residues could be a promising solution to the removal of phosphate in the wastewater treatment and pollution control.

Keywords: Dairy effluent, incineration residues, Phosphorus, Sorption.

Modelisation de l'écoulement turbulent aere à l'aval du point d'inception par la methode des volumes finis

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L'objectif de ce travail est axé sur l'élaboration d'un modèle numérique régissant l'écoulement turbulent aéré à l'aval du point d'inception sur les coursiers d'évacuateur de crues.

Un modèle mathématique régissant les écoulements turbulent aéré à l'aval du point d'inception basé sur le système d'équations de Navier Stokes et sur des hypothèses de simplification à été élaboré. Pour la modélisation de la turbulence, nous avons utilisé le modèle de turbulence k-ε.

L'étape suivante a été consacrée à l'élaboration d'un modèle numérique de l'écoulement turbulent aéré à l'aval du point d'inception dans un canal à forte pente. Ce modèle a été établi en utilisant la méthode des volumes finis pour la discrétisation des équations différentielles et l'algorithme Simple pour la résolution numérique.

Ce dernier permet ainsi de déterminer les différents variables de l'écoulement, le point d'apparition de l'eau blanche, la concentration d'air, le profil de vitesse, l'énergie cinétique turbulente et le taux de dissipation de l'énergie cinétique turbulente.

Mots clés : Simulation, écoulement turbulent aéré, point d'inception, méthode des volumes finis, algorithme Simple, loi de puissance, loi totalement implicite.

Underwater electrical discharge systems for microbial inactivation

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The inactivation of *Escherichia Coli* was investigated with two types of underwater electrical discharge systems such as pulsed electrical discharge (PED) and dielectric barrier discharge (DBD). For the underwater PED system, the electrical discharge starting from the tip of submerged tubular discharging electrode propagated downward and the direction of working gas injected through the discharging electrode was also downward. The DBD system was made up of a quartz tube and a coaxial discharging electrode, which was submerged in biologically contaminated water. Unlike the PED that occurs directly in water, the electrical discharge in the DBD system is created in the gas phase. The inactivation performances of the underwater electrical discharge systems were comparatively examined with experimental variables including working gas type (air, O_2, N_2, argon), the mode of operation, electrical energy and treatment time. According to the electrical discharge methods, different physicochemical processes worked on the inactivation, i.e., dominant inactivation mechanisms of the two types of underwater electrical discharge systems were different from each other. Due to the different physicochemical inactivation processes, the DBD system was superior to the PED system with O_2 working gas, whereas the PED system exhibited better inactivation performance than the DBD system with N_2 working gas. Although the emission of UV from the DBD system was able to help inactivate *E. coli*, more or less, the inactivation by the DBD could be best characterized by the ozonation. Electrical energy was more efficiently utilized for the inactivation with an operation at lower electric power (the DBD case) or at lower pulse repetition rate (the PED case), but optimal condition should be determined, taking both energy utilization efficiency and treatment time into account.

Keywords: Inactivation; *Escherichia coli*; pulsed electrical discharge (PED); dielectric barrier discharge (DBD).

Enregistrement et effets du climat sur les stocks d'eau de l'échelle globale à celle de la zone méditerranéenne et de quelques bassins versants situés au Maghreb

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Ce travail, réalisé dans le cadre des programmes AUF, Tassili, Seine-Aval, a pour objectif de dresser une synthèse des effets du climat sur les stocks d'eau de l'échelle globale à celle régionale de bassins au Maghreb, en passant par la zone méditerranéenne.

A l'échelle du globe, même si les effets du changement climatique (CC) peuvent être perçus de manière diverse suivant les régions du monde ou la nature des outils utilisés, celles-ci sont en accord 1) sur le principe de l'existence de ce changement (observable dans la température et les précipitations), 2) sur ces conséquences sur les hydrosystèmes : modification de la température de l'eau, du débit des fleuves, du niveau des nappes souterraines et de la mer.

La zone méditerranéenne, reconnue comme zone de hot spot du CC, devrait connaître d'ici 2100 une hausse moyenne des températures de 3 à 4 °C, une baisse des précipitations et une augmentation des évènements extrêmes. L'effet combiné du CC et de l'impact anthropique entrainerait une pénurie d'eau pour environ 290 millions de personnes.

A l'échelle des bassins étudiés (Soummam et Khébir Rhumel en Algérie, Tensift au Maroc, Cap Bon en Tunisie), on constate une baisse et une détérioration de la qualité des ressources en eau, sans qu'il soit possible de quantifier la part des facteurs climatique et anthropique.

Toutefois, une analyse de la variabilité hydrologique menée sur deux de ces bassins, par analyse en ondelette, a mis en évidence des bandes de fréquences identiques dans les précipitations et le débit à 1, 2-3, 5-7 et 15 ans, qui sont la signature de la NAO. Deux discontinuités majeures sont observées autour de 1970 et 1990. Ces discontinuités, également présentes dans d'autres hydrosystèmes de part et d'autre de la Méditerranée et de l'Atlantique et dans la NAO, peuvent être qualifiées de ruptures climatiques globales.

Tigris River Middle Reaches Environmental studies

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The study of the environmental influences resulted from the construction of six dams along the Tigris river between the center of Al-Mousl city and Al-Sherqat town , Al-Battani company provided us with 1:100000 and 1:25000 topographic maps of the studied area, in addition to the plans of the proposed six dams .the field work was carried during June and march 2002-2003 with an average of 10 hours per day ,and all the field work was monitored by Al-Battani Company. that should be studied in the field , related to the effects of the construction of these dams and their associated reservoirs . these subjects are :

1- The influence on agriculture, lands, types of farmers, agricultural plants, irrigation, types of irrigation, irrigation plants ..etc…, in addition to estimates of lost lands and the possibilities of presence of substitutions . the total area of farmlands in the tigris flood plan is about 130000 donam.

2- The influence on population in the studied area , density of these populations , type of works , types of living houses and villages with economic estimates on the costs of refunds of the emigrated populations .the studied area is occupied by about 300000 individuals, living in 78 villages , 2 centers of districts of Qadhaa. This population consists of about 24000 families living in 24000 houses. These were built on about 8000 donam (donam= 2500sq.meters) which from about 6% of the total area of Tigris river flood plain .

3- The influence on the animals farms and fishing .the total number of cattle is as >41000 cow ,>218000 sheep in addition to 5 chicken fields , four of them in Al-Hammam district and one in Al-Qesar village, chickens are up to 750000 , assuming that most of the house have least 15 to 20 ones.

4- The influence on the industrial plants, their water intakes, units of treatment of industrial wastes, the influence of water table on the roads, communication and electrical power nets related to these industrial plants, verifies these plants. All the water purification plants consists of (water intake system, purification tanks and pushing pumps and pipes).

5- The influence on the biological activities around the reservoirs of the dams.

The plan of the middle Tigris project suggests the construction of six relatively small dams on the Tigris river between the city of Al-Mousl and Al-Sherqat Qadhaa. The designed elevation of the water levels of the reservoirs +212, +199, +190 and +167 MSL.

The Tigris river basin between Al-Mousl city and Al-Sherqat Qadhaa consists of relatively narrow (3-5 Km wide), long (75 Km) flat flood plain bounded from both sides by relatively high lands. In this study, the reader will note that both the direct and the indirect effects of the proposed dams and their associated reservoirs were taken into our consideration .It is also important to mention here that during our data collection in the field we stress to collect the data from official references, such as the directors of Al-Nawahi, the directors of the agriculture and irrigation sectors in each of the studied Nawahi in addition to the sheriffs of the studied villages.

As it was previously mentioned, questionary table was designed to study the population ,the agriculture activities, the irrigation activities, public services, road, communication, electricity lines, animal farms and any other important studies.

Sources of Tigris River Water Deterioration and the Suggested Treatment

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Tigris river water is being deteriorated since long ago; its quality is slopping down before entering Mosul city and within it. Different types of wastewater are drained to it, assuming the river as a sink. According to that the organic load as BOD_5 is not less than 5mg/L upstream Mosul city, and 48mg/L down stream it. Some of 500000m^3/day of wastewater is drained to the river within Mosul city. The present conventional water treatment is not capable to overcome such change in the nature of Tigris river water quality. Liming to a pH 8.5 (as a maximum permissible standard level for drinking water) had been proved to be promising. A reduction in the parameters of T.D.S, TH, BOD_5 and Total Bacterial Count (T.B.C), were 27-31%, 44%, 49-52%, and 55-66% respectively. Where lime has many useful applications mainly as coagulant, precipitant and disinfectant at the same time.

Keywords: Tigris river; wastewater; Drinking water; BOD; Organic load; Heavy metals; Discharges.

Climate changes and the role of Wind Vector on *Nudolaria* algae blooma in the Caspian Sea

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Anomaly climate parameters changes follow with global warming are the noticeable outlines in aquatic ecosystems in which are importance in increase or decline of some environmental occurrences. Recently, *Nudolaria* bloom is one of the unpredictable phenomenon's which happen in the Caspian. In this study, day time period changes and wind vector on algae blooma was investigated in the southern Caspian Sea from 2005 Up till now, there is not any concern with meteorological aspect in *Nodularia* bloom investigation.

Key words: Meteorology, Climate changes, Nodularia, Wind Vector.

Positive aspects of Groundwater Artificial Recharge in Arid Regions

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Groundwater Artificial Recharge storage in Arid Regions has many advantages comparing to surface water storage in dames. The main advantage is the avoiding of surface water evaporation factor. In this paper 2 test sites for artificial recharge in the Jordan Valley would be presented:

a- The first test site is the Jeftlik area in the Wadi Fara basin north-eastern of the West Bank between Nablus city and the Jordan Valley. This Wadi represents an important agriculture area in the Palestinian Jordan Valley region. The Jiftlik area belongs to the lower part of the Wadi basin. Arid climate with precipitation less than 150 mm/yr and high evaporation rates generate a limited groundwater supply. These hard climatically conditions in connection with salinisation of the shallow aquifers, high pumping rates and the pollution through waste water and fertilizers complicate the water situation.

b- The second is Wadi Wala dam area in Jordan. This dam is located south of Amman and was built before many decades for the artificial recharge of Wadi Es Sir Limestone aquifer. The study should clear the relation between recharge (infiltration) from Wala reservoir and the water level fluctuations in the Heidan wells field not far away from the dam.

In both test sites floods water in the winter season are stored by artificial recharge infiltration and this water can be used in the summer and dray periods again.

Keywords: Artificial Recharge test site, Geo- investigations, Jeftlik Area, Wadi Fara, Jordan Rift Valley

Récupération du zinc et l'Élimination du fer présents dans les effluents de l'unité d'électrolyse de Zinc ALZINC de Ghazaouet Avant leur rejet en mer

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A l'état naturel, le fer est étroitement lié aux métaux utiles contenus dans les gisements minéraux. Il est donc extrait pendant le traitement hydrométallurgique et le drainage acide. Dès qu'il est en solution, il nuit à la récupération des métaux utiles. Ces déchets présentent peu de possibilités de récupération, sans compter que leur volume croissant et leur potentiel de lixiviation toxique alourdissent la responsabilité environnementale de l'industrie minière.

L'élimination sélective du fer au moyen d'agents de précipitation permettrait la récupération subséquente des métaux tels que le zinc, et la précipitation du fer sous forme de Jarosite et cela avant le rejet en mer.

L'objectif de notre axe de recherche vise à réduire les répercussions environnementales des déchets ferrifères sur l'environnement marin. L'influence de plusieurs paramètres a été étudiée en utilisant plusieurs méthodes d'investigation.

Les différents types de Jarosite élaborés à base de Na^+, NH_4, K^+ ont été identifiés par diffraction des rayons X et par micro-sonde. L'influence de la concentration de l'agent de précipitation, du pH de la solution, de la température du mélange et du temps d'agitation ont été examinés.

Le travail de recherche consiste à optimiser les conditions de précipitation du fer. Les résultats obtenus démontrent qu'à une température déterminée, un pH de la solution peu acide, et une certaine concentration de l'agent précipitant favorise la précipitation du fer en formant le composé Jarosite. Après enregistrement et résolution de l'une des structures de ces différents précipités, nous avons pu démontré qu'il s'agit d'un monocristal où la molécule Zn est entourée de 6 molécules d'eau avec 2 molécules de SO_4 et 2 molécules de NH_4.

Mots clés : fer, jarosite, lixiviation, agents précipitants, structure cristalline, complexes de Zinc.

Outil méthodologique pour la détection d'éventuels changements climatiques dans la série hydrologique et climatique au niveau du bassin de Tensift (Maroc)

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Le changement climatique, au fil du temps, se réfère à tout processus d'évolution lente qui affecte les caractéristiques climatiques dans une région comme le réchauffement ou le refroidissement. Les variations globales du climat de la Terre ont des cycles de réchauffement plus ou moins en alternance avec le refroidissement différents dans leur durée.

La compréhension de ces changements nécessite une analyse approfondie des données hydroclimatiques de l'ensemble des données disponibles sur les sites d'observation au niveau d'un bassin versant.

Les documents relatifs au traitement des séries temporelles de ces paramètres (précipitations, températures, débits) exigent d'abord l'étude des caractéristiques stochastiques.

Une série est dite non-stationnaire si les changements de variabilité varient dans le temps ou si les valeurs de chaque jour sont en corrélation les une avec les autres et montrent ainsi une certaine tendance. Si le processus de traitement de séries temporelles est invariant, il est appelé à l'arrêt. Nous pourrons alors traiter la série par des outils de modélisation. La stationnarité assure que le modèle choisi peut être utilisé en dehors de la période pendant laquelle il a été estimé.

Dans le cadre de l'étude du phénomène à travers le bassin hydrographique du Grand Tensift, toutes les données disponibles seront analysées pour détecter la présence ou l'absence de perturbations majeures dans les observations. Un autre objectif est de corréler l'histoire hydroclimatique de la région avec des phénomènes à grande échelle tels que la NAO.

Les modèles de séries chronologiques, retenus pour cette étude sont basés sur les processus ARIMA correspondant à une famille de processus aléatoires. Il existe une relation entre les observations éventuellement retardées et les erreurs de prévision. Les modèles ARMA (p, q) sont utilisés pour modéliser les séries temporelles, comme les précipitations, le débit ou d'autres phénomènes environnementaux.

Nous distinguons les processus autorégressifs qui peuvent faire des prédictions simples et des processus fiables et que l'on appelle la moyenne mobile est utilisée pour éliminer ou atténuer les fluctuations cycliques, saisonnières et accidentelles.

La modélisation des précipitations et la température vont tenter de déterminer les processus et les modèles capables de reproduire l'évolution de ces variables

Mots clés: changements climatiques, Tensift, NAO, série chronologique, hydrologie des pluies, ARMA, prévisions.

Les ressources hydriques du bassin versant de l'Ouergha : quel avenir face à la sécheresse pluviométrique ?

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La problématique des changements climatiques à l'échelle mondiale et au Maroc en particulier est devenue un enjeu majeur avec de fortes implications environnementales, sociétales et économiques.

L'inquiétude générale que suscitent ce fléau, hormis les incertitudes qui persistent concernant leur ampleur et leur vitesse, provient des événements extrêmes qui les accompagnent (sécheresse, inondation…), d'une part, et que leurs impacts risquent de dépasser nos moyens d'adaptation, d'autre part.

Le bassin versant de l'Ouergha, régularisant le 1/3 des ressources hydriques du Maroc, forme un passage entre le Rif et le moyen atlas étalé sur 7300 Km2, occupant l'essentiel du versant Sud atlantique de l'arc rifain et s'étend sur la majeure partie de la montagne rifaine. Sa situation géographique favorisent la pénétration de la douceur, de l'humidité et des masses d'air de l'atlantique lui permis d'être la région la plus pluvieuse au Maroc. Cependant, sa structure lithostratigraphique essentiellement marno-argileuse empêchant l'infiltration des eaux de pluie et donc lui empêche d'avoir une contribution d'eau souterraine. De ce fait, le bassin versant de l'Ouergha renferme le plus grand aménagement hydraulique du Maroc (Barrage El Wahda).

Notre étude se focalise sur le changement climatique (pluviométrique et thermique) dans le temps et dans l'espace en se basant sur une étude illustrative, fréquentielle et cartographique. Cette étude a mis en évidence une régression pluviométrique avec une succession de sécheresse météorologique au cours des dernières années.

L'étude du changement thermique montre un réchauffement de 0,15°C/an, alors que le changement pluviométrique a confirmé la distinction entre deux périodes différentes : 1956/57-1982/83 humide et pluvieuse et 1982/83-2007/08 ; sèche et mois pluvieuse.

La moitié de la période est formée des années météorologiquement sèches ce qui va se refléter négativement sur les ressources en eau au bassin de l'Ouergha où les eaux météorologiques forment le seul moteur de son hydrologie.

Mots clés : Ouergha, eau, changement climatique, sécheresse, réchauffement.

Modélisation géostatistique de la conductivité hydraulique de la nappe de Tafilalet (Maroc)

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La conductivité hydraulique constitue une des variables d'état de l'écoulement souterrain. Sa caractérisation d'une manière continue dans l'espace est primordiale pour la compréhension de la structure des 'écoulements souterrains, ainsi pour le modèle de simulation numérique et de gestion des ressources en eaux qui sera développé pour la nappe de Tafilalet. Cependant, les valeurs de ce type de paramètres ne sont connues que dans certains endroits spatiaux où l'on trouve un réseau de mesure, par des essais de pompage, qui est forcement de densité limité. Dans ce travail, on présente une méthodologie de modélisation géostatistique qui permet l'analyse de la variabilité spatiale et l'estimation des valeurs de la conductivité hydraulique dans des zones non échantillonnées. Cette méthodologie qui combine les performances du SIG et les techniques géostatistiques est appliquée sur des valeurs observées dans 78 forages implantés dans la plaine de Tafilalet. Elle prend en compte la normalité nécessaire des données pour une meilleure estimation par Krigeage. Ainsi, une transformation logarithmique a été effectuée pour normaliser les valeurs de référence spatiale de distribution non-normale. Deux types de variogrammes expérimentaux ont été réalisés prenant en compte l'aspect isotrope et anisotrope des formations et permettant d'inférer les corrélations spatiales existantes entre les valeurs. Ces variogrammes ont fait l'objet d'une modélisation par deux types de fonctions analytiques ; exponentielle et sphérique. La performance de cette modélisation a été évaluée grâce à l'analyse des erreurs d'estimations calculées par la méthode de validation croisée. Les résultats ont montré que les plus faibles valeurs de la moyenne des erreurs d'estimation sont obtenues par le modèle exponentiel du variogramme isotrope dont les paramètres ont été utilisés pour l'interpolation spatiale de la conductivité hydraulique.

Mots clés: conductivité hydraulique, variabilité spatiale, géostatistiques, nappe de Tafilalet, interpolation spatiale.

Uncertainties in the Assessment of Groundwater Resources and Groundwater Budget for Arid Regions

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Introduction: The assessment of groundwater resources and groundwater budget is the most important prerequisite for an optimal groundwater management in arid regions. Groundwater recharge in arid regions is generally very low, so that the water supplies for municipal, industrial and agricultural consumption almost exclusively dependent on fossil groundwater. These resources are finite and during human time scale non-renewable.

Objective: The aim of our study is a description of the uncertainties in the determination of the groundwater resources in storage and the estimation of water budget components at a regional scale. Two examples from arid regions are presented. The first example analyzes a sandstone aquifer and the second example a highly karstified limestone aquifer.

Methodology & Results: The different parameters of the groundwater budget are analyzed in terms of quantity and uncertainty. The analysis shows that the most important budget term is the extraction of groundwater for agricultural use. However, the quantification can be done with sufficient accuracy by using statistical data, field studies and remote sensing techniques. The determination of groundwater recharge from precipitation has the biggest uncertainties. However, this term makes only a small part of the total water budget in arid areas. Applying a conservative approach, it can be neglected.
For the assessment of groundwater resources in storage the knowledge of the geometry and the properties of the aquifer are required. While the determination of aquifer geometry is relatively simple, reliable and accurate determination of the storage properties (storage coefficient, specific yield) is fundamentally inaccurate. As the analysis of pumping tests

shows the error in the determination of the storage coefficient can easily be up to a factor of ten.

A practical solution to this dilemma is the approach to use regional groundwater models that are updated continuously. Reliable aquifer parameters can be obtained from the analysis of so called mega-pumping tests. Mega-pumping tests are large-scale groundwater withdrawals that occur e.g. in agricultural centers. The study shows that this approach gives a sufficiently accurate determination of the storage properties of the aquifer on a regional scale and provides a robust basis for an optimal groundwater management.

Contribution à l'évaluation de la qualité physicochimique et bactériologique de l'eau d'oued Inaouène: Premiers Résultats et Perspectives

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Le présent travail est un extrait de l'étude qui est en train de se mener sur la partie du bassin versant de l'Inaouène se trouvant en amont du barrage Idriss 1er. Cette région couvre une superficie d'environ 3100 Km^2, soit 7.74% du bassin du Sebou. La qualité physicochimique et bactériologique des eaux de l'oued Inaouène s'est avérée qu'elle est menacée du fait, que son cours d'eau principale constitué un exutoire pour faire le ménage des déchets solides et les eaux usées sans traitement préalable, bien que le niveau des activités industrielles soit relativement moins élevé. C'est ainsi qu'une étude systématique du statut de pollution d'oued Inaouène par rapport à différente activité anthropique est devenu une obligation, du faite de son utilisation comme source principale d'irrigation, de plus il se trouve en amont du barrage Idriss1er qui représente un intérêt économique importante. L'évaluation des risques de pollution de ces eaux nécessite la connaissance de leurs caractéristiques physico-chimiques et bactériologiques qui sont des moyens d'investigation, parmi d'autres.

L'étude a porté tout d'abord sur l'étude physicochimique des eaux, notamment la température, la conductivité, le pH, la turbidité, le TDS, la dureté totale, la teneur en éléments majeurs, la DCO et la DBO_5, puis l'étude des nutriments à savoir les composés soufrés, les composés azotés et les phosphates, et enfin la concentration de certains métaux lourds dans les eaux de l'Inaouène. Ensuite une analyse bactériologique a été faite.

Les premiers résultats ont révélé des teneurs relativement élevées en DCO et DBO_5 qui seraient dues principalement aux rejets domestiques liquides non contrôlés. Certains éléments majeurs ont à leurs tours affichés des teneurs élevées notamment le calcium et le magnésium. Ces concentrations seraient attribuées à la nature géologique des terrains traversés, en l'occurrence, dans la partie amont du bassin versant. La teneur en quelques métaux lourds s'est révélée supérieures aux normes relatives, tels que le Cu, le Cr, le Pb, ce qui serait engendrés aussi bien par les quelques activités artisanales de la ville de Taza et aux rejets domestiques liquides. Par ailleurs, les métaux lourds, en plus que leurs origines

éventuelles des activités anthropiques, ces métaux peuvent avoir une origine géologique entrant dans le système de rivière par érosion climatique. Des taux élevé en coliformes et streptocoques fécaux qui sont des indicateurs d'une contamination fécale et qui dépasse les 300000CF/100ml, tandis que la valeur fixé par L'OMS pour l'irrigation est de 1000 CF/100ml uniquement.

En général la qualité des eaux d'oued Inaouène est localement douteuse ou pollué, de ce faite, la protection contre les contaminations de différentes sources est nécessaire et tranchante pour que ces eaux retrouvent leur qualité conforme aux normes de L'OMS.

Mots Clés : Pollution, Oued Inaouène, qualité d'eau, physicochimique, Bactériologie, Métaux lourds, Taza.

Diagnostic de la qualité des eaux de surface et souterraine du bassin versant de l'oued Soummam, Algérie

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Le présent travail, réalisé dans le cadre des programmes Tassili et AUF, propose un diagnostic de la qualité physico-chimique et de l'état de pollution des eaux de surface et souterraines de la vallée de la basse Soummam, en Algérie.

Ce travail repose sur des mesures ponctuelles de paramètres physico-chimiques (température, pH, MES, DBO, DCO, O dissous, potassium, magnésium, calcium, chlorures, nitrates, sulfates, métaux lourds…) sur : 4 stations situés le long de l'oued Soummam en période d'étiage de 2002 à 2004 pour les eaux de surfaces ; 17 forages/puits répartis le long de la vallée de la basse Soummam en hautes et basses eaux de 2002 à 2006 pour les eaux souterraines.

Les eaux de l'oued présente une forte charge polluante d'origine organique, exprimée par des concentrations moyennes en MES, DCO et DBO_5 dépassant respectivement 100, 75 et 50 mg/l. Les analyses physico-chimiques ont montré également une mauvaise qualité des eaux souterraines et l'existence d'une pollution se traduisant par un excès des teneurs de la majorité des éléments analysés.

Que se soit pour les eaux souterraines ou de surface, on constate un gradient croissant de la pollution allant de l'amont vers l'aval.
Cette charge est due essentiellement au volume important des rejets urbains et industriels vers l'oued, mais également pour les eaux souterraines, aux processus géochimiques naturels liés à la nature des substrats. L'oued Soummam a été classé comme extrêmement pollué par comparaison avec d'autres rivières à l'échelle du globe.

Il s'agit d'une des premières études sur la variabilité spatiale à la fois des eaux souterraines et de surface en Algérie, combinant plusieurs paramètres physico-chimiques. Cette première investigation pourra servir de base et de référence pour de futurs travaux et une meilleure compréhension de la qualité de l'eau en Afrique du Nord et sur le bassin méditerranéen.

*Sa*linisation des nappes phréatique côtières : cas de la nappe Korba-El Mida de la Côte Orientale au Nord Est de la Tunisie

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Les conditions climatiques et pédologiques de la nappe de la côte orientale sont à l'origine d'une exploitation intensive des eaux souterraines pour une mise en valeur agricole par irrigation. Ceci a posé ou pose le problème de la protection de ces nappes contre les risques d'invasion saline et de contamination des eaux douces. Etendue sur une superficie de 438 km^2, l'aquifère côtier de Korba, avec plus de 6000 puits équipés, se caractérise par un climat semi-aride, une pluviométrie annuelle de l'ordre de 450 mm, une évapotranspiration estimée à 1100 mm et une activité agricole très intense. Elle est caractérisée par une surexploitation qui n'a pas cessé de causer des problèmes à la fois quantitative et qualitative. Les relevés piézométriques depuis les années 1960 ont montré l'existence de l'intrusion marine au niveau de la nappe. Actuellement, une dépression de -15 m par rapport au niveau de la mer et une salinité dépassant 12 g/l sont enregistrées. L'exploitation des eaux souterraines de la nappe côtière a connu une évolution remarquable durant ces trois dernières décennies, elle a manifesté les signes les plus aigus de la surexploitation suite à une sécheresse prolongée qui provoque un déséquilibre entre les prélèvements et l'alimentation naturelle de la nappe.

Les fluctuations piézomètriques et l'évolution de la teneur en sels de la nappe côtière, ont permis la mise en évidence de la dégradation du potentiel de la nappe tant sur le plan quantitatif que sur le plan qualitatif. La salinisation de la nappe côtière provient essentiellement de l'intrusion marine, de la lithologie de l'aquifère formée par des sols salés et les eaux d'irrigation résultant de la forte productivité agricole

Cette étude, réalisée dans le cadre d'un travail de recherche en cours de finalisation, permettra de clarifier la dynamique de cet aquifère côtier, particulièrement à travers la modélisation d'intrusion marine.

Quantification of the degree of inorganic and organic pollution of Bejaia harbour

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The goal of this work is the evaluation of the degree of inorganic an organic pollution of Bejaia harbour, during which we are committed to highlight the impact of the rejections on the quality of seawater. For this purpose, seventeen stations distributed around the three basins were selected and some physicochemical parameters (temperature, pH, dissolved oxygen, turbidity and conductivity, COD, BOD, SPM), and Polycyclic aromatic hydrocarbons (PAH) with eight metallic elements traces in dissolved and particulate phases (Cu, Zn, Fe, Co, Cd, Pb, Cr and Ni) were reported. The results obtained revealed a relatively good situation for the temperature and conductivity, and a low pH. The level of organic contaminations was very important, this was confirmed by the strong concentrations of chemical oxygen demand (COD) (>3 g/l), biochemical oxygen demand (BOD_5) (10—234mg/l) and suspended particulate matter (SPM) (27 -223 mg/l) and the moderate dissolved oxygen contents in particularly in basin of "arrière port". The spectral analysis of the extracts showed the presence of the PAH, and the quantitative analysis confirmed a high level of contamination for all the stations (5-7 µg/l). This work indicate in addition, the existence of highly heavy metals pollution, including the most toxic (lead and nickel) with concentration ranging from 6700 to 738 mg/ kg for Pb, from 24138 to 27 mg/kg for Ni (particulate phase), however, iron was the most abundant metal with predominance of 62.48 % in dissolved phase and 33.44 % in particulate one. This study also revealed that the particulate phase is 1000 times more polluted than the dissolved phase.

Key words: trace metals, marine pollution, organic pollution, PAH, harbour.

Bilan d'eau du barrage Hammam Grouz et mise en évidence de fuites karstiques dans un contexte semi-aride (Oued Rhumel, Algérie)

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Ce travail de recherche qui bénéficie du soutien de l'Agence universitaire de la francophonie (Projets de coopération scientifique inter-universitaire), s'intéresse au bassin du haut Rhumel (1130 km^2), contrôlé par le barrage Hammam Grouz dans la région du Constantinois (Algérie orientale). Le bassin renferme des formations karstiques à partir desquelles émergent plusieurs sources, en partie thermales.

Le fonctionnement hydrologique du barrage (capacité : 45 hm^3), est étudié à travers les données du bilan de régularisation mensuelle de la période 1987–2008. Après le sévère déficit qui a caractérisé quinze années d'exploitation de la retenue dans un contexte méditerranéen semi-aride, les apports pluvieux exceptionnels de l'année hydrologique 2002/2003 sont à l'origine du premier déversement de crue du barrage et ont eu, pour conséquence, de remarquables débits de fuites d'eau, confirmés à l'aide des traçages chimiques et par l'apparition, au sein de la cuvette, d'importants gouffres karstiques.

L'analyse comparative des apports de l'oued calculés au barrage (ou « affluent ») avec ceux mesurés à la station de jaugeage, située à l'amont, a mis en évidence des volumes de fuites (7,04 hm^3 en 2002/03 et 32,2 hm^3 en 2003/04), bien plus importants que ceux mesurés aux seules sources du Hammam.

Une investigation morpho-structurale et hydrogéologique approfondie s'impose à l'échelle régionale de l'hydrosystème.

A national GIS system for estimating Evapotranspiration, irrigation water requirements in Saudi Arabia

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The management of irrigation water conservation is a difficult process in the Kingdom of Saudi Arabia in view of the hot and dry climate, which poses great pressure on limited and non-renewable water resources. Lack of consistency of the spatial distribution of climatic factors, soil, terrain, water quality, land use in all parts of the country makes it necessary to develop an efficient system for handling and managing irrigation water under such type of circumstances. A Geographic information system (GIS) capable of accessing any region, an irrigation scheme or farm anywhere in the kingdom and estimates evapotranspiration and crop water requirements has been developed. A set of data bases comprising climatic data, land use, locations of irrigated farms and irrigation schemes, well location and water quality criteria, are integrated in the GIS system for this purpose. The accessibility to any particular location in the kingdom is achieved by a grid system, latitude and longitudes, covering the whole kingdom. The required data of the same site are interpolated from the various data bases and used for the calculation of crop evapotranspiration. The evapotranspiration is calculated using ten methods depending on suitability of individual equations to a particular site and data availability. Following this the total irrigation water requirements are estimated on farm , regional and country wise scale. A set of operational systems are subsequently linked to estimate irrigation scheduling center pivot nuzzling and irrigation optimization.

Owth response to Millet plant growth under irrigation b diluted sea water to zinc and ascorbic acid spraing

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A pot experiment was conducted in the greenhouse of the National Research Centre, Dokki, Cairo, Egypt in the summer season of 2005 to study the effect of spraying ascorbic acid or ascorbic acid plus zinc and salinity by irrigation with diluted seawater (2500 and 5000 ppm more than fresh water as a control) on growth and photosynthetic pigments of millet plants. Continuous decreases in plant height and area of leaves parallel to the increase in salt concentration in water of irrigation. Number of leaves and stem diameter decreased similarly to the both salt concentrations. Increased salt level in the irrigation water exerted pronouncing decrements in dry weight of stem and the top of millet plant, meanwhile, this adverse effect was more with higher salt level. Plant height, stem diameter, and stem and whole plant dry weight increased by ascorbic acid application and the combination of zinc with this vitamin encourage the promoting effect in these parameters. The highest positive effect on number and area of leaves were detected by spraying ascorbic acid alone but the effect of spraying ascorbic acid with or without zinc sulfate are similar. Chlorophyll a and total carotenoids concentrations were decreased with salt stress. The depressions were more in plants irrigated by diluted seawater contains 5000 ppm than that contains 2500 ppm salts. The concentration of chlorophyll b and total chlorophyll showed the same response but the differences not great enough to reach the level of significant. Spraying ascorbic acid solitary or in combination with zinc sulfate did not induced any significant effect on the concentration of chlorophyll a and chlorophyll b or total carotenoids in the leaves tissues of millet plants.

Key words: Millet-Salinity-Zinc sulfate-Ascorbic acid-Growth-Photosynthetic pigments.

Inter-linkage between groundwater and surface water sources along Dhobikhola River corridor, Nepal

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Growing population and water need of the Kathmandu valley coupled with incapability of the concerned authority to supply the water have led Kathmanduites to extract underground water in a huge quantity by means of dug wells, tube wells and boring. Thus, groundwater has been the most dependent water sources in the valley despite of its quality. In addition to the higher extraction rate than recharge, valley surface concretization has left the river water to recharge the shallow groundwater. It is because the surface water and groundwater are interconnected resources and their occurrence is linked to the hydrologic processes at the local level. Depending upon the hydraulic effect, groundwater may supplement water to river as well as surface water may replenish water to nearby aquifer. The study carried out along the Dhobikhola River corridor showed that the river becomes extremely polluted as it flows down the path. The groundwater samples were also found contaminated. Due to hydraulic effect of the river coupled with the hydrogeological formation of the area, polluted river water has higher probability to percolate into shallow groundwater aquifer. Along with this, external factors of groundwater contamination are leakage of leachate from solid waste, infiltration and percolation of contaminants and chemical fertilizer from upper surface. About 53% of the groundwater samples collected during all seasons contained fecal coliform, which was counted in number above 8000 CFU/ 100 ml. Only one sampling site contains zero fecal coliform during all sampling season. BOD, COD, nitrate, ammonia and iron have exceeds the WHO water quality guidelines. A weak relationship between groundwater and surface water has been observed in the study; however, the higher permeability and transmissivity of the land surface along Dhobikhola River may create avenue to replenish the aquifer with river water.

Environmental Impact Assessment for Desalination and Water Treatment Plants (Case study - North of Jordan Region)

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Jordan is one of the most ten dry countries in the world. Demand for water exceeds Jordan's available water resources. This in principal led to the deterioration in ground water quality, increase in salinity levels and widened the gap between available water resources and demands in an ascending trend.

Desalination has become the best available option to supply drinking water to some areas in Jordan, and the water treatment and desalination industry is increasingly contributing throughout the country to the water supply due to the deteriorating quality of the ground water resulted from the over exploitation of the conventional water produced from the aquifers.

In addition to the produced drinking water (treated water), desalination and water treatment plants produces water with another quality resulting as a byproduct from the treatment processes, which is then disposed in the form of waste water. In the case of desalination this byproduct water is called Brine while in the water treatment plants are called rejected water. The aforementioned two types of water resulting as a byproduct from the desalination and treatment processes have great impacts on the environment particularly on the quality of ground water aquifers and the atmosphere. Therefore, one of the most significant problems with desalination and water treatment plants is finding environmentally viable options for the disposal of the resulting Brine or rejected water.

In order to mitigate the environmental impacts of desalination and water treatment activities in the region, rejected water has to be managed and processed to be friendly to the environment, particularly when knowing that most of the desalination and water treatment plants in Jordan are inland and far from disposing it to the sea.

In this research (paper), current status for all desalination and water treatment plants which are located within the north Jordan region were studied. The rejected water from these plants was found to be disposed- off through discharging it into the nearby streams, which by time leads to deterioration of the environment and water quality of the

resources spread in the region. Some proposals for the safe discharge of the Brine and disposed water were presented.

Analysis of climate change effects on climate parameters of Karaj River Basin

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Since the advent of industrial revolution and consequently the increase of greenhouse gases in the earth's atmosphere, the world has been experiencing the phenomenon of global warming. One of consequences of this phenomenon is the change of earth plant climate during years. There are several ways for investigation and detection of climate changes in a region, one of which is investigating the process of changes in climate parameters of a certain region within past years. In order to investigate and find out climate changes and in general the effects of global warming on the region under study, this essay analyzes the process of changes in climate parameters of maximum temperature and annual rainfall in the past years. To investigate the process of changing these parameters, two methods of "Mann-Kendall test" and "linear regression" have been used. Process of changes in climate parameters in Karaj River Basin (Amirkabir Dam) within the past years indicated the increase of maximum temperature and increase of annual rainfall. These findings may show signals of climate changes in the region being studied.

Impact of Climate Change on Drinking Water Availability in Coastal Areas of Bangladesh

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Bangladesh, a densely populated country with total area of 143,998 km^2 living about 160 million people. In Bangladesh coastal area covers 32% of total areas and 28% of population lives in those areas. Bangladesh is highly vulnerable to climate change due to its low lying geography, high population density and below poverty levels. In coastal parts of the country more frequent and severe flooding and cyclones due to climate change are already damaging water resources and sanitation facilities. Sea level rise is jeopardizing clean water supply with salt water intrusion. This paper was prepared based on very critically reviewed of relevant research papers, documents and reports and explores the impact of climate change on safe water availability resulting unrest situation on livelihood, Gender, Health, Social and Food security among coastal people of Bangladesh. Shortage of safe drinking water is likely to become more pronounced, especially in the coastal belt of the country. The impact of climate change on the water sector in coastal areas is disrupting health, education and putting women and children's lives at risk. This will impose hardship on women and children, who are responsible for collecting drinking water for their families. Increasingly saline drinking water also results in health hazards, especially for pregnant women. All of these changes have put threats the food security, livelihoods and health of the poor. People living on river islands and along the coastline (e.g., fishing families), are among the poorest people in the country and the most victim of the climate change. Water crisis due to climate change is likely to increase the incidence of water-borne diseases in coastal areas. Bacteria, parasites and disease vectors breed faster in warmer and wetter conditions and where there is poor drainage and sanitation.

Electron Beam Treatment of Antibiotic Agents and Antibiotic Resistant Bacteria in Aquaculture Effluent

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A large amount of antibiotic agents have been used to protect fish from disease. The residues of antibiotic agents may affect the microbial community and introduce antibiotic resistance in the bacteria. The presence and persistence of antibiotic resistant bacteria have been identified as rising concerns for public sanitation and health. Radiation processing such as electron beam and gamma ray has been considered as a promising technology for the treatment of micropollutants including PPCPs (Pharmaceuticals and Personal Care Products) and the disinfection of pathogenic microorganisms in ecosystem. Electron beam radiation as sterilizing treatment causes direct damage to cell DNA through ionization inducing mutation and killing the cell. It also has an indirect effect as a result of radiolysis of cellular water and formation of active oxygen species, free radicals and peroxides causing single and double strand DNA breakages.

In this study the distribution of antibiotic agents and antibiotic resistant bacteria in aquaculture effluent and the disinfection of antibiotic resistant bacteria by electron beam radiation were investigated. The antibiotics employed in this study were ampicillin, tetracycline, oxytetracycline, ciprofloxacin, streptomycin, gentamycin, erythromycin-H_2O, and sulfamethoxazole. It was shown that the multi-drug resistant bacteria were *Aeromonas* sp., *Citrobacter* sp., *Bacillus* sp., *Marinobacter* sp., *Pantoea* sp., *Pseudomonas* sp. and *Enterobacter* sp. in aquaculture effluent. 41.66% of total strains showed the resistance against one antibiotic agent, and 58.33% of total strains showed the resistance against more than two antibiotics. It was evidently shown that QSAR (Quantitative Structure Activity Relationship) was important to estimate and expect the toxicity and physicochemical properties of antibiotics. Electron beam irradiation was very effective for the disinfection of antibiotic resistant bacteria from aquaculture effluent, in which the disinfection efficiency was approximately 99.9% with electron beam of 1 kGy.

Benefits distribution pattern of a WatSan program

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Largely, the water and sanitation programs does help alleviate poverty, but whether these programs distribute the benefits equally among the households having varying wealth status has been a big question mark. Hence, the objectives of the study was to determine the impact of a water and sanitation program on households having different wealth status in alleviating poverty through: a) reducing their medication cost; b) enhancing income generating opportunities; c) improving education, health, gender equity and empowerment of the households. Also, what are the perceptions of the beneficiary households about these benefits: do they perceive them as a help toward escaping from the vicious circle of poverty?

48 households in six villages were selected for the study. Methodology for selecting villages and households is discussed in the following paragraphs. For the field study, a questionnaire was prepared with the intention of using it for the semi-structured interviews with the men and women of the selected households.

The findings of the study revealed that the target households are drawing multiple benefits from the program interventions. In addition to attaining the goal of the program, i.e., "improving the quality of life through reducing the diarrhoeal incidences in the target population," the program has an appreciable impact on poverty reduction. The program interventions have empowered the beneficiary households through involving them in all phases of the program. However, the degree of empowerment varies significantly and corresponds to the degree of well being. By and large, the richer households have control over the program issues. Due to the poorer households' low rate of literacy, less exposure to outside, and incapability to handle issues; they are excluded from active participation in the program. Therefore, these households did not see any significant change in their household empowerment.

Health Risks from Microbial Growth and Biofilms in Drinking Water Distribution Systems in Palestine

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Water distribution systems play a major role in determining the final quality of potable drinking water. Pathogenic and toxigenic microbiological agents in drinking water can cause diseases and death to consumers. The health risks associated with these pathogens range from viral and bacterial gastroenteric diseases to infections such as hepatitis A and giardiasis. Drinking water samples (n=24) with a volume of 1000 ml were collected in sterile bottles from the distribution systems at different regions in Ramallah District in Palestine. Moreover, swabs from the inside of the water distribution system of the same regions were taken. Sample were filtered through 0.45μM membrane, and various tests were conducted on each sample including total coliform, fecal coliform, heterotrophic plate count, Pseudomonas auroginosa count, fecal streptococci, sulfite reducing anaerobes, residual chlorine, turbidity, ammonium and nitrate. For protozoa, microscopic examination was done for the swabs transported in saline from the biofilms within the same day of sampling. Four samples out of 12 (33%) were containing too many to count for HPC. The remaining 8 samples were containing an average of 26 CFU/100 ml. Five samples out of 12 (42%) were found to contain total coliform. The number ranged between 0 and 80 CFU/100 ml. The average number of total coliform was 14 CFU/100 ml. Summer samples were found to have more total coliforms than winter ones. Neither winter nor summer samples were found to contain fecal coliforms. Residual chlorine ranged between 0.08-0.55 mg/L (average 0.24mg/L) and nitrate concentrations in drinking water samples ranged between 4.79-16.26 mg/L (average 9 mg/L). PCR results of the DNA extracted from a total of 25 samples of different origins (pipes water, tanks water and biofilm swabs) revealed that 23 samples were not containing the microbes (bacteria and protozoa) considered in this study . Our results show that the drinking water quality in the distribution system of Ramallah District is of good quality and water intermittent supply should be avoided when possible, as this was associated with an increase in total coliform and turbidity.

The political economy of the INGA hydroelectric capacity: Opportunities and challenges

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The hydroelectric capacity of the INGA dam on the Congo river has a long history and only part of its capacity has been exploited (INGA 1 and 2 and INGA-SHABA high tension electricity line of 1400 km between Kinshasa and Katanga province). New plans are being developed. One is INGA 3 to produce and sell electricity from the Cape to North Africa . Consortia of enterprises –Westcor- have been considering investment but failed to implement it , up to now. Even greater development projects are being considered (GRAND INGA) with the aim to fill the gap in electricity production in Europe, where nuclear energy and carbon emission prone electricity production is restricting supply. Technically spoken, the hydroelectrical capacity of INGA to deliver electricity to Africa and even Europe is theoretically feasible because of the unique features of the Congo river (flowing through regions in the southern and northern hemispheres provide a constant water debit).

Does technical feasibility also mean that the development of the hydroelectrically potential is also economically, socially and environmentally feasible and desirable?

This paper will try to analyse the opportunities and challenges that explain the gap between on the one hand technical features and economic, social and environmental constraints on the other. The expected result is to show under what conditions the opportunity of unique natural resources could also be sustainable in terms of human and environmental development.

The methodology (and angle of research) is that of political economy – which is the study of how income, wealth and power are distributed amongst classes in society. Analyzing power relations in the context of a fragile/weak state within a globalizing economy where international interests looking for securing energy needs may especially weaken the interests of local livelihoods and overlook environmental concerns. This working hypothesis will be tested in this paper.

Standardization of micro-irrigation and fertigation methods for mustard crop under semiarid conditions

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India is the third largest rapeseed-mustard seed producer in the world with 12 per cent of world's total production grown domestically. Rapeseed-mustard cultivation is the major source of livelihood especially for marginal and small farmers in rain-fed areas. They are being cultivated in 26 states in the northern and eastern plains of the India occupying about 6.2mha area with 7.37 mt of production and the productivity ranged from as low as 524 kg/ha in Assam to as high as 1559 kg/ha (Haryana) with overall yield of 1157 kg/ha during 2009-10. The low productivity of mustard in India is major cause of concern. Keeping this in view an experiment was formulated on "Standardization of Micro-irrigation and Fertigation methods for mustard crop under semiarid conditions" and was undertaken during rabi (winter) season 2009-10 in spilt plot design (SPD) with three replications. Five irrigation methods were tested in main plot viz. Microsprinkler system (MS), micro sprinkler followed by check basin (MS+CB), drip irrigation system (DS), drip followed by check basin (DS+CB) and only check basin (CB) irrigation system and four N doses viz. Control (0 N), 40 Kg/ha N, 80 Kg/ha N and 120 Kg/ha of N doses were evaluated in subplot. The initial soil pH and EC were 8.5-9.5 and 1.5-2.5 $dSm^{-1.}$ Maximum water use efficiency was recorded with drip irrigation along with 120 kg N/ha, which was at par with drip irrigation and micro-sprinkler irrigation system along with 80 kg N /ha. Compare to check-basin irrigation system, the water use efficiency was observed higher under micro irrigation techniques at every fertigation treatments 40, 80, 120 Kg N/ha and even at control. Micro-sprinkler, drip irrigation systems resulted in significantly higher increase in test weight over check basin irrigation method, same trend was recorded in biological and seed yield of Indian mustard. Contrary to this trend higher oil content was observed in check basin but reverse trend was recorded in protein content. However significantly higher oil and protein yield was recorded in micro sprinkler and drip irrigation systems due to higher seed yield over check basin, which were comparable in case of micro irrigation systems along with the check basin irrigation systems. Among ferti-gation treatments 80 Kg N /ha was found at par in enhancing the test weight, biological, seed yield and also oil and protein yield over the

120 Kg N /ha. The maximum water was applied in check basin to meet the crop water requirement it was less in case of drip and micro-sprinkler system, 50 % of water was saved under drip and micro-sprinkler system over check basin.

The micro irrigation and check basin irrigation even in combine resulted in higher water use efficiency over only check basin irrigation in mustard crop but it was lower compare to drip and micro sprinkler irrigation system. The water use efficiency was increased substantially from check basin to drip and micro-sprinkler system. However economically best results was obtained from drip system up to 120 Kg/ha of N, closely followed by micro-sprinkler and drip system with 80 Kg N/ha (B:C ratio of 4.3 & 4.2 respectively). Thus micro irrigation with ferti-gation addresses the problem of dwindling of natural resource and maintains the high productivity.

استخدام تقنية Virtual GIS في محاكاة تقنيات حصاد مياه الأمطار في حوض وادي الملح شمال العراق

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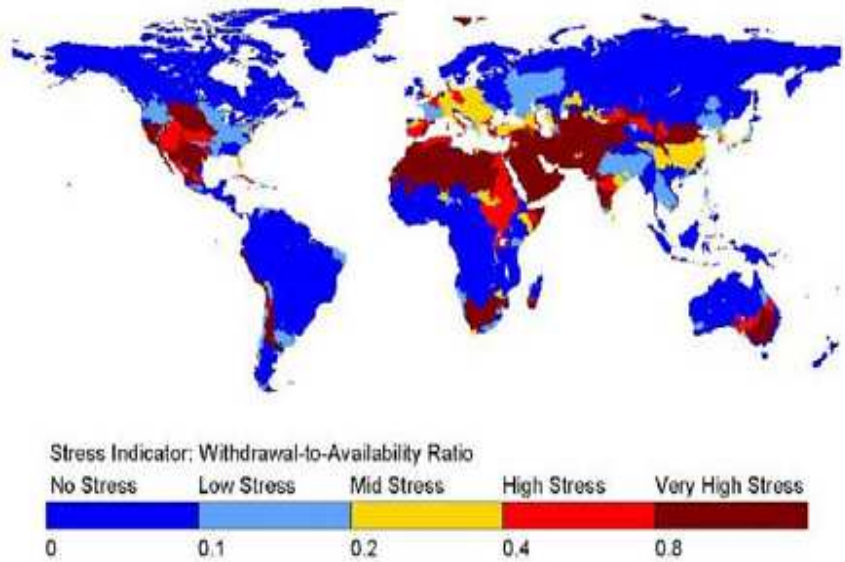
تعتبر الأودية الموسمية المنتشرة في جميع أجزاء العراق مجهولة من ناحية كمية الموارد المائية الموسمية التي تجري فيها سنويا وما هو مصير هذه الكميات ، لذا تم اختيار احد الوديان الموسمية والمتمثل بوادي الملح في شمال العراق لتطبيق إحدى تقنيات حصاد مياه الأمطار والمتمثلة بإنشاء سلسلة من الحواجز الحجرية. تم اختيار انسب المواقع لإنشاء هذه الحواجز وإعداد الخرائط الغرضية اللازمة لإعداد محاكاة واقعية لنظام حصاد المياه المقترح باستخدام تقنية Virtual GIS وحساب كمية المياه الموسمية المخزونة ومساحة البحيرات الافتراضية المتكونة خلف هذه الحواجز حيث تعطي هذه التقنية صورة واضحة لصانعي القرار والمخططين على تقدير كفاءة تقنيات حصاد مياه الأمطار المقترحة ومدى ملامتها لمنطقة الدراسة.

إن التصحر يشكل القضية البيئية الأولى التي سوف تعيق خطط التنمية المستقبلية للعراق حيث بلغت المساحة المتصحرة (166.687) ألف كم^2 من إجمالي مساحة العراق البالغة (437.5) ألف كم^2 ولا شك أن ظاهرة التصحر أصبحت محسوسة يوميا في البيئة العراقية ومن توقعات الأمم المتحدة للوضع العالمي نتيجة التغيرات المناخية لخارطة العالم والتوقعات المائية لعام 2015 حيث يبين الشكل (1) الوضع الصعب الذي يحتمل أن يواجه العراق خلال السنوات القليلة القادمة.



الشكل (1) يبين الوضع المائي العالمي المتوقع بحلول عام 2015 نتيجة التغيرات المناخية

إن إحدى الطرق للحد من ظاهرة التصحر هو اعتماد تقانات حصاد مياه الأمطار حيث تم اختيار تقنية إقامة الحواجز الحجرية القاطعة للوديان الموسمية لحصاد مياه الأمطار الموسمية في المنطقة (Balachandar,2010)(Girish,2008). تم تطبيق هذه التقنية على احد الوديان الموسمية وهو وادي الملح الكائن في شمال العراق والقاطع لتركيب جبل قند والذي يتبع إداريا لقضاء تلكيف ضمن محافظة نينوى والذي يتحدد بين خطي طول (00″ 07′ 43°)(00″ 00′ 43°) وبين دائرتي عرض (00″ 37′ 36°)(30″ 42′ 36°) شمالا ، تبلغ مساحة حوض وادي الملح (330.41) كيلومتر مربع ويبعد حوالي(33) كيلومتر عن قضاء الموصل.

إن تقنية Virtual GIS (المقدمة من شركة ESRI والمعنية بإنشاء برمجيات نظم المعلومات الجغرافية) هي عملية تمثيل وتحليل المظاهر الأرضية بأشكال ثلاثية الأبعاد والتي يمكن من خلالها تمثيل وتحليل البيانات الجغرافية ،تستخدم هذه التقنية في التطبيقات الخاصة بإنشاء قواعد البيانات الخاصة بنمذجة ومحاكاة المشاكل التي يراد حلها(Ribarsky,et.al,1994),(Giertsen,et.al,1994). تم استخدام هذه التقنية في إجراء محاكاة لاختيار انسب المواقع لإقامة هذه الحواجز. تم اختيار امثل ستة مواقع لإقامة هذه الحواجز الحجرية وإجراء عملية المحاكاة لها والانتهاء بإيجاد أشكال وحجوم وكميات المياه المخمنة في البحيرات الصناعية الافتراضية التي تنشأ خلف هذه الحواجز.

الضرورات الستراتيجية للادارة المتكاملة للموارد المائية في العراق

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تعد المياه اهم اساسيات الحياة بكل اشكالها , و توفيرها يعني وجود اهم عوامل التنمية الاقتصادية و الاجتماعية . اما الافتقار اليها او محدودية كميتها في منطقة ما ، يعد اهم اسباب تدهور نظمها البيئية واكبر معوقات التنمية فيها .

ومشكلة بحثنا تتمثل بتراجع كمية الموارد المائية في العراق و تدهور نوعيتها بسبب التلوث . كما إن للتغيرات المناخية و موجات الجفاف و سياسات دول الجوار و بخاصة تركيا التي ينبع منها نهري دجلة و الفرات تاثير كبير في تفاقم هذه المشكلة , و مما يزيد من تفاقمها هو ضعف الادارة للموارد المائية لعدم تبنيها اسس و مبادئ الاداره المتكاملة للموارد المائية. فقد كانت إيرادات نهري دجلة و الفرات قبل عام 1980 بحدود 80 مليار م^3/سنويا و لكنها تراجعت بشكل كبيرالى نحو 45 مليار م^3/سنويا كمعدل للمدة من 1998-2008 و من المتوقع ان تتراجع كميتها بشكل كبير خلال العقود القادمة .

يرى الباحثان ان العراق سيواجه تحدي كبير جدا في مجال توفير احتياجاته المائية في المستقبل المنظور مالم يبادر الى ستراتيجية مائية تعتمد على تطبيق مبادئ و اسس الادارة المتكاملة للموارد المائية بحيث يتم تاسيس مجلس اعلى للسياسات المائية يضم في هيكليتة الوزارات المستهلكة للمياه و هي (الزراعة و الصناعة و البلديات و البيئة فضلا عن وزارة الموارد المائية) و يكون مرتبط هذا المجلس برئيس الحكومة . هدفه تنسيق السياسات المائية مع السياسات التنموية للوزارات الاخرى و يعمل على حث هذه الوزارات على تغيير اساليب استثمار المياه و منع الهدر و التلوث .كما يضع خطة لتنمية المصادر المائية الحالية و البحث عن مصادر اخرى، كالتحلية و حصاد المياه و تدوير استخدام المياه العادمة بعد معالجتها . كما ينبغي على المجلس ان يحدد المعوقات الفنية و المالية و الادارية و القانونية التي تواجه ستراتيجية الادارة المتكاملة للموارد المائية لا سيما تنمية الموا رد البشرية في مجال صيانة الموارد المائية و تقليل الهدر منها و تنميتها و هذا ما سيسعى البحث الى القيام به لمساعدة الجهات المعنية بادارة االموارد المائية في العراق .

العواصف الغبارية والرملية في العراق

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العراق

العواصف الغبارية والرملية احد مظاهر مناخ العراق و ذلك لموقعة على حافة الشريط الصحراوي ولوجود الصحراء الغربية ذات المساحة الواسعة والمنبسطة من الاراضي الجافة وشبة الجافة، كذلك بعض الاراضي المتصحرة الواقعه بين نهري دجلة والفرات بدءا من جنوب بغداد حتى الحدود الدولية الجنوبية او تلك التي في طريقها للتصحر . اضافة الى زحف الصحراء على المناطق الزراعية من الغرب باتجاة الشرق وتحول هذة الاراضي وبمرور الزمن من اراضي مستغلو ومنتجة الى اراضي صحراوية غير منتجة وبتاثير الرياح الشمالية الغربية السائدة والمسببة بنقل مواد التربة المتصحرة والخالية من الغطاء النباتي ..... كل هذا يسهم كمصادر للعواصف الغبارية والرملية ويشجع في تكرار حدوثها في العراق .

وانطلاقا من اهمية الدراسات المناخية الشمولية التي تعمل على تحليل الظواهر الجوية المختلفة وتفسيرها ومنها العواصف الغبارية والرملية التي تعرف بانها انخفاض مدى الرؤية الى اقل من1كم بسبب كثافة الاتربة في الجو التي تحملها رياح ذات سرعة 6كم\ثا فاكثر .

وبالتالي فان هذه الكميات الكبيرة من الاتربة وبمساعدة الاتجاه السائد للرياح في العراق فانها تقوم بنقل الترب الصحراوية نحو المناطق الزراعية وتهديدها بالانطمار محولة اياها وبصورة ديناميكية خلال الزمن الى اراضي غير منتجة ثم الى مكمن ومصدر جديد لانطلاق تلك العواصف الغبارية والرملية .

الكلمات الدالة: سرعة الرياح, اتجاة الرياح, الاستشعار عن بعد, نظام المعلومات الجغرافية

الاختيار الأمثل لتحديد موقع بناء محطات لتوليد الطاقة الكهربائية بواسطة طاقة الرياح في مناطق جنوب العراق باستخدام تقنية الاستشعار عن بعد ونظم المعلومات الجغرافية

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يتضمن البحث دراسة استخدام طاقة الرياح في انتاج الطاقة الكهربائية في مناطق جنوب العراق واختيار افضل موقع تنشط فية الرياح على مدار اليوم حيث تم استخدام تقنية الاستشعار عن بعد (Remote Sensing) لتحديد سرعة واتجاه الرياح من خلال المعلومات التي نحصل عليها من المرئيات الفضائية للأقمار Landsat بالاعتماد على برنامج Envi Imagine. تمت الاستعانة بنظام المعلومات الجغرافية لتسهيل عملية جمع المعلومات وضبطها وتحليلها وتحديثها وتوظيفها بشكل فعال ومؤثر في عملية التقييم والتخطيط والتحليل البيانات. وبعد تحليل نتائج القياسات تبين ان المنطقة المحصورة بين محافظة ذي قار و محافظة المثنى جنوب العراق هي افضل مساحة لنصب مراوح لتوليد وانتاج الطاقة الكهربائية حيث بينت الدراسة ان معدل سرعة الرياح في منطقة الدراسة هي 12 كم/ساعة على مدار السنة وهي كافية لتدوير المراوح وانتاج الطاقة وبذلك نحصل على بيئة نظيفة خالية من التلوث باستحدام طاقة بديلة جديدة في ظل الضروف الاقتصادية الحالية. حيث اثبتت هذة الدراسة امكانية التغلب على العجز الحاصل في توفير الطاقة الكهربائية لمدن جنوب العراق .

تقويم اعتماد الجغرافيين العرب لتقنيات نظم المعلومات الجغرافية والاستشعار عن بعد فى ابحاث المياه

د شريف عبد السلام شريف

شهد علم الجغرافيا، وما زال يشهد تجديدا وتطويرا فى وسائل وأساليب دراستة، وتحليلها، واستخلاص النتائج المفسرة للواقع الجغرافى فى ضوء تطورات الماضى واختراعات المستقبل.ونظم المعلومات الجغرافية أصبحت أحدى الدعائم ألاساسية فى دعم اتخاز القرار على جميع المستويات والمجالات،حيث تكمن قدرتة على جمع وتخزين وتحديث ومعالجة وعرض البيانات سواء كانت بيانات جغرافية أم كارتوجرافية ،ام وصفية.

وتكمن أهمية دراسة الموضوع لاستخدامها الاستطلاع المباشر للجغرافيين العرب، لمعرفة ارائهم فى التقنيات الحديثة ومدى مساهماتها فى تقدم الفكر الجغرافى ودراساته المختلفة والبيئية على وجة الخصوص..والدراسة تطبيقية تستهدف:

- معرفة الواقع الفعلى لتقنيات نظم المعلومات الجغرافية فى اقسام الجغرافيا فى المدارس الجغرافية العربية المختلفة.
- رصد اراء الجغرافيين العرب فى دور نظم المعلومات الجغرافية فى تقدم علم الجغرافيا وخدمة الدراسات والابحاث المائية.
- معرفة اراء الجغرافيين العرب فى درجة اتقانهم لنظم المعلومات الجغرافية نومدى الاستفادة من التقنيات الحديثة فى حلول المشكلات المكانية المائية وتحقيق خطط التنمية

و اعتمدت هذه الدراسة على بيانات استبيانة لنحو 517 جغرافى من أصل 671 استمارة حيث لم يقم بالرد سوى 517 جغرافى ، حيث اعتمدت الدراسة على استبيان مباشر لنحو 197 ، ونحو 320 استمارة عبر شبكة المعلومات الدولية ، سواء لبعض الجغرافيين المعروفيين لدى الباحث أو عن طريق المواقع الإلكترونية المهتمة بالجغرافية العربية . ومن الملاحظ أن الاستجابة الالكترونية كانت سريعة حيث قام بالرد 87% من اجمالى الرسائل الإلكترونية ، وقد شمل الاستبيان معظم الدول العربية ومعظم الأعمار والدرجات العلمية بداية من الليسانس حتى الأستاذية ، وقسمت الاستبيانة إلى محاور رئيسية يشمل الأول المعلومات العامة ، والثانى الوضع الحالى لنظم المعلومات الجغرافية والاستشعار عن بعد فى دراسة المشكلات البيئية ، والقسم الثالث مستقبل التقنيات الحديثة . وكان حضور الباحث للمؤتمر الرابع للمعلومات الصناعية والشبكات بالرياض بالمملكة العربية السعودية تحت مظلة المنظمة العربية للصناعة والتعدين فرصة سانحة لمعرفة بعض آراء الجغرافيين العرب المشاركين فى المؤتمر حول نظم المعلومات الجغرافية والاستشعار من بعد فى تطور الدراسات الجغرافية البيئية والمائية.

الأخطار الهيدروجيومورفولوجية في مصر بالتطبيق على منطقة دمياط باستخدام نظم المعلومات الجغرافية

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تعد الأخطار الهيدروجيومورفولوجية اتجاه حديث من فروع الجيومورفولوجيا التطبيقة، فلا يكاد يمر يوم دون أن نسمع أو نرى أو نقرأ عن حدوث كارثة طبيعية في مكان ما من العالم ، وإذا كان نجاح التنمية يقتضى استمرارها وتواصلها ، فلا يأتي هذا النجاح إلا في حالة تمكين المواطنين من الحياة الآمنة

وتجدر الإشارة إلى أن مفهوم الخطر الهيدروجيومورفولوجي ليس معناه انتظار وقوع الخطر ثم التعامل معه والحد من أثاره، وإنما المقصود به التبوء لوقوع خطر ما بالدراسة العملية المكثفة وجمع المعلومات والبيانات وتحليلها وتحديد طريقة معالجتها ، وتوفير كل ما تحتاجه لمواجهتها فور وقوعها المفاجئ.

وتتعرض منطقة الدراسة لمجموعة من الأخطار الهيدروجيومورفولوجية التي تهدد المنطقة والأنشطة الطبيعية والبشرية المنتشرة بها، والتي أمكن تصنيفها على النحو التالي :

- الأخطار الجيومورفولوجية الناجمة عن التعرية النهرية :
- الأخطار الجيومورفولوجية الناجمة عن التعرية الساحلية :
- الأخطار الجيومورفولوجية الناجمة عن المياه الأرضية :

وتتمثل هذه الأخطار في عمليات تأكل الشواطئ والتي ينتج عنها إلحاق الأضرار بمظاهر العمران المنتشرة على الشاطئ وتدميرها، وخطر إطماء المواني الذي يهدد السفن وحركة الملاحة منها وإليها. كذلك النحت بقاع وجوانب مجرى النيل، مما يمثل خطراً على المنشآت المتاخمة وعلى الأراضي الزراعية. فمع استمرا هذه العلمية ؛ يؤدى إلى تقليص الأراضي الزراعية ، مما يؤدى إلى زيادة درجة الخطورة . كما تعد ظاهرة الترسيب على قاع مجرى النيل من الأخطار الهيدروجيومورفولوجية، لما يترتب على الترسيب مشكلات تتعلق بعمق الغاطس والاختناقات الملاحية . أما بالنسبة للخطر الناتج عن المياه الأرضية ، فتتمثل في تأثيرها على صور استخدام الأرض، مثل: تملح الأراضي، وانخفاض إنتاجية المحاصيل، وتجوية الأساسات والتي تؤثر في النهاية على الإنسان نفسه.

أثر السياسات المائية لدول الجوار الجغرافي على الأمن المائي العراقي- دراسة جيوبولوتيكية

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تعد الموارد المائية في أي دولة عنصر فعال ومهم في بناء قوة الدولة ، ولاشك إن للماء أهمية كبرى في كل مجالات الحياة بل هو أساس الحياة على الأرض وفي ضل التحولات المناخية وامتداد ظروف الجفاف الى مناطق واسعة من اليابس العالمي والعربي ، أصبحت مشكلة توفير المياه او تأمينها او حمايتها تأخذ أبعاد إستراتيجية خطيرة ، وتدخل ضمن أولويات الأمن المائي العربي بشكل عام والأمن المائي العراقي بشكل خاص.

ان من أهم التحديات التي يواجهها الأمن المائي العراقي هي دولية أنهاره و بشكل أدق وقوع معظم منابعها خارج حدود العراق ، اذ تقع أجزاء أساسية من أحواض نهري دجلة والفرات في داخل أراضي (تركيا وسوريا) كما ان هناك منابع روافد مائية مهمة تقع داخل الأراضي التركية مثل (الخابور و الزاب الكبير) ، كما ان نهري (الزاب الصغير و ديالى) تأتي بعض مواردها من أراضي إيرانية .

تشكل دولية الأنهار العراقية مشكلة جيوبولوتيكية معقدة جعلته تحت تأثير السياسات المائية للدول التي تنبع منها أنهاره (دجلة والفرات وروافدهما) وفرض عليه ضغوط سياسية واقتصادية ودبلوماسية تجاه هذه الدول ، وجعلت منه عرضة للتهديدات المستمرة التي تؤثر على الحصة المائية له .

من المعلوم ان تقليل مناسيب المياه في نهري دجلة والفرات او التجاوز على الحصة المائية الواصلة الى العراق من قبل دول الجوار الجغرافي يعني إلحاق أضرار كبيرة في مختلف الجوانب الحياتية لسكانه بسبب اعتماد سكان العراق على مياه النهرين في نشاطاتهم المتنوعة ، وأضرار اقتصادية تتعلق بالزراعة ، لان معظم الأراضي الصالحة للزراعة في وسط وجنوب العراق تعتمد بشكل كلي على منسوب مياه النهرين .

الإمكانات الجغرافية المتاحة لاستخدام تقنيات الري الحديثة في محافظة النجف العراق

المدرس المساعد صفاء مجيد عبد الصاحب المظفر

جامعة الكوفة – كلية الآداب –قسم الجغرافيا

العراق

المقدمة:

في ظل الشحة المائية التي يعيشها العالم اجمع والعراق من ضمنها يتوجب دراسة كيفية الحفاظ على الثروة المائية المتوفرة سواء كانت السطحية أو الجوفية منها فالخبراء يقولون إن الحروب في المستقبل هي حروب مياه خاصة وان العراق يعاني من مشكلة إن منابع أنهاره غالبيتها من خارج حدوده من هذا يتحتم علينا دراسة الكيفية التي يمكن من خلالها الحفاظ على كل قطرة مياه متواجدة واستخدامها بالشكل الأمثل وفي ظل هذا الجانب وجد ان الزراعة يذهب إليها من كميات المياه نسبة 80% وتماشيا مع التطور الذي وصلت إليه دول العالم من استخدام تقنيات ري تتناسب وكميات المحاصيل الزراعية المزروعة مع مراعاة ما تتطلبه المحاصيل من كميات المياه .وتعويض الكميات المهدورة باستصلاح أراضي أخرى يمكن الزراعة فيها بتوفير هذه التقنية وفيما يخص محافظة النجف تتوفر مساحة هائلة تقدر 95%من مساحتهاالكليةالبالغة (28824)كم وهي تستورد اغلب المحاصيل الزراعية من دول الجوار في ظل التزايد المستمر للسكان يجب توفير اقالم للمدن تكون مزودة لكل ماتحتاجه المدينة وبهذا نكون قد عملنا على تقنين المياه من جهة وتوفير المصادر الغذائية للمدن وتوفير الأمن الغذائي الذي أصبح محور خطير في جميع الأنظمة السياسية من جهة ثانية و الحفاظ على التربة من الملوثات وإنهاك التربة جراء الري الخاطئ التقليدي الذي يؤدي الى ظاهرة أخرى خطيرة تجتاح تجتاح العالم اليوم وهي ظاهرة التصحر وبهذا نكون قد عالجنا مشاكل مهمة تعاني منها المحافظة.

مشكلة البحث:

مامدى توفر الأمكانات المتاحة لأستخدام تقنيات الري الحديث في محافظة النجف ؟

وتتفرع من هذه المشكلة مشاكل ثانوية :

1- ماهي الخصائص الطبيعية لمحافظة النجف؟
2- ماهو طبيعة الأنتاج الزراعي في المحافظة؟
3- ماهي طبيعة خصائص طرائق الري الحديثة المستخدمة في محافظة النجف؟

فرضية البحث :

بالأمكان استخدام تقنيات الري الحديثة في محافظة النجف وخاصة في منطقة الهضبة الغربية وتتفرع من هذه الفرضية فرضيات ثانوية :

1- تتمثل الخصائص الطبيعية في محافظة النجف بطبيعة السطح والتربة وطبيعة الموارد المائية والعوامل المناخية المؤثرة على امكانات تطبيق تقنيات الري الحديث في المحافظة .

2- تتمثل المحاصيل الزراعية في منطقة الدراسة على محاصيل الحبوب والخضروات والفواكه وامكانية استخدام طرق الري الحديثة في زراعتها

3- تتمثل طرائق الري الحديث في منطقة الدراسة بطريقتي الرش والتنقيط

الهدف من الدراسة :

تهدف الدراسة الى الكشف عن امكانات استخدام طرائق الري الحديث في محافظة النجف لأرتباط هذا الموضوع بمعالجة عدة مشاكل منها النهوض بالواقع الزراعي الذي اخذ بالتراجع بسبب الشحة المائية ومشاكل ملوحة التربة المترتبة على اساليب الأرواء التقليدية .

تلوث مياه نهر الفرات في محافظة النجف العراق

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يعد تلوث المياه من المشاكل العالمية المهمة التي تشغل اهتمام الحكومات والشعوب والباحثين في الوقت الحاضر، وذلك لما له من خطر جسيم على مكونات البيئة الحيوية (إنسان ، نبات ، حيوان) .

يعرف **التلوث** بشكل عام على انه حدوث تغير في تركيز الخصائص الفيزيائية أو الكيمياوية أو البايلوجية للمكونات البيئية الرئيسة التربة والماء والهواء عن الحد المسموح به نتيجة للأنشطة البشرية المختلفة

أما بالنسبة **للتلوث المائي** فقد عرفه عدد كبير من العلماء على انه (إضافة مواد من قبل الإنسان إلى البيئة المائية كافية لأحداث ضرر في صحة الإنسان أو المواد الحية أو الأنظمة البيئية بضمنها نواحي الراحة والاستجمام.

يتناول هذا البحث دراسة وتحليل لمصادر تلوث مياه نهر الفرات في محافظة النجف في العراق بهدف معرفة هذه المصادر المسببة لتلوث هذه المياه السطحية والتي تعد مصدرا مهما للاستخدام البشري والحيوي والزراعي في منطقة البحث . ومن ثم تقيم هذه المياه لمعرفة مدى صلاحيتها لمختلف الاستخدامات الحياتية .

اعتمدت هذه الدراسة على جمع وتحليل 6 أنموذجا من المياه السطحية في المنطقة (4) منها من المناطق المتأثرة بالمخلفات الزراعية و(2) منها من الجهات المتأثرة بمخلفات الصرف الصحي .

مشكلة البحث: تتمثل مشكلة البحث بالسؤال الآتي:(هل تتعرض مياه نهر الفرات في محافظة النجف في العراق للتلوث) .

فرضية البحث: تسهم العوامل البشرية في تلوث مياه نهر الفرات في محافظة النجف في العراق.

اعتمدت الدراسة على المنهج الوصفي والتحليلي في دراسة نهر الفرات في محافظة النجف وتحليل مصادر تلوثه .

توصلت الدراسة إلى النتائج الآتية :

- أن مياه نهر الفرات تعاني من التلوث بالمخلفات الزراعية والتمثل ببقايا الأسمدة الكيمياوية ، وكذلك بقايا المبيدات الحشرية الضارة من جانب ، ومن التلوث بالمخلفات المنزلية والمجاري الثقيلة التي تلقى مباشرة في مياه نهر الفرات دون ما معالجة.
- أن أهم العناصر الملوثة لمياه نهر الفرات تتمثل بـ:

أ .الهيدروكاربونات المختلفة الناجمة عن تلوث المياه بمخلفات المجاري الثقيلة.

ب . كاربونات الصوديوم والكبريتات والأملاح النيتروجينية والفوسفاتية الناجمة عن وصول مياه المجاري والقاذورات ومياه البزل إلى المياه السطحية.

ج . مادة الاندرين والالدرين والدالدرين السامة الناجمة عن بقايا مبيدات مكافحة الحشرات والمتسربة عبر مياه البزل إلى المياه السطحية.

- أن مياه نهر الفرات غير صالحة للشرب وفقا لمعيار منظمة الصحة العالمية إلا بعد معالجتها.
- عطل معظم وحدات التصفية والتعقيم في محطة المياه الثقيلة في النجف مما يؤدي إلى وصول هذه المخلفات إلى المياه السطحية دون معالجة .
- إن هذه المياه عالية الملوحة ولا تصلح إلا لري المحاصيل المتوسطة والعالية التحمل للأملاح مثل الشعير والقمح والقطن والنخيل ، فول الصوديا، الجت ، الرز ، وبشرط الاهتمام بعمليات غسل وبزل التربة.
- إن هذه المياه يمكن استخدامها لشرب الحيوانات ولكناه قد تسبب إسهالا مؤقتا لها.

تحويل مياه المصب العام إلى منخفض الصليبات جنوبي العراق وإمكانية استخدامها لزراعة الأراضي الصحراوية وتغذية المياه الجوفية

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تهدف هذه الدراسة إلى إمكانية تحويل مياه المصب العام جنوب مدينة الناصرية إلى منخفض الصليبات الواقع ضمن صحراء العراق الجنوبية والمعروفة باسم سطح الدبدبة .تم الاعتماد على الصورة الفضائية(SRTM) والخرائط الطبوغرافية والخرائط جيولوجية ،فضلا عن التحريات الميدانية المتعلقة بالمسح الجيومورفي الدقيق .تناولت الدراسة العوامل الطبيعية لمنطقة الدراسة والمتمثلة بالخصائص الجيولوجية والتضاريسية وطبيعة الانحدارات والتربة ،فضلا عن تحديد مساحة المنخفض وتحديد المواقع المكانية لتغذية المنخفض بمياه المصب العام من الجهة الجنوبية وتغذيته بمياه نهر الفرات من الجهة الشمالية. وقد تبين ان المنخفض يصلح لانشاء بحيرة صناعية ، تباينت قدرتها الخزنية بتباين الموديلات او النماذج التي وضعها الباحث ،اذ اوجد ان هنالك اربع مستويات للغمر يمكن ان يستوعبها المنخفض ،وبالاعتماد على هذه النماذج ،فان مستويات الغمر والقدرة الخزنية والأعمال الهندسية المطلوبة كانت النحو الآتي :

النموذج الأول بمستوى غمر (5 متر) بلغت المساحة السطحية للمياه التي يستوعبها المنخفض (643.8 كم^2) أما حجم المياه فقد بلغ (3.58)مليار متر مكعب .وهذا لا يتطلب اي اعمال هندسية ما عدا ايصال مياه عبر محطة ضخ المصب العام.

النموذج الثاني بمستوى غمر يصل إلى (7) متر لمستوى العمق فان المساحة السطحية بلغت (1022.6 كم^2) وبقدرة خزن بلغت (6.2)مليار متر مكعب على أن يتم عمل سواتر بارتفاع (1) متر شمال المنخفض وبطول (25 كم) .

النموذج الثالث الذي مثل مستوى غمر (10 متر) فوق مستوى سطح البحر ،بلغت مساحته السطحية (1286.9 كم^2) وقدرة خزن بلغت (8.46) مليار متر مكعب ،مع الأخذ بنظر الاعتبار بناء سواتر ترابية شمال المنخفض بمعدل ارتفاع (2 متر) وبطول (59 كم).

أما **النموذج الرابع** والأخير، فقد مثل مستوى غمر (15 متر) بمساحة سطحية بلغت (1452.8 كم^2) ويستوعب قدرة خزن وصلت إلى (12) مليار متر مكعب على أن تبنى سواتر في الجزء الشمالي للمنخفض بارتفاع (7 متر) وبطول يصل إلى (73كم).من هذه النماذج يتضح صعوبة تطبيق النموذج الرابع وإمكانية تطبيق النماذج الثلاث الأخر. ومن وجهة نظرنا يمكن البدء بإنشاء هذا المشروع بمستوى غمر معتمد على النموذج الأول لأنه لا يحتاج إلى أي أعمال هندسة وإنما فقط الأعمال الخاصة بشق قناة توصل مياه المصب العام إلى منخفض الصليبية الذي ينخفض السطح فيه إلى دون مستوى سطح البحر.

إن خزن المياه في هذا المنخفض سوف يوفر كميات كافيه من المياه ، يمكن استغلالها لتغذية المياه الجوفية واستثمار المياه للأغراض الزراعية والصناعية ،فضلا عن تربية الثروة السمكية والطيور البرية . إن تحويل مياه المصب العام إلى ذلك المنخفض سيؤدي إلى إحياء مئات الهكتارات من الأراضي الصحراوية وتحويلها إلى أراضي منتجة والى إنشاء المستوطنات البشرية .

اثر المناخ على التصاميم الاساسيه للمدن ومعالجاتها البيئية"
(دراسة تطبيقيه لنموذج من المناخ الحار الجاف على مدينه الحلة)

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تلقى المناخ اهتماما قليلا في أدبيات المدن وخاصة فيما يتعلق بحاله الغلاف الجوى للمدن,ولكن الإنسان استطاع ولظرفه البيئية ,أن يخلق نوعا من المناخ الوسطىmeso-climateسواء أكان بالاتجاه نحو الكهوف أو خلق أماكن مضلله والابتعاد عن حر النهار وبرد الشتاء ,وكانت المستوطنات البشرية في بقاع مختلفة من العالم لها نوع من المساكن ذات الطابع متكيف مع المناخ المحلي والإقليمي والتي حاليا قد فقدت بسبب تغيير في النسيج والهيكل العمراني وفي مواد البناء وبالتالي أخذت طابعا واحدا وعلي مستوى العالم .

أن الاستجابة والتفاعل قديما كان يتم من خلال بناء الإفراد لمنازلهم (بالاتجاه والانغلاق نحو الداخل حيث التأكيد على الظل والبرودة الداخلية والفضاء الخارجي) ,من هنا كانت محاولات التركيز على عناصر المناخ في تخطيط المدن موجودة وعلى مراحل مختلفة من التاريخ إلا أنه لم يكن لها التأثير الواسع على مناخ المدينة وعلى مستوىmic-macro climateوالاستفادة من موضع المدينة وشكلها وأثره على مناخها باعتبار المدينة كائن حي لها ألقدره على خلق مناخ وسطي ,ولذا فأن مهمة مخططي المدن الحاليين هو الحفاظ على المناخ الحضري ,إن هذا المفهوم يعني (نتاج من استلام وانتشار الطاقة على وفوق سطح الأرض وللمنطقة الحضرية) علما أنه ولكي تحافظ الكره الارضيه على متوسط درجه حرارتها لابد من أن (تشع إلى الفضاء وسطيا ,نفس كميه الطاقة الحرارية التي تتلقاها من الشمس وهي تفعل ذلك عن طريق إصدار إشعاع موجات طويلة في المنطقة تحت الحمراء من الطيف لكي يصدر منها إشعاعا مقداره 236واطام لا بد أن تكون حرارته نحو 19 درجة مئوية) .

أن الجهود تبذل من أجل فهم التوازن الإشعاعي للا رض بما ذلك الذي تسببه (الزيادة في غازات الاحتباس الحراري والهباء الجوي من شأنه أن يغير درجات الحرارة على الأرض ,مما يؤثر في أنماط الطقس والمناخ وبالتالي في شكل الحياة وفي المنظومة البيئية والمائية والمنظومة الاجتماعية ألاقتصاديه على كوكبنا) ,وهكذا الجهود تبذل لفهم العمليات الفيزيائية علما أن أول الدراسات التي بحثت في هذا المجال هي دراسة Luke Huwardعام 1883 لمناخ لندن والذي أوضح فيه مقارنه ما بين (موضع مدينه لندن والبيئية الريفية المحيطة بها وخلص إلى إن المدن هي عبارة عن جزر حرارية urban hot island.