UNESCO-IHP Role In Sustainable Water Resources Management In The Arab World

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Abstract

Most of the Arab countries are located in arid and semi-arid zones known for their scanty annual rainfall, very high rates of evaporation and consequently extremely insufficient renewable water resources. Sustainable management of water resources using the integrated water resources management approach, is a must as water scarcity is becoming more and more a development constraint impeding the economic growth of many countries in the region. The per capita share of renewable water resources in the Arab region is less than 10% of the worldwide average. In the Arab World, there are more than 50 million persons without access to safe drinking water and more than 90 million without access to proper sanitation. This is a big challenges for governments, donors, international organizations, and scientists to achieve the MDG and targets on water and sanitation by year 2015.

The International Hydrological Program of the UNESCO (IHP) is a vehicle through which Member States can upgrade their knowledge of the water cycle and thereby increase their capacity to better manage and develop their water resources. It aims at the improvement of the scientific and technological basis for the development of methods for the rational and integrated management of water resources.

The sixth phase of IHP (2002-2007) strives to minimizing the risks to vulnerable water resources systems, taking fully into account social challenges and interactions and developing appropriate approaches for sound water management. Assessing the global time and space distribution of freshwater availability and use, developing approaches to reduce the vulnerability of hydrosystems and their supporting ecosystems and improving water resources management for vulnerable areas are among the main objectives. Capacity-building and water education and training, as well as institutional development are reinforced. IHP addressed the interaction between technical, social and ethical aspects of water to develop an efficient water conflict prevention and resolution strategies.

The forthcoming seventh phase of IHP (2008-2013) will contribute in addressing policy-relevant scientific aspects of global hydrology, it will also reinforce its action in support of UN Millennium Development Goals and the UN Water for Life decade. At the local level, IHP will strengthen its efforts for linking hydrology to governance, redressing eco-hydrological imbalances and improving environmental management.

Therefore IHP-VII will provide a global framework to address the science and policy issues related to water interdependencies, global changes, water governance and socio-economics, hydro-ecology, environmental sustainability, water quality, human health and food security.

In addition, through its intergovernmental and global scientific framework, IHP-VII can help support the scientific community and national institutions in developing better information and methods to evaluate and solve some of the problems and linkages between: education-capacity building and governance; ecohydrological imbalances and environmental management; water demand and water scarcity; surface water-ecosystems and groundwater systems; social needs and economic costs; human health, water quality and food security.

The urgent need for comprehensive assessment of the world's freshwater has been emphasized by the UN Commission on Sustainable Development. It urged a collective initiative to this effect. This led to the launch of the UN system-wide World Water Assessment Programme (WWAP) led by UNESCO, which aims to improve the assessments of the state of world water resources and their response to the pressure posed by escalating human demands, as well as by factors related to global change. UNESCO is a lead agency in the decade of water for life 2005-2015 and Cairo Office will be instrumenatl in implementing this them in the Arab Region.

Therefore, UNESCO Cairo Regional Office (UCO) is implementing efficiently the themes of the IHP relevant to the Arab Region priorities. It is taking the lead in groundwater protection and dryland hydrology through several concentration areas of groundwater protection and integrated water resources management in drylands. UCO is a co-founder of the global G-Wadi network. A new concept of the ecohydrology of dry lands is an emerging topic to ensure linkage between hydrology and environment in the arid region. Most recently, UCO has launched the Arab Network on Water use Ethics, focusing on issues related to water interactions with society, culture, and other stakeholders. Our strategy is to consolidate efforts of various national, regional and international agencies in these areas to address these themes. Human resources development and capacity building has been a prime objective of UCO activities. UCO is actively following the UNESCO approach of result based management in all its activities.

Elaboration and Implementation of PV Water Pumping Systems (PVPS) In Arid and Semi-arid Areas

(Ghardaia site/Algeria)

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Abstract :

The Geographic location of Algeria around the equator, favourites the solar energy uses in water pumping, mainly in arid and semi-arid regions. The large solar radiation covering the whole Algerian south and the average sunny day which ranges between 5h to 10h hours, as well as the abundance of high quantity of underground water allow the photovoltaic water pumping systems (PVPS) to be the appropriate solution to supply water for drinking and irrigation in large scale, especially in remote areas. Since the installation of a complete test bench in our lab, on march 2005, for photovoltaic pump characterization at Applied Research Unit of Renewable Energies/Ghardaia, which consists of a stainless steel cylinder tank (length=2m and Diameter=1.5 m), composed of two flow meters, depth sensor, MPPT (max power 300 w), DC/AC inverter for three phase pumps, electrical display panel and PV generator composed of 110 w / 26 Isofoton modules. Several tests have been carried out to characterize different submersible PV water pump models: (Grundfos with nominal power V=240 – 300 V, I= 7A, P= 900 w). On 6th march 2007, we reached about 40 m3 of pumped water during 8 hours of pumping with an average flow rate of 4.709 m3/h at daily average solar irradiance of 658.09375 w/m2/h for a head of 25m . (Water Max WA 64 with nominal power V= 64v, I= 4,6 A ,P= 300 w), after about 7hours of pumping, we reached a storage of 4.766m3 water volume with an average flow rate of 0.6947 m3/h at daily average solar irradiance of 696.375 w/m2/h for a head of 15m . The results are illustrated by tables and curves, for different heads. Two study cases have been carried out to install two PV water pumping systems for the benefit of two farms with well heads 28m and 25m, respectively and 50 m3 daily cumulative water for each system, in Sebseb village about 60 km south west of Ghardaia. Through simulation studies, it has been found that the power required to extract such quantity of water are approximately 4.5 kw and 3 kw respectively. A future (PVPS) projects will be installed in Hassi-Lafhal Region about 140 Km south of Ghardaia where the well heads range from 5m to 10m.

Visibility study shows that the availability of both solar radiation and the wide underground water lake in large desert area of Algeria are advantages that our country will profit and is necessary to investment decision makings in using solar energy adding to other renewable for water pumping and treatment.

A sustainable proposal to River Xuquer water management

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Keywords: River Xuquer, sustainability, water management, water pollution, Valencian region.

The River Xuquer is an important water source for the coastal Valencian region. It is the base for both biodiverse environment and economic development of the region, being in addition the main drinking water source for Valencia, the capital city.
During last decades, an intensive not sustainable use of this river has generated pollution and flow decrease. Due to this, an important enviromnental problem has appeared, specially associated to the drinking water flow dropping. This is a rising problematic fact due to the spectacular increasing of urbanization in the coastal zone.
The increase of the drinking water demmand because of the population growth, the increase of standards of life, illegal water wells and extractions…. and, of course, the climate change, are some of the most important factors that cause this negative dynamique in the river.
In order to reverse this tendency diverse proposals are given to manage, protect and regenerate the water flow of the most important river in the Valencian region.

Application of Expert System in Integrated Water Resource Management Plan (IWRMP)

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Abstract

An Integrated Expert system for the evaluation of water management options is presented. Different supply and management options are simulated for the best available option. The system incorporates the water balance calculation for the base year and projects the demand requirement for the planning horizon. The demand projections are made based on the expected activities in agriculture, domestic and industrial requirements. The evaluation procedure uses well defined comprehensive indicators in determining the best available options; these are water availability, cost benefit ratio and social acceptability. The system is designed to be used in arid regions where groundwater is main source of water.
Key words: integrated water resources management plan(IWRMP), demand management, expert system Oman

RENEWABLE HYDROGEN PRODUCTION SYSTEM RESEARCH AND DEVELOPMENT IN MALAYSIA

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Abstract

Hydrogen is the fuel of the future. It has several advantages compared to the conventional fossil fuel. Hydrogen is the lightest and most abundant element in the universe. It is found in all organic matter and water and can be used in its liquid or gaseous form for fuel. When it burns, hydrogen releases energy as heat and produces pure water vapor as a by-product and when handled and used properly is safe.. Since no carbon is involved, using hydrogen fuel eliminates carbon monoxide, carbon dioxide and does not contribute to greenhouse warming.

Hydrogen fuel can be renewably made by separating the components of water with electricity. This process is called electrolysis. Renewably generated hydrogen fuel is clean, efficient, and inexhaustible. Solar and wind energy is the most environmentally compatible form of producing hydrogen from electrolysis. This paper will present hydrogen energy roadmap for Malaysia. In addition, the performance of a 5 kW grid connected photovoltaic hydrogen production system suitable for the urban areas and a hybrid wind photovoltaic standalone hydrogen production system suitable for remote islands. Finally, the paper will discuss the strategies for the widespread application for renewable hydrogen for Malaysia.

THE WATER FOOTPRINT OF ENERGY CONSUMPTION: AN ASSESSMENT OF WATER REQUIREMENTS OF PRIMARY ENERGY CARRIERS

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Abstract

Climate change, related to the use of energy, and the availability of sufficient fresh water of good quality are major issues on a global level of scale. Solutions to solve problems in one system often affect other systems, however. For example, the energy system and the water system are interrelated because to make energy available, almost always water is needed. This paper assesses the water footprint (WF) of energy carriers expressed as the amount of water required to produce a unit of energy (m^3/GJ). The paper observes large differences among the WF's for specific types of energy carriers. For fossil energy carriers, the WF increases in the following order: uranium (0.09 m^3/GJ), natural gas (0.11 m^3/GJ), coal (0.16 m^3/GJ), and finally crude oil (1.06 m^3/GJ). Renewable energy carriers show large differences in their WF. The WF for wind energy is negligible, for solar thermal energy 0.30 m^3/GJ, but for hydropower 22.3 m^3/GJ. For biomass, the WF depends on crop type, agricultural production system and climate. The WF of average biomass grown in the Netherlands is 24 m^3/GJ, in the US 58 m^3/GJ, in Brazil 61 m^3/GJ, and in Zimbabwe 143 m^3/GJ. Based on the average per capita energy use in western societies (100 GJ/capita/year), a mix from coal, crude oil, natural gas and uranium requires about 35 m^3/capita/year. If the same amount of energy is generated through the growth of biomass in a high productive agricultural system, as applied in the Netherlands, the WF is 2420 m^3. The WF of biomass is 70 to 400 times larger than the WF of the other primary energy carriers. The trend towards larger energy use in combination with increasing contribution of energy from biomass to supply will bring with it a need for more water. This causes competition with other claims, such as water for food crops.

sustainability | climate change | energy | biomass | natural resource use | water footprint

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Using Phase Change Material to promote seasonal solar energy storage

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Abstract: Facing the increasing shortage of the fossil sources, the valorization of solar energy becomes legitimate and urgent. However, this energy is dispersed in time and space. It thus should be stored according to the seasons. Storage by sensible heat was proved, in most applications, expensive and limited to low enthalpy.
Storage by phase change becomes increasingly profitable. This due to its capacity of storage even at high enthalpy. Moreover, this material (PCM) has a second advantage, most significant to know, his capacity to transfer energy with a coefficient 100 to 1000 times larger than that from water.
In this paper, we present a numerical study on the transfer of heat using water and a PCM.
This study is based on solving the partial differential equations related to convection using a Hermitian compact method. The results show the advantage of the advantage of PCM like storage body of solar energy.

Effect Treated Waste Water and Different Levels of Nitrogen Fertilizer on Yield of Sorghum.

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The use of treated sewage water for irrigation economical crops is one of main tasks Omani government, using sewage treated water with nitrogen fertilizer on sandy soil may case ground water pollution water .

The experiments aimed to study effect of three Nitrogen levels (0,130kg/ha, and 260kg/ha) and water type (tertiary treatment treated water and Tap water), on yield of Sorghum fodder uses. And protect ground water from nitrate pollution

Soil samples were chemically analysis before and after the study. Crop growth parameters were sampled.

Water type has significant effect on fresh and dry weight, plant height, chlorophyll concentration, leaf length , leaf No, and tillers No. the Nitrogen has significant effect on fresh and dry weight, plant height, leaf No, tillers No.

Treated water without, adding Nitrogen fertilizer adequate for increasing fresh and dry weight more than Addition of 260 kg N/ha for tap water and decrease Nitrate concentration in soil profile.

Sustainable water circulation system by using graywater in complex

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Keywords: graywater, membrane, advanced oxidation process, sustainability

Abstract
According to development of industry, urbanism and diversification of life style, a lot of demand of water are to request. As a large scale apartment complexes are constructed recently, problems are not only increasing of demand of water but also increasing of wastewater. Wastewater in complex like apartment can be divided as wastewater of kitchen, bathroom, laundry and chamber pot. If wastewater can be reused, demand of water and wastewater can be decreased. In this study, wastewater of kitchen, bathroom and laundry was defined as graywater. Graywater was treated by membrane and advanced oxidation process. The characteristic of quantity and quality of graywater was enough to establish sustainable water circulation system to reuse wastewater of apartment.

Implementation of coagulation - flocculation treatment in towns with seasonal inhabitant increment

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Nowadays, because of the severe drought that several cities and even countries are suffering, a new concept consisting of a treatment focused on its final reuse is being imposed, what is complicated in tourist cities.
The management of wastewater treatment is difficult due to its dependence on many variables. This fact becomes more patent in those cities and towns with a high seasonal variation, reaching even the double of the usual, what is the case of most tourist cities near the Mediterranean coast. Thus, it is necessary the application of complementary treatments to the already established in order to get both high quality depurated water and the lowest economic cost.
It is proposed the implementation of a flocculation-coagulation step, as a way to improve the wastewater treatment, in a specific city located in the Mediterranean Spanish coast. The success of this additional treatment step was based on the COD and turbidity levels, which were reduced to values over 80%.
Keywords: Wastewater, coagulation, flocculation, sustainability.
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Grid Connected Solar Fired Combined RO/TMD Seawater Desalination Plant

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The newest commercial technology for converting **S**ea**W**ater (**SW**) into potable water is based on **R**everse **O**smosis **(RO)** membrane treatment. In recent decades, various new solar powered RO desalination units have been proposed, and currently, grid connected **P**hotovoltaic (**PV**) powered **SWRO** units is considered the most promising, particularly for small systems where other solar technologies are less competitive. However, the main drawback to most solar PV systems has been the high initial cost and limited amount of electrical output (**8:15 %** of the absorbed solar radiation), the rest dissipates as heat. Thereby, these PV-SWRO units cannot currently compete, from an economic point of view, with other conventional desalting technologies, without further improvements. Thermal Membrane Distillation (**TMD**) is receiving recent attention as a technique to efficiently desalinate seawater, besides many other applications. It has potential benefits of low temperature (**40 C to 80 C**) and pressure operation with high degrees of separation. This motivates a heat and electricity cogeneration system, where heat is removed from the PV array, stored or/and used primarily for TMD. From this standpoint the present work was undertaken to include proposed grid connected solar PV/Thermal (**PV/T**) system targets the two dominating energy demands in seawater desalination plant: low level energy for TMD units and high level energy (electricity) for grid connected RO units. Simulation models have been presented for the modeling of thermal and electrical performances of solar PV/T system for combined RO/TDM seawater desalination plant. The usefulness of developed models has been shown by carrying out numerical calculations for the amount of solar power and thermal energy produced by various installations, solar desalted water produced at each quarter hour time interval in the year, cumulative performance over a year of the examined system. Further, a simple effectiveness analysis has been carried out to calculate the rate of fossil fuel saving in electrical power grid for examined system. First calculations show that, the proposed design of seawater desalination plant offer high specific rate of fossil fuel saving and good overall thermal performance over a conventional PV-SWRO plant. Enabling a faster introduction a solar PV/T system can cover a significant fraction of the combined RO/TMD units heat and electricity demand. However, combining Solar PV panels and flat plate collector in one PV/T collector results in lower direct electric and thermal power output.

Keywords: PV, Reversed Osmosis, Sea Water, PV/Thermal

Towards a sustainable urban water cycle: technological challenges

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The urban water cycle deals with drinking water supply and sanitation in cities. In most western (European) countries drinking water quality fulfils high quality standards and waste water treatment effluent is only a limited burden to the surface water. It is therefore that waterborne diseases hardly occur in most western countries. However, western systems are often not sustainable in the sense that relative large amounts of water are used and thus have to be treated to produce drinking water and to clean the waste water, using large amounts of energy and/or chemicals. Several trends in the near future might ask for more sustainable concepts. Examples of such trends are the global climate change leading to changes in water quality and quantity, higher energy prices, more stringent legislation and a continuing urbanisation leading to an increase in water and energy consumption. In a large number of countries the situation is entirely different. Water and/or energy scarcity present serious challenges for a sustainable urban water cycle. Here, there is an urgent need for water treatment technologies that use less water and/or energy. In addition re-use of waste water effluent for drinking water might be necessary.

POTENTIAL OF KISAMIR (*HURA CREPITANS L*) AND BINTARO (*CERBERA MANGHAS L*) OILS FOR ALTERNATIVE BIODIESEL FEEDSTOCK

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Abstract

Biodiesel fuel is one of the most promising bioenergies, which can be produced from oils/fats through transesterification. The use of biodiesel can contribute to mitigation of environmental burden already being faced in our society. In Indonesia, most of biodiesel is produced from palm oil. From the viewpoint of food demand, however, inedible oil/fat feedstocks are more acceptable for biodiesel fuel production. In this study, therefore, we studied kisamir (*Hura crepitans L*) and bintaro (*Cerbera manghas L*) oils as inedible ones mainly focusing on their fatty acid composition and discussed their potential for biodiesel fuel.

Keywords: kisamir oil, bintaro oil, feedstock, esterification, biodiesel

Recent Advances in Desalination and Water Reuse Technologies: A Novel Manipulated Osmosis Desalination Process

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Water is not just the essential ingredient for life, but also a fundamental factor in the economy of any country. The provision of drinkable supplies through desalination of sea and ground water and through treatment of industrial and domestic wastewater is one of the most significant challenges that the world faces. It can also be said that the global industrial ecology, which is currently driven by considerations of minimal environmental impact and renewable energy sources, relies very heavily on the availability and accessibility of fresh water supplies. Many countries around the world have water shortages, including the Arab world which house the world's most extensive oil, fossil fuel and mineral reservoirs whose exploitation rely heavily on cost-effective technologies for ground water and industrial waste water treatment. In some places water may even become more valuable than oil in the medium term. Solutions, including traditional water resources management techniques and water resources developments, will not be suffice to address future water problems. Tapping into the seas seems to be one of the only options available to address world water shortages and meet future water demands.

On the humanitarian dimension, UN Statistics refer to 1.1 billion people today lacking sufficient clean water. If just a small proportion of the 3 million lives lost each year can be prevented, then something of global importance will have been achieved. The motivation for providing break-through innovation in water treatment technology is therefore global.

Desalination is a process, whereby salt is removed from seawater, using either thermal distillation or membrane separation. The most widely-used desalination techniques are Reverse Osmosis (RO) and Multistage-Flash (MSF) distillation. Although the capital and operating costs of these techniques have been significantly reduced during the last 40 years, due to innovations and advancement in technologies, these techniques still have major practical limitations, resulting in high operating and capital costs, which make their use less affordable by many nations.

A novel membrane desalination process has been invented and developed at the Centre for Osmosis Research and Applications (CORA) at the University of Surrey. The technical obstacles being overcome in this process are the avoidance of all scaling, bio-fouling, high operating pressures, and necessity for restrict pre-treatments and the associated chemical wastes, with resulting direct and indirect reduction of cost. In addition, of major importance to the practicality of this invention there will be less discharge or brine disposal of the processed water as compared to the conventional deslination processes. The new technique can be used to obtain clean water from any available water source irrespective of its purity, such as waste streams, seawater, brackish water, river water, etc. The new technique can also be integrated with most existing deslination plants (thermal or membrane).

Osmotic Power Generation and Reverse Osmosis Desalination Hybrid System

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Abstract
Osmosis is the movement of a liquid across a semipermeable membrane into a region of high solute concentration. Osmotic power generation (OP) is a process that harnesses osmosis to produce hydraulic energy. The flow and pressure of a membrane permeate are used to drive a hydroturbine which in turn runs a generator. This renewable energy process emits no carbon to the atmosphere.

Reverse osmosis (RO) is an advanced water purification process widely used around the world. The osmotic pressure of a salt water solution is overcome with hydraulic pressure, forcing pure water through a semipermeable membrane and leaving concentrated brine behind. Recent developments in seawater RO technology, including the development of isobaric energy recovery devices, have dramatically increased the energy efficiency of these processes.
This paper describes a proposed new process that combines OP and RO into an efficient and economical system using a single bank of membrane elements.

Steady state Simulation of MSF desalination plant

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Abstract

The Renewable Energies and Water Desalination Research Center (Tripoli/Libya) has started recently a technology transfer project aimed to design and construct once through MSF desalination plant. The plant has a total capacity of 1200 t/d and is composed of 12 stages.
This work presents an attempt to simulate the MSF plant using the Tri diagonal Matrix steady state model developed by Helal et al, (1), which is motivated by REWDR need for reliable model for comprehensive understanding of system operation and component interaction; optimizes the system components, estimates the energy consumption and distillate water production, ……etc.

The once through plant has been simulated for different inlet seawater temperatures and recycle flow rates was predicted to keep the sea water inlet temperature into the evaporator always constant at 28 C . The model results were compared with the design data, the agreement was found to be good in particular when additional fouling factor was used. The Computer program developed has showed good stability and converges rapidly over a wide range of conditions.

Concentrate disposal for brackish desalination

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In those cases where fresh ground water sources are scarce and surface water is either absent or heavily polluted, the use of brackish ground water might be an alternative source. Brackish ground water can be treated to drinking water by reverse osmosis. However a serious problem is to find a destination for the resulting membrane concentrate (brine). Especially for in land applications the discharge to surface water is often impossible due to an unacceptable (local) effect on the surface water quality. A solution might be to infiltrate the concentrate back into (a deeper layer in) the aquifer. As a consequence, it is not allowed to use anti-scaling and only a recovery of about 50% is possible. Vitens Water Supply Company has started a pilot project to find out 1) whether a permit can be obtained within the Dutch (European) legislation and 2) whether the concept can be operated without technical problems. The approach to prevent both membrane fouling and injection well clogging is to treat the ground water and to infiltrate the concentrate under anaerobic conditions.

Desalination in the Sultanate of Oman to solve water shortage

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Sultanate of Oman is an arid country .The main water resources are surface water, ground water and desalination. During last two decades the water consumption is increasing very rapidly due to increase in population, industrial and commercial growth. In addition, there is rapid decrease of the rainfall during the last few years. Due the over pumping of ground water the water table has already fallen very quickly at many places in Oman and surface water dried & at few places at he verge of drying. Therefore, the only option for water resources in Oman is water desalination. The total desalination capacity in Oman is about 0.54 million cubic meters per day. Large-scale seawater desalination plants are in operation at Al Ghubrah, Barka and Sohar produce about 85% of the total desalinated water.

In addition, there are more than 50 plants in other locations in Oman with small/medium capacity and most of them are brackish water reverse osmosis desalination plants. The growth of desalination is due to increase in water demand and reduction in desalination cost due to advances in the desalination technologies.

In this paper the water desalination in Oman is presented including the capacity, desalination technology used, type of feed water used (sea water, brackish water) and the unit cost of produced water.

Ultraviolet dose distribution in different water disinfection reactors: experiments and modeling

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Disinfection using ultraviolet radiation is a rising technique in water treatment in the goal of its reuse. The efficiency of this technique depends on the UV dose received. In this work we present an experimental study and numerical modeling of the received dose in a photoreactor.
In the experimental part, we have set up a protocol of dosimetry based on photochemical reaction. The experiments have been done on three reactor configurations; batch reactor, well agitated continuous reactor and continuous reactor without agitation. The dose measurment was deduced through the actinometer reaction evolution in the reactors. The results have shown the agitation effect on the received dose amount and so, on the reactor efficiency. In other hand, the effect of clogging, induced by the actinometer and the product deposit on the quartz sleeve, was investigated.
A CFD approach was used for the numerical modeling of the reaction. The simulation was based on coupling hydrodynamics with the intensity distribution to simulate the evolution of the product concentration at the reactor outlet. The comparison of experimental measurements and the simulation results shows a good approval.

The hybrid wind pump water supply system – HWPWSS: An application model for National Park Way Kambas (TNWK) Lampung – Indonesia

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ABSTRACT

The high demands of water (13,565,190 litters/year) and power (8,075.99 kWh/year) in the National Park Way Kambas (TNWK) can be defined as the biggest demands for rural areas in Indonesia. Therefore, to meet the demands, two models (discrete and continuous time models) of dynamic system of water supply are described in this article. There are four fundamental aspects which are considered as key factors of the implementation model. The factors are affordable costs (design, manufacture and maintenance), end user oriented, local supports (material and technology) and reliability product. To assess, the models, pseudo random number within interval of both values of the demand is deployed. Throughout modelling, for serving water demand only and low demand of the power, the discrete model is selected. For serving both demands of the water and the power, the continuous model is preferred.

Keywords**: Hybrid systems, dynamic models, water supply, renewable energy, national park Way Kambas**

Swine slurries: environmental problems and possible solutions applicable to a specific case

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Nowadays, due to the intensive farming a high concentration of swine waste and wastewater (W-Ww) in punctual areas is produced. To attend the fodder needs, farmers must employ huge amounts of fertilizers, mainly chemical fertilizers. Since the transportation cost of the swine W-Ww to the crops is too high, the use of them as manure instead of chemical fertilizers what would be an interesting way of handling them, is widely refused.
The most common management procedure in Europe, USA and some South American countries is the uncontrolled storage even though this treatment leads to environmental problems because of the soil, water and atmosphere impacts they generate. Thus, other treatment, valorization or safe disposal must be therefore found. In this work the composition of the swine is studied as well as its environmental impact. Also, minimization and treatment alternatives are reviewed. Finally some suggestions applicable to a Spanish study case are proposed based on the valorization and biogas production.

Keywords: Swine; pollution; treatment; minimization, valorization

Renewable Energies and water treatment to the help of the poor rural zones

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Abstract: It is well Known that water and energy are the main pillars of any development and hence sustainability of water and energy sources is the key to any sustainable development.
According to the Word Summit on Sustainability, one can notice that:

- About one-fifth of the world's population lacks access to the safe drinking water;
- Two billion people of the total world population are without access to commercial energy supplies;
- Urban population is projected to reach by 2050, 75% of the world population. Most of this burgeoning population will concentrate along the coast. The consequences are harmful: more coast pollution, desertification of rural zones and ,so, the disappearance

of a labour specialized to ensure biological food production and to maintain in life ecosystems kinds of the lungs for our planet.
This rural migration was justified in the past by the relative abundance of employment and especially town comfort. Today, this tendency, whereas it is reversed in the rich countries, continuous to intensify in the poor countries.
The global sustainable development passes forcing by the sedentarisation of these rural and this in their ensuring water and energy: two essential tools for work and a platform necessary for a decent life. These two resources must thus be available in any time.
In this paper, after having presented the requirements out of water and energy in the rural zones, we propose the valorization of renewable energy

- in the production of fresh water starting from sea and brackish water ,
- in the waste water treatment to prevent sickness and to re-use the water in irrigation,
- in heating greenhouses to cultivate crops for exportation,
- in electricity production for lighting and other applications,

by using local competences and we expose processes and technologies allowing to achieve these goals.

Strategic study for the development of autonomous units for desalination in Tunisia

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This article proposes to develop a new methodology, inspired from the FMEA method (Failure Mode and Effect Analysis), to highlight the various rural zones presenting critical water resources deficiency as well as significant potentialities for the development of autonomous desalination units in Tunisia. This approach is based on the calculation of a criticality index taking into account all the decision parameters: Importance of the population in the rural area, Rate of network drinking water connection, Rate of network electric power connection, Percentage of springs with salinity more than 2g/l, Average Salinity, Quantity of underground water available and presence of potential in renewable energies.

After the collection of the informations concerning all the rural areas in Tunisia, we set up a data base necessary to this investigation. The application of this new approach to the case of Tunisia allows releasing a "Zoning" of the country in three different areas. Moreover, this work is of great importance to define the strategy of the country in term of autonomus desalination unit's development.

Capacity building strategies and policy for desalination using renewable energies in Algeria

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Abstract

Algeria has for decades relied on rainfall for the water policy and strategy, but that proved to be not an adequate solution considering the actual water deficit. The water needs for different sectors is increasing and this will worsen since it is projected that population will double in the next 20 years. The use of non conventional solutions, mainly sea/brackish water desalination, becomes imperative and inevitable solution to supply fresh water. Many important desalination projects are launched with a target to produce about two millions cubic meters per day by 2009. In this program, a dozen of large-scale seawater desalination plants are planned along the 1,200 km Mediterranean coastline, where most of the country's population is concentrated, and several brackish water plants in other areas of the country. Desalination market is growing faster than human resources in Desalination in Algeria. More efforts in training, academic education, human resources management and R&D in desalination are needed. Capacity building program is necessary not only to improve the operation and maintenance of desalination plants by enhancing human resources and expertise but also to build an integrated adoption of this sustainable technology in Algeria. Desalination technologies require thermal and/or electrical energy. Renewable energies such as solar or wind resources are suitable for small scale desalination technologies especially in remote areas where there is no electricity supply grid. The integration of renewable resources in desalination and water purification is becoming increasingly attractive. This is justified by the fact that areas of fresh water shortages have plenty of solar energy and these technologies have low operating and maintenance costs. In this paper, an overview of capacity building strategy and policy for desalination in Algeria is presented. Importance of training and education on renewable energies is also outlined. The contribution of the Middle East Desalination Research Center in capacity building and research and development in desalination in Algeria is also presented.

Keywords: Capacity building; Renewable energy; Desalination; Education; Research

SOLAR ASSISTED DEHUMIDIFICATION SYSTEM FOR MEDICINAL HERBS

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Abstract

The uses of traditional medicine and medicinal herbs as alternatives to modern health care products have increased. Moreover, the products are safe and have virtually no side effects. However, tremendous amount of energy is required for conventional commercial scale drying systems. Traditional methods of drying such as open air drying where the product to be dried is exposed directly to the sun has many disadvantages such degradation by wind-blown debris, rain, insect infestation, human and animal interference which will result in contamination of the product. In addition, most volatiles in herbs would be lost if it is subjected to temperature more that 50 ^{o}C. Therefore, solar assisted dehumidification system is an effective and viable alternative to the many present drying techniques. A solar assisted dehumidification system has been developed. The system consists of evacuated tube solar collectors, dehumidification system and the drying chamber. A temperature of 40 ^{o}C and air at relative humidity of 20 - 30 % can be achieved in the drying chamber and operating continuously since an auxiliary heater has been installed in the storage tank. High quality product can be produced using this drying system.

THE SECOND GENERATION OF THE SOLAR DESALINATION SYSTEMS

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ABSTRACT

In Solar Energy Laboratory, Mechanical Engineering Department, Faculty of Engineering & Technology - Sebha University, an investigation has been conducted of the productivity of solar desalination system working on the basis of evacuation. Solar energy intensity has been increased by means of concave mirror, which reflects the sun rays to the focus of the concave, where the still is located. Present research is complementary of previous study published at "The International Workshop on Vacuum in Renewable Energy Technologies", held on April 15-19, 2003 in Pakistan [1].

The apparatus has been designed and fabricated in our laboratory, the experimental model consists of elliptical, metallic container (to resist the imposed outer pressure) located in the focus of concave reflector. The still works under vacuum of 562.5 torr (25 kPas absolute) to reduce the normal boiling point of the income water. A condenser has been used to condense the outlet vapor - and working as a water trap - before interring the vacuum pump. The experiment was carried out during the period from 15 April to 15 May, 2003. The water productivity of the offered still was found about 20 liter/day per unit area of the reflector.

The experimental results showed a significant improvement of the productivity of desalinized water, about 303% compared with the other thermal solar stills. Moreover, the increase of the performance ratio is about 900% more than the roof type desalination solar systems.

These results encourage us to adopt the offered procedure to manufacture large-scale solar desalination plants to provide the rural regions with drinkable water.

Modelling and aquifer artificial recharge: A Tool for management and groundwater protection: A Moroccan case.

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Abstract: The objective of aquifer artificial recharge is to supplement the available groundwater resources by storing water for the future in order to use it during the dry periods.

Lasting recurrent years of drought in Morocco, the region of the Northwest of the country knew a very important water deficit because it lacks groundwater resources and of the dams. During this dry period, the Charf-Laqab hydrogeological basin located in the northwest played a strategic reservoir role for water storage by artificial recharge. This coastal hydrogeological basin, multilayered system, covering an area of 17 km^2, is a completely closed, with no outlet. The structure of its bedrock protects it against the saline intrusion. In order to understand the hydrodynamic state of this aquifer during the artificial recharge and its discharge, a hydrodynamic model has been developed permitting to identify its hydrogeological parameters. The realization of such a model would permit a protection and good groundwater management in this zone characterized by the scarcity of water resources.

Key words: *Aquifer, artificial recharge, Modelling, Morocco*

The hybrid wind pump water supply system – HWPWSS: A field survey of National Park Way Kambas (TNWK) Lampung – Indonesia

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ABSTRACT

The increase of water demand in isolated areas including national park Way Kambas for elephant conservation centre becomes a critical point for its sustainable program in the future. This article reveals a field survey on water demand, fundamental public facilities, topographical condition and other sources. The survey is addressed to provide an optimum water supply model in which performance indicator of local sources utilization and its reliability are the main factors. Throughout the survey, it has been observed that renewable energy sources, wind pump and hybrid system in particular can be deployed as a prime source of the water supply.

Keywords: Hybrid system, water supply, renewable energy, National Park Way Kambas

Optimum geometry of a wind turbine by resolving the Inverse problem based on the lifting line theory

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Abstract: Presently, there exist few numerical methods which treat the inverse problem for the determination of the geometry of a wind turbine. The one considered in this paper is based on the lifting line theory in which the selection of the circulation distribution is obtained by resolving a variational problem. The resolution of this inverse problem, consists in sorting the circulation distribution on the lifting line, which for a given power extracted by the wind turbine, minimises the loses due to the induced velocity; In effect, for a given wind site characterized by a wind-rose, and for a fixed power coefficient C_P, we intend to construct a complete correspondent blade (in 3 D) of a wind turbine .Very promising results have been obtained which include: the circulation distribution for a given extracted power, chord lengths distribution law and the optimum geometry of the blade in 3 D.

Key words: *Inverse problem, Induced Velocity, vortex, Optimum geometry, lifting line,*

Expression of glutathione S-transferase in antibiotic resistance organism isolated from the poultry litter

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Abstract

Intrinsic resistance to antibiotics in bacteria is due to inactivation of the antibiotic molecule by a glutathione S-transferase that catalyses the formation of a covalent bond between the sulfhydryl residue of the cysteine in glutathione and the C-1 of antibiotics. This reaction results in opening of the epoxide ring of the antibiotic to form an inactive adduct. Induction of various antibiotics such as amp, ery, tetra, chlora, strep, tobra, rif and Kan to *Staphylococcus, Streptococcus* and *Micrococcus sp*. which is isolated from the poultry litter have expression of glutathione S-transferase (GST) was determined with the substrate 1-chloro-2,4-dinitrobenzene (CDNB) and Glutathione. Induction of antibiotics shows that the activities of GST in isolated strains have three to four times higher than those of control. The GST were isolated and migrated in SDS-PAGE shows that the intensity of band was higher than the control in all the isolated strain with a molecular mass of 27 kDa. An analysis of the isozyme pattern of GST revealed variation in the expression presumably due to resistance. The above results indicate that GST may play an important role in the detoxification of antibiotics via GST-mediated reactions. Intrinsic development of antibiotic resistant bacteria which is cause by the spontaneous gene mutation due to the antibiotics was interpreted from the above studies.

Keyword: Glutathione S-transferase (GST), Glutathione, CDNB, Antibiotic, SDS-PAGE,

Isozyme, Resistance.

One year of experience in desalting seawater with an autonomous solar-powered membrane distillation system

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In Jordan, water resources are very limited; the per capita of water supply amounts to 148 m^3 only. On top, Jordan is totally dependent on imported oil. However, the average daily solar radiation is 5 kWh/m^2 for a sunshine duration of 300 days per year. Therefore, solar energy can be harnesses to power small-scale desalination plants to produce the fresh water necessary to cover the basic human needs.

Fraunhofer ISE has developed a solar thermally driven stand-alone desalination system through SMADES EC-funded project. The system is based on membrane distillation separation technique. The unit consists of three subsystems: the solar collector field, the heat exchanger and the membrane distillation module. The unit was installed in the Aqaba city of Jordan and fed with real seawater without any pretreatment. The unit is in operation since February 2006.

The aim of this paper is to present the performance of this unit over one year of continuous operation. The system produced about 200 to 800 liters per day. However, the performance of the unit has degraded after a bout 6 months of operation and currently is need of an acid washing every month to bring its performance to its original level.

The Role of Media in Promoting Water Literacy for Sustainable development.

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Print media creates opinion of elite class. While electronic media is effective in rural area, mostly radio is more effective than television in Indian villages for water education. Traditional folk media can also be use for promoting water education.

The present paper is related to media's role in public education it has been rightly pointed that the control of environmental pollution impinges on many sectors of the economy and on social priorities within a community.

It is true that Water quality surveillance is call of the time it has been observe that there is now a general awareness of the need to establish harmonized water quality monitoring network to meet both local and national needs and Endeavour is now extending to the Earth watch. There are three basic aspects in water literacy, one to educate people regarding use of water, second regarding controlling the wastage the third is related to save water resource by maintaining water table of ground water resources.

On the basis of above discussion following triangle is prepared to reflect new model and new formula for mass education for saving water resources.

A+B+C+D= Effective water education.

Action Programme (A) + Communication Strategy (B)+ Cultural Tranformation (C) + Behaiviour Chaige= EFFECTIVE WATER EDUCATION.

Water education can be possible through media management and information control for changing the mass behaviour. It has been pointed that it is rather questions about the nature of the control and management activity itself which are of greater relevance. [10]. In this connection following suggestion can be made here.

a valid and accurate communication model for processing dynamic Human behaviour is required.

There is a need making availability of reliable, robust instrumentation for the raped collection of information about actual process performances.

Media must develop physical storages capacity, in the case of mass transfer process.

There is a need to the develop ability to specify clear, precise, unambiguous process performance objectives.

Communication media can play a vital role in the field of water education. New aspects in customs must be tress-out for changing people behaviour it is true that there are many such rituals in our custom which may be useful for our health and environment while some may have bad impact.[11] . Water is very important source both for energy renewal and renewal of life. Water is mostly misuse in day to day life in Asian countries and they faces very serious problems during hot summer days. Water if it is not properly used it can be a serious problems. Due to D forests station and due to urbanization underground water table is going down every year.

WIND ENERGY SYSTEMS ADAPTED TO THE SEAWATER GREENHOUSE DESALINATION UNIT DESIGNED FOR ARID COASTAL COUNTRIES

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Abstract
The wind energy can be used to power the seawater greenhouse. The aim of this study is to present the feasibility of wind energy in the seawater greenhouse desalination unit. The seawater greenhouse combines fresh water production with growth of crops in a greenhouse system. The technique is adapted for farms in arid coastal regions that are suffering from salt infected soils and shortages of potable groundwater. The dimension of the greenhouse has the greatest effect on the water production and energy consumption. A wide shallow greenhouse (200 m wide by 50 m deep) has been found to give 297 liters per day of fresh water in only eight hours (between 09:00 and 17:00). The greenhouse produces 98% of total fresh water. This interval corresponds to the higher winds period.

Keywords: Desalination; wind energy systems; solar energy, seawater greenhouse