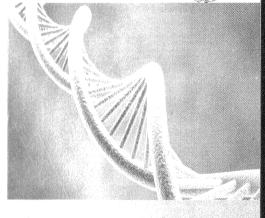# 2015 Regional Conference of the International Network of Women Engineers & Scientists

BOOK
OF ABSTRACTS

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Contaminated sediment in Ramsar wetlands; A Challenge towards sustainable management of sensitive ecosystems

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Abstract
Wetland ecosystems are rich in species biodiversity, have fertile soils and can support a number of economic activities such as farming, fishing and grazing. In poor countries such as Tanzania, wetlands have been taken for granted for agricultural production and other livelihood activities. Toxic organic and inorganic contaminants such as pesticides and heavy metals are strongly associated with suspended matter and the attached organic carbon. Such pollutants are transported as part of the sediment load in a river basin and can enter the food chain. A study to assess the environmental impact of agrochemicals application was conducted in Kilombero valley flood plains-the second largest designated Ramsar wetland in Tanzania. 68 samples of undisturbed sediment surface layers from 7 rice and sugarcane plantations were collected in rainy season 2012 and in dry season 2013. The eco-toxicity of sediment elutriates and slurries to algae and bacteria were measured by standardized biotests (Algae growth inhibition test with P.subcapitata, sediment contact test with A. globiformis, luminescence bacteria test with V. fischeri). The data sets were assigned to one of 3 levels of increasing toxicity, applying a fuzzy-logic based classification in order to get an overview over toxic responses in the area. Fuzzy rules were used to formulate three quality classes as little/no potential risk, elevated potential risk and high risk based on the ecological end point. More than 70% of the sampling locations were classified as having no or low potential risk with regard to the eco-toxicological response. Dry season results from bioassays indicate elevated toxic responses. Pesticides and other toxic chemicals are transported off the arable land of Kilombero Ramsar wetlands as part of the runoff and erosion process, and might later accumulate in the food chains. Increased concentrations of these contaminant-laden sediments may pose serious threats to river basin-wetland ecosystems, the sustainability of natural resources, and human health in general.
Key words: contaminated sediments, agro-chemicals, potential risk, Ramsar wetlands, ecosystem

Conservation Status of Swamp Wetlands in Uasin Gishu County, Kenya

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Abstract
Despite their high productivity and provision of many benefits, wetland ecosystems in Kenya are still facing serious threats. Wetlands in Uasin Gishu County are under various degrees of threat because of the rapid human population growth. However, inadequate investigation has been carried out on the integrity of these wetlands and their benefits to the surrounding communities.
The aim of the study was to identify the main human activities in and around the swamps and obtain the local people's perceptions on conservation. The Likert Scale Scoring method, observations and informal discussions with community members were used to assess the conservation status of the swamps. The conservation status of the four swamps studied was generally low. The main disturbance events included drainage and reclamation of the swamps for agricultural development, burning, and plant harvesting. Agriculture was rated as the most important use of the wetlands. Chepkongony swamp was the least conserved and this was attributed to the extensive cultivation in and around the swamp. The swamps in Uasin Gishu County are under varying degrees of threat. There is need to promote indigenous knowledge on conservation through education and awareness programmers' with community members living around wetlands.
Key words: Uasin Gishu, Conservation, swamp wetlands, Likert Scale

Sustainable use of High Aswan Dam Reservoir in view of climate change

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Abstract

Egypt is one of the most vulnerable countries to prospective impacts and hazards of climate change to major resource sectors including water, land, coasts, and agriculture. Consequently, the experts of water resources management in Egypt are facing the challenge of achieving sustainable use of water resources. Many climate scenarios predict that rainfall in the Nile basin will be highly sensitive to climate change, and might affect the Nile flow into High Aswan Dam Reservoir (HADR). Moreover, the possible temperature rise will influence evaporation from HADR as well as the evapotranspiration from agricultural lands leading to lower crop yields. Actions are essential to diminish climate change hazards, such as measures to decrease the evaporation losses from High Aswan Dam Reservoir through reducing the water surface area. This study analyzed three alternatives: removing the sediment loads; eliminating some khors or combining these alternatives. Landsat TM images were used to simulate the lake morphology at different water levels to model the lake's hydrological characteristics. The results demonstrated that alternative three would save about from 25% to 30% by the end of this century which enables sustainable use of HADR.

Development of the societies of Lake Kyoga in Uganda

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Abstract

Lake Kyoga which is a shallow depression consisting of a number of arms, many of which are covered with swamp vegetation, namely water hyacinth, water lettuce, papyrus and others. This weed cover developed into large areas of floating mats which contributed to rising water levels and eventual flooding of the surrounding areas in 1999 by hindering the lake's flow to the Nile. The water quality was deteriorated due to the low oxygen level because of the dense mats of water hyacinth, in addition to the mixing of sanitation water from the flooded villages with the lake water. Consequently, numerous victims suffered from waterborne diseases such as malaria, typhoid and bilharzias. Huge programs were executed to overcome the spread of the aquatic weed. Consequently, Uganda considered one of the most successful countries regarding management of the water hyacinth problem. Generally, The aquatic weeds cause the presence of the huge areas of floating mats and islands. These floating mats interfere with the flow of water, navigation, fishing and recreation activities causing many socio-economic problems to be raised. The riparian societies are very poor, and have only fishing or agriculture activities without any industrial activities, due to lack of energy resources (no electric network). On the other hand, the biomass produced from the aquatic weeds can be utilized in several ways. This study aimed to monitor and utilize the aquatic weed in Lake Kyoga. This lake is wide and inaccessible, therefore satellite images were used in studying this area. Remotely sensed Landsat images covering the period from 1974 till 2009 were processed and analyzed in order to identify areas occupied by aquatic weeds and their types. Identifying the types of the aquatic weeds will facilitate the choose of the suitable methods and machines for controlling and removing the aquatic weed, and the utilize of the different biomass. The study recommended small projects to cultivate mushroom on the collected water hyacinth biomass. These projects can be executed by the women, who play the main role in the Ugandan families. Huge integrated projects were also recommended to utilize the chopped aquatic weeds in generating biogas as nonconventional energy resources. The produced energy will be used in generating fertilizers, and animal fodder, in addition to farms for cultivating banana and sugar cane, and pasture within the same project area. These projects will improve these riparian societies income and Uganda's gross domestic product (GDP).

Keywords: Landsat images, Water hyacinth, Papyrus, Lake Kyoga, Biogas

Monitoring Phenological phases of the crops using TerraSAR–X Spotlight Images based on Factor Analysis

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Abstract

This study investigated how Factor analyses tool in SPSS statistical package can be used to observe the phenological phases and the distribution of the investigated crops using TerraSAR-X images in order to detect problems in the growth and low productivity of the monitored plants. Fuhrberger fields are located within a drinking water protection area about 30 km north of Hanover. The investigated area is about 1300 hectares of arable land. 28 Fields were surveyed with a 180 Hectares area stand for 14% of the investigated arable land. The major crops were asparagus, grass lands, grains, sugar beet, peas, potatoes and maize. A test area of 7 Fields was selected including one field per crop, stand for 25% of the surveyed area. 10 TerraSAR-X satellite imagery in dual-polarization (HH, VV) were used to monitor the crop growth phases in the period from March 2008 to October 2008. The images were filtered using Degrandi Multi-temporal filter. The tested fields were isolated from the 10 TerraSAR-X Satellite Imagery, and the reflection values were investigated using the factor analysis to get the rotated component matrix. The study showed that the values of the rotated component matrix are high when the plants were growing up and covering the whole fields, the rest of the period had low values. The study recommended to use the TerraSAR-X to observe the growth of plants to detect and investigate the fields with low crop production.

Keywords: Factor analysis, Terrasat-X, SAR, phenological phases

Enhancing resilience of Kenyan sweet potato to climate change through selection of root knot nematode resistant genotypes

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Abstract

The effects of climate change on root knot nematode (RKN) abundance and geographic distribution may have a detrimental impact on sweet potato production in Kenya. The aim of this study was to identify sweet potato genotypes that are resistant to RKN in order to mitigate potential yield reductions that may result from the effects of climate change. Seventy-two sweet potato genotypes were evaluated for resistance to the RKN, *Meloidogyne incognita*, under greenhouse conditions. Known susceptible (Beauregard) and resistant (Tanzania) sweet potato varieties were included as controls in the trial. The sweet potato genotypes were collected from farmers' fields and research stations in Western, Nyanza and Eastern Province, Kenya. Response of sweet potato genotypes to *M. incognita* infection was assessed as the level of galling on a scale of 1 to 5, where 0 = 0 egg masses (most resistant) and 5 = > 100 egg masses (most susceptible) and the number of eggs. There was a significant difference ($P < 0.001$) in the number of eggs and level of galling among the genotypes. The sweet potato genotypes BS10, SPK 004, EM9 and MK10 were resistant to *M. incognita* with a galling index of 1. Susceptible genotypes included, Kenspot 4, Kenspot 6, Kampala 1, MK15, BS1, EM3, MK16, EM6, EM7, MK5 and MK9 with a galling index ≥ 4. These preliminary results indicate that the Kenyan sweet potato gene pool contains RKN resistant genotypes which may be used in mitigating the effects of climate change on sweet potato production in Kenya.

Key words: Climate change, *Ipomoea batatas*, *Meloidogyne incognita*.