

UN calls on countries to address lack of women in science and technology

Women and girls run the risk of being left behind in scientific and technological fields if countries do not put measures in place to address discrimination and change traditional attitudes.

This is according to the United Nations (UN), which warned that this gap constitutes an obstacle to nations' progress.

"Women tend to be overrepresented in the humanities and social sciences, and underrepresented in science and technologies, said Claude Akpokavie of the UN International Labour Organisation's (ILO's) Bureau for Workers' Activities. "Measures need to be put in place to redress this imbalance."

According to ILO, the gap between men and women in the scientific and technological fields is linked to pervasive

gender roles and attitudes in different societies – visible in both developed and developing countries – which encourages girls to pursue 'softer' subjects.

Investigations have uncovered gender discrepancies in a number of countries around the world, which are hindering women's participation in science and technology both at school and at work, the agency noted. In the United States, for example, a Yale University study found that women science graduates are discriminated against when applying for research posts. In Iran, the government recently announced that women will be excluded from a wide range of university studies, including nuclear physics and electrical engineering. In China, several universities require women to obtain

higher entry grades than men for science courses.

"Girls are far less likely than boys to study engineering or computer or physical sciences," said Director for ILO's Bureau for Gender Equality, Jane Hodges. "Stereotypes of girls represent them as less interested or capable in certain subjects – such as mathematics and science. This inevitably reduces their access to jobs with better pay or labour markets that may offer better opportunities."

With an estimated 500 million people entering the global workforce over the next decade, Hodges stressed that it is crucial that women in science and technology jobs are not left working at the lowest levels. "Education and



skills training – along with a change in attitudes – are vital to ensure women are not left behind."

Source: UN News

More investment in agriculture needed



Making more and better investments in agriculture is one of the most effective ways to reduce hunger and poverty while safeguarding the environment.

This is the key message of the United Nations Food & Agricultural Organisation (FAO) flagship report, *The State of Food and Agriculture 2012*.

The world's more than one billion farmers must be central to any agricultural investment strategy as they are the biggest investors in this sector, the report notes. But farmers' investments are often limited by unfavourable investment climates.

"A new investment strategy is needed that puts agricultural producers at its centre," said FAO DG José Graziano da Silva. "The challenge is to focus the investments in areas where they can make a difference. This is important to

guarantee that investments will result in high economic and social returns and environmental sustainability."

New data compiled for the report show that farmers in low- and middle-income countries invest more than US\$170-billion a year in their farms – about US\$150 per farmer. This is three times as much as all other sources of investment combined, four times more than contributions by the public sector, and more than 50 times more than official development assistance to these countries.

Investing in agriculture is clearly paying off, according to the FAO report. Over the last 20 years, for example, the countries with the highest rates of on-farm investment have made

the most progress in halving hunger. The regions where hunger and extreme poverty are most widespread – South Asia and sub-Saharan Africa – have seen stagnant or declining rates of agricultural investment over three decades.

"Recent evidence shows signs of improvement, but eradicating hunger in these and other regions, and achieving its sustainability, will require substantial increases in the level of farm investment in agriculture and dramatic improvements in both the level and quality of government investment in the sector," the report said.

To access the report, Visit: <http://www.fao.org/publications/sofa/en/>



**Groundwater:
A NEW PARADIGM**
Durban | South Africa | 17-19 September 2013
13th Biennial Ground Water Division Conference and Exhibition
www.gwd.org.za

**10 MARCH 2013
ABSTRACTS CLOSING DATE**
Book your exhibition space now
www.gwd.org.za

Research shows fishways have not helped fish

Despite modern design intended to allow migratory fish to pass man-made structures on waterways, fishways have failed to let economically important species reach their spawning grounds, say an international team of economists and fish ecologists.

The international team, led by JJ Brown of the Masdar Institute of Science and Technology, United Arab Emirates, included investigators at SUNY College of Environmental Science and Forestry, Syracuse; Virginia Tech, the University of Arizona, City University of New York and the University of Victoria, British Columbia as well as the University of Massachusetts Amherst (UMass Amherst).

According to the team, in spite of state-of-the-art fish passage facilities, actual numbers of fish passing through them over several decades reached only a tiny fraction of targeted goals.

The three northeast US river systems studied, the Merrimack, Connecticut and Susquehanna, are historically important for fish populations that migrate from the sea to spawn in rivers.

Numbers of American shad, once one of the America's premier food fish, that passed through dams has hovered around 2% of the target in the Merrimack River and close to 0% in the other two. "Dams are contributing to reduced resilience not only of shad, but all diadromous species," said Adrian Jordaan of UMass Amherst. "The result is that other factors, including

climate change, will have a greater impact on these populations that are at a fraction of their historical levels.

Restoration targets for river herring vary from several hundred thousand to millions of fish. However, in recent years, river herring returns on these rivers have averaged less than a thousand fish. Using publicly available data collected by various agencies since the 1960s, the research team shows that these state-of-the-art fish passage facilities have been unsuccessful.

The authors support finding new approaches to the problem and call for ecologists and economists to propose alternatives to main stem dams. In Maine, they note, one solution was to purchase two main stem dams on the state's largest river, the Penobscot. It offers an ideal situation because it splits into two rivers low in the watershed, allowing augmented hydropower capacity in one branch to compensate the electric utility with alternative power generation.

But Jordaan says it remains to be seen whether the situation there can be improved for fish migrating upriver without more dam removals in the main stem and tributaries.

The researchers caution planners in countries such as China, Laos and Cambodia, where dams are on the verge of being constructed in species rich rivers, such as the Mekong.

Mercury pollution rising in developing countries

Communities in developing countries are facing increasing health and environmental risks linked to exposure to mercury, according to recent studies by the United Nations Environment Programme (UNEP).

Parts of Africa, Asia and South America could see increasing emissions of mercury into the environment as a result of the use of the toxic element in small-scale gold-mining, and through the burning of coal for electricity generation.

According to the *Global Mercury Assessment 2013* the emissions of the toxic metal from artisanal gold-mining are significantly greater than were reported in 2008. Rising gold prices are driving greater small-mining activity, but new and improved reporting has also provided more accurate estimates of emissions from the sector. Annual emissions from small-scale gold-mining are estimated at 727 t, or 35% of the global total.

Greater exposure to mercury poses a direct threat to the health of some 10 to 15 million people who are directly involved in small-scale gold-mining. The UNEP study assesses for the first time at a global level releases of mercury into rivers and lakes. The report says an estimated 260 t of mercury are being released into rivers and lakes. Much human exposure to mercury is through the consumption of contaminated fish, making aquatic environments the



critical link to human health.

The study provides a comprehensive breakdown of mercury emissions by region and economic sector, and highlights significant releases into the environment linked to contaminated sites and deforestation.

"Mercury remains a major global, regional and national challenge in terms of threats to human health and the environment," said UNEP Executive Director Achim Steiner. "We have many alternative technologies and processes needed to reduce the risks for tens of millions of people. A good outcome can also assist in a more sustainable future for generations to come."

To access the *Global Mercury Assessment 2013* report, Visit: www.unep.org/PDF/PressReleases/GlobalMercuryAssessment2013.pdf

Marginal lands are 'prime fuel source' for alternative energy

Marginal lands – those unsuited for food crops – can serve as prime real estate for meeting the nation's alternative energy production goals, according to US researchers.

Scientists at Michigan State University, together with other organisations, have published an article in the journal, *Nature*, showing that marginal lands are a huge untapped resource for growing mixed-species cellulosic biomass. Cellulosic ethanol is a biofuel produced

from wood, grasses or the inedible parts of plants.

"Understanding the environmental impact of widespread biofuel production is a major unanswered question in the US and worldwide," said lead author Ilya Gelfand. "We estimate that using marginal lands for growing cellulosic biomass crops could provide up to 215 gallons of ethanol per acre."

The notion of making better use of marginal lands has been around for nearly

15 years. However, this is the first study to provide an estimate for greenhouse gas benefits, and an assessment of the total potential of these lands to produce significant amounts of biomass.

Among others, the scientists characterised the comparative productivity and greenhouse gas impacts of different crops, including maize, poplar, lucerne (alfalfa) and on-field vegetation. They then used a supercomputer to identify and model biomass production that could

grow enough feedstock to support a local biorefinery with a capacity of at least 24 million gallons per year.

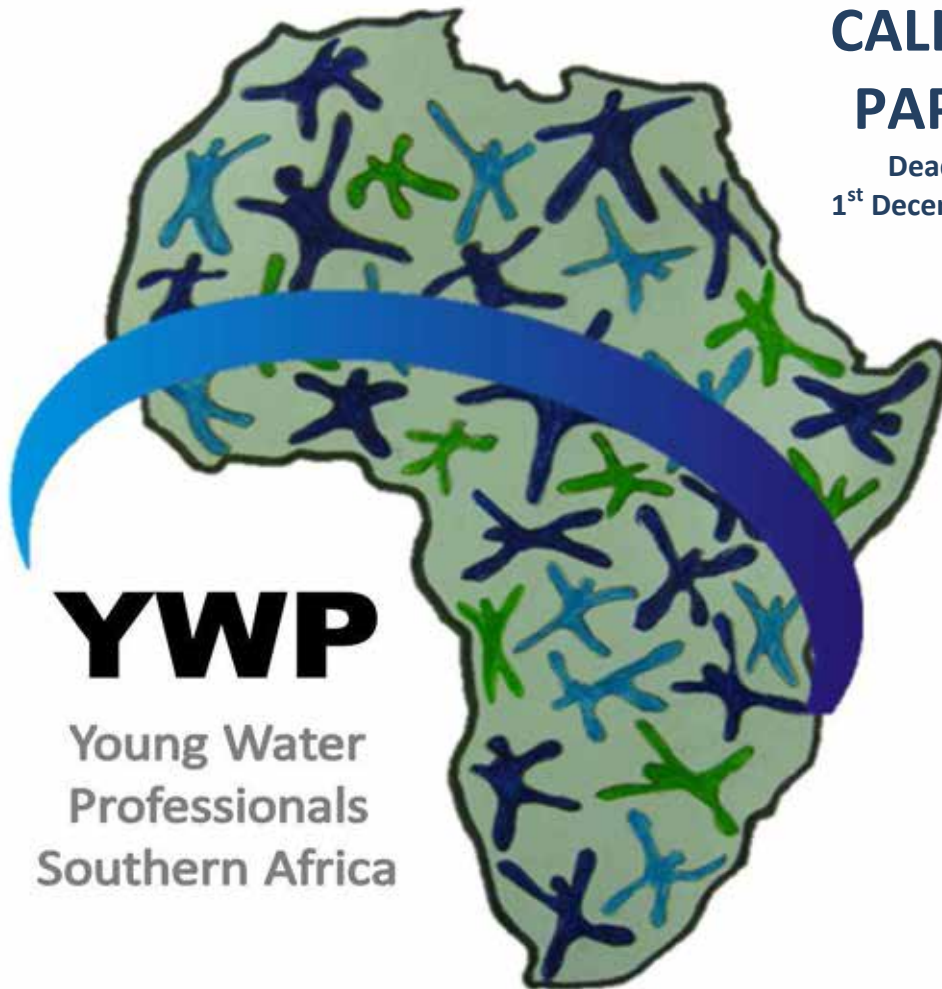
The scientists found that, using marginal lands, the US Midwest could produce up to 5.5 billion gallons of ethanol alone. "The value of marginal lands for energy production has been long-specified and often discounted," said co-author Phil Robertson. "This research shows that these lands could make a major contribution to transportation energy needs."

3rd Southern African Regional Biennial YWP Conference

16th - 18th July 2013 : Music Conservatorium, University of
Stellenbosch, South Africa

**CALL FOR
PAPERS**

Deadline :
1st December 2012



YWP

Young Water
Professionals
Southern Africa

WATER. AFRICA. YOUTH.



International
Water Association



Water Institute of SA



Website : <http://www.sa-ywp.org.za>

New from the WRC

Report No. KV 279/11

The influence on social welfare grants on the dependency on and valuation of wetland ecosystem services (F Lewis; J McCosh & Z Nxele)

The primary objective of this study was to qualitatively explore whether the introduction of social welfare grants had resulted in a change in the perceived value of, and associated behavioural responses to, wetland ecosystem services by local households. The Mbongolwane Wetland (in KwaZulu-Natal), was used as a case study. This wetland is well known for its importance to local households and small-scale farmers through providing services such as water provision, resource harvesting and crop production.

Report No. 1918/1/12

Elucidation of foodweb interactions in South African reservoirs using stable isotopes (WR Harding; RC Hart & LG Muller)

This research project examined the foodweb structure of the Rietvlei Dam in order to determine the possibilities for fishery biomanipulation as a tool for attenuating the impacts of eutrophication. To do this, the study employed stable isotope analysis techniques for the first time in a South African reservoir.

Report No. 1968/1/12

Assessment of the incidence of faecal indicator bacteria and human enteric viruses in some rivers and dams in the Amathole District Municipality of the Eastern Cape Province of South Africa (AL Okoh; T Sibanda; VN Chigor)

Regional disparities in access to piped water are sizeable in South Africa. When comparing the percentage of the population covered by the service, the lowest rates of access to pipe-borne water are observed in the rural areas of the Eastern Cape. South Africa's surface-water bodies are very vulnerable to pollution, with decomposable organic matter and pathogenic agents, as well as the use of raw/treated wastewater

for irrigation, constituting serious public health risks. This study was motivated by the absence of data on the virological quality of water bodies in the Eastern Cape and the paucity of information of the rivers selected for this study, namely the Tyume and Buffalo rivers.

Report No. 1904/1/12

Water, sediment, nutrient and organic carbonic fluxes in small-scale agriculture landscapes (V Chaplot, P Dlamini, C Mchunu, E Oakes, C Orchard, G Jewitt & S Lorentz)

The fluxes of water, nutrients and carbon at landscape level, in response to natural processes such as soil infiltration by water, photosynthesis or organic matter decomposition, are key regulators of the main ecosystem functions. While most efforts have aimed at describing and quantifying water fluxes at the hillslope or watershed level, little is known about interactions of nutrients and organic carbon in these land features. This research study was undertaken in a 1 000-ha agricultural catchment of the Drakensberg foothills, in the Bergville district of KwaZulu-Natal. It shows a typical association between rangeland, small-scale farming and commercial farming. The study aimed at improving our understanding of the relationship between man and environment in a small-scale agricultural setting, a prerequisite for sustainable use of natural resources and development. Specifically, the project team aimed at understanding the mechanisms of land degradation by both sheet and linear erosion and their consequences on the fluxes of water, nutrients and organic carbon from the ecosystem.

Report No. 1721/1/12

Inverse transients to define deficiencies in pipelines (F van Vuuren)

A major operational and management problem associated with the optimal use of water infrastructure is the identification and quantification of deficiencies

which developed in the system. Two major deficiencies which are difficult to identify in bulk water pipelines is the presence of localised trapped air bubbles and leaks. The objective of this research was to use inverse transients to detect these deficiencies. The procedure of inverse transients is based on the notion that the propagating pressure wave will be influenced by the deficiencies and by analysing the recorded pressures at different locations in the system, the location of the deficiency can be determined.

Report No. TT 538/12

Development and applications of rainfall forecasts for agriculturally-related decision making in selected catchments in South Africa (TG Lumsden & RE Schulze (Editors))

The rationale behind this project was, among others, that the South African climate is highly variable over short and longer periods. This day-by-day as well as intra- and inter-seasonal variability is likely to be amplified by the global changes in climate, along with changes in other baselines such as those of population or land use. Agricultural production and water management are intrinsically linked to climate variability, and many decisions are made based on weather and climate information, especially on assumptions regarding weather and climate in the near future. Farmers need such information to help them plan for operations such as planning, irrigating and harvesting of their crops. Weather and climate forecasting can aid users to make more informed choices and assist in planning activities. However, gaps exist between the products of weather and climate forecasting, both in the links to resulting agrohydrological responses and in the application of forecasting information to agricultural decision-making. Overall, this project aimed to develop and test techniques and models for translating weather and climate forecasts in South Africa into applications for decision support at a range of spatial scales in both rainfed

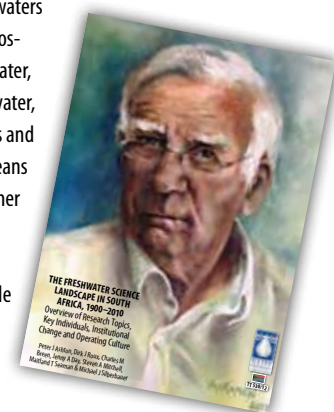
and irrigated agricultural production and water management, in order to reduce risks associated with vagaries of day-to-day seasonal climate variability.

Report No. TT 530/12

The freshwater science landscape in South Africa, 1900-2010. Overview of research topics, key individuals, institutional change and operating culture (PJ Ashton; DJ Roux; CM Breen; JA Day; SA Mitchell; MT Seaman & MJ Silberbauer)

This study originated as a consultancy contract issued by the Water Research Commission (WRC). The effective management of South Africa's water resources requires an informed and reliable scientific foundation to provide appropriate evidence-based information to guide decision-making. Aquatic sciences, together with engineering, provide this foundation and help to ensure that the country's water resources are managed sustainably.

This study set out to record the evolution of aquatic sciences in South Africa since 1900, identify the external driving forces that helped to direct research, pinpoint the individuals and institutions responsible for shaping the ways in which aquatic sciences developed, and determine the extent to which aquatic sciences have contributed to effective management of South Africa's water resources. This study focused on inland surface waters, while recognising the clear and inextricable links between surface waters and atmospheric water, groundwater, estuaries and open oceans – the other parts of a single, indivisible hydrological cycle.



To order any of these reports, contact Publications at Tel: (012) 330-0340; Fax (012) 331-2565; E-mail: orders@wrc.org.za or Visit: www.wrc.org.za