

October 2012



Community Engagement & Outreach

CONTENT

LAUNCH OF THE NATIONAL SCIENCE WEEK 2012 AT SWC

SCIENCE WEEK

FACULTY OF SCIENCE INVOLVED IN EAT MY DUST PROJECT IN KLIPTOWN, SOWETO

FIRST CANSA SHAVATHON AT SCIENCE

MATHEMATICS OLYMPIAD TRAINING PROGRAMME

ADULLAM COMMUNITY ENGAGEMENT PROJECT: WATER QUALITY OF TWO DAMS AT THE ADULLAM MISSION

ZOOLOGY @ LURE FISHING COMPETITION WINTER SCHOOL

INVASIVE SPECIES: A THREAD TO OUR UNIQUE BIODIVERSITY

Science Centre hosted 2012 National Science Week



Minister of the **Department of Science** and Technology, Ms Naledi Pandor, and learners

> Learners attending Science Week



The 2012 National Science Week (NSW) was launched by the Minister of the Department of Science and Technology (DST), Ms Naledi Pandor, at the Soweto campus of the University of Johannesburg in Gauteng on Saturday 28 July 2012. Learners, students, teachers, academics, parents and the public attended the event.

The NSW, a DST initiative, is an annual week-long event aimed at highlighting the important role that science plays in everyday life and encouraging more youth to participate in science, mathematics, engineering and technology related studies and careers. NSW is also intended to expose the public and educators to science-based careers.

NRF SAASTA UNIVERSITY al Research South African Agency for Science JOHANNESBURG The UJ Soweto Science Centre steered the launch of NSW as well as the rest of the

activities during the rest of the NSW. The Faculties of Science, Engineering and the Built Environment, and Health Sciences participated in the launch and the NSW activities. The activities also included a UJ Science Day at Bhukulani Secondary School in Soweto, which was also attended by various surrounding schools.

The theme of this year NSW was The Role of Science in Economic Development and the subtheme was Sustainable Energy based on UN's International Year of Sustainable Energy for All.



FACULTY OF SCIENCE INVOLVED IN EAT MY DUST PROJECT IN **KLIPTOWN, SOWETO**

The Eat my Dust project, in partnership with Kliptown Youth Program (KYP) and Rue Du Soleil, was founded in January 2011 in Kliptown, Soweto by Delphine de Blinc, a French movie director. The project's mission is to change the youth of Kliptown's view of the world by introducing them to the art of cinema and documentary film production. Every year a group of young people between the age of 15 and 20 are chosen to attend weekly workshops on both theoretical and practical aspects. During the practical sessions short video clips and movies are shot in Kliptown with each participant taking turns at writing, directing, shooting, editing and acting. Particular emphasis is placed on social interaction with and responsibility to the community. Thus, these films as well as other classical movies are screened every last Saturday of the month in the open air to appreciating crowds of more than 400 Kliptowners and visitors from outside.

As part of Eat my Dust's mission to document relevant social issues, it was decided in 2011 to collaborate with the Designing Hope Association in its campaign against AIDS. After workshops to broaden the participants understanding of AIDS and its negative impact on the community, a series of short improvisational films for the campaign, I love you Positive or Negative, resulted and were screened.

Such were the success and impact of these movies, that it was decided to undertake a similar project on ecology and the impact of pollution and global warming on Kliptown in particular and the earth in general. Eve Fischer from Spectrau, Cobus van Dyk and Pietro de Lange-Jacobs from the Department of Zoology become involved and after preliminary discussions with Delphine de Blic, facilitated the first ecology workshop in Kliptown in July 2012. During this workshop the basic concepts of ecology were explained and the Eat my Dust group was introduced to

the huge negative impact of pollution, using examples from inside Kliptown and along the Klipriver during a walking tour of the township. This will be followed up by a series of workshops, each covering a specific and more advanced topic.

A wonderful character, Ecoloshe, who was created for these films, will





definitely have a huge impact and is set to become a real hero with a big following. After hard work and lots of creativity, the first film was to be screened on 29 September. It is set to woo the crowds, that's for sure, but also to let them think twice about their role and responsibility to the Kliptown environment and its future generations.



First CANSA Shavathon at Science

CANCER ASSOCIATION

OF SOUTH AFRICA

The Department of Biochemistry hosted its very first CANSA Shavathon . CANSA's Shavathon events are held annually to help fight cancer by collecting funds by spraying or shaving people's hair at schools, workplaces and shopping centres countrywide. Organising this charity event was inspired through the Biochemistry's Cancer Research Group, headed by Dr Marianne Cronjé, with the main focus on the ability of novel metal compounds and indigenous medicinal plants to induce cell death in cancer cells; these 'metallo-drugs' are in the process of being patented.

Another Biochemistry Research Group, under the supervision of Prof Liza Bornman, is evaluating the relationship between vitamin D status, age, gender, ethnicity, vitamin D receptor functionality, genetics as well as epigenetics of the Vitamin D Receptor gene that has been implicated in the susceptibility of certain individuals to various types of cancer development. Some scary South African cancer statistics for thought: 1 in 23 SA men are diagnosed with prostate cancer and 1 in 29 SA women are diagnosed with breast cancer with 1 in 35 SA women diagnosed with cancer of the cervix. Skin cancer is the most common cancer in SA with approx. 20 000 new cases being reported each year (all stats obtained from CANSA website www.cansa.org.za)

ADULLAM COMMUNITY ENGAGEMENT PROJECT

WATER QUALITY OF TWO DAMS AT THE ADULLAM MISSION

The Adullam Caring Hearts Project, initiated by Dr Erna Bruwer of the Department of Zoology, is one of the community engagement initiatives of the UJ. The Adullam mission is located near the town of Secunda in Mpumalanga. The mission provides schooling and accommodation for children from the surrounding area. As part of this initiative Dr Cobus van Dyk and Ms Pietro de Lange-Jacobs visited the mission in 2011 to identify an engagement project, to fall within the scope of the research activities of the Department, but also to include an educational aspect for the children of the mission.

During the site visit in 2011, it was pointed out by a teacher from the mission that the effectiveness of the current septic tank system is in question and that the water in an old, small quarry located near the drainage field of the septic tank, may pose a potential human health risk if children should swim in the water. It was suggested that the water quality of the quarry be tested. Another, larger water body is located next to the Adullam property. Both this dam and the water-filled quarry serve as watering holes for livestock kept on the property. This larger dam was selected as a reference site for the water quality testing, as it is not located in close proximity to the septic tank drainage field.

The aim of the project was formulated as two specific outcomes:

- A short field excursion organized for the children of Adullam, with the aim to demonstrate basic concepts of water quality and aquatic ecosystem bio-monitoring;
- To analyse the water of the old quarry (Dam 1) and the larger dam (Dam 2) for levels of selected contaminants.





A short field excursion took place in May 2012 to Dam 2. The high school class of the mission participated in a three hour fieldwork exercise. The activities included a demonstration of the measurement of physical water quality parameters, the collection of fish, a fish dissection, as well as aquatic invertebrate collection and identification. All the children in the class participated in the activity and got the opportunity to look at different invertebrates under a light microscope and to identify the species with the aid of field guides provided. A few fish were also collected using gill nets and a dissection was done to demonstrate the internal anatomy of a fish.

With regards to the second outcome of the project, the major concern in terms of the water quality was the possibility of bacterial contamination of Dam 1 by the septic tank drainage system. Subsequently, the water quality of both Dam 1 and Dam 2 were measured for selected physical parameters and analysed for faecal coliform bacteria (FCB). However, the Adullam mission is located near various mining activities and freshwater systems in the area could contain high metal levels. Hence, water samples were also tested for selected metals. The results were evaluated against the Target Water Quality Ranges as stipulated by the South African Water Quality Guidelines of the Department of Water Affairs.

Of the physical water quality parameters measured, the total dissolved salts and conductivity were the only parameters that markedly differed between Dam 1 and Dam 2. Measurements were considerably lower in Dam 1. The most likely cause for this difference was indicated by the ICP-MS metal results which showed noticeably higher levels of selected elements in the water of Dam 2 compared to Dam 1. These included high levels of calcium, potassium, magnesium and sodium. However, none of the metal levels measured was of concern in terms of human health, should the dams be used for recreational activities. Although the water from these two dams is not used for

human consumption, it is used for livestock watering. The results showed that the metal levels detected do not pose a health risk for the livestock drinking the water. In terms of the Target Water Quality Range for aquatic ecosystems, arsenic levels were found to be slightly above the acceptable range.

FCB levels are primarily used to indicate the presence of bacterial pathogens. FCB are usually enumerated as counts or number of colonies/100 mL of water. The FCB counts for both Dam 1 and Dam 2 were above 20. In terms of the stipulated Target Water Quality Range a value above 20 poses a significant and increasing risk of infectious disease transmission should a person drink the water. In terms of full contact recreation eq swimming, a value of 20 or above poses a risk of gastrointestinal effects. It is unlikely that the septic tank drainage field next to Dam 1 is responsible for the FCB contamination of the water, as both dams had high levels of FCB. The most likely cause would be the livestock that grazes near these water bodies and drink from the water. In this process, these animals spread manure, contributing to the FCB contamination. A possible explanation for the higher FCB levels in Dam 1 might be due to its smaller volume compared to Dam 2, resulting in a more concentrated solution of FCB. However, in terms of the target water quality range for livestock watering, the water poses no adverse health effects to the livestock.

It can therefore be concluded that the metal levels detected in both dams at Adullam, do not pose a health risk with regards to recreational activities. However, both the dams are contaminated with FCB counts which could pose a health risk to humans should the water be ingested or used for full contact recreation. Although the outflow of the septic tank system is not suspected to be the probable and/or primary source of the FCB contamination in Dam 1, it would be recommended that a specialist plumber be consulted regarding the functioning of the current system and the effectiveness of the drainage field.



Zoology @ Lure Fishing Competition

A tri-nations art lure angling competition took place at the Sand River Dam in Swaziland and was hosted by the Swaziland Art Lure Angling Association. Prof Herman van der Bank and Dr Richard Greenfield from the Department Zoology were invited to aid in correct identification of fish at the competition.

The tri-nations competition took place between Swaziland, Namibia and South Africa (SA) with 10 teams in total taking place. The fishermen and women taking part are special kind of anglers. Size matters, or so they say, but this couldn't be further from the truth with these anglers. They aim to catch as many species as they can using artificial lures of all sizes, makes and materials. The only rule is it must be synthetic. They are so fanatical that they will go so far as to glue minute hooks onto their line with super glue.

The trip was also the perfect platform for the two researchers to collect samples for their research on genetics (DNA) of freshwater fishes in southern Africa. It enabled them to collect samples from 11 species of fish, freshwater molluscs and one species of freshwater (introduced and alien) crayfish. In total 91 specimens were collected for DNA Barcoding as well as 46 blood smears for parasitological studies and two species of ecto-parasites. It was interesting to see the number of exotics that were caught in the system with the Australian red-claw crayfish and the largemouth bass being the most worrying from a diversity point of view. The other common exotic species caught was the Olive bream or Nembwe and the not so common Greenhead bream.

The researchers were also able to put together an identification sheet for the Sand River Dam which will in the future help anglers to identify their catch. The sheet shows a photograph of the fish and points out the things to look at for the correct identification of the different species.



The Academy of Computer Science and Software Engineering, in conjunction with support from Standard Bank, a long standing partner, started the winter school in IT in 2009. The aim of the winter school was twofold.

Firstly, the Academy understood that there was a need to support grade 12 learners with the programming component of the school curriculum. There are learners who are not provided with the right skill set by their teachers, who may not have the right training themselves, as IT is a scarce skill in South Africa. Then there are learners who are working towards a distinction, who need to fine-tune their programming skills in preparation for the final exam.

Secondly, the Academy recognized that the winter school could provide the Department with an opportunity to expose learners who are interested in IT as career to study possibilities and the operational environment of the Department. For this purpose, a lecture is given by academics in the Department to grade 12 learners as part of the week.

Since 2009, the winter school for government schools was presented by Mrs Marina Meyburg, a well-known educator and examiner for the grade 12 subject. The







IT Learners attending the workshops

MATHEMATICS OLYMPIAD TRAINING PROGRAMME AT UJ

The Department of Mathematics at the University of Johannesburg in collaboration with the South African Mathematical Foundation (SAMF) and the Department of Science and Technology (DST) has started a Mathematics Olympiad Training Programme. This programme is aimed at promoting mathematics comprehension at school level in an interactive and informal environment. The programme focuses on training for grades 7-9 (junior) and grades 10-12 (senior) learners for the annual Mathematics Olympiad. Workshops are held at the Auckland Park Kingsway and Soweto Campus of the University, free of charge.

focus of this winter school is the Delphi programming language, and it is presented in the June holiday period. She has presented the winter school with great success, as the numbers have grown from 24 in 2009 to 53 in 2012. Grade 12 learners leave the winter school with new enthusiasm for IT as subject. and are impressed by the facilities of the Academy of UJ.

In conjunction with the winter school for government schools, a winter school for IEB schools is also held as these schools have different holiday periods and use Java as programming language. Mr Sean Barber, another excellent educator has presented this winter school since 2010 with great success.

A Facebook page has been started in 2012 to provide a more consistent avenue for the marketing of the winter school. Here, learners can post their comments on the winter school, which have been very positive.

The Academy is in support of growing the winter school in the future as it provides very good support to grade 12 learners, as well as teachers who also attend the school to grow their skill set. We hope to have close to 100 learners attending the winter school in the next year to two.







INVASIVE SPECIES: A threat to our unique biobiodiversity

Prof Michele van der Bank and Mr Gerhard Groenewald owner of Klipbokkop Mountain Reserve, Worcester

Scientists from different backgrounds and experiences worked once again together in the Toyota Enviro Outreach, led by Prof Michelle van der Bank from the Department of Botany & Plantbiotechnology in the Faculty. The group has one common goal – to DNA barcode South Africa's rich Biodiversity, which forms part of the International Barcode of Life Project (iBOL). All the data generated will be uploaded onto the Barcode of Life Data Systems (BOLD), an online informatics platform where it will become part of a growing reference library of DNA barcodes for South African plants and animals that will be freely available for use by the broader scientific and amateur naturalist communities. A total of more than 750 species representing approximately 1450 individuals were collected during this Toyota Enviro Outreach.

The aim of the *Toyota Enviro Outreach* for 2012 was to address one of the biggest ecological challenges in Africa and globally, namely the invasion and spread of alien species. Currently there is an alarming uncertainty regarding the future of the world's richest biodiversity hotspots, given that all climate change scenarios predict an increase in species invasiveness. South Africa is currently facing one of the largest problems with invasive plant species in the world, with the Fynbos Biome being a particularly vulnerable vegetation type in South Africa. In South Africa more than 660 alien plant species have become established in natural areas and many are known to be contributing to the widespread transformation of once pristine habitats. Animal species have also established feral populations in the country and have a negative impact on native species.

The most drastic impact of invasive animal species have been recorded in South African rivers, where alien fish such as carp and bass have altered habitats and successfully outcompeted native fauna. Today at least 60% of South Africa's endemic freshwater fish are threatened. Thirteen snail species have established invasive populations in South Africa. Forty of the 42 major invertebrate crop pests are not native to South Africa. This raises serious concerns about the future of our agriculture and ecosystem-related services. For example, in South Africa, invasions have reduced the value of fynbos ecosystems by over \$ 11.75 billion, the total cost of lost water resources due to invasion is estimated to be about \$ 3.2 billion on the Agulhas Plain alone and the net present cost of invasion by black wattles amounts to \$ 1.4 billion with the cost to clear alien plant invasions around \$ 60 million per year.

These alarming figures of impact have led the South African Government to establish the *Working for Water* programme with the specific objective of managing invasive alien plants to protect water resources and ensuring the security of water supply.