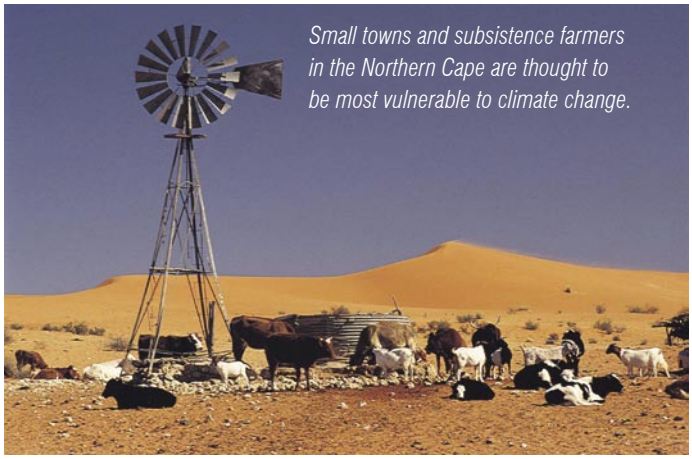
Help for small towns dealing with climate change



Small towns and subsistence farmers in the Northern Cape are thought to be most vulnerable to climate change.

Photo courtesy of SA Tourism

A new publication which can assist small towns, especially in the Northern Cape, deal with the onslaught of climate change, has been published by the Water Research Commission (WRC).

Most climate projection models suggest a decrease in rainfall over the western part of southern Africa in the coming decades. The Northern Cape, where water resources are already scarce, small towns and subsistence farmers are thought to be most vulnerable.

Most rural residents (or 30% of total population) are dependent on groundwater reserves. However, the reliability of groundwater supplies is not adequate due to, among others, restricted resource availability, quality of water, erratic precipitation, drought and water management issues.

The WRC funded study, undertaken by the University of Cape Town, investigated the adaptive capacity of small towns and communities in the Northern Cape to climate variability, specifically drought. In the past, poor planning for emergencies and the lack of structured contingency plans have resulted in water shortages during times of scarce rainfall. An estimated 25% of the towns have, as a result, over-utilised their groundwater resources.

At present, water shortages are dealt with reactively, i.e. by tanking water in from other areas. However, this is not reported to be a sustainable long-term solution.

According to the authors of the WRC report, climate change will add an additional layer of stress to which adaptive strategies and adaptation policies will have to be directed. "There is a need for proactive strategies at local and national level to deal with the impacts of drought and climate change."

The authors note that emphasis should be placed on demand side management. Several strategies are described in the report, including the implementation of dry sanitation systems rather than flush toilets; public information and school education programmes; as well as rising block tariffs and water restrictions.

"Groundwater is likely to be most severely affected, with the groundwater table dropping due to reduced recharge. Strict groundwater management systems should be put in place, with early warning mechanisms to report depleted groundwater reserves. Continual monitoring of the aquifer against climate conditions will provide some knowledge of the future potential under projected climate conditions."

It is also recommended that each local authority develop a locally-based strategy, which follows the multi-criteria analysis tool set out in the report. It is recognised that there is huge deficiencies in capacity in some areas, and this will have to be addressed if the challenges brought on by climate change are to be overcome.

- *To order the WRC Report No 1500/1/06 contact Publications at Tel: (012) 330-0340 or E-mail:* publications@wrc.org.za

Water by numbers

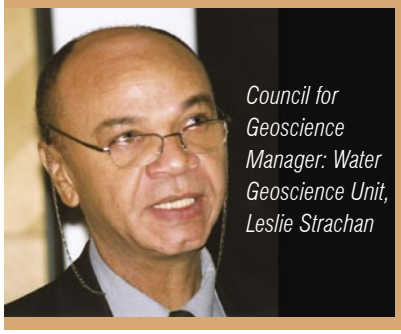
- **1,6 million ℓ/s** – The speed of the Augrabies falls, following the release of water from the overfull Gariep Dam. Usually the waterfall, known as the 'Place of Great Noise' by the indigenous Namas, flows at 30 000 ℓ/s.
- **US$500-million** – The funds being mobilised by the African Development Bank until 2007 to finance clean water projects and a social hygiene programme to benefit rural regions in Africa.
- **40%** – The improvement in access to basic sanitation, according to the Department of Water Affairs & Forestry (DWAF). By March, about 3,91 million households still did not have safe toilet facilities.
- **84%** – The average percent of rural households around the world that participate in agricultural activities, according to the UN Food and Agriculture Organisation. In some areas this figure is as high as 99%.
- **30%** – The black economic empowerment target set by the newly signed construction charter by 1013. The charter further targets a 10% economic interest in the hands of black women.
- **2,8 billion** – The number of people believed to be living in water-stressed and water-scarce parts of the world.
- **83%** – The percentage of bucket systems that have been replaced to date in Gauteng. According to Premier Mbhazima Shilowa, all the 12 000 remaining buckets will have been replaced by June ahead of the 2007 target.
- **R130-million** – The funds set aside by DWAF and the KwaZulu-Natal Department of Agricultural and Environmental Affairs for the eradication of alien plantation in the province.
- **85%** – This is how full South Africa's main dams are, compared with 65% last year. According to DWAF, only the Eastern Cape, Limpopo and the Western Cape have less stored water than the same time last year.
- **14%** – The percentage of South Africa's estimated 800 wetlands which are fully protected.

Polluted mine-water still threatens Gauteng

If the now defunct compartment adjacent to existing gold-mining operations at ERPM on the Central Rand Basin is allowed to fill up with underground water unabated, decanting of polluted mine-water could occur within less than two years, with potential disastrous consequences for the greater Johannesburg metropolitan area.

So reports manager of the Water Geoscience Unit at the Council for Geoscience, Leslie Strachan. He was speaking at a mine-water symposium in Johannesburg earlier this year organised by the Geological Society of South Africa.

At present, ERPM is pumping out about 35 Mℓ/day of water with financial assistance from government to enable mining in the South Vertical Shaft. However, water in the adjacent No 3 Shaft is rising at about 1,3 m a day at a level of about 800 m below surface.



Council for Geoscience Manager: Water Geoscience Unit, Leslie Strachan

Strachan told delegates it was very difficult at this stage to predict exactly when decant would take place, since basin dynamics are not yet fully understood.

One possible solution for the ERPM situation is to construct a 2,5 km shaft and siphon (about 200 m below surface) from the mine's South Vertical Shaft to manage water through controlled decant at a point southwards on the Elsburg Spruit near the Elsburg Dam. The water can then be treated at the dam.

The Council of Geoscience has been undertaking an investigation into this and other mine-water pollution issues on the Witwatersrand on behalf of the Department of Minerals & Energy since 2002. The project aims to, among other, prevent ingress of (clean) water into underground mine workings both from surface and underground sources and recommend solutions to the State to reduce risks associated with minewater in the Witwatersrand area.

It is interesting to note that the West Rand Basin, near the Cradle of Humankind, is the only area included in the study where decanting is taking place at present. Investigations are continuing in each basin, including the identification of ingress areas; development of groundwater geohydrological conceptual models, and the establishment of shaft level and sampling networks.

Turning 'Cinderella' of water sector into princess

The Cinderella of water services, sanitation, came under the spotlight with the first ever National Sanitation Week held in South Africa in March.

The theme of the week was 'Washing Hands for a Healthy Life' with government encouraging its citizens to practice safe health and hygiene habits. "Germs play a major part in the millions of cases of diarrhoea among children under the age of five. Almost 50% of all reported cases diseases are related to poor sanitation," said Minister of Water Affairs & Forestry Buyelwa Sonjica.

R2 m. for flood victims

The North West government has donated more than R2-million to about 300 families affected by recent floods in Taung.

The donation is part of the Social Relief of Distress programme. Only families who do not already receive social grants qualified for assistance.

Meanwhile Africon Consulting Engineers has assessed the extent of damage caused by the floods on behalf of the provincial government. According to the National Disaster Management Committee set up in the area a long-term plan is being formulated to ensure Taung is not susceptible to future floods.

Diary

ASSET MANAGEMENT
MAY 17-19
A workshop on strategic asset management and maintenance for the public sector will be held at the Ridgeway Hotel, Randburg. *Enquiries: Steve Matkhutle; Tel: (011) 803-0009; E-mail:* workshops@tci-sa.co.za; *Web:* www.tci-sa.co.za

DESALINATION
MAY 18-21
An international conference on desalination and desalination plant rehabilitation will be held in Sharm-El-Sheikh, in Egypt. Topics to be discussed include thermal desalination processes, brackish water desalination, renewable energy and desalination, and economics of desalination plants, among others. *Enquiries: Desalination Studies & Technology Centre; Alexandria University; Tel: (+203) 591 1152/0096; Fax: (+203) 591 4340/0720; E-mail:* adst@frcu.eun.eg

WATER RESOURCES MANAGEMENT
MAY 23-25
The conference on Integrated Water Resources Management & Challenges of Sustainable Development, to be held in Marrakech, Morocco, is being organised by the International Association of Hydrogeologists. *E-mail:* gire3d@ucam.ac.ma

CAPACITY BUILDING
MAY 24-26
The Third International Water Association Young Researchers Conference will be held at Nanyang International University, in Singapore. The conference aims to provide an international forum at which postgraduate researchers and young professionals working in the water sector can present their research work and network with their peers. *Enquiries: Tom Williams; Tel: +44 (0)20 7654 5500; Fax: +44 (0)20 7654 5555; E-mail:* YRC2006@iwahq.org.uk; *Web:* www.yrc2006.iwa-conferences.org

Diarrhoea killing children in Khayalitsha

Diarrhoea and gastro-enteritis have overtaken HIV/Aids as the biggest killer of children under five years in Khayalitsha, outside Cape Town.

According to news agency Health-e, the child-related deaths related to these diseases have doubled over the last four years. This is mainly due to the critical lack of sanitation. Authorities have been battling to serve residents of this burgeoning settlement, with an estimated 48 000 new arrivals every year.

At least 55% of people in Khayalitsha live below the poverty line, with half of all adults reported to be unemployed. About one in three people have no access to on-site water. Health-e reports that there is an average of 105 people per toilet in Sites B and C in Khayelitsha. In 2004, 280 of 7805 children born died at birth, with 60 children under five dying of diarrhoea in 2004.

Irrigation symposium calls for papers

The South African National Committee on Irrigation & Drainage (SANCID) has called for papers for its symposium, 'the Changing Face of Irrigation in Southern Africa', to take place from 15 to 17 November, at the Aventura Swadini Resort in Mpumalanga.

The irrigated agriculture industry is one where continuous change is a reality. Water users and their support services have in the last decade had to deal with new challenges due to changes both in the policy and the natural environment they operate in. Access to water is being regulated through new water allocation methods; urban development and economic growth is putting additional strain on regional water resources, thereby increasing competition for water and demanding water efficiency; and access to international markets requires strict control measures to be adhered to, to name but a few.

In light of these developments, the SANCID symposium will be used to evaluate the changes that have taken place. Sub-themes include, inter alia, design, technologies and innovation; irrigation management; the institutional environment; human resource development; and natural resources and environmental impacts.

- *Abstracts for papers for the symposium need to be submitted to programme co-ordinator Litha Magingxa at E-mail: magingxal.sci@mail.uovs.ac.za by 16 June, 2006. For more information, contact Isobel van der Stoep at Tel: (012) 420-2174 or E-mail: Isobel.vanderstoep@up.ac.za or visit: www.sancid.org.za*

SLUDGE MANAGEMENT
MAY 29-31
The IWA Specialised Conference on Sustainable Sludge Management: State of the Art; Challenges and Perspectives, will be held in Moscow, Russia.
Enquiries: Tel/Fax: +7 095 101 4621; E-mail: IWAconference@sibico.com; Visit: http://IWAsludge.sibico.com

AQUATIC RESOURCES
JUNE 19-23
The Southern African Society of Aquatic Scientists together with the Phycological Society of Southern Africa are hosting a joint conference with the theme 'From Source to Sea'. The conference, to be held in Maputo, Mozambique, will focus on aspects related to shared water resources and includes themes on research, conservation and management of aquatic resources in southern Africa. *Enquiries: Dr Richard Greenfield; Tel: (011) 489-2444; Fax: (011) 489-2286; E-mail: rgr@na.rau.ac.za*

SOIL SCIENCE
JULY 9-15
The 18th World Congress of Soil Science will be held in Philadelphia, US. *Enquiries: Soil Science Society of America; Tel: +1 (608) 273-8095; Fax: +1 (608) 273-2021; Web: www.18wcss*

WATER TREATMENT
JULY 10-12
An international conference on 'Decentralised Water Systems' will be held in Australia. The conference, being organised by Murdoch University, will focus on design, operation, maintenance and management of small treatment units and the uptake of decentralised systems. *Enquiries: Dr Kuruvilla Mathew; E-mail: K.Mathew@murdoch.edu.au; Web:" www.etc.murdoch.edu/au/conferences/decent.html*

ASSET MANAGEMENT
JULY 11-14
The First World Congress in Engineering Asset Management will take place at the Conrad Jupiters Conference Centre, in Queensland, Australia. *Visit: www.wceam.org*

EVAPORATION
JULY-17-21
A Water Research Commission project workshop on Evaporation Estimation will be held at the University of KwaZulu-Natal, Pietermaritzburg. There is a workshop aimed at students and one aimed at practitioners. *Enquiries: Bennie Hoosen; Tel: (033) 260-5510; E-mail: hoosenb@ukzn.ac.za; Web: http://fred.csir.co.za/extra/project/evapmon*

ENVIRONMENTAL WATER QUALITY
AUGUST 14-18
The Institute for Water Research at Rhodes University will be hosting a course on the introduction to managing environmental water quality. The registration deadline is 24 July. *Enquiries: Dr Heather Davies-Coleman or Juanita McLean, Tel: (046) 622-2428; Fax: (046) 603-8532; E-mail: course@iwr.ru.ac.za; Web: www.ru.ac.za/institutes/iwr/ucewq*

WRC project sows success in FS

Minister of Water Affairs & Forestry Buyelwa Sonjica has praised the Water Research Commission's (WRC's) rainwater harvesting initiatives which are helping to feed thousands of villagers in Thaba Nchu, in the Free State.

Speaking at Water Week Celebrations in the area earlier this year she said that innovative technologies, such as rainwater harvesting, had the potential to contribute to substantially reducing food insecurity, poverty and unemployment. "We need to use innovation, science and technology to open new horizons for better water use." She also argued for an increase in research into groundwater harvesting methods.

Water harvesting is based on the principle of depriving part of the land of its share of rain (which is usually not used productively)

and adding it to another part where it can be used beneficially. The rainwater harvesting technique developed through WRC-funded research combines the advantages of water harvesting, no-till, basin tillage and mulching on high drought-risk clay soils. The practice reduces total runoff to zero and evaporation from the soil surface considerably, thus increasing crop production in the semi-arid areas with low potential clay soils.

Research has shown that, on average, in-field rainwater harvesting technology increased crop yields by about a third when compared to the use of conventional tillage techniques. Crops such as maize, beans spinach and fruit have been grown successfully in Thaba Nchu. The technique is now being taught to farmers in the Eastern Cape and KwaZulu-Natal.

Maintenance crucial, says DBSA

Growth and development depend not so much on the rapid rollout of infrastructure itself, but rather on the sustainable delivery of the services which that infrastructure makes possible.

This is the main message from the new report published by the Development Bank of Southern Africa (DBSA) on the state of infrastructure and service delivery in South Africa. The *Infrastructure Barometer 2006* was published in March. Commenting on the publication, outgoing DBSA CEO Mandla Gantsho said: "The importance of appropriate and sustainable infrastructure as a foundation for socio-economic development, and particularly in improving the quality of people's lives, is no longer a matter for debate. The focus is on meeting the many challenges of delivery facing South Africa and other countries on the continent."

In 1996, a household consisted of 4,47 persons, and in 2001, it was only 3,8 persons.

Part I of the report focuses on the contribution of infrastructure to growth, through an examination of national level infrastructure sectors – including water and sanitation. Part II, on the other hand, examines the infrastructure requirements of municipalities in general and marginal communities in particular, and introduces a financial model which assesses the financial sustainability of reducing the country's municipal infrastructure backlogs.

Interestingly, the financial modelling of the rollout of municipal infrastructure (to meet national coverage targets) indicates that, in addition to the estimated R140-billion in capital expenditure, municipalities will also need to increase income by 50% over the same period to cover operation and maintenance of the new infrastructure. This suggests that the present trend towards high levels of service will lead to even more serious financial difficulties for many municipalities when operational costs far outstrip revenues.

The report also shows that between 1996 and 2001 households increased by 5,33% against the 2,09% increase in the population. The reason for this increase in the number of households was the change in household size. In 1996, a household consisted of 4,47 persons, and in 2001, it was only 3,8 persons. This finding is critical for planning and for rollout of municipal infrastructure.

Among the other issues addressed in the report include the question of the present realities governing decision making; a series of complex strategies challenges, the maintenance of South Africa's ageing infrastructure stock and dysfunctional institutional arrangements.

- To access the report, go to www.dbsa.org

Boost for water and sanitation in Africa

Efforts to provide Africa's poor with safe water and sanitation has received a boost following the signing of a Memorandum of Understanding between UN-Habitat and the African Development Bank (AfDB).

The two parties will provide grants to the value of about US$217-million over the next five years. It is expected that this will lead to additional opportunities for follow-up fast track loans from the bank of about US$362-million to speed up efforts to reach the Millennium Development Goals on water and sanitation.

Under the terms of the memorandum, the AfDB and UN-Habitat will collaborate in several areas, including raising political ownership, and advocacy in specific areas such as resource mobilisation in urban and peri-urban pro-poor activities in water and sanitation schemes; security, gender and environmental activities.

US$20-bn a year needed for Africa to reach MDGs

Africa needs US$20-billion a year to attain the United Nations Millennium Development Goals of halving poverty by 2015. This was revealed at the Fourth World Water Forum held in Mexico in March.

To date, Africa has developed only 3,8% of its water resources for supply, irrigation and electrical power. This situation implies the need for hefty investment in various areas. This investment must go hand-in-hand with changes in regional and national policy and capability that will pave the way for governance and the appropriate implementation of policies, such as integrated water resources management.

In a report prepared for discussion, the main challenges for the continent with regards to water resources development are said to be:

- The need to obtain financing to expand access to water, sanitation, food security and the production of energy;

- The ability to deal with climate variations and natural disasters;
- Reducing the negative effects of human activity on water resources;
- Increasing agricultural areas; and
- Developing security in production of energy.

Maths helping to save biodiversity

Mathematical formulae normally used by economists and engineers are now being applied in determining which of the world's biodiversity hotspots to save first. ABC Science Online reports that ecologist and mathematician Prof Hugh Possingham and team at the University of Queensland have applied mathematical tools to save as many species as possible. They have developed a method of prioritising hotspots to take into account a range of features apart from how many species an area has. High priority is given to areas where habitat is fast disappearing, little of the area has already disappeared, and where the cost of conserving habitat is low.

World's rivers captured in detail

The World Wildlife Fund has developed data and created maps of the world's rivers to provide researchers with information about where streams and watersheds occur on the earth's landscape and how water drains the land surface.

HydroSHEDS provides hydrographic information in a consistent and comprehensive format for regional and global-scale applications. It offers a suit of geo-referenced data sets, including stream networks, watershed boundaries, drainage directions and ancillary data such as flow accumulations, distances and river topography information.

Data for many international river basins are patchy, and remote areas are often poorly mapped. For some regions of the world, such as the Congo Basin in Africa and part of the Amazon Basin in South America, HydroSHEDS will provide the first high-resolution digital river maps produced for these large areas.

Data is freely available for non-commercial use and can be accessed at www.worldwildlife.org/hydrosheds or http://hydrosheds.cr.usgs.gov

Snippets

- CSIRO, in Australia, has launched an online **Water Quality Calculator** to help manage irrigation water quality to sustain crop production. Visit www.cotton.crc.au/CottonLOGIC/WQC/
- Achim Steiner has been named the new head of the **United Nations Environment Programme**. Steiner, who hails from Germany, was DG of the World Conservation Union.
- **Climate change** could become a major source of global conflict over the next 30 years, with countries battling for control over water supplies, British Defense Secretary John Reid has warned. He said military planners have already begun considering the consequences of climate change for British forces over the coming three decades.
- Botswana is still struggling to control a **diarrhoea** epidemic that has reportedly claimed the lives of more than 470 children. Contaminated water, unhygienic practices, poor sanitation, infant feeding-bottle contamination and ongoing person-to-person transmission has apparently all contributed to spreading the disease.
- Researchers at the University of Hawaii have reportedly developed a new, inexpensive **filtration system** that removes not only bacteria but also heavy metals from water. The new product, dubbed MicroNose, comprises granules made of clay, iron and other materials.

Millions of litres saved through Cape project

The City of Cape Town is saving about 5,7 million litres of water a day (the average daily water consumption of 38 000 people) following the commissioning of a R30-million water recycling plant at Chevron (previously Caltex).

The plant, a joint-venture project between the oil refinery and water company Improchem, draws treated effluent from the nearby Potsdam Wastewater Treatment Works in Milnerton for reuse in the oil refining process. The water is purified to near drinking water quality using clarification, ultrafiltration and reverse osmosis after which it is supplied to the refinery as steam and cooling water. Not only is this saving the city water, but it also reduces the amount of treated effluent discharged from the Potsdam works to sea via the ecologically sensitive Milnerton lagoon. It is reported that this project, initiated a few years ago, has inspired Chevron to launch a new R110-million upgrade for its own wastewater treatment plant within the next few months, pending approval from environmental authorities. Through this upgrade, the company hopes to bring the refinery in line with international best practice for wastewater treatment, while reducing public concerns with regards to odour and visual impact of the Chevron effluent at sea.

At this stage it is envisioned that the upgrade will include the construction of a 6 000 m^3 equalisation tank to remove contamination spikes; two moving bed biological reactors (MBBRs) and ancillaries; and operation of the existing retention basin on empty to provide 2 000 m^3 additional surge control.

The MBBR bioreactors are the core components of the upgrade. The mechanism used in the MBBRs is an accelerated biodegradation process involving specially designed carrier media kept in suspension by blowing air through the reactor. The carrier media provide a large surface area on to which the biological microorganisms can attach, and affect the acceleration breakdown of hydrocarbons.

The MBBRs will overflow to two clarifier/thickeners to remove solids from the effluent. The resultant filter cake will contain about 40% dry solids and be produced in quantities of about 5,2 m^3/day to be stored in removable skips. The remaining treated effluent will be pumped to sea via the existing sea outfall.

Dam reaches halfway mark

Construction on the concrete-faced rockfill Berg River Dam project is more than 50% complete, reports the Berg River Dam Project Joint Venture.

The dam will be the highest concrete-faced rockfill dam in South Africa. Construction started on the dam last year after the Berg River was successfully diverted through a temporary intake structure and conduit. At the time of writing, the contractors were preparing for the first face slab construction.

Company shorts

- Mzimkulu Msiwa, previously general manager: operations, has taken over as acting CEO of **Umgeni Water** after the unexpected resignation of Gugu Moloi. Moloi, who took over the reigns from Cromet Molepo in 2002, has sighted personal reasons for her surprise departure, one year ahead of her contract.
- South Africa's largest steel plant **Mittal Steel's** Vanderbijlpark mill has launched its new R222-million zero-effluent discharge main treatment plant. The plant ensures that no process water is released beyond the boundaries of the mill.
- **CSIR** has launched its new corporate identity. With a positioning statement that reads, "our future through science", the organisation hopes to develop a distinctive brand to support its recent reconfiguration with a renewed focus on science and research.
- Construction on the Vaal River Sub-system Augmentation Project (**VRESAP**) is well underway following the sod turning ceremony in March. The R2,5-billion emergency project, which will supply water mainly to Eskom and Sasol, will be completed by July 2007.
- The **ERWAT Laboratory** has once again been awarded the Department of Water Affairs & Forestry tender for the supply of laboratory analysis services for Gauteng. The contract is reportedly worth some R2,365-million a year.

Water on the Web

www.iclei-europe.org/logowater
This is the website of the LoGo Water project, an European Union funded project that brings together African and European researchers along with local governments from southern Africa, to jointly contribute to support local governments to improve water resources management in the region.

www.idadesal.org
This is the official website of the International Desalination Association, which commits itself to the development and promotion of the appropriate use of desalination and desalination technology worldwide. Apart from IDA news, the website offers features information on several desalination plants around the world.

www.onefish.org
The oneFish Community Directory is an Internet portal providing access to information on fisheries and aquatic research and development. An open-access environment is provided whereby individual researchers, as well as research institutions and organisations, can publish their research output directly on the Web.

www.yearofplanetearth.org
The United Nations General Assembly has proclaimed the year 2008 to be the United Nations International Year of Planet Earth. This is aimed at, among others, reducing risks for society caused by natural and human-induced hazards; discovering new natural resources and making them available in a sustainable manner; determining the non-human factor in climate change; and detecting deep and poorly accessible groundwater resources.