Achieving International Excellence in Research

Academics and researchers reflect on research enhancement

CESAR Director to Tawasul:
Research centers are new undertakings that need more support

Dr. Jumana Saleh:
Sitting is killing us even if we exercise

Study:
Assessing The Impact of Global Food Crisis on Food Security in Oman
The Department of Academic Publication and Outreach took part last month in Frankfurt International Book Fair. The Department’s stall included over 60 new books, in both English and Arabic, covering a variety of fields including religion, literature, history, geography and social studies. Other publications were research studies carried out by Sultan Qaboos University academics and researchers.

The pavilion attracted many visitors interested in the topics of the books, in particular, and Oman in general. A number of seminars and gatherings were held, which provided a good opportunity for the Omani delegation to meet international academic publishers.

The meetings were focused on promoting bilateral relations, exchange of expertise and marketing SQU scientific publications at the global level. Complimentary copies of SQU books and DVDs about Oman were dedicated to foreign delegations.

Editors
Officials from the Qatari Ministry of Environment have recently paid a 3-day visit to Sultan Qaboos University as part of a collaborative research program between the two sides. During the visit, they had talks with SQU academics on exchanging know-how and promoting bilateral cooperation. The delegation included Engineer Saleh Al-Jarallah Al-Marri, Director General of the Department of Livestock, and Dr. Muzzamil Atta, a livestock nutrition expert. The SQU team consisted of Professor Osman Mahgoub Gaafar and Professor Isam Tawfik Kadim from the Department of Animal and Veterinary Sciences.

The two sides have concluded an agreement to put into effect research grants under the National Priorities Research Program between the Qatar National Research Fund and Ministry of Environment. They also agreed to have certain aspects of a joint project carried out at the Department of Animal & Veterinary Sciences (DAVS), SQU.

The project is entitled: Effects of Feeding Palm Fronds and Date Waste on the Productive and Reproductive Performance of Awassi. The livestock experimentation part will be carried out in Qatar. Two Awassi sheep will be fed with conventional and non-conventional diets. One preliminary digestibility and four feeding experiments will be conducted. The preliminary experiment will examine the digestibility coefficients of the crushed palm fronds and date waste. Accordingly, two isocaloric and isonitrogenous complete mixture diets will be formulated. The first one (the non-conventional) is based on crushed palm fronds and date waste and the second (the conventional) is based on barley grains and Rhodes hay. The diets will be offered to the sheep in four feeding experiments.

The first part of the project studies the gestation and lactation performance of the parent ewes and their first crop of ewe lambs, starting from conception to the end of lactation. The second phase is concerned with pre- and post-weaning performance of ewe lambs. The third will study the pre- and post-weaning performances and slaughter characteristics of ram lambs, starting from birth to slaughtering at the age of sexual maturity. The fourth phase is concerned with semen evaluation of the parent rams during summer and winter seasons.

The work, to be carried out at SQU, will be focused on assessing the nutritive value of feeds and meat products. The feeds will be assessed through chemical analyses and in vitro and in vivo experiments to test the digestibility of the feeds.

The Qatari team visited the DAVS laboratories, the Agricultural Experiment Station, and some facilities at SQU. They met with the DAVS faculty and discussed plans for training staff from the Qatari Environment Ministry. They also met with Deanship of Research officials and discussed the financial aspects of the project.
Developing Oman’s education system

A research team from the College of Education has conducted a study aimed at improving the school system in Oman, in light of the need for comprehensive education reform and stretching the boundaries of student learning potentials. The study has sought to boost all school system elements, examine their impact on the empowerment of students and improve their academic performance and design a practical model of school performance and sustainable development.

The work is based on the assumption that any sustainable improvement in the school system depends on promoting the factors affecting the educational system, which in turn leads to enhancing school performance and learning opportunities.

The sample included four schools (cycle two) in Muscat and consisted of 3,600 students from grades (5-10). They were tested and followed up in three phases in grades 5-6, 7-8, and 9-10. All teachers, administrators and parents of students were part of the study sample.

Researchers used experimental, analytical and descriptive methodologies. The application of the proposed model was based on a variety of measures and tools to collect quantitative and qualitative data from different sources (students, teachers, classroom environment, school documents, administrators, supervisors, and parents). The project is expected to contribute to the enhancement of the output of educational institutions.

Discharge of Salt Water by Marine Outfall Systems

A research team from the College of Science, headed by Dr. Anton Purnama, is investigating how desalination plants can discharge brine continuously through marine outfall plant systems. They are also going to evaluate its potential environmental impact, as the desalination plants extract large amounts of sea water and discharge the undesirable hot water into the sea, along with the wastewater which contains highly concentrated salts.

The research project will examine theoretical and numerical solutions which indicate that the bottom of the sea and coastal flows affect the depth and spread of the constantly mixing brine as it is discharged through the submerged outfall systems.

The project is in collaboration with the College of Environment at Beijing University of Teachers, China.
Research centers are landmarks for generating research that would contribute to the scientific and intellectual development and progress of nations. As such, they play a significant role in networking among researchers, promoting research and consolidating development plans.

SQU has long put in place huge resources to build research centers covering diverse fields and supplying them with the state-of-the-art equipment. An important center is the Center for Environmental Studies and Research (CESAR) which undertakes significant projects. In the following interview, the CESAR Director, Dr. Mahad Bawain, reflects on the duties and roles of the center.

**CESAR Director to Tawasul:**

**Research centers are new undertakings that need more support**

What are the roles that the Center is doing

The Center for Environmental Studies and Research (CESAR) has a multi-disciplinary approach among many environmental related fields. The main role is to conduct and facilitate integrated environmental research by focusing on capacity building and outreach activities. Therefore, CESAR has conducted a series of studies and research related to the environment, whether independently or in cooperation with various public and private organizations. The center also contributed to the organization and coordination of a number of environmental studies and research carried out by some colleges and units at Sultan Qaboos University. Furthermore, CE-
SAR plays an important role in the collection and dissemination of information on environmental research on Oman and the region. Thus, it serves as a link to promote research cooperation and interaction between the university, government and private institutions concerned with the environment. The center also contributes effectively to the representation of the university internally and externally represent the Sultanate in the events and conferences related to the environment in addition to its leading role in the organization of seminars, symposia and conferences on environmental issues.

**What are the most issues that Center has done on Studies and Research**

Since its inception, CESAR has broadly worked on the following issues;
Research in the area Environmental Management including wastewater treatment, solid waste management, air quality and climate change.
Research on Mountain Ecosystem management.
Assessment of coastal and marine pollution, springs, agriculture etc.
Assessment of social and environmental responsibility of corporate sector in Oman.
Stakeholder mapping for issues related to development
Publication of Research Books (Research Directory, Bird list, Mountain Ecosystem of Oman, Desalination and Environment, newsletters etc).
Development of databases such as bird list and fungi database of Oman.
Provided professional consultative services to government, industry and private individuals.
Engaged in organizing conferences, workshops, short courses, seminars relating to development activities and environment.
Capacity building of local institutions and ministries on EIA and natural resources Management.

**Some people think that there are some overlap between CESAR and other organizations such as Ministry of Environment and Climate Affairs. What’s your response**

At the outset, it is important to note that CESAR is a research Center not a regulatory body like Ministry of Environment and Climate Affairs (MECA) or other relevant authorities. The activities of CESAR are focused on research and studies related to environment and development. Most of CESAR’s research outputs aim to provide inputs to MECA and other line ministries to conduct their duties more efficiently. Hence, there is no scope for duplication of work or conflict of interest between these organizations. In contrary, CESAR and other public authorities can demonstrate integrated efforts toward environmental management for sustainable development.

**We have published the Bird List and some important studies**

There is no overlap with the public sector.
How are the links between CESAR and Social Organizations outside SQU

CESAR has developed close relationships with the government departments at various levels and local organizations such as ESO, industry collaborates and many (to name few of them such as Oman water society, Oman Green Awards, various schools etc). Additionally, through interaction and working in partnership with other organizations, industry groups or other research/academic organizations, researchers at CESAR keep abreast with local and global developments in their respective fields.

How can CESAR make use of good student in serving the Center and its Research

CESAR has been very active in engaging students in research and services. It will continue to encourage the participation of students, visiting scholars, and postdoctoral fellows in research conducted at the Center besides its role of liaison in the past. CESAR could also sponsor and find research placements in appropriate colleges for scholars who have external funding for travel and sustenance. CESAR receives regular enquiries from volunteers who would like to help with environmental research.

Academic people believe that media is important in publicizing and marketing for research centers. Where are you from cooperation with media

We seek to raise environmental awareness among students and the community

and engagement. In fact, CESAR staff published many articles in the local newspapers, radio talks and represented as jury in green environmental issues within the Sultanate.

What are the most challenges facing your research

Research centers at the university, although still considered as recent phenomenon, are growing steadily. However, they need more support and attention to overcome the many obstacles facing them. The most challenges facing the research activities in CESAR (and other research centers) can be summarized as follows:

Lack of dedicated research laboratories for the center.
Lack of fixed funding from SQU budget for CESAR’s research.
Lack of sufficient Research Cadre to encourage and lead research projects and junior staff.
Lack of qualified research assistants, postgraduate students and postdoctoral fellows.
Lack of international collaboration in research, capacity building and outreach activities.
Minimal collaboration with other Research Centers and Colleges.
Lengthy processes in submission of research proposals for funding.
Over-commitment of research professionals for administrative and community services.
Lack of coordination and poor perception among Colleges and College Staff to depute students to work with the Center.

We attract bright graduates and strengthen ties with the media

CESAR has been very active with media through its project outputs and other programs. Most of the times, CESAR has been working with media and published many articles, program reports etc. Media has been one of the important part of CESAR’s strategy to reach out wider community and engagement. In fact, CESAR staff published many articles in the local newspapers, radio talks and represented as jury in green environmental issues within the Sultanate.

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What are the solutions to overcome the challenges and obstacles so that the Center can meet its objectives and Mission

The research centers, including CESAR, should attract the best qualified scientists to meet the current development requirements. Furthermore, they need to adopt flexible and interactive mechanisms to deal with the current challenges. In light of these facts, there is a need to develop a strategy where the research centers play an active role in identifying problems and issues that require appropriate decisions in different fields. In striving to meet its research vision, CESAR proposes the following solutions;

Need to adopt an integrated strategy for research at the Center. Bring in well-defined and established research cadre in order to create potential human resources for long term research and retain experienced staff. Establish equipped research laboratories and facilities to pursue the research objectives of the center. Allocate funds that meets the needs of various activities of the Center as it continues to grow and expand. Identify themes of research that meet the development goals of the society and submit proposals for funding with potential funders. Strengthen infrastructure and upgrade human resources for research. Develop cooperation with public and private sectors within and outside Oman to promote research activity. Adopt systematic approach in disseminating knowledge and organizing continuing education, training programs and short courses. Highlight through the media the Center’s role in community service and development. Establish strong relations with leading research organizations, Universities and international agencies for research cooperation and exchanges.
Parent Perceptions of Child Car Safety Seats

Dr. Samir Al Adawi, from the Behavioral Medicine Department, College of Medicine and Health Sciences, is investigating the use of child car safety seats in the Sultanate and the United Arab Emirates.

His study seeks to define the behaviors and positions of parents in both countries, and the extent to which parents are familiar with such seats for the safety of their children. Initial evidence indicates that parents are not aware of the sound and safe practices. In addition, there are no regulations that mandate the use of such seats.

The work also aims to understand the demographic factors that could affect the parents’ decisions to use or not to use these seats.

It is hoped that the research will help inform the legislative bodies in the two countries of the importance of enacting laws and legislations relating to compulsory use of car safety seats for children. It is also expected to raise awareness in this regard through media campaigns.

C-H Functionalization

Dr. Hamad Al Mamari, from Department of Chemistry, has carried out a research work aimed at developing new reactions for C-H bond functionalizations catalyzed by transition metals and controlled by monodentate directing groups.

C-H functionalization is of potential significance to Oman, the researcher said. Activation of C-H bond avoids the use of prefunctionalized materials and hence shorter routes for the synthesis of molecules. Therefore, C-H activation provides rapid and direct access of desired functionalized materials/compounds. As a result, the merits would then be atom economy, chemicals/reagents economy, time economy and environmental friendliness, as would be manifested by much less waste. The overall outcome is thus green chemistry, which supports our environment, Dr. Al Mamari pointed out.

He added that C-H functionalization poses significant potential importance to the economy of Oman. Important small molecules such as methanol, ethanol can be made through C-H activation in shorter and more efficient methods. The strategy can lead to shorter and more direct routes for the synthesis of chemical, biological, medicinal, pharmaceutical, and agricultural products.

The oil industry is an important pillar in the economy of Oman. C-H functionalization should allow activation of C-H bonds in hydrocarbons formed as waste, by functionalizing them into useful functionalized molecules such as methanol. The result would be a reduction of the hydrocarbon waste by reusing/recycling it, reduction of the emission of greenhouse gases into the atmosphere and eventual green chemistry/science, the researcher concluded.
A research team from the Department of Physical Education have undertaken a study aimed at identifying the lifestyle and physical activity of teenagers and adolescents in Oman. The work includes obtaining baseline data for male/female Omani national population between 15-17 years of age with regard to a healthy life style to combat HRD & NCDs. A school-based cross-sectional multicenter collaborative project has been adopted. The participants are adolescent males and females enrolled across secondary schools in Sultanate of Oman.

According to the team chief, Dr. Kashef Zayed, the main goal of the research is to describe current patterns related to: (1) daily physical activity and regular exercise activity among Omani adolescents; (2) dietary patterns in respect of daily macro and micro nutrient intake and frequency of food consumption of Omani adolescents; (3) body mass index (BMI), total body fat (TBF), and overweight and obesity prevalence among Omani adolescents. The researchers also aim to investigate the associations between obesity measures and several lifestyle factors, including physical activity, sedentary behaviors, sleep duration and dietary habits among Omani adolescents. Evaluation and examination of the data will be conducted also when comparing gender differences on the above variables.

It is expected that the findings stemming from this strategic research endeavor will be substantial and very beneficial from public health perspectives. The results of this research will certainly supply us for the first time with a comprehensive and recent data on physical activity/inactivity patterns, eating habits, and sleep curtailment of Omani adolescents, and their relationships to risk-factor measures. Finally, this project will provide valuable baseline data for the Ministry of Education, Curriculum supervisors in PE, public health authorities and policy makers in the Sultanate of Oman. This information is very essential for any strategy aimed at improving physical health education in schools and at preventing and controlling poor health outcomes.
Recent years have seen a plunge in the oil revenues of the Gulf Cooperation Council (GCC) countries. This comes at a time when other economic resources have drawn little attention from domestic and foreign investors, which, if utilized, could push forward the economies of the region and create prosperity. Addressing this issue, Dr. Sufian Tayeb Mohammed, Assistant Professor at the College of Law, and Dr. Omar Ali Ibrahim, Assistant Professor at the College of Banking and Financial Studies, Muscat, have investigated the motives of foreign direct investment in the Sultanate. The importance of this study is that foreign direct investment is one of the basic pillars of the strategic plan “Vision Oman 2020”, which aims to diversify the economy by reducing dependence on oil. Foreign direct investment is complementary to domestic investment, contributing to growth and development. Hence, the study helps to show the most important factors for attracting investments to the Sultanate.

The researchers have made recommendations as to the best ways of attracting investment to the Sultanate. One finding has to do with what economic policy makers in Oman are expected to do. They call for creating an enabling environment to attract foreign direct investment through the adoption of good macroeconomic policies, and to provide preferential incentives, especially for investment projects that could significantly contribute to the strategy of diversifying production resources in the country.
The sharp increase in global food prices over the recent years has raised concerns about the short-term effects of high and volatile food prices on the welfare and nutritional status of people around the world as well as the effect on the national food security now and in the long run. The GCC countries, including Oman, import most of their food and like the rest of the world are very much concerned about the recent global food price surge. Dr. Houcine Boughanmi, from the College of Agricultural and Marine Sciences, has conducted a study to quantify and measure the likely impact of the food crisis both at the national and household levels in Oman in order to generate the information needed for policy makers to design effective policy responses. The Hicksian compensation methods were used as a general framework to estimate the impact of the price surge on household welfare. The project will provide policy makers with sufficient information to design and implement the appropriate policy actions in response to current and future food crises.

The analysis of household food consumption patterns in Oman indicates that although food expenditure share has declined slightly over time due to increased income, the average Omani household still spends a large proportion of total expenditure on food (28%). The food basket of Omani households has been stable over time with meat food products, cereal and dairy as the main items. The only exception is the significant increase in the share of restaurant food expenditure and the significant decrease in the share of consumption of food from “own production”. The increased reliance on the market and food away from the home increase the vulnerability of low income households to price increases and raises a nutritional concern that the government has to address.
The image of Arabs in social studies curriculums in Oman and Kuwait has been the subject of a recent Masters dissertation submitted to the College of Education at Sultan Qaboos University.

Tawasul has interviewed the researcher Howra Al Ajami, who talked about the objectives of her study and its importance, findings and recommendations.

**Goals**

Ms. Howrah said the research was aimed to measure the Arabic component in those curriculums, and identify the aspects that should be highlighted in the textbooks on social studies. It also focused on comparing and contrasting between the social studies curriculums in the two countries in terms of how much the Arabic dimension has been considered at different school levels and grades.

**Significance of the Study**

The researchers carries on: “The importance of the study lies in the fact that it is the first of its kind to deal with such a topic in the Arab world, thus, it merits novelty and originality. It is
The development of universities and academic institutions is normally measured by their academic publishing and the funds and resources put in place for it. This can only be achieved through producing researchers with the know-how required to generate knowledge and publish scientific findings. One more factor is creating the infrastructure necessary to sustain research and, thus, attain the goals and missions of universities.

One of the priorities which has been given much attention by Sultan Qaboos University is academic publishing, since it plays a leading role in disseminating scientific knowledge, highlighting research results, and enriching local and international scholarship with new and useful studies. Sultan Qaboos University has always been keen to ensure that its publications undergo peer-reviewing and evaluation by its Academic Publication Board and by professors specialized in their respective fields. This guarantees a high level of integrity, scientific authenticity and language accuracy.

In 2009, the deanship of research was established according to a royal decree. One of the units is the department of academic publication and outreach, which is in charge of academic publishing. Since its inception, the department has been seeking to achieve its objectives in highlighting the role of scientific research and to realize the University’s aspirations to enhance scientific publishing in all forms, such as books and studies, and refereed proceedings of international conferences and symposiums. Such publications will definitely benefit researchers in their scientific pursuits to develop new ideas and build on previous research, and, thus, enriching human knowledge with further innovative achievements.

Universities have given special attention to academic publishing, so they have harnessed human and physical resources to promote the publishing industry. In this regard, Sultan Qaboos University has put in place a printing house as well as issuing five academic journals publishing in diverse fields papers submitted by researchers from Oman and abroad. This has enhanced the reputation of these periodicals among other journals in the Arab world and beyond.

The University has also been keen to publish refereed books and participate in local, regional and international scientific conferences and book fairs, which are excellent platforms to market its various publications.

Scientific Publication has become a fundamental and important standard by which universities are evaluated and ranked. Other criteria have to do with the level of participation in scientific conferences and the discoveries and inventions made by them, which promotes their reputation and enhance their ranking among others.
The enhancement of research is important for improving the ranking of universities. This can be done through increasing funding, encouraging publishing in leading journals and spreading a research culture. To this end, Sultan Qaboos University has exerted sustained efforts in various colleges and centers.

Tawasul has interviewed some researchers from different departments to get to know their opinions and inputs about ways and means of promoting research and the University’s ranking. Here are some of their remarks.
First, Dr. Nasser Hussein, Head of the Electricity and Computer Science Department, reflected on the major challenges facing researchers: “Faculty members do not find enough time to do their research work, because they are overloaded with teaching, administrative tasks and committees, all of which burn out the faculty. There are not enough teaching assistants to take up part of teaching load. On the other hand, few SQU PhD grants are in place, which is another factor that obstructs the development of research. It is a fact that PhD students are the cornerstone of any scientific research. Grants offered to PhD students by the Research Council (TRC) are limited to three years and linked to the project period. This is problematic as finding and appointing doctoral students take between six months to one year; so, when students begin their studies, they are left with less than 3 years of the grant.”

Dr. Yunis Baqi, from the College of Science, puts forward some suggestions to strengthen the position of the University. He says: “We should attract and retain distinguished researchers, from different disciplines. We should also accept more postgraduate students (Masters and PhD) and distribute them to faculty members so that everyone can have the opportunity for supervision. We should support research centers and post-doctoral research as well as reducing the teaching load to have more time for research.” He went on: “I also suggest to engage postgraduate students and post-doctoral researchers in teaching and to enhance research through Omani capacity building and the creation of opportunities for research and academic partnership with distinguished scientists worldwide to get high-quality research results which can be published in leading journals. I would also suggest a paid research leave (one or two semesters in length) for all teaching faculty who have served the university for at least five years. This will encourage faculty to produce further studies that would be published in high-impact factor journals.”

On the other hand, Dr. Raed Abed, Associate Professor at the Department of Biology, argues that: “Scientific research depends on a lot of materials and devices that take up to one year to acquire. For example, in one subject on the prohibition of chemicals ordered from abroad and which are stored in warehouses in the Sultanate, much of the time of the project will be wasted. So, I suggest to facilitate the procurement procedures by setting up an electronic system to allow researchers to put orders directly, and to increase the payment of cash to over 200 riyals. I also call for giving diligent academic researchers a research leave, or a reduced teaching load for one semester.” He added that there are plenty of resources to upgrade research and studies such as ambitious students, funds, devices, and laboratories. The university should recruit world-class researchers and academics in order to efficiently raise the level of our students in the
feature of scientific research, he underlined. Laboratories have to be redistributed among faculty members, and more space given to researchers and those who have postgraduate supervision, he concluded.

Dr. Mohammed Al-Balushi, a researcher at the College of Medicine and Health Sciences, expressed his view by saying: “Given that the enhancement of research has recently been on top of the priorities list of the university, one can see more evidence in this direction, in terms of research quantity and quality. However, we are still a long way from being comparable with leading universities, because our research level is low. Therefore, it is necessary to increase financial support for research, because many people have distinctive ideas, which need to be considered and encouraged. I noticed that the university is interested in research results rather than researchers. Also, there are no defined categories to which researchers can belong. In addition, we need foreign expertise to support and train junior Omani researchers.”

In this regard, Dr. Ashraf Selim, Associate Professor at the Electricity and Computer Science Department, reflected on the challenges facing scientific research by saying: “The University provides various kinds of support for research including internal grants, external funding, such as that coming from the UAE University and the TRC, building excellent research labs and facilities, and purchasing equipment. However, there is not enough safe space for some devices, and some of them are very expensive, which requires increasing the procurement budget.”

Dr. Jumana Saleh, from the College of Medicine and Health Sciences, points out that: “countries that have made leaps in scientific research usually link it with their societal needs and development plans. That is why, researchers make sure that their studies meet those needs and have an impact on the community. In our situation, teamwork and goal-oriented efforts are much needed in order to take advantage of the possibilities and devices available in various centers and laboratories.”

As to the reasons behind the decline in scientific research, she says: “There are a number of factors that impact any change of research development. For example, research topics are generally replicated; the University does not pay enough attention to private and public institutions, instead, we see the University recruiting foreign experts rather than investing in the local expertise; we do not have long-term, longitudinal research projects, which can produce credible results.”
Multimedia Technology and Hearing-Impaired Children

A new study is underway to design an educational program for children in Oman with hearing difficulties. The program will be based on multimedia technology, such as video films, images and animations. It will be used to examine the children’s basic skills in gymnastics and see the effect of those skills on the level of attention and motor and performance skills. Dr. Manar Shaheen, carrying out the research at the College of Education, says the study sample will consist of forty children aged 6-11 with deafness or hearing impairment, selected from the School of Al-Amal for deaf children in Muscat. Pre-test measurements will be made according to the research variables (i.e. level of attention disorders, level of motor abilities and level of ground skills). This will be followed by the application of multimedia software to teach some ground skills. Based on the school’s curriculum, the teaching material will be organized and applied progressively for a period of 8-10 weeks, with two units per week, each lasting 45 minutes. Post-test measurements will be calculated and the data will be processed using the SPSS 19 (Statistical Package for the Social Sciences). The researcher hopes the children will enjoy the experiment and interact with the multimedia program.

By-products of Omani Date Palm for Treating Hospital Wastewater

A research group, headed by Dr. Said El-Shafey, is undertaking a study on the treatment of hospital wastewater using sorbents from modified by-products of Omani date palms. The project, which was launched two years ago, is funded by the TRC. The researcher said: “Regardless of the growing concern over hospital waste management, little attention has been paid to wastewater generated from hospitals and health care institutions.” Results show that chemically prepared sorbents from date palm leaflets are highly efficient in the removal of such pharmaceuticals. Heavy metals were tested in the project. Results showed efficient removal of specific heavy metals. The column filter system showed promising results of developed sorbents for the removal of heavy metals. Developed adsorbents from date palm leaflets are significantly cheaper and more efficient for different types of pharmaceuticals, heavy metals and other organic compounds, and the future of utilizing such materials in treating hospital wastewater is highly very favorable, Dr El-Shafey concluded.
Mitigating Noise in Computers

At the College of Engineering Dr. Mohammed Swelim is developing metamaterials with filtering capabilities to mitigate simultaneous switching noise (SSN) in high-speed microprocessors of personal computers and laptop devices. Usually, SSN is excited by a transient current that results in voltage fluctuation in the power distribution network. This can lead to severe signal/power integrity and possible electromagnetic radiation and interference problems. This would eventually put restrictions on IQualc certification of systems during production stages. Numerical modeling of the SSN problem in high-speed PCB environments will be developed and investigated through this research work and validated with experimental work.

SQU Publications at Book Frankfurt Fair

The Department of Academic Publication and Outreach took part last month in Frankfurt International Book Fair. The Department’s stall included over 60 new books, in both English and Arabic, covering a variety of fields including religion, literature, history, geography and social studies. Other publications were research studies carried out by Sultan Qaboos University academics and researchers.

The pavilion attracted many visitors interested in the topics of the books, in particular, and Oman in general. A number of seminars and gatherings were held, which provided a good opportunity for the Omani delegation to meet international academic publishers.

The meetings were focused on promoting bilateral relations, exchange of expertise and marketing SQU scientific publications at the global level. Complimentary copies of SQU books and DVDs about Oman were dedicated to foreign delegations.
ترقبوا الفقرة الأسبوعية حول "الجهود البحثية" صباح كل ثلاثاء على إذاعة الوصل 96.5 FM.

طرح:
- أهم نتائج الدراسات والبحوث
- آخر المستجدات البحثية
- مشاركة الباحثين في المؤتمرات العلمية الخارجية
- آخر الابتكارات الطبية

بالتعاون بين إذاعة الوصل ودائرة النشر العلمي والتواصل بجامعة السلطان قابوس
A team of researchers from the College of Agricultural and Marine Sciences is looking into the economic feasibility of testing plants irrigated by saline water to grow under Omani conditions. The results will be used to plan a large scale study. All necessary measurements (soil, plant and yield analyses) will be done based on reliable published references. The findings will be generalized to the public through the extension channel and farm applications.

The principal investigator, Dr. Ahmed Al Busaidi, says that a major part of land and water resources of Al-Batinah, the principal region of Oman’s agriculture, has become highly saline due to seawater intrusion and secondary salinisation. This situation was created due to over pumping of water exceeding the annual recharge and has now become almost permanent. Hence, all future agriculture will be saline agriculture if land resource is to be saved at all, because a rapid land use change is occurring and vast valuable agricultural lands are disappearing while buildings are being constructed on such lands. Agricultural lands are scanty in the country. He added: “The farmers can only be motivated not to change the land use and sell their lands if an alternative and economically attractive use is made possible and demonstrated to them. They can be convinced by presenting a solution in which they can still use their saline lands...
Experts say: Sitting is killing us even if we exercise

By: Dr. Jumana Saleh - Biochemistry Department

Sedentary life style has become a major concern. People spend most of their time sitting and machine-driven. Unfortunately, many jobs now require more than one-half of a person’s day sitting and performing desk work. Research, led by Dr. David Alter at the University Health Network (UHN) in Toronto highlighted the outcome of 47 studies performed over the previous 16 years examining the relationship between sitting and mortality. Sedentary life style was shown to be a significant health hazard for people who sit for long times rendering them at increased risk of diabetes, heart disease and cancer even if they exercise! The study showed that despite the health benefits of physical activity, health risks were still a major concern. The study was published in the journal Annals of Internal Medicine in January 20, 2015.

The study found that people who sit for long periods were 24% more likely to die from health problems compared with people who sat less. The author suggested that sitting for more than 8 hours, a day may increase the risk. Prolonged sitting was linked to 91% increased risk of Type 2 diabetes, 18% increased risk of dying from cardiovascular disease and 17% increased risk of dying from cancer. The cancer risks associated with prolonged sitting were breast, colon, colorectal, endometrial and ovarian cancers. Also, recently researchers found that sitting for 10 hours or more significantly increased nonalcoholic fatty liver disease (NAFLD) compared to subjects spending less than five hours a day sitting. Adverse outcomes of sitting are attributed to the fact that a fixed position on a chair restricts the blood flow in the legs and redistribution to the body. Insufficient blood supply results in slowing down of heart activity and decreased blood returning to the heart from the lower legs causing fatigue and tiredness. Pooling of blood in the legs also leads to swelling and eventually varicose veins. Generally, people who exercise have lower risks of adverse health conditions than those who don’t exercise. However, prolonged sitting surpassed the effect of exercise, and exercise did not eliminate health risks. People, who sit for long periods, but also exercise, were only one-third less likely to die than people who reported little or no exercise; however they still had an increased risk of dying from the same diseases. This study was one of the largest and most rigorous analyses performed. It included nearly 830,000 people who died from health problems, 550,000 people who developed heart problems and 745,000 people who developed cancer. The study endorses the saying that prolonged sitting is the new smoking.

However, people can still overcome these risks by increasing their activity in their working place. This could be achieved by taking mini breaks to move around every 20 to 30 minutes. Even while seated, leg and feet exercises are recommended to maintain a good blood flow. Several workplaces have recognized this problem and started to spread awareness among their employees to “take a serious stand” against sitting.

for growing of economically viable plants that can bring them fodder, food and reasonable income even using saline water for irrigation.”

Salicornia and Jatropha are the potential plants that can be grown in saline lands and hot moist sandy coastal belts like Al-Batinah and can also be irrigated with highly saline water, he said. A systematic research will be conducted on these two plants continuously for three years in order to assess their salt tolerance, performance under prevailing conditions and other related aspects like oil and protein content, palatability and quality of fodder, etc.

The outcome of the study will be the utilization of degraded saline water and lands and laying a theoretical and experimental foundation for the future to bring fodder for goats, sheep and livestock, and vegetable oil, burning fuel and even bio-fuel for vehicles. Thus, employment for the rural communities can be developed again and new industry can develop.
Sultan Qaboos University has always been keen to support scientific innovations with the aim of attaining its mission for enhancing scientific research and community service. One of the areas which has won the attention of the University is student activities which contribute to the culture of innovation and entrepreneurship, specifically in competitions and workshops. Recently, Sharikati’s ‘Best Company of the Year 2015’ award was awarded to the student company Eureka at Injaz Oman’s Sharikati award ceremony.

**Eureka in lines**

In press remarks made to Tawasul, Ahmed Al Jabri, Eureka’s chairman, said Eureka is a student company from Sultan Qaboos University specializing in alternative energy sources and making use of unutilised energy sources. The company aspires to develop renewable energy sources that are both cost effective and environmentally friendly.

**Products**

With these objectives in mind, the student company came up with two innovations: a way of extracting bioenergy from date seeds and a method of producing what it called a “power shoe”, which is power-generating sandals.

Developing the skills of Omani youth and bridging the gap between academia and the requirements of the private sector represent the core objective behind the foundation of Injaz Oman. Injaz Oman programs develop knowledge of the students to help them realize the work opportunities available for them in the...
We work on alternative energy and have produced two inventions.
Power sandals is one innovative product.
Biofuel is extracted from date palm kernels.
SQU provided resources to our company.
We seek renewable environment-friendly energy.

local market. In addition, the programs equip them with the necessary skills to efficiently venture into the market either as employees or entrepreneurs.

Eureka will represent the Sultanate in the Injaz Al Arab Young Entrepreneurs regional competition where they will compete with student companies from all over the Arab region.

The award for ‘Most Sustainable Product’, introduced for the first time to reflect the values of Sharikati’s main partner, Nama Group, went to the student company Technophyll. Sultanah was named during the event as, winner of the ‘Best Marketing’. The students participating in Injaz Oman’s Sharikati program and competition learned about teamwork, leadership, planning, research, negotiating, problem solving and critical thinking.

Future plans

Reflecting on the company’s future plans, Ahmed Al Jabri said Eureka seeks to become a pioneering company in the field of alternative energy and the enhancement of multi-purposes products. He concluded his remarks by expressing his gratitude and appreciation of the generous support from Injaz and other agencies.
SQU attended the 55th meeting of the World Intellectual Property Organization (WIPO) held in Geneva last month. During the meeting, the conferees discussed draft amendments of patents, authors’ rights, the Madrid trademarks system, the Hague industrial designs and Barcelona geographical indicators. Other issues considered related to international IP services on patent collaboration, the Peking convention on audiovisual performance, as well as traditional and folklore resources.

Academic Council Approves IP Policy

The Academic Council endorsed a draft plan for Intellectual Property for the University at its meeting last May with minor modifications. The draft will be submitted to the University Council for final approval.

The new policy has as its three objectives the interpretation of the purpose of intellectual property and its value, definition of property rights, distribution rights, rights of commercializing research-related products, and compilation, invention, encouragement of scientific research, and the provision of product commercialization revenues. The policy is based on a set of principles, including the disclosure of intellectual property, intellectual property rights, distribution of revenues related to intellectual property, licensing of intellectual property and technology transfer, and dispute resolution that may result from intellectual property.

This policy applies to all intellectual forms of property that are invented or developed, either in whole or in part, by the university staff, including members of the academic, technical and administrative body, researchers, students, and other personnel who take part in university programs or using university resources.

The draft policy has been reviewed by intellectual property consultants in collaboration with the Academic Innovation Program. Feedback from SQU colleges and centers was also considered.

Sharikati 2016 to be launched at SQU

Preparations are underway at Sultan Qaboos University to kick off the student competition Sharikati 2016 due in December. It is worth mentioning that the University’s student company Eureka won the ‘Best Company of the Year 2015’ award.

Over 30 student companies, from different colleges in the University, have signed up for the contest, which will extend until June 2016.

The event has as its objectives to provide the opportunity for students to take part in this race and to engage in entrepreneurship through establishing and running real companies with a capital, finance and management structure.

Two inventions registered

On October 26, 2015 the Innovation Advisory Committee approved for patent registration two inventions out of five applications. The first invention was submitted by the chair of nanotechnology for desalination, funded by the TRC, while the second came from the Department of Computer and Electrical Engineering, College of Engineering. Another invention, submitted by the chair of nanotechnology, was accepted on condition that it fulfil patent registration requirements, including originality.
The Department of Academic Publication and Outreach has recently published a book in Arabic entitled “The Role of Al Julanda in the History of Oman”.

Authored by Mariam Al Burtamani, the 135-page manuscript introduces Al Julanda, one of the oldest families that ruled Oman, following the family of Malik Bin Fahm. They remained kings of Oman even after the advent of Islam, which they embraced. During the Umayyad rule, the Muslim world witnessed new developments. There were tensions with some neighboring powers, one of which was Al Julanda. That hostility had culminated in the dispatch of military campaigns to Oman by Al-Hajjaj ibn Yusuf who finally seized control of the country after Suleiman and Said Al Julanda were forced to leave for East Africa.

According to the writer, the book was based on her BA research project which briefly addressed the same topic. She added that very little was written about the historical role of this family, which prompted her to conduct a study that would document the sequence of events and historical facts using an analytic and comparative methodology.

The book makes a significant contribution as it highlights the major role and influence of Al Julanda in the political, social and religious history of Oman, before Islam and until the third hijri century. Researchers have not covered these aspects of Omani history depth, but only touched on some of them, including a simplified study by Wilkinson entitled “The Sons of Julanda in Oman”. This book, however, is a more comprehensive and detailed account.

In applying a historical, descriptive and inductive approach, the author developed her research through extrapolation of the different narratives in the primary sources. She also embarked on analysis and comparison of the sources of Omani and Islamic history, and reviewed inputs made by modern historians about the role of Al Julanda in Oman before Islam until the third hijri century.

The book is divided into three chapters, a preface, conclusion and appendices. The first chapter addresses the Al Julanda before Islam until the end of the Rashidi rule. The second chapter sheds light on their role during the era of the Umayyad dynasty (41-132 Hijri). There are two sections: The first introduces the beginnings of Ibadhism in Basra, and its spread in Oman. The second deals with the role of Suleiman Al Julanda during the Umayyah era and the battles fought by Said and Suleiman Al Julanda against Al Hajjaj, their migration to east Africa, and the place they settled in.

The third chapter deals with the role of Al Julanda in the era of the Abbasid state (132-656 hijri). It comprises three sections that cover their rule during different stages. The first section introduces the first Ibadhi imamate (132-134 hijri); the second addresses the position of the Abbasids against the first Ibadhi imamate and the opposing stances made by Jaafar bin Said bin Al Abbad Julanda, and his death at the hands of Imam Julanda bin Masood. The third section is about the role of Al Julanda in the era of the second Ibadhi imamate (177-280 hijri) and the emergence of internal opposition of Al Julanda to the second Ibadhi imamate (177-280 hijri).
Healthy and Medicinal Ingredient of Camel Milk Protein Isolates

Drs. Ahmed Al-Alawi and Louis Lal-ey submitted a research paper at the fourth conference of the International Society of Camelid Research and Development (ISCRD) held in Almaty, Kazakhstan, 8-12 June 2015. The presentation was based on their research project Characterization of Camel Milk Protein Isolates as Nutraceutical and Functional Ingredients, a joint collaboration between Sultan Qaboos University and UAE University. In press remarks, the two researchers said the conference was a success as scientists from different countries had their views and contributions on the theme of the event. Some 155 papers were presented at the ISCRD congress.

As to the findings of their work, the two academics said it demonstrated the richness of camel milk protein fractions/isolates, their molecular weights, their amino acid content and some of their functional properties as nutraceuticals and as functional ingredients. Their study was conducted using certain data and methodology. Five breeds of Emirati and two Saudi breeds of milking camels were selected. A total of 98 milk samples (both colustrum and raw camel milk) after parturition were collected over a period of 10 months from Al Ain Dairy. Skimmed milk was prepared by centrifugation to remove the fat. The whole milk protein, mainly the casein, was obtained by precipitation at pH 4.6, followed by centrifugation to obtain the supernatant of whey proteins. Both the casein proteins and the whey proteins were suspended in a buffer. Each protein aliquot was subjected to chromatography on HPLC representing 196 samples being analyzed.

Preliminary fractions of proteins chromatograms were obtained and subjected to electrophoresis to determine their molecular weights and characteristics. The electrophoresis of the obtained various fractions were subjected to SDS-PAGE electrophoresis. Raw camel milk was obtained from Al Ain Dairy. The whole milk was subjected to evaporation and concentration prior to the spray drying. Process development was conducted using the following various parameters: set temperature, inlet temperature, outlet temperature, product flow rate, and the direction of the product versus the drying air. Based on these processing parameters, the best conditions were selected to produce excellent camel milk powder based on cow milk powder quality standards such as solubility, flowability, color and moisture content. Additional analyses were conducted such as functional properties, heat stability and accelerated shelf life of the camel-milk powder.

A few batches of camel milk soft cheeses were produced with some limited success using some commercial enzymes. Overruns were conducted to test other commercial enzymes. These enzymes were used successfully to produce soft curd camel milk cheese. Chymosin from camel abomasum was isolated. Again soft curd cheese was produced.

Milk was fractionated into its four components: fat (pure fat and cream), casein, whey and lactose. The cream was separated by centrifugation and out of the cream the fat was separated by solvent extraction (Rose-Gottlieb method). Casein was precipitated by bringing the pH to 4.3. The whey was precipitated by saturating the casein and fat-free milk with ammonium sulphate. Finally, the lactose was precipitated by adding ethanol to the milk.

Figure 1 S1: Mix of standards
(α-casein, β-casein, κ-casein, a-lactalbumin, b-lactoglobulin)
Dr. Abdulwahab Jouda, Professor of Economic Sociology at the College of Arts and Social Sciences, has submitted a paper on cultural and heritage tourism for sustaining the national economy at the National Architectural Heritage Forum – World Heritage Day, held in Saudi Arabia in April 2015.

Human heritage reflects monumental evidence of the lives of individuals and their civilization, the academic said. It is a narrative about the stages of human evolution through history, and the level of ability to control and adapt with the surrounding environment. It is the key element of cultural identity of every nation.

Dr. Jouda added that human heritage includes tangible elements (material) that reflect urbanism, and intangible elements (moral) that denote values, attitudes, taste and identity.

Many countries have realized the importance of human heritage being one of the economic resources of the communities, which can be exploited to generate economic revenues, an extra source of income for the national economy. Therefore, countries have put in place informed plans to invest in the human heritage, as one of the economic resources for the society, in particular the investment in architectural heritage sites. This could have huge economic, social and cultural benefits, including the rehabilitation and promotion of many traditional villages, centers of historical cities, folkloric markets, historic castles and palaces, forts and other traditional sites. These could be used as tourism products, and thus can bring in economic returns.

He carried on: “the traditional, subjective view of human heritage has been replaced in other countries with a more objective approach based on planning for sustainable development. Heritage, in addition to being a cultural property of people, has now become a humanitarian responsibility, which communities seek to preserve. Due to the global interest in heritage and its economic and cultural significance, researchers have tried, in various areas of research to utilize it through tourism projects and to evaluate the economic benefit of cultural sites so as to maximize the national economic revenues.”

The researcher pointed out that the social and economic yields from heritage tourism investment are immense, as it helps diversify sources of income, create jobs, revitalize local and traditional patterns of production for the local population, as well as social advantages in terms of sustaining social cohesion, cultural interaction, and social integration and empowerment.

As to the objective of his paper, Dr. Jouda said he tried to suggest a vision to activate tourism investment in heritage so as to serve the national economy, and meet the conditions of ensuring sustainable development.

He also attempted to identify investment opportunities in human heritage in general, and tourism in particular.
Earthquakes are one of the most dangerous phenomena to mankind. They cannot be prevented and many countries cannot avoid their consequences. Earthquakes cause thousands of deaths every year and have sufficient energy to initiate landslides, collapse engineering structures, start fires, liquefy soil and produce flooding and tsunamis. In addition to many indirect impacts, earthquake occurrence may trigger an economic recession that may persist for a long time. So, it has become crucial for the development of urbanization plans to consider such risks, which can be reduced dramatically by conducting accurate seismic hazard studies and to disseminate their results for use in design and construction of earthquake resistant buildings.

Duqm City with its giant port and the ambitious development plans in the available space makes the area extremely attractive to both public and private sector investors. The Earthquake Monitoring Center (EMC) at Sultan Qaboos University (SQU) realized the importance and the need for seismic hazard assessment of the region as a part of a comprehensive study which aims to optimize the land use, to secure maximum safety of facilities, and to identify areas with the highest priority for rescue operations if an earthquake occurred.

The number of large earthquakes documented inside Sultanate of Oman is low. Earthquake activity takes place around Oman due to collision of the Arabian plate with the Eurasian plate along the Zagros zone, subduction of the Arabian plate beneath Iran and Pakistan along the Makran subduction zone, the transformation of the Owen fracture zone, and rifting and seafloor spreading in the Gulf of Aden. The seismotectonic settings around Oman strongly suggest that large earthquakes are possible, particularly along the Arabian plate boundaries. With the exception of the Oman Mountains, which are proved to have limited seismic activity, earthquake sources are not located inside the Sultanate of Oman. This activity makes it imperative to assess the seismic hazard in terms of seismic ground motion that might be generated from each of these seismic sources and its effect on the Duqm area.

The surface geology of the Duqm region varies from relatively hard rock in the western and northern parts to weak sediments in the east and central parts of the area. Additionally, large areas are covered with Sabkha deposits, which is one of the weakest soft soils that requires special treatments before companies embark on the construction of engineering facilities. The intensity of ground shaking is extensively affected by the presence of soft soil, which can cause enormous amplification and thus, variation in the spatial distribution of earthquake ground motion. Mapping of such variation can be achieved using the seismic microzonation studies. Therefore, accurate seismic hazard study requires knowledge not only on the earthquake sources and propagation of seismic waves, but also on the effect of local geology on the earthquake ground shaking. Type, thickness, and the shear wave velocity of the covering soil are the main parameters controlling the amplification of earthquake ground mo-
tion. Since the maximum ground motion amplification occurs at the fundamental frequency of the soil, many geophysical measurements were conducted to calculate the fundamental frequency at each selected site. Dr. Ahmed Dhayf, from the Earthquakes Research Center, has compiled an earthquake catalogue covering the period from 734 to 2010 for Oman and its surrounding areas using information from several local, international databases, and many specialized publications that are concerned with individual large earthquakes and seismic activity of the region. The resulting catalogue was used to define the seismotectonic source model with 26 source zones that characterize earthquake activity in the area of interest. This seismotectonic model was constructed taking into consideration all the seismic sources that might affect Oman including Oman Mountains, Zagros fold-thrust belt, the Makran subduction zone, the Gulf of Aden, the Owen zone, the Murray ridge and Yemen.

The recurrence parameters for the seismic zones were determined using the doubly-bounded exponential distribution. The maximum strength of earthquakes on known faults were determined using the maximum length of the fault that can rupture in one earthquake, while for the remaining active provinces, it is determined using recent statistical models based upon the available compiled catalogue. The seismic waves attenuate according to the nature of medium in which they are propagating and the distance between the seismic source and the site of interest. Suitable ground motion prediction equations (attenuation models) were selected to express the decay of seismic waves from their initiation to the area of interest so as to get the most precise results.

Horizontal ground accelerations in terms of geometric mean were calculated using ground-motion prediction relationships that were weighted to account for the epistemic uncertainty. Five percent damped seismic hazard maps at rock level in the Duqm area for 2475 years return period were created for peak ground acceleration and spectral accelerations at all the important periods from the engineering point of view.

Extensive ambient noise measurements at 90 sites 500m apart allowed the characterization and mapping of the fundamental frequency of the sedimentary cover at Duqm area. The results indicate a progressive decrease of the fundamental resonance frequency from the western parts, where the bedrocks outcrop, towards the eastern coast where a thickness of the sedimentary cover is present. Most of the region is dominated by high resonant frequency (greater than 10 Hz) in consistency with the general surface geology. Areas with smaller fundamental resonance frequency are observed at the coastline and valleys, where the thickness of the soft layer is relatively large. Shear wave velocity in the surface layers is obtained using the Multichannel Analysis of Surface Waves (MASW) technique at the selected 90 sites with consultation of geotechnical data provided by 55 boreholes with depths ranging between 10 to 25m. Microzonation studies are repeatedly based upon the utilization of the average shear wave velocity in the uppermost 30m (VS30), which has been adopted in most of the recent seismic building codes. A map of (VS30) for the studied area was created.

Ground motion amplification was calculated using SHAKE91 software. The highest amplification values occupy the eastern coastal area, while the region of most interest has amplification values less than 1.5 for all the periods considered. No amplification is observed at the western hard rock areas, where the calculated shear wave velocity is relatively high. The amplification results at spectral period of 0.2 sec show amplification values up to 2.8 at the eastern parts.

Ground surface seismic hazard maps of peak ground acceleration and spectral acceleration at different periods for the 2475 year return period were provided. The attached map shows ground motion values for the 2475 year return period at a 0.2 sec spectral period. Lack of space in this article limits displaying all the expected ground motion maps at each period, as well as amplification, fundamental frequency, and shear wave velocity maps, which are all available at EMC. Surface ground motion at longer periods (e.g. 1.0 sec and higher) is much less than those at shorter periods, and almost no amplification was observed at these long periods. Computation results clearly indicate that compared with regions of high seismic risk, seismic hazard in the Duqm area is low, but it must be taken into account when designing and implementing installations.

In conclusion, many of the devastating earthquake consequences could possibly be avoided by the development of better construction methods, safety systems, early warning systems, effective evacuation planning and event preparedness.
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