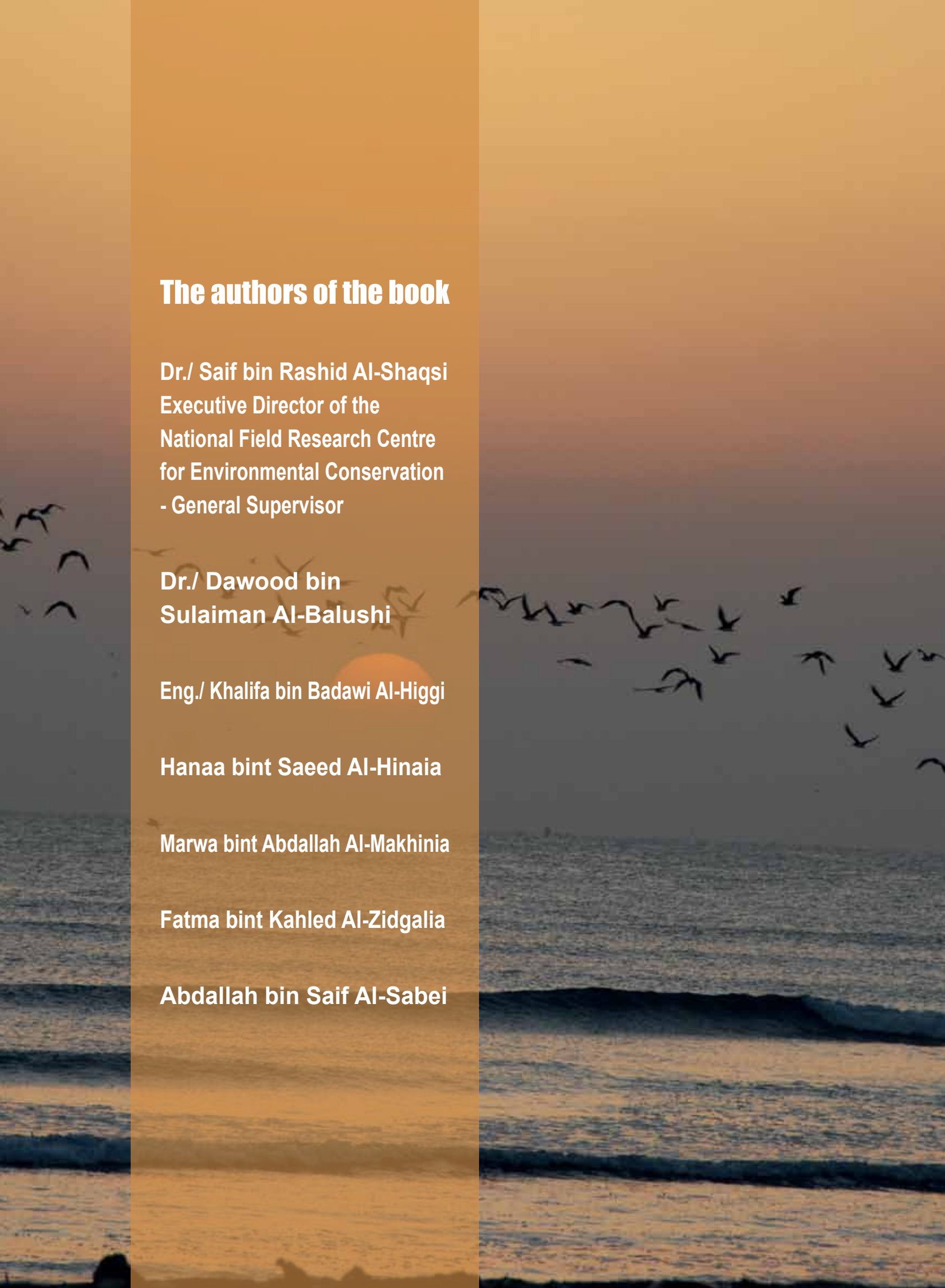
The National Field Research Centre for Environmental Conservation

Sultanate of Oman
Diwan of Royal Court

Environmental Issues & Studies



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Introduction

Environmental research and studies are a fundamental axis in developing the environmental system in the Sultanate, due to the scientific, research and field balance it represents for various environmental issues, which aim to address environmental issues and find appropriate solutions to them in line with new technological developments and access to sustainable development.

This book deals with some research, studies and environmental issues that the «Lynx» environmental newsletter, issued by the National Field Research Centre for Environmental Conservation, has explored, studied and published throughout its pages for 4 consecutive years over a number of 48 issues, as it varied between research and issues concerned with environment. Animals, plants, research and issues are concerned with climatic and environmental aspects. In addition to focusing on research and issues of the marine environment, as well as presenting scientific studies for new environmental discoveries in the Sultanate, clarifying the role of Islam in preserving the environment, and highlighting some environmental issues that affect society directly, such as pollution, electronic waste issues and plastic bags.

During these researches, studies and environmental issues, the topic was presented in its various aspects, and the study methodologies, axes, and scientific methods were presented, supported by appropriate figures, statistics and pictures that serve the topic. The National Centre has collaporated wth a number of government agencies, universities, scientific colleges and civil society institutions to contribute to the study and conducting this research, which achieves the important goals in the field of specialized environmental media that focuses on enhancing environmental awareness and spreading environmental culture.

The publication of these researches, studies and environmental issues in the «Lynx» newsletter has contributed to finding a solid scientific environmental methodology to address environmental issues, and the presentation of some environmental issues contributed to the movement of some parties to find appropriate solutions for them in cooperation with individuals and various entities in the Sultanate, in addition to the demand for them It is read by various readers and interested in the environmental and media field in the Sultanate, and increased cooperation between the National Centre and various entities in publishing their environmental research and studies in the newletter.

Dr./ Saif Bin Rashid Al-Shaksi

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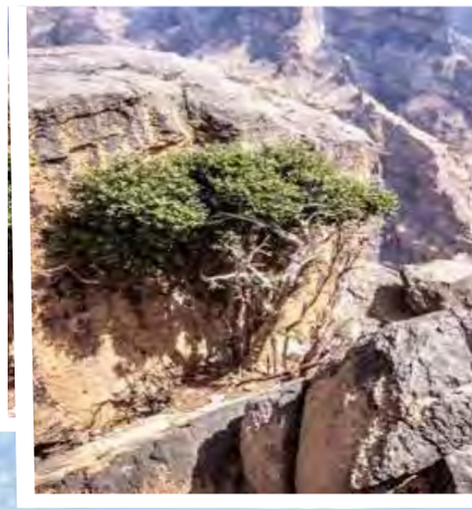
wood land Study focuses on Itm and Al alan

Olive and Juniper Woodlands

Glory of Omani Natural Heritage



The Omani olive (Itm) and juniper (Al›alan) trees, prevalent in the western part of the Hajr Mountains, represent the unique richness of the Omani natural heritage. These rare trees that belong to the pinales species however, are on the decline. Previous studies have clearly shown that the number of juniper trees continues to drop as they are slowly dying with no replacements (Gardner and Fisher, 1996), while olive trees too are at significant risk (Al-Jamie, 2004).

Preliminary:

- The increasing temperature and decreasing fog during the last thirty years change the environmental conditions suitable for the growth and propagation of plants.
- The Jebel Akhdar has some rare wild plant species including the well-known plants in the western Hajar Mountains.
- Grazing helps in the propagation of plants that are not suitable for grazing and its prevalence in the ecosystem of the Jebel Akhdar.

In response to the risk of extinction of these trees, the National Field Research Centre for Environmental Conservation (NFRCEC) launched a project to study the woodland in Jebel Akhdar and Jebel Shams. The primary objective of the project is to coordinate the efforts of various stakeholders and involve community members in preserving Omani olive and juniper trees through integration of the results of scientific research and local knowledge towards the creation of a sustainable ecosystem.

The first step in the development of this sustainable eco-system is the assessment of the status quo, and identification of the risks to the safety of these trees.

Assessment

The first phase of this project assessed the woodland and collected data on plant conditions, environmental factors and the extent of human influence to determine the threats that Omani olive, juniper and other plants face. Further, it aimed at involving community members in addressing these risks and providing remedies thereof.

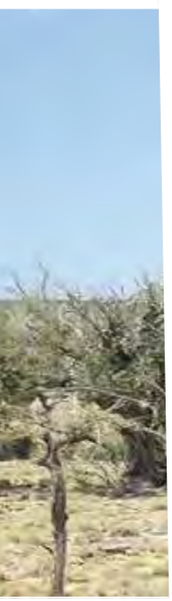
The assessment found that many Omani olive and juniper trees in Jebel Akhdar are damaged, though there are some healthy trees in a few areas such as Heil Al-Jawari in Jebel Shams.

Study Location

Omani olive and juniper trees in the Sultanate exist only in Jebel Akhdar and Jebel Shams, two summits that are part of the Western Hajr mountain range. Jebel Shams is the highest peak in Oman at 3009 m above sea level while Jebel Akhdar is 2500 m high. These high altitudes offer a suitable environment for these unique trees that do not grow at heights less than 2100 m on the southern sunny slopes and 1600 meters in the lush shadowy northern slopes. This high-rise environment is quite different from other environments in the Sultanate with average temperature hovering around 18.5 degrees Celsius compared to 29.5 degrees at lower altitudes.

Previous researches about Vegetation

This project, which proceeds from previous researches of some scientists, aims to complement such researches about the Olea Europaea and Juniper trees. Some previous data are mentioned below:



The center aims to develop a sustainable system to maintain Alatm trees and Alalan in oman

The nineties of the last century: Gardner and Fisher were the first scientists to conduct a detailed research about the Olea Europaea and Juniper trees in the Sultanate in 1996. Those two scientists started their research by conducting a general evaluation for some 2000-meter-high mountain peaks to identify the sites where coniferous trees grow, their integrity and safety.

At the beginning of the new millennium, this project has carried out the Jebel Akhdar initiative to evaluate natural resources and ecology in the Jebel Akhdar in 2007, in what was called (the Jebel Akhdar Initiative 2007). It came out with the following main findings:

Plants: There are some rare wild plant strains in the Jebel Akhdar including 9 well-known plants in the western Hajar Mountains.

Climate: The studies has recorded an increase in the temperature and a decrease of fog at the Jebel Akhdar since 1987.

Cattle: Overgrazing affects the Jebel Akhdar's environment due to the poor status of pastures, the propagation of plants that are not suitable for grazing at most of the areas (as well as overgrazing of plants that are suitable for grazing).

These findings highlights the importance of the Trees Nature Reserve for environmental diversification in the Sultanate. It also explains the factors that endanger such nature reserves, including the increasing temperature and decreasing fog. The findings also explain the effect of these factors on vegetation. Oman Oasis Project: Researchers from different universities took part in this project to study agriculture in the Jebel Akhdar. Some efforts have focused on cattle and pastures management, including the areas where the Olea Europaea and Juniper trees grow. This research project concluded that grazing helps the trees that are not suitable for grazing to propagate and prevail in the ecological system of the Jebel Akhdar (Brinkman et al 2009, Decofair et al 2010).

Completing the Previous Researches

The current evaluation of vegetation is unique in terms of its size and comprehensiveness. The status of Juniper trees has never been previously evaluated in all aspects. In addition, an evaluation of all trees related to the Juniper trees in a mountainous environment has never been conducted before except in the study conducted by Fisher and Gardner in 1995. By addressing all aspects of the topic, this project, conducted by the National Field Research Centre for Environmental Conservation (NFRCEC), links all aspects of researches related to vegetation, including the Olea Europaea and Juniper trees and the other remaining trees together. It also addresses the effect of grazing and the use of natural resources by local residents as the evaluation the entire ecosystem constitutes the bedrock for building a sustainable framework for conserving the environment.

Components of Vegetation and the Biodiversity Study

Some sites have been chosen to study biodiversity in various areas of the Jebel. The sites have been carefully selected to identify the vegetation patterns because they represent various environments and altitudes in the Jebel Akhdar. The research team tended to evaluate the shrubs, herbs and grasses at each site using a typical square covering an area of 10 x 10 square meters. At this area, the number of each strain of plants is recorded. As for the big trees, a bigger typical square covering an area of 20 x 20 meters, is used. These squares are utilized in identifying the species and strains of plants that grow at each site. Some variables have been collected and analyzed at each site including the type of environment, altitude, soil and organic ingredients.

Great efforts to protect Arabian Tahr

Arabian Tahr

a significant element of biodiversity in the Sultanate

"NFRCEC conducts studies on Tahr to protect it from extinction and cons

The Arabian Tahr is considered one of the most significant elements of biodiversity in the Sultanate. It is a cloven-hoofed mammal animal. The height of its legs reaches about 60 cm and its total height is about 90 cm. The Arabian Tahr acclimates to the environment in which it lives. During the winter, the Tahr herds go to the valleys and plane lands, while in summer, they move to the high mountains and the peaks.

The mountain ranges, deserts and plains provide safe habitats for the Arabian Tahr in the Sultanate. The Tahr herds take these places as safe shelters to which they escape when in danger or when they want to get some food.

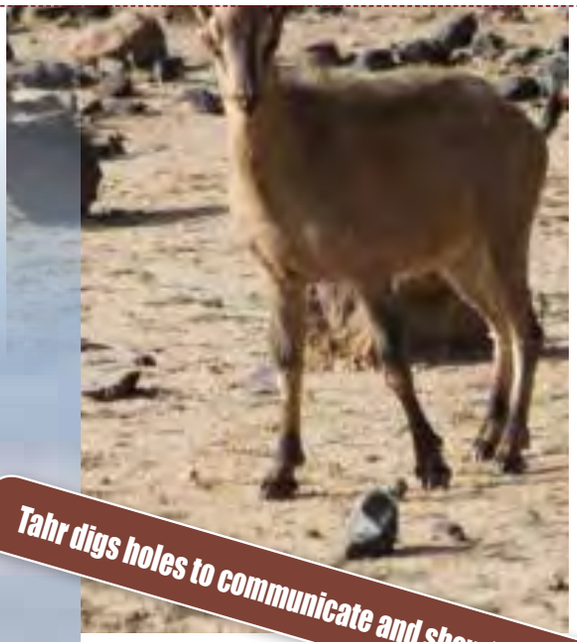
Protection Efforts

Though these species enjoy full legal protection, their numbers are estimated to be less than 5000. They are decreasing continuously despite the significant efforts made by the Sultanate to preserve them. Also, scientific information available for supporting the programs of conversation such species is still little.

In line with the important role played by the National Field Research Center for Environmental Conservation (NFRCEC) in field research, the Centre has taken up the task of studying the environment of the Arabian Tahr in order to support the Sultanate's programs to protect such endangered species and to conserve the environmental system of Al-Hajr mountains where these creatures live. Through the Arabian Tahr research project, NFRCEC seeks to expand the conservation scope in the Sultanate as it is designed as a collaborative global project in conservation.

This project focuses on several key aspects, the most important of which is to evaluate the status of the Arabian Tahr by identifying their resource needs and distribution patterns. In addition, the project studies the threats facing the Arabian Tahr and also works towards drafting an action plan for protecting it. Simultaneously, NFRCEC has created environmental awareness materials related to the Arabian Tahr in order to build Omani competencies in environmental conservation.

The methodology of this promising research by NFRCEC on the Arabian Tahr centres on developing a new and enhanced system of studying the Tahr in its very difficult environment with the objective of evaluating its status at Al-Hajar mountain ranges along with studying its social behavior and system. The research also seeks to identify how the Tahr lives in its environment, apart from its movement patterns and requirements.



Tahr digs holes to communicate and show its capabilities, and also as a means to fight parasites

serve the

Data Collection

In order to achieve this objective NFRCEC used remote sensing camera traps and a survey of their traces to evaluate their distribution.

Through strenuous efforts researchers could collect significant data which clearly identified the places in which the Arabian Tahr exists. The Centre followed it up with efforts to understand the behavior of the Tahr considering the fact that their behavior, breeding, environment and ability to survive in the hard environmental conditions are all inter-related.

Understanding the original environment of the Tahr

The most significant threat facing biodiversity in Oman is the deterioration and loss of natural environments. This certainly applies to the mammals. The environment is defined as the biological and non-biological characteristics needed by all species to survive and breed. Therefore, it is necessary to know the components of the Arabian Tahr's environment in order to understand how to preserve its vital resources and thus protect the species. To understand the Tahr's environmental usage characteristics, these animals were captured and tracking collars fixed. These collars provide highly accurate data about the location of the animal, the places it visits, and the patterns of its movement and requirements. Monitoring the Arabian Tahr for a period of one year contributed to understanding and deducting the needs and details related to food sites, shelter requirements, and seasonal resource needs. Determining these requirements is essential for preserving the Arabian Tahr. Over a period of one year and half, the Centre has managed to capture 15 Tahres. They were then released into the wild environment after fixing the tracking collars on nine of them. It is now clear that the Tahr travels a distance ranging between 2.4 -11.8 km daily.

The male Tahr moves in a bigger boundary compared to the female. Their activity reaches its peak at 6 am and 4 pm approximately. During the summer, they become more active during the night hours. The peak of its activity is recorded in the early and late hours of the day respectively.

Warning alarm

Scientific study: about 85% during the last 13 years The average production of the tree in Dhofar

The study investigates the real situation of trees and analyze their protection policies to maintain a sustainable production of Frankincense ali bin Salem bin Muslim Bait Said for the frankincense "Boswellia sacra Flueck" populations at Jabal Samhan Nature Reserve in Dhofar Mountains.

This assessment has been performed in collaboration with the Desert and Arid Land Sciences Program, College of Graduate Studies at Arab Gulf University in the Kingdom of Bahrain.

The research included an investigation about the reality of the frankincense spread, an evaluation of its density and productivity, an analysis of the policies for its protection, and the contribution of local populations in maintaining a sustainable production of the frankincense.

The sustainability of natural resources in the nature constitutes one of the challenges that face the management of nature reserves in the Sultanate. The integrated environmental analysis that depends on indicators provides an effective means for evaluating the reality and prospects of using natural resources and analyzing the various effects of their usage. It is considered to be a practical way for managing the environmental effects of human activities through facilitating the framing process and the optimal implementation of the suggested policies and strategies.

The Biggest Nature Reserve

Jabal Samhan Nature Reserve is the biggest nature reserve in the Sultanate. It covers a area of 4500 km2; i.e. about 1.5% of the Oman's size. Jabal Samhan was announced a nature reserve in 1997. It has been classified under the second category of the International Union for Conservation of Nature's classification nature as a national park primarily managed for the protection of the eco-system. The nature reserve is characterized by its wild and coastal landscapes. It includes greatly endangered animals like the Arabian Leopard and semi-endangered species like the frankincense tree. The nature reserve is one of the main areas that produce frankincense in the Sultanate. It contains 60% of its environments; particularly the Hujri type, one of the best Omani frankincense types.

Frankincense in brief

About Frankincense "Boswellia sacra Flueck" The Frankincense "Boswellia sacra Flueck" trees are semi-endangered species. The populations of this tree fall under human and natural pressures that threaten their existence, as well as the live of local populations who depend on collecting its frankincense. These pressures include overgrazing, excessive collection of frankincense, soil erosion, and insect infestation. The pressures include also the precursors of climate change and the accompanying possibilities of a decreased rainfall and disruption in its circulation. The Frankincense trees belong to the Boswellia species and the Burseraceae group. The tree grow to 8m in tall. It has a single or branched trunk at the bottom. The bark of this tree is leafy peeled, and its leaves are dropped and compound. The leaves consist of 6 – 8 pairs of semi-opposite leaves with wavy edges. White yellowish light flowers with five petals and 10 stamens bloom on this tree. The fruits of the frankincense are small sized capsules that bloom broadly with sizes ranging between 8 – 13 mm. The tree propagates through seeds.

Regions of the frankincense

The regions of the frankincense trees' spread at the nature reserve have been specified through the field visits and the use of a geographic

Frankincense Trees

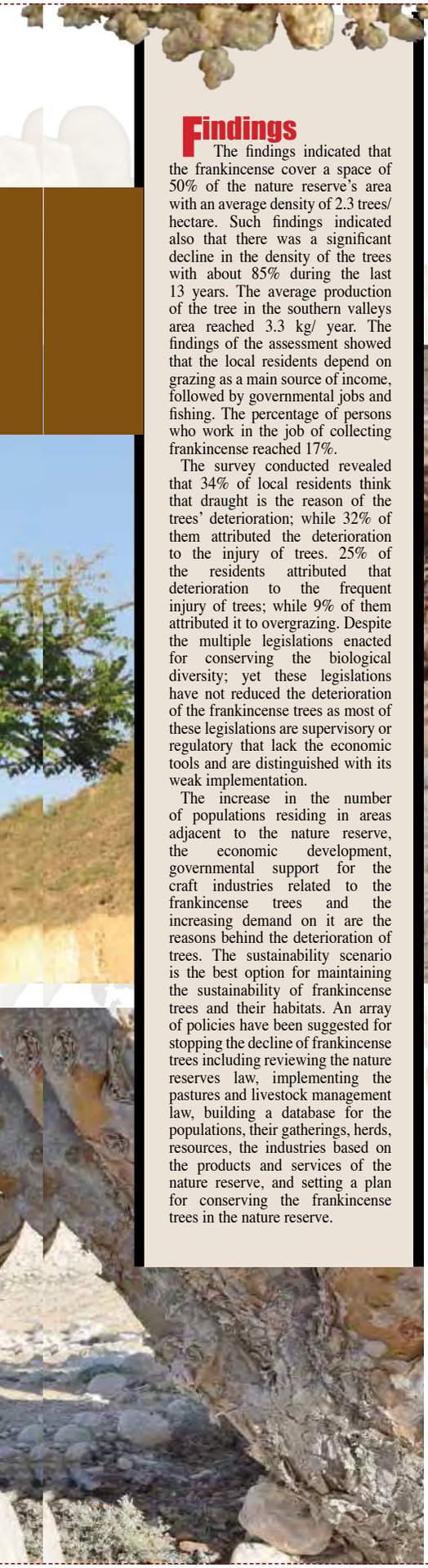
A Symbol of the Omani Ingaenuity

Findings

The findings indicated that the frankincense cover a space of 50% of the nature reserve's area with an average density of 2.3 trees/ hectare. Such findings indicated also that there was a significant decline in the density of the trees with about 85% during the last 13 years. The average production of the tree in the southern valleys area reached 3.3 kg/ year. The findings of the assessment showed that the local residents depend on grazing as a main source of income, followed by governmental jobs and fishing. The percentage of persons who work in the job of collecting frankincense reached 17%.

The survey conducted revealed that 34% of local residents think that draught is the reason of the trees' deterioration; while 32% of them attributed the deterioration to the injury of trees. 25% of the residents attributed that deterioration to the frequent injury of trees; while 9% of them attributed it to overgrazing. Despite the multiple legislations enacted for conserving the biological diversity; yet these legislations have not reduced the deterioration of the frankincense trees as most of these legislations are supervisory or regulatory that lack the economic tools and are distinguished with its weak implementation.

The increase in the number of populations residing in areas adjacent to the nature reserve, the economic development, governmental support for the craft industries related to the frankincense trees and the increasing demand on it are the reasons behind the deterioration of trees. The sustainability scenario is the best option for maintaining the sustainability of frankincense trees and their habitats. An array of policies have been suggested for stopping the decline of frankincense trees including reviewing the nature reserves law, implementing the pastures and livestock management law, building a database for the populations, their gatherings, herds, resources, the industries based on the products and services of the nature reserve, and setting a plan for conserving the frankincense trees in the nature reserve.



positioning device. Three sites at the nature reserve have also been chosen to be subjected to study. These sites include the southern valleys (Samhal, Recout and Dahnout), the central plateau (East of Sanaq Heights, West of Sanaq Heights, Moudin Heights) and the northern valleys (Amdat, Harwell and Karnah 2, 1). The density of the frankincense trees has been calculated according to the dimensional method – the nearest individual method. No less than 20 random spots of the frankincense populations. The distance from the random spot to the nearest tree (m) has been calculated. The average distance to the spot has been calculated in meters, then the density of trees has been calculated in hectares. The production of frankincense by the trees has been estimated according to the traditional method of collecting it by choosing three sites utilized by the local populations. The similarity percentage in the density of frankincense trees in the sites of study has been specified statistically using the cluster analysis.

Economic and Social Survey

The viewpoints of local residents about the real position of frankincense trees, the reasons of their deterioration, the pressures that face the nature reserve, and the current and suggested policies to maintain them have been reviewed through a questionnaire that included conducting interviews with a random sample of residents at various areas surrounding the nature reserve. Focus was made on the residents who work in the professions of collecting the frankincense. The questionnaire included questions about the social status and the professions practiced by local residents. In addition, it included questions about the products and services provided by the environmental authorities in the nature reserve for residents, their viewpoints about the benefits of creating the nature reserve and the extent to which they are aware of the policies and laws that regulate the management of the reserve and their suggestions about them.

Integrated Environmental Assessment

An integrated environmental assessment has been conducted for the deterioration of the frankincense trees issue in the nature reserve using the (DPSIR) matrix. The environmental policies applied in the Sultanate, in addition to the policies related to the nature reserve and the production of frankincense, in particular, have been collected, analyzed and reviewed. A scenario that serves as a supposed perception for the expected reality of the frankincense trees has been set in light of the current usage. This scenario has been compared to the sustainability scenario after taking the driving forces and the pressures experienced by the frankincense trees into consideration. These factors have been linked to the current reality, the effects resulting from these pressures and the responses to them. Alternative policies have been suggested to reach the status of sustainable usage of these resources.

Environmental Research about Falaj Luzugh :

One of the Fresh water Ecosystems

Falaj Luzugh

the First Application of aquaponic system in aflaj environment in the Sultanate.

The fresh water ecosystem is considered to be one of the necessary systems, as it has a big role in providing services like drinking and irrigation water, and to provide the safe haven and environmental attraction for biodiversity. It is a habitat for many plants, herbs, invertebrates, reptiles, and some kinds of sweet water fish and other kinds of living organisms. Aflaj are an evidence for the Omani ability and determination to build civilization. These Aflaj -since it emerged and spread in the Sultanate- represent the intentions of progress and civil, for what it provided of basics for the human civilization, and reasons for social stability, and it provided suitable environment for man and fungal life. As Aflaj are important, this project was carried out to study the environmental means regarding sweet water, through sustainable system represented in Aflaj. One of the Dawdian Aflaj is chosen for its powerful and stable flow throughout the year, it is Falaj Luzugh, Wilayet Samayl.

The Start

The projects was carried out in stages, the first stage was full survey to the Falaj and the places it irrigate, the biodiversity of the Falaj was studied, and a comprehensive questionnaire was held about the customs and Sunan of the Falaj, and the crops in the village. In addition, all the Falaj registers was scanned, and a study of maximizing the economic rent was carried out to guarantee its continuance.

The Questionnaire

In order to know all the important information needed, a questionnaire was designed with all the comprehensive questions that benefit the project in a direct way; the questionnaire also included people's opinions about the project and how they benefit from the Falaj.

Water Measurements and the Flow

One the project stages was testing the water chemistry and measuring its quality, in addition to the daily flow measurements using modern devices, and comparing its results with its precedencies. Many water samples was tested, to measure some elements like: dissolved oxygen, pH, basic elements, dissolved salts, turbidity, and heavy elements.

- **Falaj water chemistry is being tested and identifying its quality, in addition to the flow measurements which is done daily by modern devices, and comparing its results with previous measurements.**
- **Falaj waterwheels systems is being developed to find modern alternatives that decrease the amount of leaked water.**

The Study of Biodiversity

The study included surveying many forms of fungal life, more than 60 species were reported, including wild growing plants and crops in Luzugh farms; also many various insects were reported, for example: dragonfly, multi wings. Six species of these insects were reported in Luzugh farms, for example: Blue tail Evans and Green Octal. Bug's life in Falaj farms provide a good source of food for many birds; regarding this part, 12 different species of birds were spotted in Luzugh farms; for example: the laughing dove, sparrow, Indian blue winged, and others.

Promoting Sustainability

The National Center intentioned through this project to find suitable alternatives to maximize the economic rent, and reach the maximum benefit of the water, this for the continuance and sustainability of the Falj for the upcoming generations, and to the safety of the environment, three projects where carried out regarding this aspect:

Aquaponic System:

It's a closed vital system, where the fresh water fish are being raised with the seasonal crops in basins, crops are planted soilless. Moreover, there is that kind of integration between the two environments, where fish provide essential nutrients for the (Nitrogen – Phosphate – Potassium) plants, and non-essential for (Iron – Copper – Calcium) through its organic

- **The study included biodiversity survey, and more than 60 kind of wild growing plants was registered in addition to crops.**
- **The project also studies the feasibility of modern irrigation system using the solar power, to accomplish the perfect administration for irrigations.**

waste. Plants also work on filtering the returning water through a closed dynamic system.

Hydroponic system provides several advantage that are not accomplished through traditional agriculture, where the soil is used; as hydroponics need less space where more plants can be planted, more than 50 plants in one square meter. The system based on recycling water provides bigger chance thrift water, and also less cost compared to traditional agriculture. Lastly, hydroponics goods are considered to be organic, free of chemical interference and has high economical value.

Solar Energy and Irrigation Systems

The modern energy irrigation using solar energy in Lazg village feasibility study is all about accomplishing the perfect administration for irrigation networks, by developing modern ways to irrigate the crops. One farm was chosen, which is applicable for the study standard, as it has open fields where all kinds of irrigation networks can be applied, and all the old ways of irrigation (Flood irrigation) was replaced in this farm by three integrative systems for modern irrigation; we determine which way to use according to the crop. Throughout this project, the water owned by the farm owner is assembled in a cistern specially made for this purpose, where water is being pumped and crops irrigated using the alternative energy, according to the plants need.

Through the preliminary notes, the quality and efficiency of these systems were uncovered; plants irrigated by dripping increased significantly, as the humidity is provided in the roots all the time, due to the irrigation long duration, this allows removing salts from the soil, and that contributes in organizing its salinity. In addition, these systems, as the farmers certifies, decreased the labor by 75%, and electricity is saved in a way suitable to environmental standards, which helps accomplishing sustainability, this is through solar panels, where the solar energy is converted into electric, through photoelectric system to operate the irrigation system at low cost.

Developing Waterwheels holes:

The project aims to find modern alternatives more efficient than traditional waterwheel holes, the efficiency of these alternatives is in providing direct services; for example, decreasing the amount of the leaked water from the holes, and therefore, maintaining stable rate for the flow along the Falj. In addition, it contributes saving time and effort needed in exchanging irrigation. It also provides indirect services, represented in saving the leaked amounts and using it to agriculture more fields far from water reach, which contributes in enriching the biodiversity and agriculture production.

Future Vision:

Having variety in economic rent and entering modern systems for the maximum benefit of the Falj water is considered to be one of the major aspects for this study; as the rewarding economic rent directly contribute in the continuance of the Falj and drawing people's attention to it; that's why, we predict that these projects would be beneficial, and through their results and evaluating their efficiency, the center will provide models for real experiments provided with numbers and statistics, to be applied to other Aflaj environments, according to the nature of everyone.

Regarding the scientific and research aspects, there are many ways where the researchers and interested can go scientifically, environmentally, and touring, for what these Aflaj possess of cultural heritage, environmental enrichment, scientific diversity, and natural beauty.

Community Participation

The most prominent ingredient behind the success of this study is the local cooperation and their activity in creating the suitable environment for study, and providing all they can to serve and help success of this work; and now, here the projects goes on the road to success, which will benefit everyone specially te Falj society.

Environmental Search about The Rhim :

Rhim

Subjected to overhunting and distruction of its natural habitats destroy

the Poets Inspirer over Centuries

Is Endangered!

The gazelle already exists in the Arab consciousness with the poems that made it an epitome of beauty, specially the sand gazelle (The Rhim). It sparkled poets' imagination over centuries, who paid the utmost care not to kill a gazelle in their poems. No incident of hurting a gazelle was ever mentioned in their poems, despite the numerous tribes and clans in the Arabian Peninsula. In a holy shrine she stands a gazelle, Of my Damsel's memories I can tell. (Says the famous Arab poet Omro' Al-Kais of its sanctity)

Nevertheless, it has been classified as an endangered species, and its numbers are substantially shrinking in Al-Wosta governorate due negative, modern human behaviors in in its natural habitat natural refuges as well as overhunting. Therefore, a research project wasconducted by the Nature reservation Bureau of the Omani Diwan of Royal Court with an aim of safeguarding the Rhim, increasing its numbers and returning it to its natural habitats. Noteworthy, Rhim is the only type of gazelles that regularly gives birth to twins, and the mother usually separates the twin-babies form each other in the first week of their lives. With its faint colors, the Rhim is a herbivore that adapts in the extremely dry desert life. It inhabits the desert areas along the Omani borders with its neighbors at the ends of Al-Rub' al-Khali. Moreover, it is one of the migratory species that are in constant movement searching for food; however, it does not display a consistent migration pattern like other desert species.

Overhunting and safeguarding Efforts

Sand gazelles were excessively hunted in large numbers as well as having its natural habitats destroyed and almost perished due the unprecedented economic boom of the region and over-possession of 4x4 vehicles and firearms. Meanwhile, it has been classified as "endangered" in the Red List of Threatened Species issued by the International Union for Conservation of Nature (IUCN). Countries with natural dispersal of sand gazelles launched an initiative for raising herds in zoos and breeding centers. Numbers have been subject to re/ settlement programs in the wilderness.

Location and Objectives

Organism and Fungi Natural Reserve in Al_Wosta is located 100 km to the east of Haima' district and surrounded by a two-meter fence. The 2824 km2

Historical Brief

The sand gazelle lives in the open desert areas of the Arabian Peninsula across Iraq, Jordan, Syria, Southern Turkey and The Sultanate of Oman in which it lived in the latter in Rub al-Khali and Sharqiah sands (known as Wahiba Sands), and often reaches Al-Hasbawiya Plateau in Al-Wosta Governorate. In 2000, a group of scientists surveyed the Omani side of Rub' al-Khali for two days by cars. Observations resulted observing 44 gazelles and tracing other 34, 78 sand gazelles in total (with a density estimate of 1.26 gazelle/km2. Besides, Saudi Wildlife Authority made a similar survey in 1990 that observed a flock of Rhims near the Saudi- Omani borders in a range of 40 km.

Office for Conservation of the Environment is currently implementing a national project to build herds of deer in the sand and live fungal organisms protected

More than 600 Gazal in pens breeding reserve for the time being

The Sultanate Sand Gazelle project

Authorities raise a small group of captured Rhims in the Omani Wild Animals Breeding Center established in 1800s in Al-Seeb district, Muscat. Meantime, The Nature Reservation Bureau is progressing an instrumental national project of raising flocks of wild sand gazelles in Organism and Fungi Natural Reserve in Al_Wosta Governorate. A small number of sand gazelles has been recorded in the Sultanate's wilderness. Reports, relayed by Maqshan Unit of Wild Life Monitoring of Ministry of Environment and Climate Affairs, observed small numbers of Rhims in the south-northern parts of Dhofar Governorate during 2011-2013.

Sand gazelles inhabited the open sand areas of Rub' al-Khali and Sharqiah sands (known as Wahiba Sands), and often reached Al-Hasbawiya Plateau in Al-Wosta Governorate.

Families Management

The natural reserve received more than 300 Sand Gazelle from three captive groups in three different countries from the natural spread scale of the Sand Gazelle (Schedule 1), this is for the genetic diversity of the herd to be established. Before being moved to Jaaluni, the animals were separated in different farmyards specialized for isolation, the animals were numbered to make it easy to identify. Once animals reach Jaaluni, they are isolated in quarantine barns for three weeks, and the majority are then set free in the big barn (1x1 km) while keeping a small number from each country in separate quarantine barns to maintain the genetic purity of each group. During the first months (January-March), 41 births and 18 mortalities were recorded of the 338- livestock herd in March 31.

Genetic Management & Research

Necessity dictates the fact of outlining a cohesive and detailed methodology to monitor and manage the sand gazelle herd in order to reduce the loss of the herd genetic diversity via laboratory analyses for the following objectives:

- Verifying the species genetic purity and the possibility of genetic discrepancies among herd members
- Evaluating the herd genetic diversity and matching with other captured groups as well as setting up the basis for genetic researches on sand gazelles in the region
- Assessing the ability of the genetic researches to determine the genealogical, and identifying the individuals in one herd.
- Establishing a plan for the genetic administration of the Sand Gazelle, and the mechanism of registering the genealogical
- Establishing a detailed and continuous plan to monitor and examine the genetic diversity of the Sand Gazelle herds.

Reserve is mostly comprised of the plateau of Jeddat Al-Harasees, with dispersed plant concentrations Known as Heilat. The eastern side embraces a part of the well-attested Al-Huqf slope that consists of wonderfull Geological formations of ancient time.

The Reserve is a natural habitat for the wild extinct Arabian Oryx that were re-settled in Jeddat Al-Harasees in 1982, living with a number of Arabian Gazelles, Nubian Ibexes and various species of birds and reptiles. Despite the fact the sand gazelles did not permanently exist in the Current location of the Reserve, they entered it coming from Rub' al-Khali during some rainy seasons. In 1990s, unfortunately, the area suffered from overhunting that ended up with heisting large numbers of wild animals, mostly Oryx, Nubian Ibex and Arabian Gazelle. Recently, sand gazelles are no longer seen in the Reserve.

Nutrition

Rhims feed twice a day at morning and afternoon on clover, grass and concentrated feed while being under continuous monitoring. Veterinary surgery may be recourse to in case of severe injuries or disease-suspicion.

In January 2013, the Reserve launched the Arabian Gazelle Project with the following objectives:

- Raising wild herds of sand gazelles in the Reserve along with
- Oryx and Arabian Gazelle. The released flocks should be genetically diverse.
- Stimulating more social support for the Reserve via programs of mutual communication, awareness and environmental education.

Enhancing tourist attraction for the Reserve.

A 1x1 km2 barn was set up in Jaaluni, the Reserve field center, including a plant cover of Prosopis, Acacia tortilis and salam (Acacia ehrenbergiana); and small barns for quarantine and medical care with additional umbrellas. A group of specialists, supervisors and workers carry out daily works of feeding, caring of and supervising captured animals beside veterinary surgery if necessary.

Environmental Search about The Green Wadies :

Green wadies

The National Feild Research Centre for Enviromental Conversation at the Diwan of the Royal Court, being a centre for scientific researches in the environmental field in the Sultanate, has launched a national environmental initiative under the title of "Green Wadies" Initiative I the Sultanate" aims at saving different valleys in the Sultanate fron the desertification phenomenon restoring the natural and environmental balance by planting local Omani wild trees, achieving environmental, touristic, enlightening, economic, social and sporting goals.

intiative launched by the Centre to combat desertification and rebalance ecological system

This initiative comes as part of the Sultanate celebration of the World Day to Combat Desertification, and with a great contribution of so many governmental and private authorities, academic research institutions and civil society organizations in the Sultanate, local communities , there include. The Ministry of Environment and Climate Affairs, The Ministry of Agriculture and Fisheries, Ministry of Regional Municipalities and Water Resources, Muscat Municipality, National Feild Research Centre for Enviromental Conversation at the Diwan of the Royal Court, the Directorate of General for Scouts and Guides, Omani Garden of Plants at the Diwan of the Royal Court, the Committee of Sport and Environment at the Omani Olympic Committee, Oman Holding Environmental Services, Hayah Company for water, Occidental Company, serenity food Co., Al Namaa Poultry Company, Sultan Qaboos University, German University, Higher College of technology in Al Khuwair, ESO group clean Oman, the Environment Backers Group, Busher Sports Club,

◆◆ The importance of the contribution of all the local society members lies in implementing this initiative as a sort of actual partnership between the authorities and the society

◆◆ They seek planting Omani wild trees to achieve environmental, touristic, economic and social goals

representatives ofAl Ansab area community at Bucher state and representatives of the families of some of other states in the Sultanate.

During the coordination meeting among different contributing authorities in this national environmental initiative which was headed by the CEO of the National Feild Research Centre for Enviromental Conversation at the Diwan of the Royal Court Dr. Seif bin Rashed Al Shakasy, the initiative goals were discussed with all their dimensions as well as there importance of this initiative regarding the environmental, touristic, economic, social, enlightening and sporting aspects. In addition, the working mechanisms, the timed schedules for execution and the focus on the importance of contribution in this initiative as a sort of real partnership between the authorities and the society were all discussed as well. The first stage of this initiative will be executed in Al Ansab area at Bucher state in Muscat provenance as a kick off for the state's launch with the contribution of its members in the work field in which many other authorities contribute. The natural and environmental balance of this Wadies will be

Al Shakasy:

The initiative is one of the results of some environmental fieldwork reasearch study that was done by the National Centre about the wood land cover in the Sultanate

re-set by planting local wild trees as Seder, hills, Ghaf, Alhua and many other types of trees along one of the routs near the Wadies, benefitting from the shallow water collected on the banks of the Wadies in order to water these trees in the first stage and then to be left to grow naturally in its natural habitate.The CEO of the National Feild Research Centre for Enviromental Conversation at the Diwan of the Royal Court Dr. Seif bin Rashed Al Shakasy stressed that adopting this national environmental initiative by the National Centre is because that it's one of those scientific research centres in the Sultanate specialized in the environmental aspect, under the pretext of its interest in the wood land in the Sultanate and its work on the preservation of the Omani wild trees from deterioration and extinction; as this initiative forms one of the environmental fieldwork research results which is done by the National Centre on the wood lands in the Sultanate. It seeks the contribution of different governmental and private authorities as well as academic research institutions and civil society organizations in planning and executing processes, the thing which it has succeeded in doing previously in its environmental fieldwork researches and studies on the wood land in the Jabel-Al Akhdar area and Jebel Shams as well as the studies of the ecosystems of fresh water in the Sultanate.

Dr. Seif Al Shakasy pointed out that the Sultanate has a unique green land cover owed to its unique geographic position, as more than 1295 kinds of plants were recorded all over the Sultanate, 136 plant species of which are endangered with extinction and deterioration. This is because of natural reasons as climate changes, drought, lack of water and desertification; in addition to human reasons as poached logging, pollution, development, running vehicles randomly on the green land cover and overgrazing. This all led to the decrease of the green patch in the Sultanate and the exposure of some local wild trees to the danger of extinction and deterioration.

He referred that God has gifted the Sultanate wadies with running water all over the year in addition to the presence of watercourses reservoirs beside it which formed a home for human, social, economic, environmental and touristic life in the Sultanate. However, it has lately suffered from some issues that made its role decrease, such as the desertification phenomenon, the accelerated development and shoveling the soil and fossils, but these valleys have become a dumpster for rubbish and remnants of buildings that affected its environmental and touristic roles negatively in the Sultanate. The CEO of the National Feild Research Centre for Enviromental Conversation at the Diwan of the Royal Court emphasized that this national environmental initiative will be generalized all over the Sultanate, as it will contribute in preserving and developing the green land cover, in addition to preserving the Omani wild trees from extinction and deterioration as well as returning the environmental, touristic and economic importance of the wadies in the Sultanate. Moreover, this initiative is not costly expensive, it contributes in preserving the green patch in the Sultanate and it supports the different types and kinds of biodiversity. It also contributes in decreasing air pollution and global warming, creating appropriate places for practicing walking sport, helps in promoting the interior tourism and enhances the environmental awareness for all society groups and segments regarding the importance of protecting the Omani environment and preserving its natural resources.

Environmental Report about the Cave of Gin Council :

The Cave of Gin Council

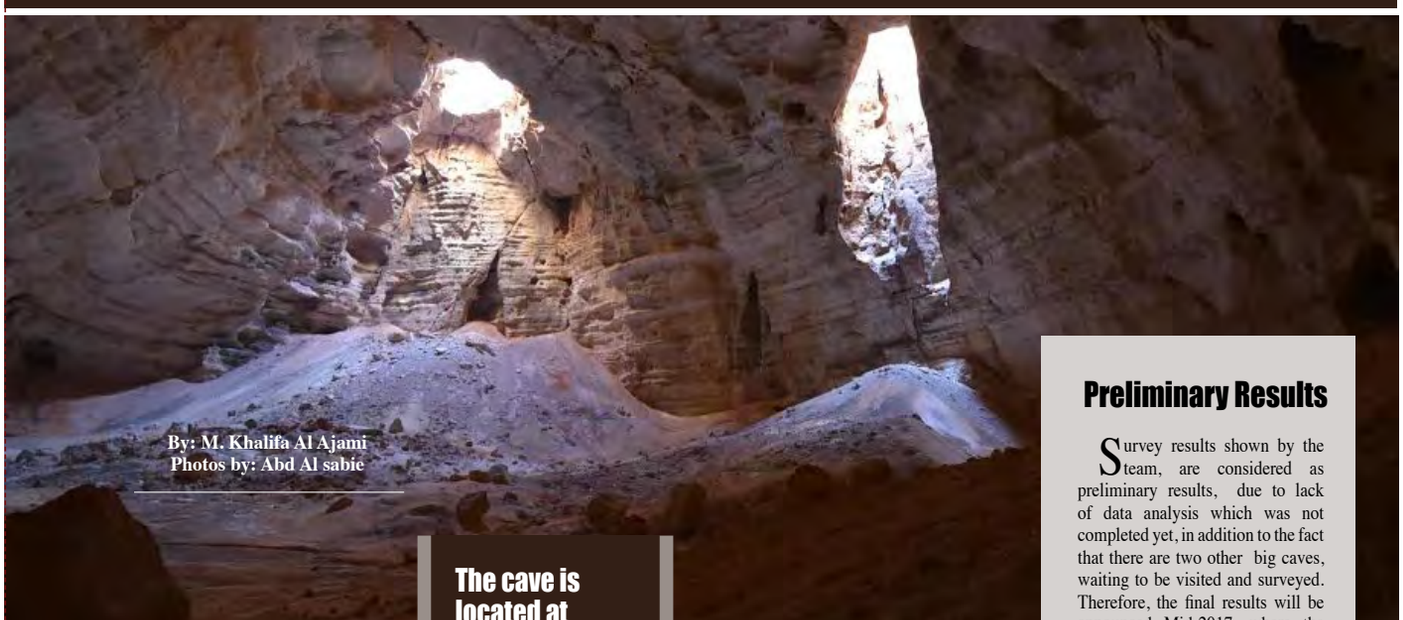
A Study Probes the depths and Reveals the Secrets

The study, conducted by the The National Center for Field Research of Environment Preservation at the Royal Court, in collaboration with the Ministry of Tourism and the International British Mission for caves Exploration, revealed accurate scientific results about the Cave of Gin Council, which is considered as one of the largest caves in the world in terms of size and area. The study lasted three consecutive days, where a precise laser device was used. Biodiversity of the cave and the surrounding area has also been explored.

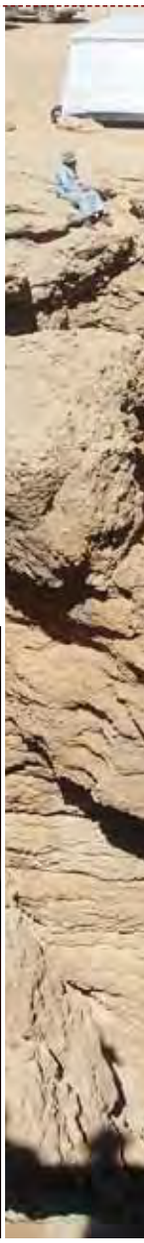
The study aimed to survey the cave cavity and determine its size, floor area, and dimensions with high accuracy

The cave can be descended into through three main upper openings of different diameter

Weather is cool inside the cave, where temperatures reach about 17 degrees C



By: M. Khalifa Al Ajami
Photos by: Abd Al sabie



The cave is located at Sulmah plateau on bani jabir Mountain at Qiryat Wilayat

The cave is the third in the world in terms of floor space with an area about 66500 sq

The Cave's Location

the Cave of Gin Council is located on Salmah Plateau that rises about 150 meters above sea level at Jebel Bani Jabir, Qiryat Wilayat. The cave can be reached via a bumpy mountain road that runs 18 kilometers off the highway linking Qiryat to Sur at the entrance of Fence village.

Description of the Cave

The cave is considered as one of the largest caves in the world. It is a huge cavity curved by nature in limestone at Jebel Bani Jabir. It is a natural archeological masterpiece and one of the greatest natural wonders in the world. This huge cavity can be accessed directly, in a free descent (without touching the edges of the cave), through three main upper openings, the first one is called Khoshlat Mgandali. Through this opening, the cave is is 130 meters deep. It it is the second largest opening (20× 14 meters) and all of the explorers descend through it, because of the breadth and the cohesion of the rocks around it. The second opening which is smaller, is located approximately 120 m west of the first one, and called Khoshlat Mangude. It features thickness of rocks around it. It goes down 30 m deep, then starts cave cavity. What distinguishes this hole is that it is in middle of the cave cavity. The cave depth from this opening is up to 150 m. The third opening is called Khoshlat Alhiyool. It is the largest and located 50 m. South of Khoshlat Mangude and 150 m southeast of Khoshlat Mgandali. It is difficult to descend from this slot because of the unstable rocks around it, the lack cohesion and obvious effect of erosion caused by floods. After its discovery in 1983, the cave was classified as the second largest in the world in terms of the size of cavity which is calculated at the time of about four million cubic meters. The estimated area of the cave is about 60 thousand square meters.

Preliminary Results

Survey results shown by the team, are considered as preliminary results, due to lack of data analysis which was not completed yet, in addition to the fact that there are two other big caves, waiting to be visited and surveyed. Therefore, the final results will be announced Mid-2017, where the 15th caves will be ranked from the largest to the smallest.

The preliminary results of this study are focusing on the following:

the Cave of Gin Council is considered as one of the best caves in terms of lighting, as the sun beams stream down through the openings into the floor of the cave to light the whole cavity. The peak of lighting is at middle. This is an important feature of the cave.

Cave of Gin Council comes in third place in terms of space (66,500 square meters) out of other 12 caves.

It occupies the fifth place in terms of size, with a size up to 4.19 million cubic meters.

There are some creeping animals, identification of which requires the help of a specialist.

No existence of plants or water inside the cave.

The explorers obtained unique photos of inside of the cave, shot by a specialist photographer.

The three-dimensional model of the cavity of the cave

Objectives of the Study

As part of its researches programs, the National Center for Field Research conducts many studies in various environmental areas, in partnership with bodies interested in environmental issue, both domestically and internationally, for integrating material and scientific efforts and capabilities. To confirm such approach, the National Center for Field Research took advantage of its international relations, both at the level of individuals or institutions, to conduct this study, in cooperation with the Ministry of tourism locally, and the International British Mission for caves Exploration, internationally. This study completed with great success and impressive results.

Details of the Study

The study lasted three consecutive days of work inside and outside the cave. The international team was led by Professor Andy Avis who has explored 12 caves around the world using the same method and devices, before exploring the Cave of Gin Council. It is planned to explore two other caves around the world to complement the 15 caves, which are considered as the largest caves in the world. To survey the cave, study used an accurate device, measures up to 1 cm of every 400 m and gives three-dimensional results. For more accuracy and greater precision, the cave cavity was surveyed from 40 points (sides) the readings intertwined to give the result of extremely precession. The rocky surface of the cave was scanned from 30 points.

Geology of the Cave

This huge cavity has been carved by natural factors on limestone rocks rich with pulverized from the Trio Eocene Age, which is estimated from 35 to 60 million years old. It is included into Group E Series of geological ages of the rocks of Oman. These rocks are distinguished by the large number of cracks and cavities. Such characteristic distinguishes configurations that embrace large caves. There are large cracks visible on the surface of the cave, part of which are the three openings of the cave. It is worth mentioning that such cracks are also displayed on the ceiling inside the cave. These are strong indications of the vulnerability of the region Erosion and cavitations by rain and waterways acid saturated water.

The cave is the fifth in the world in terms of total size, with a size of 4.19 million sq

There are indications for existence of creeping animals in the cave, but that needs a specialized expert to know the specimen of the same. No traces of plants

Its natural roof is like an irregular dome. The floor is formed up from small hills opposite of the three holes. It is obvious that such small hills are formed as a result and the sediment that is constantly falling in through the openings. The cave floor is covered by Watercourses and deposits of mud due to rain and valleys. Due to the the cave size and width, the natural factors had not been suitable to form stalagmites and stalactites in a distinctive way like other caves, though there are some of them, but on a simple scale. Weather is too cold inside the cave and is up to 17 ° C, while the heat outside the cave is 40 ° C, in spite the sunlight and air through the three slots, contrarily to the nature of the known caves.

Wildlife

Previous studies have shown the presence of creeping animals such as spiders, snakes and lizards and no presence of plants and water. On the surrounding area, there are trees, such as Samur, Sidr and some herbs, as well as the animals that live on the mountain.

Environmental Report about Protection Dhub from Extinction :

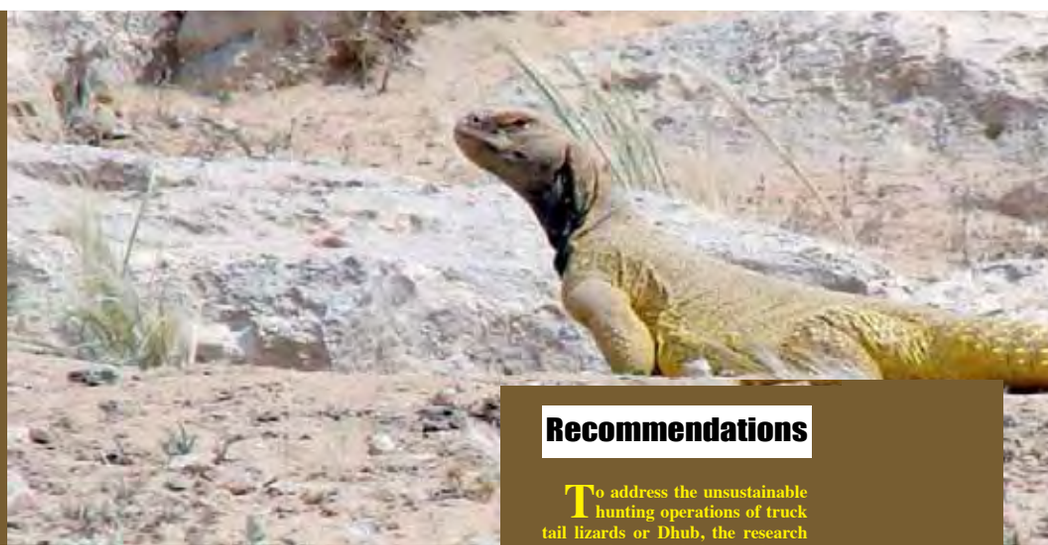
Extinction of Dhub Threatens Biodiversity and the Food Chain at its Whereabouts

Dhub

Protection of One Species is Protection of All

The spiny tailed lizard

The National Field Research Centre for Environmental Conservation conduct a study on the status of Dhub biodiversity (a type of Dhub truck tail) where the research focused on the importance of The Dhub and its burrows in enriching biodiversity in its whereabouts. This represents a great value in the chains of food at such places. Dhub 's burrows constitute a natural habitat for a range of organisms which have great importance in maintaining the food chain. Researchers proved through their study, that the extinction of Dhub could threaten biodiversity in the research area. That why the researchers of the National Centre summarized the results reached in the message: "Be keen to protect one species in order to protect all species."



Recommendations

To address the unsustainable hunting operations of truck tail lizards or Dhub, the research team of the National Centre has recommended the following management strategies that they hope will help to secure the survival of this species in the future:

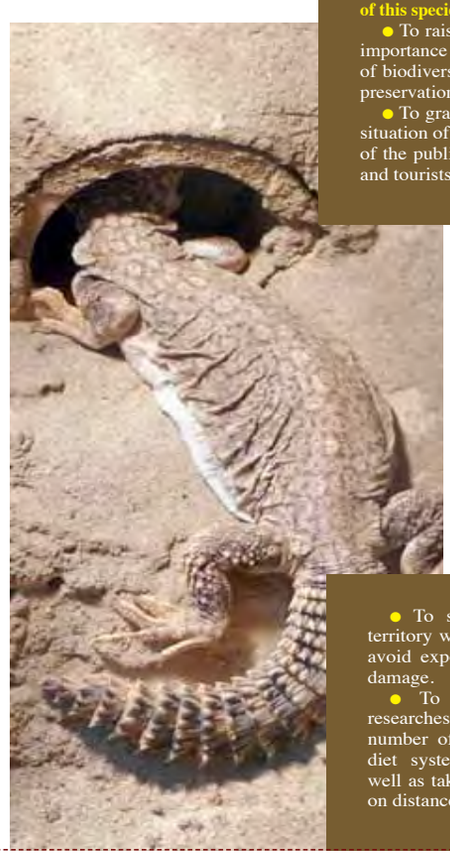
- To raise awareness about the importance of Dhub in the process of biodiversity promotion and the preservation of health ecosystems.
- To grantee protection / great situation of care/ for Dhub, a help of the public, guards and hunters and tourists.

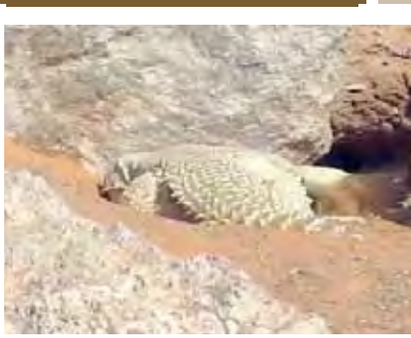
Information and Facts

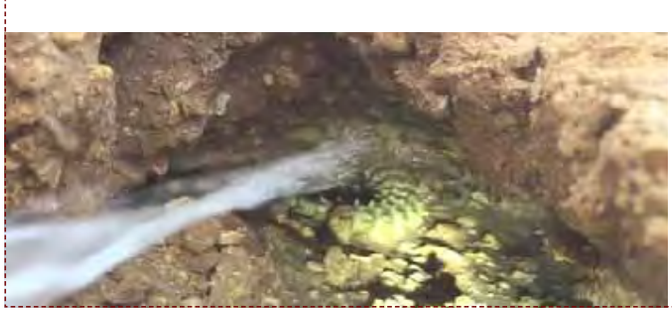
There are about 17 different species of The spiny tailed lizard Dhub (The Dhub) which live in a vast region extending from the far reaches of West Africa to Somalia, the Arabian Peninsula, Iran, Pakistan and India. There are 6 species of The spiny tailed lizard in the Arabian Peninsula. The Dhub bears the scientific name (Uromastyx SPP). It is vegetarian animal. The length of Dhub is 75 to 80 cm. The avarge whgith is 2kg. Its color changes with the change of temperature. It uses its heavy tail to defend himself and also to cover or fill its hole. It can live in an elevated area reaches a height of 1000 meters. Dhub female lay 5 to 40 eggs with an incubation period of 70 to 80 days. It gets its needed water from the plants. This kind Dhub s is often used in the pet trade.

Dhub Burrows

Dhub burrows are generally characterized by a large central opening for entry and exit and several smaller holes close to the central aperture. Burrow diameter







- To stop driving over the territory where the Dhub live to avoid exposure of their dens to damage.
- To continue conducting researches on aspects such as the number of Dhub, its migration, diet system, nests building as well as taking sampling of Dhub on distances bases.

- The National Field Research Centre for Environmental Conservation, Dhub Study and its group
- Its Burrows Constitute Natural Habitats for a Group of Organisms Which Keep the Food Chain
- There are about 17 Different Kinds of Dhub Which live in a Sprawling Area In the world

- It is one of the Grass Eating Animals Ranging from 75 to 80 cm in Length, and Its Color Changes by the Change of Temperature
- A Variety of Living Organisms Have Been Monitored in Research Area Belonging to Different Nutritional Levels
- Dhub s are reptile pets. Vegetation and geology can affect the intensity of their numbers

generally ranges between 2 to 3 meters. By measuring, it is found that the relative depth of the burrow ranges from 2 meters to 3 meters. A Dube desigened its burrows in such away it mantion haign relative humidity throvghout the wear which enable to adapt harsh envirement.

The Importance of Burrows

A variety of living organisms was hunted by traps, including kinds of invertebrate species belonging to different trophic levels. This shows the importance of Dhub burrows in the food chain. Traps were set up and the following types were recorded: herbivore, beetles, stock conclusive ants, straight wings insects, residue eaters, wood lice, the Russians beetles, termites, carrion eaters, flies, beetles, predators, scorpions, spiders, Centipedes, wasps, beetles, pollinators, flies, bees, wasps, sap vampires, aphids, mites, parasites, ticks and wasps.

Much larger numbers of rats were monitored in the Dhubs burrows, compared to the controlled areas, which indicates that rats permanently come to the burrows, perhaps because they provide widing place from predators and heat. There was no difference in the cases of foxes monitoring to a large extent. It can be assumed that the presence of the rat more often, would attract foxes to these sites.

It is noted that some of the animals involved in this Dhub burrows or around them, include some spiders and Dhub s, but the firm coexistence relationship is that of Dhub and black scorpion, where the Scorpio provides protection for Dhub from its enemies and the Dhub provides shelter and some prey for the Scorpion occupy about 20-50 cm at the beginning of the burrow where they feed on insects and other preys.

A preliminary statistical analysis carried out on a number of cases, caught by traps using dual sampling tests (t-test), shows that the total number of insects in the test sites was significantly greater than the total numbers in the areas under the control. As well, the density of the species which is considered as a measure of biodiversity, was much higher in the sites than the sites subject to control.

Threatened with Extinction

Kinds of Dhub are listed in the Appendix 2 of the Convention on International Trade with the types of wild animals and plants threatened with extinction (CITES). As well, Dhub is categorized in the List of the International Union for Conservation of Nature and Natural Resources as endangered species.

Dhub numbers have seen a decline over the past 15 years by up to 30%. Some of the major threats to the Dhub include the strong activities to collecte this animal for food and “medical” purposes in Asia, as well as the loss of habitat of its living due to overgrazing, human settlements, agricultural expansion, dumping of solid waste, off road vehicles traffic and quarrying for gravel and construction materials.

Dhub has a relatively slow period of evolution. So the hunting of which on widely scale, severely affect its numbers. Dhub is likely to face the threats of hunting on a large scale in the Sultanate as well. The fact that a large number of other species rely on the Dhub for shelter, makes reservation of Dhub highly important endeavors.

Environmental Issue about Our Sea Turtles & the Danger it Suffering :

Our Sea Turtles are in Danger !!

By: Dawood Sulaiman Al Balushi

«Our Sea Turtles are in great danger,» This is what was expressed by one of the citizens, who bemoans the situation that is attributed to the irresponsible behavior of some citizens and expatriates and their overfishing against turtles and the practiced exploitation in the sales process in a manner contrary to all the wildlife protection laws in the Sultanate. boats go out to the sea for patrolling the areas at certain points of the coast of Oman, where the turtles live. The boats come back in a convoy loaded with great numbers of turtles. Then they cut the meat of the caught turtles to sell it. This constitute a bell of serious warning, declaring the threatens against the existence of these rare marine organisms which take a natural resort in the shores of the Sultanate. All this takes place in spite the environmental legislation and the great efforts made by various government agencies in protecting the existence of these marine creatures from degradation and extinction.

Our Wealth Is Sold as Meat for A Few Riyals ... An Alarm Bell Threatns Our Marine System

This apparently is one of the dangerous phenomena that have sprung up recently in some coasts of Oman. It reflect the irresponsible actions of some citizens and expatriates in their dealings with the sea turtles, as well as it takes place secretly and away from the eyes of the Wildlife Conservation Monitors. Therefore, immediate and fast action must be taken to stop this phenomenon, by tightening control and the protection for marine life, increasing the number of observers or imposing deterrent penalties on those who caught red-handed in this environmental crime. All this must be accompanied by increasing environmental awareness programs and clarify the importance of sea turtles in the marine conservation system of the Sultanate. Other threat faced by marine turtles on the shores of the Sultanate is that some citizens and expatriates collect turtle eggs from their holes and thereby reducing their reproduction. As well, driving cars on beaches, putt the turtles at the risk of being run over directly. Adding to that, it is noticed that some turtles die by plastic bags which are carelessly thrown into the sea. That is because such bags look like jellyfish.

Protection

Various government agencies continue their tireless efforts in preserving the marine wildlife, especially sea turtles. The Sultanate enjoys a rich environment and unique biodiversity by virtue of its long shores which reach up to of 3165 km in lengths. Different species of sea turtles find a safe habitat for breeding and feeding in the shores of the Sultanate. Studies and procedures which have been designed to protect sea turtles in the Sultanate have begun long time ago, after the recognition of the importance of the Sultanate beaches and waters as a home for five species of turtles, including four species nesting in the shores of the Sultanate, namely: the Green turtle turtle Olive Ridley turtle Charfaf turtle, Riemannian (Rummani) turtle. There is a fifth kind, which is the Ant turtle that lives and feeds in the waters adjacent to the coast of Oman, but does not nest there. Sea turtles which live at the territorial waters of Oman, enjoy the necessary protection measures based on the laws and legislations issued in this regard and which culminated in the issuance of the Natural Reserves Law and Royal Decree No. 62003/ for the preservation of wildlife, as well as the objectives and programs included in the national strategy for the protection of the Omani Environment and the Action Plan on Biological Diversity which constitute practical frameworks for the protection of all types of resources and biological environment of Oman. As well, there are three main areas in the Sultanate that gained international fame and importance as habitat of sea turtles. The first area is the coast of Ras al Hadd area, which is the most famous nesting area for sea turtles in the Sultanate that and gained a distinct importance at the global level. It attracts the largest of the three clusters of green turtles in the Indian Ocean which is estimated annually between 6000 -13 000 turtle arriving in the Sultanate from as far afield as the Arabian Gulf, the Red Sea, the Eastern beaches, The second area is Misairah Island which is a home for the largest number of nesting turtles from the species of Riemannian (Rummani) turtle in the world. Up to 30,000 turtles concentrate yearly in the east coast of the island. The third area is the islands of Daymaniyat. It is a naturally reserved nesting location for large numbers of Charfaf turtle. Beside these important and well known as nesting locations for sea turtles, the

"Alwashq" opens the file of the danger that face turtles our sea turtles .. The authorities must move

Turtles are of great importance in maintaining the marine life system in the Sultanate

(Almascar), one of the main factors that cause death for turtles caught in fishermen nets

Threats and Risks

There is other source of risks that threaten the lives of sea turtles in some areas in the Sultanate. That is the the nets of fishermen which are thrown into the water and left there for long times in a method of fishing locally called "AlMascar" or "Sakar", used for catching fish in shallow waters.. Unfortunately, numbers of turtles get caught by such nets and cannot get out and eventually die and the sea currents throw them on the beaches. Traces of such nets have been noticed on the dead turtles. Sometimes sea currents throw a number of turtles dead inside the fishing nets at some locations. So we emphasize the need for cooperation of citizens and fishermen to stop leaving fishing nets for long periods in the sea without control. As well, if someone find find a turtle and stuck in a net, he must hurry to save the turtle and return it to its natural habitat.

coast of Dhofar province is considered as important places for the nesting of Green Turtles. The peak of the Green Turtles groupings at Al Halaniyat Islands takes place during the months of July and August. Moreover, Charfaf turtle and the Green turtle depend on the coast of this governorate for feeding during their migration between north and south.

Turtles Reserve

As culmination to efforts persuaded by the Sultanate for maintaining the protection of rare species of marine creatures that abound in the Omani environment, the most important of which is sea turtles, the announcement in 1996 of establishing natural marine reserve in the Governorate of Alsharqiya South at Sur Wilayat. It is called "Ras al Hadd Turtles Reserve", with an area of 120 square kilometers of beaches and coastal land, as well as the seabed, the creeks of Grama and Alhajar, to be a natural safe resort for thousands of rare endangered turtles that come to this area to live and multiply. The number of turtles nesting in this region every year is around 6000- 1300 arriving in the Sultanate from other remote regions such as the Persian Gulf, the Red Sea and the shores of Somalia.

Protection and Management of Turtles

A number of government agencies, particularly the Ministry of Environment and Climate Affairs and Environment Society of Oman, are making continuous efforts to protect sea turtles in the territorial waters of Oman. A program to count (Riemannian) turtle at of Misairah Wilayat was implemented in order to preserve the marine environment elements. The Sultanate is considered as the most important sites for the nesting Riemannian turtles on worldwide. More than 30 thousand turtle lay their eggs on the beaches of Misairah Wilayat. The aim of this program is to estimate and count the number of turtles nesting or bleaching along the coast of Misairah Island, where some turtles are given numbers during laying their eggs in order to identify new data about the life of turtles and their deployment locations after the end of the nesting season and how long the turtles continue bleaching as well as ensure its return to the beach where they live, and see how many times they bleach per season. For the first time in the Sultanate, a vital and important project was launched at Misairah Island. It is a project for remote monitoring of the Rummani sea turtles via satellite. The project aims to study and conserve the species of sea turtles use the beaches of Misairah Island as nesting area in the various times. It also primarily aimed to propose a general management plan based on sustainable development, in which it will be possible to maintain a system of the original marine and coastal system of the island of Misairah. The significance of this project is in the possibility of monitoring sea turtles, because this is for the operations of turtles maintaining and conservation of marine environmental balance. Through this project, it will be possible to know the places where the turtles spend most of their time and comparing that with the marine sites that man can use, such as fishing points, as well as provide important recommendations to reduce the number of turtles that are being injured and killed. As well, it will be possible to clarify the international importance of turtles' gatherings as they cut thousands of kilometers of water to reach other countries in order to protect them and work to keep them safe from all dangers. Also, for the first time in the Sultanate, a vital important project was launched at Misairah Island. It is a project for remotely monitoring the Rummani sea turtles through satellite. The project aims to study and protect this species of marine turtles which use the beaches of Misairah Island as nesting location in various times. The significance of this project in the possibility of monitoring the sea turtles, which is very important for the operations of turtles protection and conservation of the balance in marine environment. Through this project, it will be possible to know the places where the turtles spend most of heir time and comparing that with the marine sites that man used by people for purposes such as fishing. This will help in providing the needed recommendations for reducing the number of turtles that are being injured and killed, beside clarification the international importance of turtles gatherings, as they swim across for thousands of kilometers to reach from lace to another and they need protection from all dangers.

The Wadies are Yelling

Is There Anyone to Help ?

Recently, spread the phenomenon of dumping of waste in the middle and the edges of valleys. A phenomenon which foreshadows environmental disasters, and affects one of the most important elements of the Omani environment, the biodiversity. Also, recently many wrong practices emerged. Though such practices are by some of the weak soul persons, but they pose a serious threat that has to be watched intensively, to prevent go on and destroy our beautiful valleys, and make us lose one of the most important features of the Omani environment.

Our Wadies are turned into a dumping ground for waste or drains for the new facilities waste.

The Al-Washaq (The lynx) cameras identified samples of dumping the construction waste, discharging liquid waste of new facilities and sand in the wadies, sifting of sand and the death of many trees due to these and other actions that hurt our wadies.

Wadies are Importance for the balance of Environment

This environmental breach and this assault on the components of the ecological nature of the wadies and adjacent trees, which is one of the wealth of the Sultanate, lead to the imbalance of the environment.

This phenomena also lead to negative results such as the killing of living organisms and the closing of the wadies streams. This in its turn causes large floods that affect the villages around the wadies and the destruct the vegetation. As well, it leads to high percentage of soil salinity which is a direct threat to humans and their health. Not forgetting the negative effect of depriving agricultural land from a renewed clay resource that restores the balance to agricultural land.

Wadies are the only artery that feeds and distributes water through their streams. They are a major source of stored groundwater, that water which is used for irrigation and human use through Aflaj and wells. Therefore, attacking wadies is not merely an environmental disaster but also a crime that threatens biodiversity, affects human health, and increase desertification.

Clear Laws and Deterrent Penalties

Article 20 of the Environmental Protection and Pollution Control Law, issued by the Royal Decree No. 114 / 2001, prohibits the discharge of hazardous materials, hazardous wastes and other environmental pollutants into the wadies streams or waterways, groundwater recharge areas, rainwater and floods drainage networks or Aflaj and their streams. It is also prohibited to use or discharge untreated wastewater in the places indicated.

As well, drainage may not be used or discharged except after obtaining a permit from the Ministry of Environment and Climate Affairs in accordance with the procedures and conditions issued by a decision of the Minister.

In Article 21 of the same law, authorizes the Ministry of Environment and Climate Affairs

Assault on wadies is not just an environmental disaster, but also a crime that threatens biodiversity and affects human health

Prevention of any activity that harms the quantity or quality of vegetation or lead to desertification or deformation of the natural environment in any region. Punishment by imprisonment and fines for those who violate.

Assault on wadies is a serious threat to the nature and to natural system of the wadies environment.

The wadies are the only artery that feeds and distributes water through their streams. They are that major source for storing underground water.

The Omani legislation banned the disposal of hazardous substances and other environmental pollutants in the wadies or streams and imposed deterrent penalties on those who violate the legislation.

to take all necessary actions, in coordination with the competent authorities, for protecting the soil and combating desertification according to the natural characteristics of the soil and according to the conditions of the area concerned and It is not permissible:

A. To cut, uproot or damage any tree, shrub or grass from public forests, unless authorized by the Ministry.

B. To exercise any activity that affects the quantity or quality of vegetation in any region, that would lead to desertification or deformation of the natural environment.

C. To remove stones, uprooting trees, shrubs and grasses, or transfer soil and sand from streams, beaches, wadies, ponds, marshes, public water drains and banks without permission from the Ministry, excluding maintenance and collection of samples carried out in coordination with the Ministry.

The penalties are deterrent in Article 34, which states that, without prejudice to any more severe penalty provided for in any other law, any person who contravenes the provisions of Article 20 of this law or any owner who fails to notify the Ministry about occurrence of an environmental disaster or an illegal discharge of source or area belong to him, shall be punished by imprisonment for a period not less than one month and not more than one year and a fine not less than OMR 500 (Omani Riyals five hundred) and not more than OMR 50,000 (Omani Riyals fifty thousand) or one of these penalties.

Article (38) stipulates that «Without prejudice to any more severe penalty stipulated in any other law, any person who contravenes the provisions of Article 21 of this Law shall be punished by imprisonment for not less than 10 days and not exceeding three months and a fine not less than OMR 500 (Omani Riyals five hundred) and not more than OMR 5000 (Omani Riyals five thousand) or one of these penalties, and doubled the penalty in case of repeating the same violation.

In spite of all this, still some morally weak persons insist to break the law and damage the environment of wadies by dumping the building waste, which destroys the plant, affects human health, and destroys one of the most important environmental elements in the Sultanate, the wadies. is there any response ?!!!

Environmental Research about Jabal Samhan :

A team of researchers from the National Field Research Centre for Environmental Conservation conducted a research study on the use of land, livelihoods and conservation of the environment in the Jabal Samhan Nature Reserve. That is because the size and diversity of the Samhan Nature Reserve make it the most diverse in the Sultanate. The reserve includes a number of endangered species, especially the endangered Arabian Leopard, as it is the most important habitat in the Sultanate of the Arabian Leopard, and is the last hope to protect this species in the Arabian Peninsula as whole.

A Research study on land usage, livelihoods and conservation of the reserve area

Jabal Samhan

The biggest and diverse reserves in Oman

- It covers an area of 4500 km 2 and combines the unique cloud forests affected by monsoons in the southern part with mountainous regions and the dry plains of Najd in the north. It extends to 80 km towards the Eastern coast
- It includes a number of endemic breeds and endangered species, particularly the Arabian Leopard
- This research project seeks to support the future management for the conservation of the environment in Jabal Samhan by clarifying the geographical distribution of natural resource usages in the reserve area

Information About the Reserve

Jabal Samhan Nature Reserve area was established by the Royal Decree No. 48 / 97 under the management of the Ministry of Environment and Climate Affairs. It is the largest protected area in the Sultanate. It covers an area of 4500 km2 and combines the unique cloud forests which are affected by monsoons in the southern part of the mountain and the dry plains of Najd in the north which extend as far as 80 km towards the coast in the east. Studies and researches have unequivocally demonstrated that the unique environments in the Jabal Samhan Reserve are increasingly vulnerable, particularly as a result of the sustainable exploitation of natural resources in over grazing and unregulated harvesting of mountain resources.

The Research Project

The research project, carried out by the National Field Research Centre for Environmental Conservation, sought to support the future management for conservation of the environment in Jabal Samhan by identifying and knowing the local communities that exploit the protected area economically wise and clarifying the geographical distribution for the use of natural resources in the reserve, as well as identifying the contribution of the Jabal Samhan Reserve in the local economy and the challenges and opportunities to to be faces by the process of involving the community in environmental protection plans, by identifying the protection priorities that emerge as results of this study.

Work Methodology

This research study was based on a methodology that sought to survey the samples through taking random social classes samples from the secondary data and field visits. This framework includes 37 population gatherings, 928 families, as well as a total of 7599 members of the community including men, women and children. The strategy of samples collection required communicating with families, about 20% of the total population of Jabal Samhan. To determine the spatial reference of the mentioned human activities, a network of 16 areas of human activity was established to cover the area of the Reserve area. Field work was carried out in cooperation with the Ministry of Environment and Climate Affairs, then the data were entered into a database designed specifically for research and analysis.

The Results

The study found that more than half of the total population in Jabal Samhan live in settlement along the eastern coastline, and a few live on the northern border of the Reserve, while the smaller population is located on the southern side in small scattered communities on the hills and the valleys in the mountainous slopes. The data indicated that the families of the communities surrounding the Jabal Samhan Reserve are large families with an

- The importance of involving the investors in the southern slopes for supporting the conservation plans in the reserve area
- The study found that more than half of the total population in the region is living in settlements along the eastern coastline
- The study indicated that grazing is the most used of natural resource in the reserve
- Despite the low income of livestock, the consumption of meat and dairy products is important in the region›s human food

average of 12 persons per the family. Their income is based on the wages of their employed mambers. Many of them work in public sector jobs, either in the civil ministries or the military. These are the highest employment rates and income levels within the communities which live the north.

Although households rely on monthly wages from jobs, most households in Jabal Samhan continue to carry out traditional economic activities, particularly grazing livestock such as sheep, camels and cows in some areas, as well as harvesting natural resources. The results also show that 60% of the total number of livestock is owned by communities in the southern part of the Reserve area, while 17 per cent of the total number of livestock is owned by the communities living in the north. The majority of the households in the south send their livestock each season to the Reserve area for grazing and harvesting the natural resources, while a small number of households located in the north and east of the protected area practive similar activities.

Analysis of Livestock Production Systems

The analysis of livestock production systems indicated that despite the low cash returns of cattle, the consumption of their meat and dairy products is important in the region›s human diet. This is particularly evident in the diet of households in the south. However, the size of the herds exceeds the number of animals needed to feed these families. There are 5.43 goats per person in the northern settlements, 6.86 goats per person in the eastern settlements and 13.24 goats per person in the southern settlements. Sheep and camels spread in search of forage most of the Reserve areas. The highest grazing rates for both types are in the southern areas of the Reserve along the mountain slopes which are affected by the monsoon. It is often that herd of sheep are accompanied by the shepherd while camels are left without a shepherd.

In the northern part of the Reserve, which is characterized by drought, herds of cattle prefer grazing woody perennial plants, especially the Cactus trees, frankincense and Seder. The sheep look for plants full of seeds and Juicer plants along with perennial trees that are available in the varied vegetation in valleys at the center and the east. In the south, which is characterized by a vegetation more versatile, camel prefer grazing perennial trees that include species listed in the Red List of the International Union for Conservation of Nature (IUCN), such as the Dhofari Comb Tree, while sheep and cows prefer grazing small shrubs and plants that contain Juice, such as the grass and astrals.

Cattle Feed Data Analysis

Analysis of livestock feed data in different protected areas revealed that sheep and cows meet less than half of their food needs through grazing, while camels may consume about two thirds of their dry feed needs through grazing. Due to the scarcity of feed resources, annual expenses of on camels feed spent by families living in the dry Najd area in the north of the reserve, exceed that of the families living in the south by 25% and 10% more than the families living on the eastern coasts.

Harvesting of Natural Resources

The study showed that many of the families surveyed, practice activities of harvesting other natural resources either for domestic use or selling. The majority of the households surveyed indicated that they usually collect medicinal plants, honey and milk within the frankincense in the territories of Jabal Samhan Reserve.

The comparison of the sampling data contributed to the calculation of the annual total value of the natural resources utilized in the Jabal Samhan Reserve. The wild products were compared with the market prices, while the number of days of grazing was compared with the value of the alternative feeds. The spatial reference of all land use activities at the Jabal Samhan Reserve, which was pointed out by the surveyed families to facilitate to draw the map of the known economic values in the Reserve. This map shows that the areas with the largest economic productivity in the Reserve are located in the south and east along the mountain slope and within the part affected by the monsoons, according to the perspective of the local community which used the land. Data analysis revealed that camel and sheep feed is the largest source of economic value, followed by trade of frankincense, coal and livestock breeding.

Conclusions

• The study estimated the total value of natural resources exploited in Jabal Samhan Reserve at RO 476390. Given the magnitude of this contribution to the local economy, it would be impractical to impose strict restrictions on the use of the Reserve resources. Instead, future protection plans must include a balance between resource exploitation and resource conservation and should encourage the sustainability of the environment while using the land.

• The study showed that grazing is the most important use of natural resources (in terms of value). Different types of livestock practice different behaviors and effects in feeding which should be taken into consideration in the planning of the Reserve management.

• Although livestock do not provide significant financial returns to communities living in Jabal Samhan, evidence has shown that milk and other livestock products are an important part of household food and meeting of some social obligations such as sacrifices, banqueting and gifts, especially for communities of the south.

• Only a small number of households at Jabal Samhan rely solely on natural resources for their livelihood. Most of the households surveyed indicated that natural resources were only used for grazing livestock and they support their incomes through the sale of coal and frankincense.

• The study pointed out the importance of involving stable communities in the southern slopes of Jabal Samhan for supporting environmental conservation plans due to their great economic dependence on the exploitation of the natural resources of the Reserve and their direct association with the unique cloud forests that comprise the largest part of the rich biodiversity in the Reserve.

• The integration of data illustrating the environmental values in the Reserve with the results of this economic study, will contribute to the identification of the future management areas in the Reserve, thus achieving the best results for environmental conservation and economic returns.

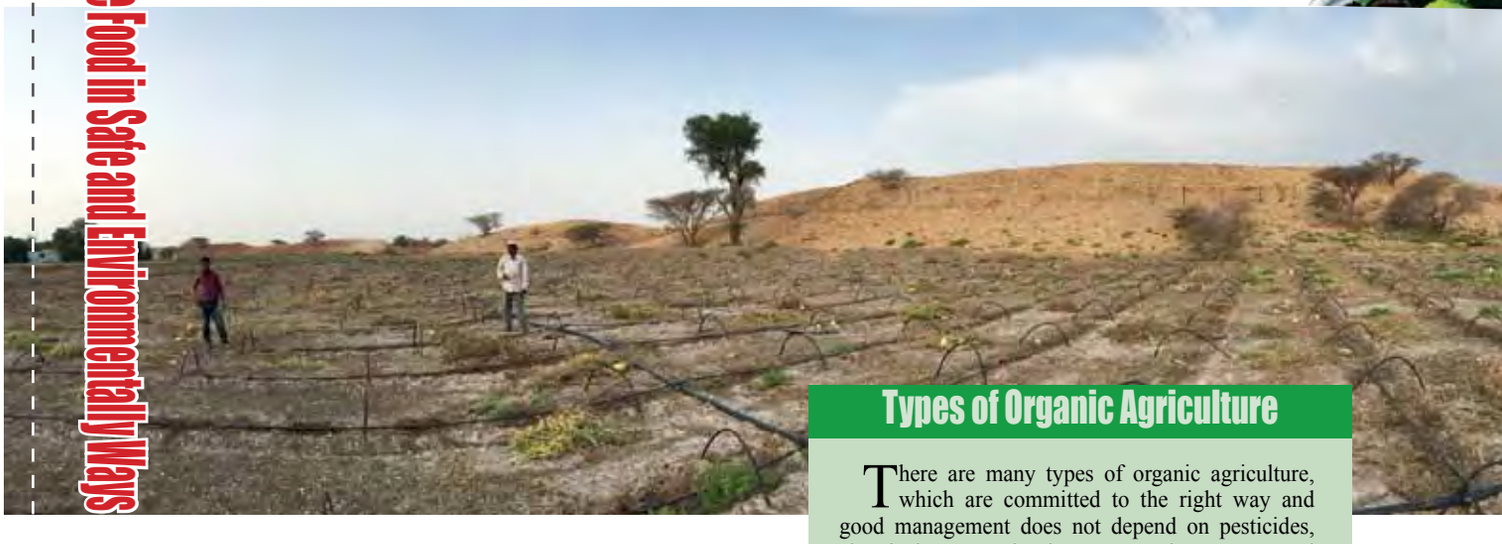
Environmental Research about The Organic Agriculture & it›s Importance :

Modern trend in recent decades towards organic agriculture of various kinds is a return to the traditional methods of natural agriculture which was adopted by humans before the discovery of chemical pesticides and industrial optimizers. Organic agriculture is a modern agricultural system (due to the use of modern technologies that increase the economic value of the project) to produce food in safe and environmentally ways, at the same time achieving economic feasibility and social justice. The organic farming system relies on the use of bio-natural materials, rather than chemical fertilizers, pesticides, breeds, genetically modified organisms, ionizing radiation or preservatives in manufacturing processes

Organic Agriculture

The Safe Alternative To Sustainable Environment

Serves to Produce Food in Safe and Environmentally Ways



Back to Nature

The idea of organic farming is to try to deal with nature instead of dealing against it. This involves recycling natural materials to maintain soil fertility. It also requires the encouragement of natural methods to control plant pests and diseases, rather than relying on chemicals.

Environmental Balance

The basic principles of organic agriculture closely follow the principles found in the natural environment, where the farmer follows the organic way with an environmental awareness that recognizes that acceptable balance in natural environment preserves the ability to coexist for all beings without negatively affecting each other.

Environmental Benefits

1. Long-term sustainability: Many of the observd changes in the environment are considered as long-term changes and occur slowly over time. Organic agriculture studies the medium- and long-term effects of agricultural interventions on agricultural ecosystems. It aims to produce food with an ecological balance to avoid problems of soil fertility and pests.

Types of Organic Agriculture

There are many types of organic agriculture, which are committed to the right way and good management does not depend on pesticides, chemicals, growth improvers, hormones and polluters of the environment. Such types of farming are all can be without soil. plants grown on non-soil bases or planted directly in the water. Plants can be grown on the porous medium to fix the roots, such as brittle, bitmose or gravel. Examples of such include the cultivation of plants on the soil (Gioponic), on water (Hedropponic) or on (Aquapounic). It is an agricultural system where breeding of fish or other aquatic organisms can take place with plants in the same System. Aquatic organisms and fish nutrients provide nutrients for plants and the plants purify water from pollutants. Or even grow plants in the air (Aerobonic,» said Dr. Abdullah Al-Ghafri, Assistant Dean for Training, Director of Aflaj Research Unit at the Life and Chemistry Sciences, Biology Division, Faculty of Science and Arts, Nizwa University. Dr. Al-Ghafari said that the idea of hydroponics is one that mixes nutrient solutions with water and also oxygen so that the roots touch the water to take the nutrients. Al-Gafri divided Hydroponics Aquaculture into six types: the drip system, the flood and drainage system, the waffle system, the immersion system, the aerobic system and the NFT nutrient slice system. In all these ways the basic tools are water tank, small water pump, air pump and pipe.

■ The organic farming system depends on the use of bio-natural materials, rather than chemical fertilizers and pesticides

■ Farmer realizes that the acceptable balance in the natural environment maintains the co-existence for all beings

An Omani Model

Al-Radwaniyah farm in Sinaw is one of the Omani models in the field of organic agriculture. The forms of organic farming vary from traditional organic farming which depends on soil, organic farming through greenhouses, and finally the paper farming based on aquaculture. About his experience with organic agriculture, Dr. Salem Bin Hamd Al-Mahrouky said that it is a rich experience despite the challenges faced it, the most prominent is the non-spread of this type of plantations, lack of such culture among the contractors who do not differentiate, pricewise, between it and other agricultural products that rely on pesticides. Nevertheless, such agriculture income has begun to increase, and the difference between it and other plantations is spreading, which made such crops achieve the desired economic return.

■ Organic agriculture studies the medium- and long-term impacts of agricultural interventions on ecosystems

■ Maintains soil biodiversity and reduces nutrient losses, which helps maintain soil productivity

2. The Soil: Soil depends on soil-building methods such as crop and agricultural cycles, symbiotic associations, cover crops, and organic fertilizers, as well, such methods encourage soil animals and plants to improve soil components and to establish more stable systems. On the other hand, the nutrient and energy cycle and the soil properties of nutrient and water retention are increasing as well as the compensation for non-use of mineral fertilizers. Management techniques can play an important role in combating soil erosion. The length of time in which soil is exposed to erosion forces decreases to increase soil biodiversity and reduces nutrient losses, which helps to maintain and enhance soil productivity. Soil losses are replenished by continuous renewable resources from the farm but are sometimes necessary to supplement organic soils with potassium, phosphate and calcium Magnesium and the rare elements from external sources.

3. The Water: Pollution of groundwater streams with synthetic fertilizers and pesticides is considered as a major problem in many agricultural areas. As the use of these substances is prohibited in organic farming, they are replaced with organic fertilizers (e.g. compost, animal manure, green manure) and by using greater biodiversity (in terms of cultivated varieties and permanent vegetation), this will strengthen soil texture and reduce water leakage. The better managed organic systems that characterized by better capacity to maintain nutrient retention, will lead to a significantly reduction in the risk of groundwater contamination.

■ Dr. Abdullah Al-Ghafri: There are many types of organic farming that adhere to the right way and are done without soil

■ Contributes in mitigating the effects of global warming through its ability to absorb carbon in the soil

4. The Air: Organic agriculture reduces non-renewable energy use by reducing agrochemical requirements (requiring large quantities of fuel). Organic agriculture contributes to mitigating the effects of warming and global warming through its ability to absorb carbon in the soil. Many of the management practices used by organic agriculture (such as minimizing tillage and increasing the inclusion of nitrogen-fixing legumes) increase the return of carbon to the soil, resulting in increased productivity and favorable conditions for carbon storage. Therefore, the call for the use of organic and biological agriculture and biological resistance has become a necessary requirement to protect the environment from pollution and raise the level of agricultural production and export competition with other countries.

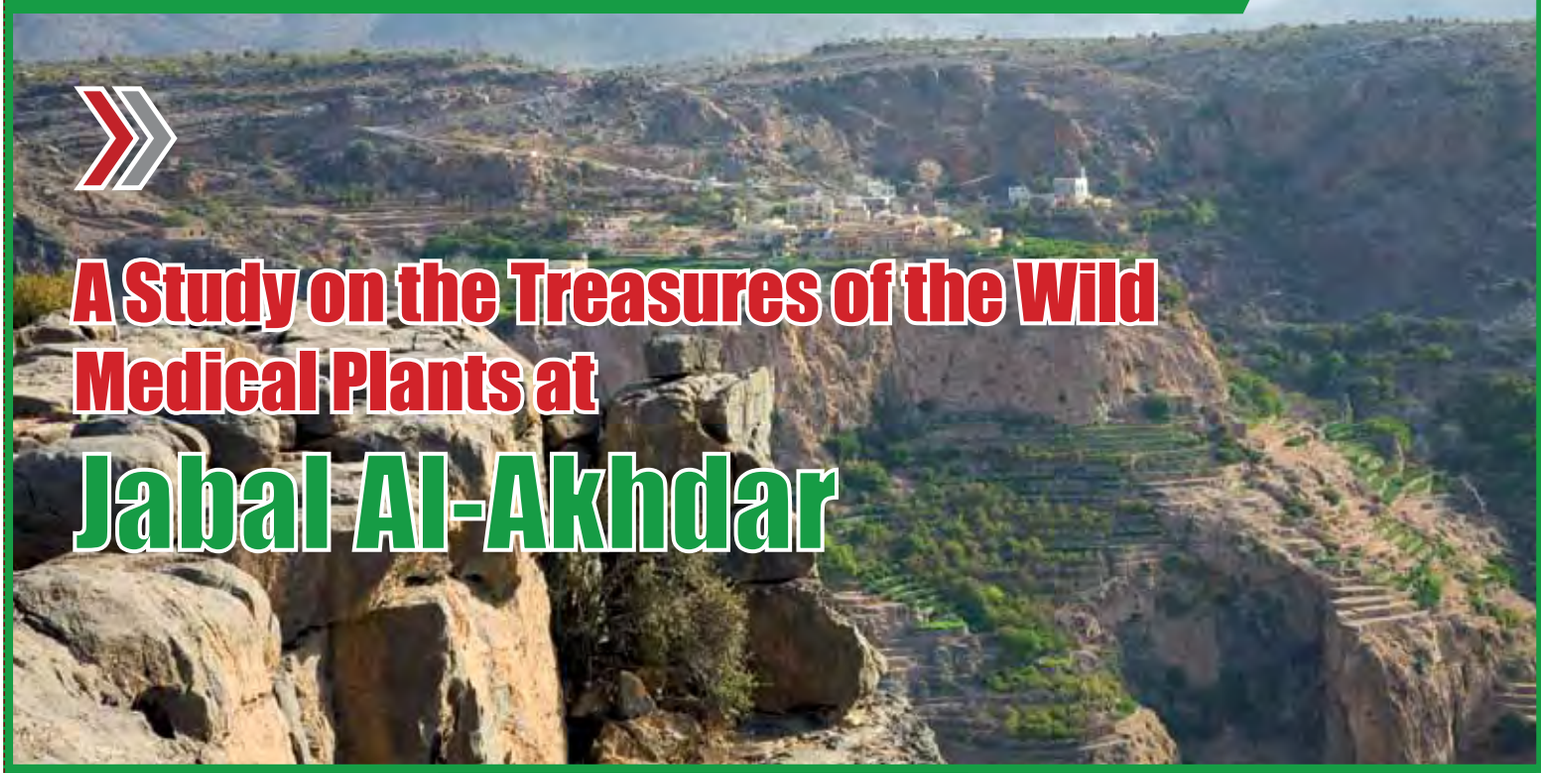
Consumer Health

Chemical compounds are very dangerous, as their effects remain in our vegetables, fruits and food that we eat every day. Studies have shown that these compounds retained kept in the liver for a long time, which explains the increase of people who suffer serious and incurable diseases such as cancer and all types of liver and blood diseases. Because our children are very precious and dear to us, we must take care of our health, by using safe organic agriculture, which has been experienced by all generations of mankind since the beginning of civilization and until 100 years ago, before these dangerous pollutants appear.

The National Field Research Centre for Environmental Conservation conducted a scientific study on the wild medicinal plants in Al-Jabal Al-Akhdar. The location was chosen because Jabal Al-Akhdar is characterized by botanical diversity that makes it a fertile area for research and environmental studies. This recent study is one of the many studies conducted by the National Centre in the field of botany in Jabal Al-Akhdar. The Mobile Environmental Research Unit has carried out many studies that have covered several aspects of rich biodiversity of Al-Jabal Al-Akhdar.

Done by the National Centre Due botanical diversification of Jabal Al Akhdar...

The research was conducted by: Waleed Al Zakwani, Azzan Al Kalbani and Abdul-Haleem Al Rashdi



A Study on the Treasures of the Wild Medical Plants at Jabal Al-Akhdar

Stages of Study

The scientific study was divided into three stages, during which help was sought from environmental and botany experts and researchers. The first stage was the holding of several meetings and lectures on Ethnography and Ethnobotany of Jabal Al-Akhdar , followed by interviews with local residents living in the villages of Jabal Al-Akhdar and have experience of wild medicinal plants. The second phase was to learn more closely from the residents experience on the most important wild medicinal plants located in the study site.

Objectives of the Study

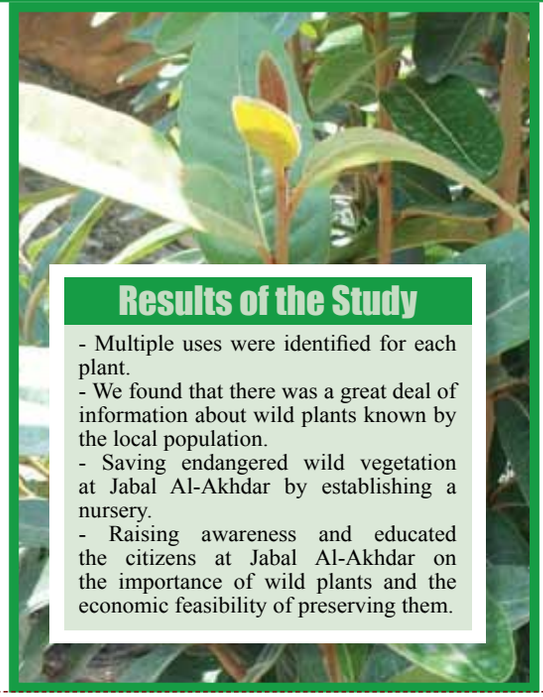
The study sought to take accurate information concerning the wild plants from the local community and the specialists of plant sciences in the Sultanate and to collect and document these data and information, to be a database and a permanent reference for future research in the same specialty. This will enable researchers and scientists to benefit from such information, as well as contributing to the preservation of this rich biological heritage for future generations.

The Plants Nursery

The plant nursery was based on the selection of plant species collected by the specialists and by local experts. A list of wild medicinal plants was prepared from the species found in Jabal Al-Akhdar, such as (Alalalan, Al-Atam, Al-Shahas, Al-Hanqalan, Al-Da›ja, Al-Saql, A;-Bot ... Etc.). The medicinal benefits of each cultivated wild plant were identified. The collected data showed the most prominent types of wild plants, such as:

Al-Utum (wild olive): It is an evergreen tree with a height of more than 3 meters. Its wood is often used in construction because of its durability and resistance to the termite insect. It is also used in the manufacture of sticks, while the fine branches are used as small sticks for puting the kohl around the eye. In the dry season, the fluffy branches with leaves are used to feed cattle.

Al-Shahas: It is a long life Dendritic Plant, used in treatment of mental illness, by rubbing the sickness place with plant leaves and and fruits. Its wood is used in manufacturing tool handles, and sometimes, the stalks of Al-Shahas are used in manufacturing of mashakeek and Omani shiwaa sticks to give the meat a special flavor.



Results of the Study

- Multiple uses were identified for each plant.
- We found that there was a great deal of information about wild plants known by the local population.
- Saving endangered wild vegetation at Jabal Al-Akhdar by establishing a nursery.
- Raising awareness and educated the citizens at Jabal Al-Akhdar on the importance of wild plants and the economic feasibility of preserving them.

The study sought to collect and document data and information, to be a permanent reference for future research.

Al-Qafs: Its oil has many health benefits. It is used as a laxative to shrink the nerves when rubbed on the shrinking spot. It is also used as a treatment for constipation. It is laxative to the abdomen and there are many benefits out of Al-Qafs oil.

Al-Hanqalan: It is a small long living shrub. Its oil contains avian and alkaloids and flavonoids and combinets and episiotic materials used in the treatment of cracks that occur in the heels of the feet. The gum Al-Hanqalan from the stems of the plant, mildly warmed on fire until it softens and then stuffed into the cracks.

Al-Dhuga: It is one of the most famous plants in the Sultanate. It is used to treat chronic liver diseases, that is by crushing Al-Dhuga stem and its extracted juice, then the the patient drinks it like tea. The Plant Extract is use to treat stomach diseases and burns. Newly grown stems of the plant have great benefit, for it is very useful and is prescribed for the treatment of high blood pressure, pain, inflammation and it is good for diabetic when added to the salad with salt and lemon.

Al-Saql: It treats burns by rubbing the white sticky substance on the burned place. It also treats smallpox for children and has many other therapeutic benefits, especially the care of hair and beauty.

Al-Namt: It is considered as one of the wild trees that have a close relationship with the mountains of Oman. It is a large shrub, famous for its delicious and moist fruits, which is often enjoyed by the inhabitants of mountainous areas and travelers. It can be used in the preparation of jam.

Al-Mahlab: It is a plant that belongs to the family of pink plum. It is one of the most important trees used as origin for grafting almonds and is grown in the cold mountainous regions. Its benefits are many such as strengthening of the senses, treatment of asthma, treatment of joints pain and treatment of tumors that are around the joints. It is also useful in treatment of diabetes.

Al-Sakhber: t has good smells, and used as medicine to cure colic. It is good food for animals, especially sheep.

Al-Jaada: It is used in treatment of headaches, and colic. It reduses the temperature and the sugar in the blood.

The Plant of Elias or Ass: It is used in treatment of abdominal diseases. Its leaves are collected, dried and crushed very well to extract a medical fragrance.

The Next Stage

- Complete the information from the local citizen through interviews.
- Identification of the spread of these plants in the study area through GIS.
- Expand this study to include other areas in the Sultanate after completion of the current study area.
- A complete book on medicinal plants in Jabal Al-Akhdar after completion of study and data collection.

Scientific Research about The Snakes In Oman :

A Scientific Research on Snakes in Oman

Their Characteristics and Their Environmental and Therapeutic Roles

The Department of Animal Science Resources at the Research Centre for Chemistry, Medical and Life Sciences at the University of Nizwa, conducted a unique scientific research on Snakes and snakes in the Sultanate. The research aims to identify snakes, their types and their characteristics, as well as to identify poisonous and non-poisonous ones. The Department seeks to produce anti-poison for the snakes found in the Sultanate, to study the components of each poison and its properties and to study its role in the treatment of diseases, in addition to the effective role played by snakes in the food chain at their habitat.

The Research Mechanisms

The Department of Animal Science Resources has searched all Omani environments for snakes species. The department has collected more than ten types of poisonous and non-poisonous snakes. Tests and studies were carried out on these species to identify their biological and behavioral characteristics, in order to document their types and places of existence and discuss their important role in the food chain in their habitats. Researchers of the Centre, continue to track these creatures and count all such species across the Sultanate.

Primary information

Studies have confirmed that snakes have been on the ground for more than 100 million years and their life expectancy is between 15 - 25 years. Snakes are Cold-Blooded (Herpetology) that belong to the Snakes' family. They have protruding bodies, covered with scales and they have skeletons as well. This combination helps the snake to move, to squeeze and to swim effectively without the need for limbs as other animals. Snakes have the ability to live in many places such as forests, deserts, lakes, oceans and spread across all of the continents except Antarctica. They exist in different lengths, ranged from a few centimeters to several meters.

Correcting False Information

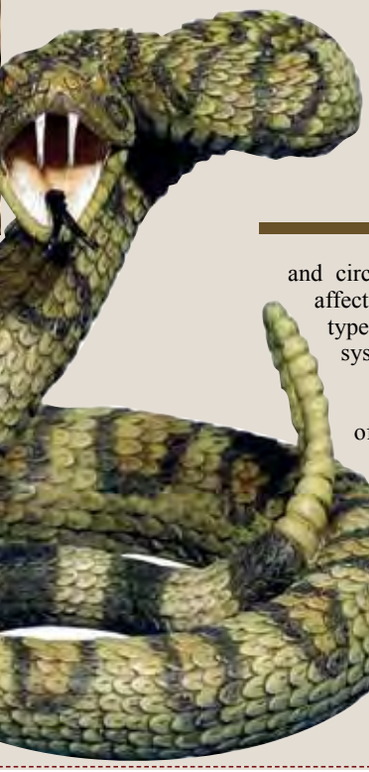
Despite the bad reputation of snake bites, most species are non-toxic, with less than 30% of snakes being toxic, and only 10% of them are dangerous to human life. Some types of venom affect blood

Environmental Balance

Like other creatures, snakes play an essential role in the ecosystem. They feed on many prey, such as small and large mammals, birds, reptiles, frogs and insects. Thus they control the numbers of rodents and other animals. Nevertheless, there are some people who use snakes skin in traditional treatments and some of them use snakes to make medicines for diseases. We should not forget that, if we kill snakes randomly now, we will suffer later from the spread of the animals that are killed by snakes and thus, we will face the spread of diseases such as plague and others diseases.

- **The Department of Animal Science Resources at the University of Nizwa seeks to produce an anti-toxin for the Snakes found in the Sultanate**

- **The department was able to collect more than 10 types of Snakes in order to document their types**



and circulatory system, some types affect the muscle tissue, and some types of toxins attack the nervous system.

Snakes Families

Elapid Snakes: All members of this family of poisonous snakes, which often spread in the tropics and subtropical regions, produce a poison that attacks the nervous system of the prey. The most famous species of this family is the Black Mamba, the Indian Cobra, the King Cobra, Cape Copra, Mamba Green and Sea Snakes.

Viperid Snakes: They are venomous snakes that spread in the Americas, Europe, Asia, and Africa. These snakes are characterized by two fangs that can rotate back and forth. Such fangs are folded back when not in use. There is a subspecies belonging to the Viperid called the Pit Viper because of the heat sensor holes on both sides of the head. One of the most popular types of Viperid Snakes is Russell's viper, Saw-Scaled Viper, Gaboon Viper, and Western Diamondback Rattlesnake.

Colubrid Snakes: It is the largest snake family, including two thirds of snakes' types in the world, poisonous and non-poisonous. They have non-hollow teeth located in the back of the mouth. The most famous types of which are: Corn Snake, California Kingsnake, the boomslang and the Black Rat Snake.

The Boa Family: Known as (Boidae). All types of this family are non-toxic. They are characterized by their large size and their strength which they depend on to kill their prey by wrapping around them and strangled them. The most famous types of them are Emerald Tree Boa, Boa Constrictor and the Green Anaconda.

Pythonidae Family: All members of this family are small, and they kill their prey by squeezing. The most common kinds of them are the Reticulated Python, Burmese Python, and African Rock Python.

The Myna Bird in Oman

Beautiful and attractive but bad detective

Inflicts Great Damage on Biodiversity

Editing By: Dawood Al Balushy & Khalifa Al Higgi

Photographer: Nasr Al-Rahbi

Exotic or invasive species pose a major threat to the biodiversity of the areas to which they enter. These species of plants, animals or birds are invasive alien species or may rapidly spread by crowding and competing with other native plants and animals when added to a new habitat that lacks traditional control factors. Invasive alien species are currently a major threat to global biodiversity. Perhaps the largest model of extraneous or invasive organisms in the Sultanate is the Common Myna Bird, the presence of which is recently noted in the Sultanate. It has spread widely. The bird has a significant impact on biodiversity at places of existence, because it is one of the aggressive birds that attack birds, animals and even humans. Therefore, It clearly affects the food chain in the areas it controls by attacking other bird nests and killing young ones.

Original Home

The open forests from Afghanistan to India, Indochina, Sri Lanka, Pakistan, Nepal and western Indonesia are the original home of the Indian Common Myna, but it deliberately or taken humans in attempts to raise it as homes pets and then migrate, the bird spread over many other places around the world such as the Sultanate of Oman, where it has been seen in abundance, especially in the provinces of Muscat and the north and south of Batinah, Al Dhakhlia, Al Dhahira and Dhofar. It is also located close to Al Jabel AL Akhdr, which is one of the most important areas of biodiversity in the Sultanate, and the bird is a major threat to those areas.

Its Features

The Indian Common Myna belongs to the Starlings Family of the platelets. The bird is 22 to 25 cm long and its wings, when flying is 33 to 36.5, cm. It is a medium-sized bird with black heads and yellow feet.

It is also dangerous in the way it breeds rapidly, mating 3 times a year, and eggs 4 - 6 eggs at a time. It is also a perennial bird, aged 25 years, and starts breeding after one year from hatching.

The Myna is a farmer›s friend in his native country for his ability to

- It's average age is 25 years, mating 3 times a year and puts 4 - 6 eggs at a time
- It is aggressive, kills birds, small animals and may attack humans
- It affects agricultural crops and contributes to the spread of many infectious diseases

eat insects that destroy crops.

In many parts of the world, Indian Common Myna is a problem for the environments in which it settled. Although in its original environment in India, it is a friend of farmers for its ability to eat insects that destroy crops, but in Australia, for example, it has been pursued after its breeding, as it is causing economic problems by destroying fruit and crops.

The story of the Common Myna with Australia is a long one, but it shows how dangerous the human interference in environmental balance can be. The Common Myna entered into Australia in 1862 to help fight insects, but the situation differed after the damage caused by the alien bird to an environment other than its original.

Damages Caused by the Common Myna

The Common Myna causes a lot of damage in the places inhabited in. The most important are:

- Attacking the nests of other birds and killing their young ones, in addition to attacking the small animals and killing them.
- The destruction of some crops grown by farmers, especially at growing stage.
- It also eats bees causing significant reduction in the output of the beekeepers.
- It helps to transmit diseases, parasites and fleas to humans and animals such as cattle.
- There is the possibility that the Myna may carry diseases causing viruses that local species do not have sufficient immunity to meet them.
- It affects the food chains. In the places where it is located, absence of crows was noted. So the role of crows in beaches cleaning from dead fish was missed. This affected the environment in such places.
- This bird is characterized by loud noise. Such sound is made in every movement it makes and when it sees another bird or any person approaching it.
- Due to its presence in urban areas, it destroys infrastructure such as canals and pipes where it builds its nests.
- Attacking other birds, nests and nesting in, and hatching the eggs of other birds.

Environmental Research about The Conocarpus Tree :

The conocarpus tree, locally known as damas, dams or Kuwaiti tree, is an extraneous exotic species to the Omani environment, "The Lynx" seeks to warn of its dangers to our environment. Although the tree has a range of benefits, but such benefits are always connected to its original environment, as the tree turns into many environmental hazards when moved to a new environment.

It is one of the most water consuming trees

Conocarpus

Evergreen, but districtive

Information

The Conocarpus is a plant species belonging to the Umayyad or Cambrian species, comprises two types of plants, the first of which is the Conocarpus and the second types is the lancifolius or Conocarpus erectus. It is an evergreen tree with many branches of Eudicots type.

It may reach a height of twenty meters and is characterized by the soft branches with green or red color. Its leaves are reciprocated, short necks, the shape spear. The edges of the leaves are flat, while their peaks are sharp. The flowers are axillary, or peripheral, and are greenish white in color, but sometimes it is dark green.

Its fruits are conical and the plant›s name is originally attributed to the conical shape of the fruit.

- **It is an evergreen of Eudicots type with many branches**
- **It has strong roots that extend deeply into the soil vertically and horizontally to search for water sources**
- **The original habitat of the tree is the Australian continent and the beaches and rivers of Somalia, Djibouti, Yemen and the edges of Florida swamps**

The Origin of Conocarpus Tree

The original habitat of Conocarpus trees are the beaches and rivers of Somalia, Djibouti and Yemen. As well, there are many such trees on the edges of the swamps of Florida. The continent of Australia is one of the original habitats of this tree. Despite the fact that it is distributed throughout the globe, it is noted that the original places of this tree features plenty of water, as this tree consumes a lot of water. but it is similar to the abundance Water, as this tree by nature consumes a lot and lots of water.

Its Benefits in its Original Environment

1. The Conocarpus tree has strong wedge shape roots that extend deep into the soil vertically and horizontally to search for water sources. This is, therefore, a good feature for stabilizing sand dunes,

2. It helps to stabilize rivers' beaches and protects them from collapse and erosion, so it was noted that the original habitats are filled with rivers.

3. Conocarpus tree wood is of good quality. It is used for construction of boats and characterized by being strong and heavy weight. They are a good source of energy (wood) and good for production of slow-burning wood coal.

4. It provides food and shelter for a variety of animals, and has the ability to resist soil erosion factors.

5. Its soft branches are considered animal feed, although they contain the Tannin which causes constipation.

6. The tree leafs extract is popularly used in the environment to treat anemia, diarrhea and fever. Studies have shown that its bark and leaves are rich with high levels of antioxidants used to treat gingival bleeding, vaginal bleeding, skin ulcers, and it is anti-cancer.

Environmental Hazards of Planting Conocarpus Tree

The benefits of this tree are connected to its original environment. This tree becomes a threat to the new environment to which it is transported. It turns into an invading plant. The most prominent of these threats to non-indigenous environments such as Oman are:

1. This tree is highly water-consuming and therefore poses a major environmental hazard to water-stressed environments.

- **The fruits of the tree have an unpleasant smell constitute a environment suitable for harmful insects and it is a breeding habitat for dangerous reptiles**

2. The roots of these plants grow horizontally, causing extensive damage to infrastructure such as water pipes, sewage pipes, electrical and telephone connections. The roots can penetrate into rocks and reinforced cement concrete in search of water, which contributes to the destruction of buildings.

3. Continuous dripping of leaves and fruit throughout the year leads to the accumulation of dirt in the streets and on the sidewalks and on the soil.

4. Recent scientific research has shown that this tree causes health risks. The gas that rises from it activates cancer cells in the body. It also causes allergic reactions in the airways, causing some people to have asthma. It is a leading cause of sinus allergies.

5. The fruit of the tree has an unpleasant smell which creates environment suitable for harmful insects and a place for dangerous reptiles such as snakes and others.

6. This tree harms the diversity in the environment in which it is planted. Because it has a high capacity to absorb water, it deprives other plants and trees from the source of life and lead to their death.

Mobile Environmental Research Unit ...

Nature Exploration Trip in «Jabal Samhan»

Prepared & Photos by: Nasr Al-Rahbi

The Mobile Environmental Research Unit of the National Field Research Centre for Environmental Conservation monitored more than 27 species of birds, most notably the Egyptian Eagle, the Bulbul and the Tharthar birds, during its recent study on the protected area of Jabal Samhan and its long-term surveys of birds, insects and small and big mammals. The study also included the vegetation cover of the reserves of Jabal Samhan.

Promising results:

In addition to the surveys carried out by the (MERU) for birds, the camera traps installed by the (MERU) in the reserves identified a group of large mammals and animals such as the red fox, the Afghan fox, the Nubian Tahr and some of the pet animals that were grazing in the area such as camels, cows, donkeys and goats. The study included a survey of small mammals also. They included Arabian mouse with spiny hair, jerboa, and muscular rodents. The survey of insects showed more than 120 samples of 30 insects. It also trapped a number of small sized insects.

In addition to this, it has also used a kind of circular nets for large butterflies and other insects of water ponds. The (MERU) of National Field Research Centre for Environmental Conservation is aimed at conducting specialised environmental studies, covering all parts of the Sultanate to prepare a database on biodiversity in different Omani environments. This has done studies on Jabal Al Hajar, Jabal Shams, Jabal Qahwan, and Al Saleel natural reserve, and has explored the environment of Oman and its biodiversity.

Results of the vegetation survey:

Vegetation is an important element in all ecosystems. It is the basis of the food chain on which other species depend. Therefore, the centre›s researchers conducted a survey of the vegetation cover of Jabal Samhan, which came out with the following conclusions:

• Plant diversity and its abundance in Jabal Samhan is of great importance to habitats which support different species of wild lifes.

• Southwest monsoon leaves a significant impact on vegetation.

• Denser vegetation of Jabal Samhan lies on the southern slopes.

• Jabal Samhan is a region rich in vegetation where there are different types of plants such as acacia trees, frankincense, figs, and Gethsemane.

• The deep wadies which penetrate the limestone plateau has some of the plant habitats, including the frankincense tree.

Survey of birds:

The reserve and its plant cover provide a suitable environment for nesting birds, as well as there is less threats and effects which prevent their settlement. One of the main factors of mobile unit's efforts is a survey of birds in the reserve by drawing a group of imaginary lines at random points of the reserve. Each line runs one kilometer. The line is divided into five points. Each point is 200 meters. The team stands for about

three minutes. Then move to the next point takes two minutes. The team surveys the area surround by the point by watching the birds with the naked eye or using telescope or by distinguishing the sounds of some birds. These lines are drawn in random areas of the reserve to cover its widest possible area as samples representing the total area of the reserve. Data are recorded for each observation of a type of a bird and if possible their classification.

Small mammals:

Small mammals are one of the most important components of biodiversity in the protected environment of Jabal Samhan, which was included in the research and survey programs of the (MERU). A survey of random points was conducted throughout the reserve to cover the mountain, the plain and the wadi, including areas with vegetation cover and arid zones. The survey was conducted using a type of traps which is in the sizes suites with the size of the animal to be studied. The team distributed about 40 traps at the search point, which was randomly assigned in a square shape. Each trap is separated by a distance of 20 meters. The trap is left for a full week at this point. The animal is attracted by leaving a piece of food inside the trap consisting of peanuts and barley peel . The results were monitored on a daily basis and the data of the animal falling into the trap were recorded and then a mark was also made on the animal›s body and re-launched in its environment. The experiment is repeated twice in each type of environment; mountain, wadi, plain. A mark is left on the animal›s body to distinguish it if they are trapped again.

Survey of insects:

The team devoted part of its time to studying the insects› biodiversity in the reserve. The survey included flying insects through the use of two types of traps: hanging nets, Malaise traps and crawling insects using other type of traps. Catching traps and suspended nets were installed in more than 10 random points in the reserve while a Malaise trap was installed at five points of the reserve. These points varied between the plain and mountain and wadi. The falling traps are metal cups with a depth of 20 cm which can burry on the surface of the ground level so as the insects can not climb out of the trap. The team inspects the cups every 24 hours as they fear that the birds might gather around them as they rely on insects. They also have to see if they were buried in the case of a dust storms. During the survey, it was also noticed that it is difficult to drill in some rocky and mountainous areas. It requires changing the point to the nearest place for the drilled. At each point, approximately 20 cups are distributed. As for the suspended network, it is a cylindrical network with one entrance from the lower side and it provides an attractive light for the night insects as well as for a Malaise trap. It was used to survey the flying insects, which is a longitudinal tent which is tilted in a container of solution. When the insect collides with the tent wall, it means it is trying to reach to the highest point where the device is located.

Camera Traps:

The team has set more than seventeen camera traps in different areas. These sensored cameras can be left in a place for more than three months. It has the ability to shoot video clips or successive images at high speed. The clarity of the captured images depends on the source of the light. If using the flash cameras, the picture will be colourful and it indicated the use of the infrared camera. Cameras are installed in the areas of the passage of animals or water pools and places frequently visited and used by them.

Environmental Research about The Omani Owl :

Omani owl ... Discovery Confirms the Biodiversity Of the Sultanate of Oman

The studies conducted by the Environment Society of Oman (ESO), in cooperation with British scientists of birds, on the owl discovered in Al Jabal Al Akhdar named as Omani owl, has revealed that this species lives and reproduces on Omani lands only. A very few of these birds are found outside the Sultanate also. Therefore, the international authorities which supported these latest studies have decided to stop calling it Buttler Owl and finally named it Omani owl, as it was for the first time found in the reservoir of Al Jabal Al Akhdar or what is called as the Green Mountains of the Sultanate.

60 bird watching site

There are more than sixty bird watching sites in the Sultanate. Most important of them is Bar Al Hakaman, which is considered the most wonderful site for watching many types of birds, including large eagles, large flamingos, gulls, hooks, etc. Some of these birds are in thousands. There are other important bird watching sites located on the beaches, islands, gulfs, deserts, mountains and fields. Most important of them is Musandam, which links the Arabian peninsula with the north Asia, where there are many birds. There is an island called the bird island in Khasab, which contains large species of birds, as well as there are coast of Batinah, Islands of Swadi, Demania and Al Fahl, Al Ansab lake in Muscat, Qurayrat, Sur, Ras Al Hadd, Masirah Island, Mahoot Island, Halaniyat Islands, and Al Jabal Al Akhdar. Dhofar governorate is distinguished by many species of birds, which can be seen before and after the autumn season. The can be easily seen and photographed particularly near sea lagoons and mountains.

This is classified as a new type of owl and one of the rarest and endangered species. This classification indicates that the Sultanate is unique in its geographic position for the biodiversity, particularly for birds. It gathers birds from three continents, Asia, Europe and Africa, in one place. The northern Oman is home to and a way of migration of the birds of Asian and European species.

Omani Owl:

During the preliminary studies conducted by a team of researchers from the Environment Society of Oman and British bird scientists using tools of monitoring and accurate recording, sounds of a new owls were heard which have not been heard or recorded before. This led the scientists and researchers to follow this thread and set up night cameras to be photograph the owl. The cameras of the scientific team spotted seven new types of owl which have never been recognized by the scientists earlier. This was named as Omani owl and was classified as among the rarest and endangered species.

In-depth studies:

One of the world›s biodiversity explorers was able

The new discovery has been classified as one of the very rare and endangered species

The sound of the bird was monitored and the 7 new types of owl bird was monitored with modern cameras

to solve the mystery of the Omani owl which was discovered on Al Jabal Al Akhdar. A number of samples stored in museums which were for a type close to the owl called the Butleri owl, which is known by its scientific name Strix Butleri, were examined. The genetic analysis of the samples collected from several countries in the Middle East was carried out. It proved that the butler owl may be divided into two types. one of them is the owl known as Strix Hadorami, which can be seen in several countries in the Middle East, including Saudi Arabia, Egypt, Yemen, southern Oman. The other is owl which is scientifically called Strix Butleri and of which only one type of sample is found in Pakistan since 135 years. A team of scientists captured one of the new species and later released it as part of a joint research project with the Environment Society of Oman and Bird Life International. The team took samples of the feathers and blood of the bird and analysed them. As a result of these efforts, the team recommended to stop calling this bird as Butleri owl and named it as the Omani Owl, as the species lives and reproduces only on Omani soil. The team has found only a few isolated birds found outside the Sultanate. This recommendation was accepted by the IOC World Bird List.

Unique diversity:

This new discovery has proved the Sultanate›s unique biodiversity. The Sultanate is an important centre for birds migrating between Asia, Europe and Africa. More than 527 species of birds have been identified in the Sultanate. The new findings of the research team has confirmed that there are other species which are facing extinction are ostriches, ibex, ducks Abu Farwa and Chershir etc. It has noted that the northern Sultanate is home to many types of Asian birds as it is closer to the Indian subcontinent, while southern Oman has African species. Oman is considered as a vital bridge for the migration of birds from Asia to Africa.

Massive efforts:

The experts of birds have started study of Omani birds ever since the seventies. Then the first book "Birds of Oman" was written. The efforts to register and classify birds of Oman continued by many including Oman Birds Registration Association. Many researchers made huge effort to collect details, record and photograph the Omani birds, thanks to the efforts of the biodiversity authorities in the Sultanate. The Environment Society of Oman is studying the Egyptian eagle, which is found in several sites in the Sultanate. Masirah island is considered as one of the most important gathering points in the world for many endangered species.

Environmental Case about The Plastic Bags & it›s Usage Annually :

Who is Responsible ?!

The problem of plastic pollution has become one of the biggest issues and challenges being faced by the Sultanate and the world recently. There are indications that the rate of plastic bag used only in major malls have reached to extreme hight. There are 40 million bags used in one commercial centre per year. It is most frightening that more than 400 million plastic bags are used in every ten malls annually. This is apart from their use in other sectors such as restaurants and other such outlets in the retail sector. It indicates that the Sultanate›s consumption of these bags is more than the global rate of use.

Usage more than 40 million plastic bags annually in every major commercial centre in the Sultanate

Shocking numbers

The plastic bags used for shopping or food preservation and all household needs are classified into 20 of the most dangerous substances. According to Dr. Hamad bin Mohammed Al Ghailani, Director of Community Affairs and Environmental Awareness at the Environment Society of Oman, commercial centres of the Sultanate only 40 million plastic bags per year. He said that consumption rates of plastic bags in the Sultanate of Oman exceeds sometimes the world's average consumption. The world consumes 60,000 plastic bags every 6 seconds, two million plastic bottles every 5 minutes and 100,000 food packets every 30 seconds in the world. He said that the annual plastic production ranges between 500,000 and one billion tons annually. Dr. Al Ghilani said that these bags are made of petroleum derivatives and chemicals, therefore, they heavily damage human health and environment. He pointed out that there was no means to contain the damaging effects caused by the trillion bags consumed by the world annually, according to the World Health Organisation.

■ Al Ghailani: World consumes 60,000 plastic bags every 6 seconds, and 2 million cans every 5 minutes

Awareness efforts

Dr. Hamad Al Ghailani called for the use of eco-friendly bags, which are available in many shopping centres and can be reused and have no effect on the environment. He also urged for minimising the use of bags as much as possible.

He pointed out that the Environment Society of Oman was printing a large number of eco-friendly bags and distributing them in important shopping centre. It also carries out continuous awareness programs about the effects of plastic bags on the environment and human being in schools, women›s associations and the society in general. It is also organising training programmes and

workshops to recycle plastic.

Under waiting

The government has dealt with the dangers caused by plastic bags and has formed a national team to study the effects of using plastic bags from all relevant bodies such as the Ministry of Environment and Climate Affairs, the Ministry of Commerce and Industry, the Environment Society of Oman and Be'ah, of the field studies, and study the effects of using plastic bags on the environment and how to reduce them, and find appropriate solutions to reduce the use of these

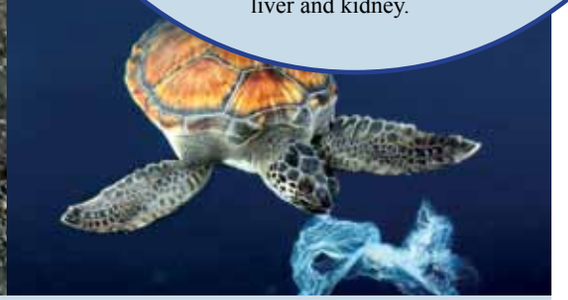
Enzyme eats plastics

Scientists in Britain and the United States have said they have developed an enzyme that eats plastics that could help fight pollution in the future. The enzyme is capable of digesting ethylene trifluate, a form of plastics developed in the 1940s and is currently used in millions of tons of plastic containers. Plastic products made from this material can survive for hundreds of years in the environment and currently contaminate large areas of land and seas around the world. Researchers from the University of Portsmouth and the US Department of Energy›s National Renewable Energy Laboratory discovered the enzyme during a natural enzyme structure that is believed to have developed into a recycling centre in Japan. «Once the enzyme has been shown to help bacteria break down or digest the plastics made from multiple ethylene trifants, the researchers decided to» modify «its structure by adding some amino acids, said John McGhehan, a professor at the University of Portsmouth who co-led the research team. This has resulted in a change in enzyme processes to allow its ability to eat plastics faster. The results of the discovery were published in the Proceedings of the National Academy of Sciences. The team is currently working on improving the enzyme›s performance to see if they can make it able to analyze plastics on an industrial scale.

- **When the regulation of use of plastic bags will be completed to reduce the risks to the environment and human health**
- **Regulations will regulate use of biodegradable bags, proposal to manufacture bags convertible into fertilizers**
- **Plastic bags classified among 20 most dangerous materials**

Damage caused by plastic in the air

Another recent study revealed that there was presence of huge quantities of plastic particles in the air of the cities which are already packed with three to ten tons of plastic per year. The same research team also found quantities of plastic particles in an apartment and hotel room. In response to this study, one scientist suggested that we inhaled plastic particles from the air. The burning of plastic bags also pollutes the air with toxic and harmful gases and vapors, such as CH2O formaldehyde, C6H5CHO, HCN, NH3 ammonia, carbon monoxide, nitrogen oxides NO2-N2O-N2O3-N2O4, and some volatile hydrocarbons VOCs Etc. These substances cause disturbances and diseases such as allergies. They also lead to respiratory diseases and effect nervous system, digestive system, heart, liver and kidney.



Risks of plastics on the sea

The plastics used in the manufacturing of goods cause pollution of marine environment, as many plastic waste ends up in the middle of the seas and oceans, affecting whales, birds and turtles and harming the fish on which they depend for food. This is leading to their depletion and death. According to a report published by the Journal of the National Academy of Sciences, 99 per cent of seabirds are susceptible to ingesting plastic particles along with food until 2050. The researchers relied on studies which were published between 1962 and 2012 and included 186 species of birds, as reported by the German website Tecite Online. Plastic waste has many risks. Waves' movement and ultraviolet light affect the plastic in the water, leading to its rupture into small pieces which can not be seen with the naked eye. Most of the plastics present in the oceans are seen only by microscope. The smaller the plastic particles, the greater the risk to marine organisms. Plastic wastes secrete their original constituents, which remain in the water for a long time.

bags, in addition to the study of Gulf standards for the preparation of standard Omani standard, and so far, the issuance of the «Integrated Waste Management» bill, the issuance of a regulation on the use of plastic bags to reduce their risks to the environment, human health, the sustainability of ecosystems and biodiversity, and the commitment of commercial centres to use bio-degradable bags to reduce their risks to the environment and human health; Ecosystems and biodiversity, and we do not know how long we will wait for this regulation despite the risks these bags cause to human health, organisms and biodiversity in the country.

Strong decisions

There is an increased awareness about the dangers of the use of plastic bags, their serious negative effects on human health and other living organisms as well as on the safety of the environment. A number of countries have taken strict measures to gradually control the use of plastic bags, try to develop new industries in this area, and change the existing plastic industries. These countries have taken into account all health, environmental, economic and social considerations.

Use of Plastic bags banned in Kenya since 2008:

Bangladesh, Taiwan, Uganda, South Africa and most of the Indian cities have banned the use of thin plastic bags.

In the European Union, Austria, France and Germany have banned the use of plastic carry bags used for storing food and other edible materials

Ireland imposed a tax of EUR 0.15 on each plastic bag. It helped in reduction of the use of these bags to about 95%. Hong Kong also imposed a tax of 6 US cents per plastic bags. It led to the reduction of the use of plastic bags to 403 in just two days, compared with 2,742 during the same period before taxation.

In 2015, Australia put a complete ban on the use of plastic bags and started giving incentives for the manufacture of paper bags and their recycling.

Yemen Standardization, Metrology and Quality Control Organization has released Yemeni Standard Specifications for Biodegradable Plastic Bags.

In United Arab Emirates, its Ministry of Environment and Water has taken a number of decisions to reduce the use of non-biodegradable plastic bags and has announced mandatory standards for plastic bags as of January 1, 2012.

In Qatar, the Ministry of Environment announced technical requirements for packing of some food items and other such materials. It has also prohibited the use of plastic bags for packing Arab and the country breads. It has also banned plastic bowls and plates for drinks and hot food items.

The European Commission has also proposed banning of disposable plastic products such as cotton bars, beverage dispensers and dumping of wastes in sea. The proposal is regarding prohibition of single-use plastic products for which sustainable alternatives are available and they do not harm the environment. The proposal obliges EU countries to collect 90 percent of disposable plastic water bottles by 2025 and requires producers to help cover the cost of cleaning and waste management.

Environmental Case about Wasting Food & a Message for Ecological Balance :

“ Eat and drink and do not waste .. ”

“Eat, drink and dont waste. He does not love the wasteful” is a message from Almighty Allah which urges us to protect our environment which he has given to us. A simple view makes us realise that one of the most important causes of global environmental crises is the lack of commitment of human being to this call of God, and the lack of awareness of his role as a witness and caliph on the earth. This is also because of human beings non-commitment to the principles of development and co-existence without excesses and non-negligence, and the ideal use of our environmental resources which God has given us as a responsibility to protect them for the future generations and other creatures. It is a call from God against the imbalances, injustice which disturb the life and the nature,and a commandment of the Almighty, for the Muslims to lead best and balanced life as a community of middle path, away from excesses and its threats to the environment and all its components.

Ramadan an opportunity:

The month of Ramadan is a month of virtues, mercy and forgiveness as a spiritual moment which demands obedience and an opportunity to correct understanding of our true religion. Many environmental voluntary organizations are trying to create awareness, believing that this holy month is important for our Islamic society. This is the month when people want to be more obedient and start changes in the pattern of consumption and start simple life on this earth. People want to harness local knowledge, innovation, values and ethics and develop local models of better development through the green movement during the month of Ramadan. They want to focus on green innovation as a method of environmental awareness. They want to push for a balanced green lifestyle respecting religious values which urge adherence to sustainable development. God has given responsibility to human being on earth to abide by the idea of sustainable development. The question is that how much we subscribe to the idea of renewable energy during this Ramadan and how much we are prepared for this in terms of awareness, understanding, coexistence and mercy.

Awareness Campaign:

Friend of Environment, which is part of the program patronised by the National Field Research Centre for the Environmental Conservation, is one of the agencies which launched campaigns during the month of Ramadan to create awareness among the social groups to take sufficient food in Ramadan but do not waste it, and strengthen the social sensitivity and relations with the environmental issues.

«The goal of the campaign is to benefit from the holy month of Ramadan, to encourage local communities to reduce food wastes, and to educate the society to not to waste food, not to throw excess food in the trash, Protecting the environment and society from environmental hazards arising from wasting excessive food,” said Azari Al Daoudiyyah, patron of the team of Friend of Environment.

She said that the campaign was to hold a number of discussion programmes in several places, where we make these video presentations aimed at preserving food. We also discuss some photos about the poor countries and the countries which use considerably excessive food. We also discuss the subject of food and sending that message that the food was the bounty of Allah and it is a must for us to preserve them. A caricature contest was also being organised about rationalising food consumption. The idea is that the message should reach to the mass that for our future we must preserve food and avoid its excessive use more than they are required.

Community efforts:

The ‘Preserving the Bounty’ in Buraimi

A message for ecological balance

Call for optimal use of our environmental resources

« Friend of Environment »

Holds awareness campaigns for rationalisation of food consumption and its preparation

« Protect the Bounty »

collects excess food, recycles and distributes it to the needy

« Seen Jeem » « Q & A »

a Ramadan awareness contest organised by Environment Society of Oman in Sohar, Ibra and Nizwa

« Green Environment »

includes activities ranging from awareness workshops and campaigns to clean tourist places

governorate is a youth team which wants to strengthen the idea of preserving the bounty of excess food, especially during the holy month of Ramadan and on the marriage ceremonies. The team communicates with the society to create awareness about wasting food.

Khalid Bin Marai Al Yahyai, member of the team of the voluntary group 'Protection of Bounty', said that the team was aimed at instilling values and principles of the Islam and to Preserve the Bounty. It collects the food which is more than the need, and prepare it properly after ascertaining its validity for human consumption and distribute it to needy families. During the month of Ramadan the remnants of food is collected after the Isha prayer, to confirm its validity and then placed in proper containers.

Al Yahyai said that the "Protection of Bounty" team which was established 2012 was playing its role in the environment protection. It believes in its social responsibility of preserving the bounty and the environment. This initiative is a model for minimising the waste from the leftover food as it damages environment and public health. We collect the leftover food which is fit for human or animal consumption and deliver them for recycling.

The winning team of the Wa iyyakum volunteer competition is one of the most active teams in the holy month of Ramadan. The team has more than 120 volunteers who travel to Al Buraimi governorate to collect food leftovers and provide them in a manner suitable for the needy.

Awareness role:

Dr Hamad bin Mohammed Al Ghailani, an environmental expert and environmental awareness director at the Environment Society of Oman (ESO), said that the association was doing some special activities during the month of Ramadan. As part of these activities, the ESO is organising 'Seen Jeem' (Question & Answer) competitions. It is a competition which is based on questions and answers about environmental issues, endangered species, biodiversity and the environmental diversity in the Sultanate. These activities are carried out at the governorate level, annually in two or three governorates. The program was organised last year in Salalah, Sur and Masirah. As for this year, the competition was held in Sohar, Nizwa and Ibra.

Green environment:

The «Green Environment» team consists of 18 volunteers. They are students of Technical College of Ibra. Although this year›s Ramadan coincides with college examinations, the team has carried out a number of environmental activities and contributed to environmental awareness in this holy month.

Hamad Bin Hamoud Al Shethani, the Green Environment team leader, said that the team›s goal was to protect the environment with all its dimensions and to encourage people to participate in the voluntary work for their environment. The team organises a number of activities, including exhibitions and workshops on recycling waste.

On the efforts of the team made during the month of Ramadan, Al Shethani said that despite the lack of time, the team organised a series of environmental awareness activities, particularly a workshop which was aimed at creating awareness about environmental hazards. It was an effort to communicate with the people about how to deal with the environmental issues in the society. A group of students gathered at Al Yahmedi Park, and discussed all environmental issues. The team also participates in campaign to clean one of the tourist areas in Ibra. He pointed out that the Green Environment team will end its activities in this holy month by organizing a volunteer evening for the students of the college.

Omani scientific study opens way for its environmental benefit

Rogue Plant

Study conducted by the students: Wijdan Bint Saud Al Nadabia - Arwa bint Nasser Al Jalandian - Razan bint Abdullah Al Nadabia

won the first place in Globe program high fertilization cabability and saline absorption of water and soil

A group of Omani students carried out a scientific study of the effectiveness of the use of rogue (reeds) in fertilisation of plants. The study has tracked the effect of reeds on water and soil on which it grows. The study achieved the first place in the Globe international environment program. The study proved effectiveness of plant in fertilization of plants, and its positive ability to absorb salinity from water and soil. The study recommends benefitting from the Rogue plants for fertilization of plants, and to explore other possible environmental use of it.

Reasons:

Rogue (reed or jungle) is the genus of a herb, belonging to the Nigella species. Its scientific name is ***Phragmites australis***, which has been widely seen in the wadis of wilayat Samail, particularly in the area where water stays for a long time. Previous studies have shown that the spread of this plant to this level was an environmental problem, because of its ability to absorb water. Its spread was considered to cause weakness in the ground water resources. In view of the spread of this plant and its ability to absorb organic materials from soil, the study focussed on research about the effectiveness of its use in plant fertilization to increase growth rates, which in the future could become beneficial for the society and the environment. The researchers in their previous studies focussed on the environmental uses of the Rough (jungle) plant for the treatment and purification of sewage water, in addition to its use in feeding the animal such as sheep and cows. It contains 35% dry material, 12% raw protein, 31% raw fiber, 1.2% fat.

Application:

This study was applied in wilayat Samail, where the Rough plant was dried and grinded to be used as fertilizer for tomato plants. The growth rates of tomato for which Rough fertilizer was used compared with the tomato plants for which usual organic fertilizer was used thRough land cover protocol. The water and soil protocol was also used to measure the properties of conductivity, salinity and acidity of the samples of water and soil from two different locations, one near the growth of the Rogue and the other away from it, and compare them.

The research was based on three main questions: How effective is the use of Rough or reed in plant fertilization? How are water characteristics affected by the growth of the Rogue compared with water in a distant location from it? How are the characteristics of the soil on which the Rogue grows compared to soil far away from it? Some relevant sources were also determined for the study

such as collecting information from the school›s educational resources centre, like encyclopedias and internet to access some articles as well as the protocols of the GLOBE program.

Tools and Approach:

The equipments and tools suitable for the work were identified. They were pH meter, salinity and conductivity measurement, metric bar, ruler, sensitive balance, distilled water, cups, moving tool, transparency tube, thermometer, GPS, paper, pen). This is in addition to collection of samples by using appropriate protocol activities (ground layer, water, soil) by cutting, drying, grinding and preparing them for fertilization. Then the tomato plants were planted on the same type of soil and irrigation was done with the same amount of water. These plants are divided into four sections, a section which was fertilised by Rough, the second which is fertilized with organic fertilizer, the third is mixed with the Rough and organic fertilizer and fourth without fertilizer, followed by observation of growth and recording of the data during three weeks as well as study of the characteristics of water, including its conductivity, transparency, Salinity and acidity on two places. One closer to the area where Rough plant grows and the other which is far from it. Similarly, the characteristics of soil including conductivity, salinity and acidity were studied where the Rough plants grow and soil is far from it.

Data collection:

Samples were taken from the study sites at the appropriate time and according to the specifications decided by the team. The working papers were designed, the growth data of the tomato plant was recorded every two days and the water was irrigated in equal quantities each time. Similarly, the data was collected and were organised in charts and were entered in the website www.GLOBE.gov. The data regarding the first question were collected by measuring the growth of the stem of the tomato plants grown according to the type of fertilization which was provided. The samples of tomato plant of the same species were selected and planted in the same soil type, given water in the same amount and divided into four sections according to the types of fertilisation. They are fertilization by Rough only, fertilization with organic fertilizers, fertilization by Rough mixed with organic fertilizers and without fertilization. Then the growth of all plants was measured and the ratio of growth of sample plants was assessed as well as data was collected about the characteristics of water including transparency, temperature, conductivity, salinity and acidity in two position in the wadi. One of them far from the area where Rough plant is found and the other is closer to the area where Rough plant is found. Then data is collected about the general properties, conductivity, salinity, acidity at two sites on the wadi, one of them is far from the presence of the Rough and the other from the soil on which the Rough grows on the wadi, and then comparing these data of the two places.

Results:

1. The results of the study indicated the effectiveness of the use of Rogue in fertilizing plants. The plant fertilized with Rogue recorded more growth rates during three weeks. It had a growth rate of 14.5 cm in three weeks, compared with a growth rate of 11 cm of tomato plant for which organic fertilizer was used. Then comes the plants for which Rogue and compost were used together. It had a growth of 10.2 cm. The plants which were not fertilised had the average ratio of growth of 5.5cms.

2. Results about water characteristics showed higher salinity, conductivity and acidity in the water sample at a wadi which was free of Rough plants. Here, water transparency was 110 cm below the sample near the Rogue.

3. The results about the soil characteristics at two different locations showed that wadis which did not have Rough plant had more salinity, conductivity and acidity. This is lower in the areas where Rough plants are found. It showed that the contribution of Rough in absorbing salinity, conductivity and acidity is seen in the ratio of acidity of the soil. These properties are found more in the land which is far from the Rough plants.

4. The ability of the Rough plant to absorb elements from soil and water gives a clear indication of the rich amount of elements which enters the structure of this plant. This encourages more investments and its use in the appropriate environmental purposes.

Recommendations:

These conclusions lead us to further research and investigation into the possibility of using the Rough plant for fertilisation of different types of plants.

It seeking new areas for the use of Rogue plants in other environmental uses.

We need to design appropriate equipments for drying and grinding process of the Rough plants, in addition to more innovations which will expand the overall utilization of this plant.

Scientific Research about Species of Birds in Jabal Akhdar :

During a survey conducted as biodiversity research in the region

The observation tools used by the mobile environmental research unit of the National Field Research Centre for Environmental Conservation (NFRCEC) recorded about 250 species of birds and about 2530- species of Omani butterflies during the scientific field study carried out by the unit during its visit to the Jabal Akhdhar reserves. The visit was part of the field research process adopted by the NFRCEC. It involved research tours to survey areas with large biodiversity and collect as much data as possible. This is required to create environmental database which helps in protection of environmental wealth of Oman in all parts of the Sultanate. The data is provided to researchers and scientists interested in biodiversity in the country for their future research.

Mobile unit of the National Centre observes more than 250 species of birds in Jabal Akhdhar

Periodic visits

The mobile unit of the NFRCEC carries out repeated visits in Sultanate's areas and reserves with biodiversity. It also conducts periodic surveys to identify the positive and negative developments taking place in these regions and compares the outcome of the surveys with previous visits. It also notes the environmental changes in these areas. The unit organises periodic visits of the researchers of different fields such as birds, butterflies, medicinal plants and study teams of water systems to these protected areas. This happens according to precise and specific timetables which vary between different seasons while the focus is on winter and summer.

- **The unit periodically visits protected areas to see environmental changes**
- **The unit conducts special field visits after heavy rainfall in one of the areas targeted for research**

Special Studies:

The mobile environmental Research unit conducts special field visits after every heavy rainfall in one of the areas targeted for research. The unit

● MERU spotted about 25 - 30 species of Omani butterflies

● Conducts studies to understand problems faced by diverse ecosystems

● During visits, unit documents biodiversity to update database

tries to support biodiversity in the region through these visits. It also undertakes research studies about the problems faced by the biodiversity in the region, such as drought which largely affected the diverse ecosystems in recent years. These visits cover various areas which comes under reserves in the Sultanate, most important of them are Jabal Samhan reserve, Jabal Akhdhar reserve, and Salil Nature Park. These visits also include coastal areas, deserts and villages in the interior of Oman. For these surveys, the unit coordinates with the concerned authorities to get permits which gives it full freedom for field work.

Documenting:

The mobile environmental unit, during its visits to different locations, documents the biodiversity in the regions. For this purpose, it uses different tools, including digital cameras with different lenses, such as remote zoom lens or zoom lens for micro organisms. The unit also documents the location of sighting and its time by using Global Positioning System, in addition to many scientific manuals, atlases used by the team to determine the species and some of the information about biodiversity in Oman. The unit in populated or near-residential areas contacts with local residents to get information which is helpful for the team and its work.

Survey of birds:

The reserve and its plants provide a suitable environment for nesting of birds. It also reduces threats which prevent their settlement. One of the main reasons of the efforts of the mobile unit is survey of birds in the reserve. It is carried out by drawing some imaginary lines at random points of the reserve. Each line stretches to one kilometer. The line is divided into five points. Each point is 200 meters. The team stands for about 3 minutes, then moves to the next point which takes two minutes. The team surveys the areas surrounded by the point by watching the birds with the naked eye or using Telescope or by distinguishing the sounds of some birds. These lines are drawn in random areas of the reserve to cover the widest possible area of the reserve and are samples representing the total area of the reserve. Information is documented for each observation such as type of bird and its classification, if possible, and its picture.

Results:

MERU (Oman's Birds and Butterfly Group) recorded about 25 - 30 species of Omani butterflies and recorded more than 250 species of birds. These birds are varied between endemic and migratory birds in the mountain region. The participants observed these birds either through binoculars and camera traps. They also know their types, ways of their lives and migration.

Environmental Research about Luban «Humpback Female» :

The First Break through of Habitat of Humpback

LUBAN moving from its isolated system to exceptional migration

the First Trans-ocean crossing of

LUBAN «Humpback Female»

from Masirah Island

Photos by:
Darryl Macdonald

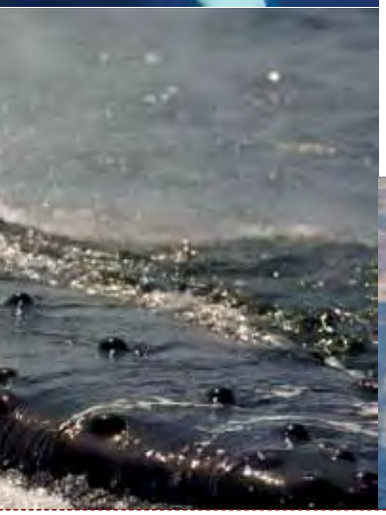
Luban" an Arabian Sea Humpback Whale tagged in the Gulf of Masirah in November 2017, has made the first recorded trans-oceanic crossing across the Arabian Sea. "Luban" is one of 14 whales that have been tagged by the Environment Society of Oman (ESO) under the Renaissance Whale and Dolphin Project, and the first tagged female.

Dedicated studies in Oman since 2000 have established that humpback whales found off the Sultanate are the only population of humpback whales in the world that do not make an annual migration between tropical and polar regions. The Environment Society of Oman started deploying satellites on the endangered species in 2014 to monitor the movements of this isolated population, to understand their movements given that no other lines of scientific investigation had linked animals observed off Oman with those sighted elsewhere in the Arabian Sea, including, Iran, Pakistan and India..

Until recently all of the tracks generated by the satellite tagging project only showed the whales moving along the Southern Coastline of Oman. However "Luban" a female tagged in the Gulf of Masirah last November started heading east across the Indian Ocean and appeared on the Indian coast in December.

Andrew Willson from Five Oceans Environmental Services (5OES) in Muscat said: "The implications of this first trans-oceanic crossing reported by the tag represents a significant break-through for regional scientists whom have been challenged to understand if the humpback whales observed in the Arabian sea are connected – or reside in their own discrete areas". Willson continues "The population observed from studies off Oman since 2000 is thought to number less than 100 individuals and resulted in their endangered population status under the IUCN Red list process. The fact that one female has now moved outside Omani waters during the known breeding season now makes this theory concerning connectively across the region more likely and a first step towards considering humpbacks in the region as a single population unit. In the long term this question may be more fully investigated through genetic studies. It also raises the question as to whether there are more whales out there than have been only observed in Omani waters andmost importantly where other important habitats may lie. These results provide some hope for the conservation agenda of these whales which

- (Luban) went to Goa, Karnataka and Kerala before returning to Masirah Island
- The first trans-ocean crossing of (Luban) has a high scientific value
- The Environment Society of Oman relies on satellites to monitor this isolated group in order to understand its movements



will now certainly require regional cooperation to support further scientific investigations and their management."

"The challenge is now on to connect multiple lines of evidence using the satellite tracking, photo identification and humpback song analysis from acoustic recording units from across the region to produce population estimates, understand connectivity in greater detail and identify important habitats. Threats throughout the range of these whales is increasing, especially with proliferation of coastal fishing and a threefold increase in shipping traffic in the Arabian sea over the last 10 years – all of which provide risks of mortality from entanglement and ship strikes. Close coordination with government and private sector stakeholders is imperative for their continued survival", comments Suaad Al Harthi, Program Director at the Environment Society of Oman.

The whale arrived off Goa after a journey of over 1500km. It then continued heading steadily south at 5km/hr and its lastknown location was off the town of Mangaluru in Indian state of Karnataka. The importance of Luban's journey has taken the interest of marine mammal researchers working off the west coast of India who have embarked on a campaign to try and locate the whale and understand how it may be using habitat off this coastline.

As part of its mission to represent Omani society in conserving the country's natural resources, ESO remains committed to continuing its world-renowned whale and dolphin programme applying an evidence-based conservation approach to ensure research is used to identify on-going threats that may arise from human activities.

"This is very exciting news as it takes years of research for us to start unveiling the mysteries of this population. It's very clear that conservation of this population will need to involve both local and regional efforts. We look forward to further implications that will be revealed through this research." said Suaad Al Harthi, Program Director at the Environment Society.

The Environment Society of Oman (ESO) through sponsorship from Renaissance and in partnership with Five Oceans Environmental Services LLC, has been tagging the Arabian Sea Humpback Whale since whale tagging was initiated in 2014. The initiative is in collaboration with local entities including Ministry of Environment and Climate Affairs, Ministry of Agriculture and Fisheries Wealth, Five Oceans Environmental Services LLC, additionally international partners this year have included Smithsonian Institution, Blue Planet Marine Ltd of New Zealand and the Slovenian Marine Mammal Society. ESO has been recognized as research pioneers within the region and is a part of the Arabian Sea Whale Network (ASWN) a group of scientists and NGOs that have formed a network which aims to address knowledge gaps in the region, share information, raise awareness and develop strategies to help to protect whales.

Development of a modern technique for extraction of polyphenols from seeds by a research team from Nizwa University

Due to its Impact Positive in Maintaining Human Health

A new comprehensive study by the Department of Plants at the University of Nizwa revealed a new method that could provide better efficiency in the extraction of polyphenols from four seeds found in the Omani environment: basil, red seeds, sesame seeds and agar seeds compared to the traditional methods used in extraction.

Importance of polyphenols

Polyphenols are very effective substances, especially as polyphenols are are some of the most effective antioxidants. These materials gain the body›s optical and chemical protection, which prevents the effect of ultraviolet rays that harm the cells of the body. Polyphenols have many other health benefits that are important to the body. They help improve the lining of blood vessels and arteries. It helps in the production of nitric oxide, which improves the performance of the lining of vessels, which helps to prevent atherosclerosis. It also prevents the accumulation of blood plaques in the arteries and blood vessels, which prevents or helps to reduce the incidence of heart stroke,brain stroke, in addition to that, polyphenols help to protect the body from aging and its effects. Polyphenols are antioxidants, which purify the body›s cells from free radicals, whose oxidation inside cells destroys cells, but polyphenols purify cells from free atoms and thus maintain them, and helps in the growth of new cells. Polyphenols, for example, prevent the oxidation of low-density lipoprotein cholesterol and thus prevent its deposition in

Accuracy and Precision

The new design of experiment, combined with UV–Vis spectroscopy for polyphenols extraction from seeds, also has the advantage of acceptable accuracy and precision. This method is easier and cheaper to perform than

The study was jointly conducted by research scholars:

Fadal Mabood, Syed Abdullah Gilani, Javid Hussain, Sulaiman Alshidani, Said Alghawi, Mohammed Albroumi, Saif Alameri, Farah Jabeen, Zahid Hussain, Ahmed Al-Harrasi, Zahra Al Abri, Saima Farooq, Zakira Naureen, Ahmad Hamaed, Rasul Jan and Jasmin Shah.

These researchers are working in departments of:

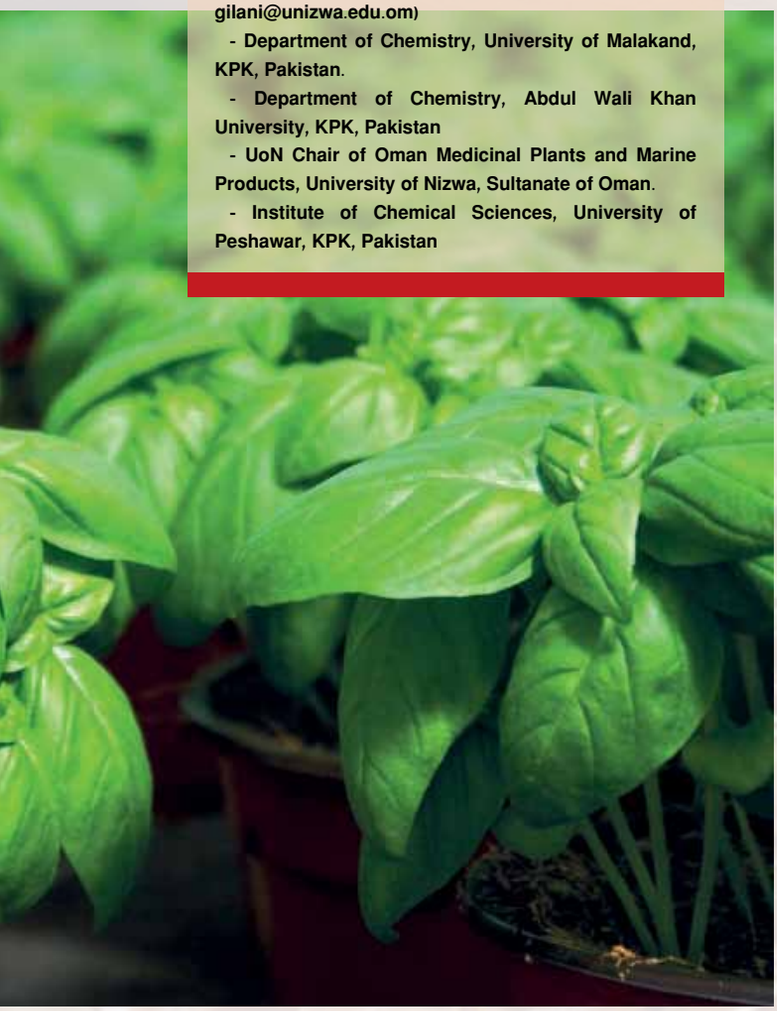
- Department of Biological Sciences & Chemistry, College of Arts and Sciences, University of Nizwa, Sultanate of Oman, (mehboob@unizwa.edu.om,. gilani@unizwa.edu.om)

- Department of Chemistry, University of Malakand, KPK, Pakistan.

- Department of Chemistry, Abdul Wali Khan University, KPK, Pakistan

- UoN Chair of Oman Medicinal Plants and Marine Products, University of Nizwa, Sultanate of Oman.

- Institute of Chemical Sciences, University of Peshawar, KPK, Pakistan



the arteries, as deposition helps in the development of coronary heart disease. Polyphenols also help protect brain cells and nerve cells. In general, polyphenols protect against brain degenerative diseases, including Alzheimer›s, and polyphenols improve the condition of high blood pressure and lead to improved insulin resistance, thus improving the condition of diabetics.

In short, polyphenols are considered to be substances that have been systematically addressed in diets or even pharmaceuticals to reduce chronic diseases, improve metabolic rates, strengthen immunity, reduce stress, and fight obesity. Recent studies have shown that polyphenols Absorption of triglycerides with the disappearance of adverse effects.

Statistical approach

Due to the complex nature of metabolic processes, statistical approaches are used to get meaningful results from the raw data that are also used when the aim is to develop any method or product. One of the statistical tests applied on development of methods is design of experiments (DoE). In the design of experiments, generally, Response Surface Methodology (RSM) is applied that reduces time, efforts on number of experiments, and helpful in getting the optimum results.

A new statistical approach - design of experiments (DoE) for getting better results from raw data - was used to conduct the study on extraction and estimation of polyphenols from four different seeds – basil seeds, red seeds, sesame seeds and Ajwan seeds. New methods of extractions and quantifications will be required according to the nature of the seed and properties. In fact, not only the extraction methods and species variations that affect the extraction of total phenolic content but also the solvents have shown variable results.

The research Objectives

An important objective of the study was to optimise the extraction and quantification of total phenols in seeds of different plants species using Folin–Ciocalteu reagent (FC reagent) method. Response surface methodology was used to optimise the extraction parameters. The estimation of polyphenols was measured through phenols reduction UV-Vis spectroscopic method of phosphotungstic-phosphomolybdic acids

In the design of experiments, generally, Response Surface Methodology (RSM) was applied for reducing time, efforts on number of experiments, resulting in getting the optimum results.

Results of the Research

1. Basil seeds is the best source of antioxidant because it contains the highest amount of total phenols at 785.76 mg per 100 gram,

2. The sesame seeds have the least amount at 33.08 mg per 100 gram.

3. The Ajwan seeds and the Red seeds contain the medium amounts, which are 379 mg per gram and 220.54 mg per gram, respectively.

4. Plant polyphenols are secondary metabolites that may be extensively studied and used in different fields of studies such as chemotoxonomy, plant biochemistry and biogenesis.

5. There are reports of more than 8,000 polyphenolic compounds identified and isolated from plants sources. These compounds have been reported from all plants parts such as roots, stem, leaves, flowers, fruits, and seeds.

6. Plasma antioxidant capacity may be enhanced by using polyphenol-rich foods.

7. The seeds of various plants are considered as rich sources for total phenol contents.

8. Study of legume seeds such as chickpeas, field peas, faba beans, common vetch and lupins has shown that chickpeas had highest phenolic contents as compared to the other tested legumes.

high-performance liquid chromatography (HPLC) separation technique and do not require expansive reagents and organic solvents. The study also found that though seeds are used in very small quantity in food, they are potential sources of antioxidants.

The Study was Prepared by the National Centre

The Environmental Efficiency of Beaches in Muscat Governorate and Barka Wilayat

Human waste on beaches, in the sea and ocean waters, has become one of the biggest concerns for marine life because of its direct and indirect impact on biodiversity and human health. It also affects economic activities such as tourism, fishing and other activities that depend on water and beaches. The National Field Research Centre for Environmental Conservation (NFRCEC) conducted a scientific study on the size and quantity of marine debris in the Sultanate, taking 13 beaches in Muscat and Barka, as a model that gives indications of the volume, number and weight of waste on Omani beaches, , and the best ways to deal with them. The study includes two phases; the first phase is a questionnaire that distributed it to beach goers. The second phase is a field survey on waste in the study site.

Prepared by:

Ahmed Jabir Al Busaidi
(Senior Researcher - Environmental Marine Life)

Abdul-Haleem Abdullah Al Rasheedi
(Professional – Wild Life)

Phase One: The Questionnaire:

The questionnaire is for studying the environmental efficiency of 13 beaches along 125 km of the coastline of Muscat Governorate and Barka Wilayat, in order to study several indicators such as the general hygiene levels of the beaches, the most common waste indicators, the priorities of improving hygiene, the mechanism used for beach cleanliness and general cultural indicators. About 105 persons selected from the target beaches. in a manner commensurate with the population, participated in the questionnaire. So, the participants from the beaches of the Bousher Wilayat are around 30 people, since this Wilayat is the most densely populated. The questionnaire questions are in both Arabic and English. Quantitative and descriptive analysis was adopted to ensure the best results from the questionnaire. The proportion of male participants is about 60%, compared to 40% of females, all of them from the level of university education.

The Questionnaire Results

- Wastes of trees remains and wood are the most common, followed by leaves, bags and cans of beverages, while electronic devices are ranked third.
- The survey included several mechanisms for the sustainability of beach cleanliness. The study highlighted that increasing awareness and educating of residents and visitors are the most influential indicators
- Most participants saw that hand sanitizers were the most common means of cleaning and collecting waste.
- On the availability of garbage bags and containers at the beaches, participants responded that they were available to a level of 36.2%.
- The questionnaire addressed a question about the form of waste, where they placed several options, «randomly placed on the ground», «received in sealed containers,» and «dangling from the container at random» where the highest percentage was randomly dumped on the ground at the level of 48.6% .
- 35.2% of respondents see that the level of waste on the beach is increasing day by day

Phase Two: Field Survey

The researchers conducted field surveys on 13 beaches in Muscat Governorate and Barka Wilayat to collect samples of marine human waste and analyze these samples according to their nature, origin, weight and number, in order to draw a conceptual map to assess the levels of coastal human waste in the Sultanate

The study included the beaches of Barka and, Al Sawadi at Barka Wilayat. Al Sib, Al Hail, Al Minoumah and Al lawami Valley at Al Seeb Wilayat. Al Azaiba, Al Ghubrah, Buashir, Al Qurum, Darsit at Mutrah Wilayat, Qantab at Muscat Wilayat, Fince and Dagmar at Qaryat Wilayat.

Samples Analysis

The researchers analyzed the samples collected along the coastline in the targeted areas. The weights, numbers, and nature of origin of each species were determined. The samples were classified according

An Important Comparision

It is noted that 65 kg / km of waste was recorded along the shores of the Sea of Oman, a high quantity, but if we compare the reports recorded globally, it is less than the levels recorded in some areas. For example: At Georgia (USA) 102 kg / km. 1990 kg / km was collected from Texas beaches. In Indonesia, the amount of sea debris was 1,000 kg / km and in the Caribbean island of Curacao the pollution levels reached a maximum of 4500 kg / km.

Recommendations:

1 – To develop a clear plan for reducing the daily consumption of plastic materials, through the development of environmentally friendly alternatives, and strengthening controls and requirements directed to factories and shops in this regard.

2 – To Tighten the laws and measures aimed at protecting the coastal environment from unsafe behaviors by fishermen in practicing of various fishing activities, by creating environmental police for beaches.

3- To call upon the competent authorities to adopt a clear approach for distributing high-quality tight garbage containers for the shores of Barka and Qaryat Wilayats in particular.

4. To adopt a periodic schedule to supervise the quality of garbage bins distributed for the beaches of Barka Wilayat and Muscat Governorate.

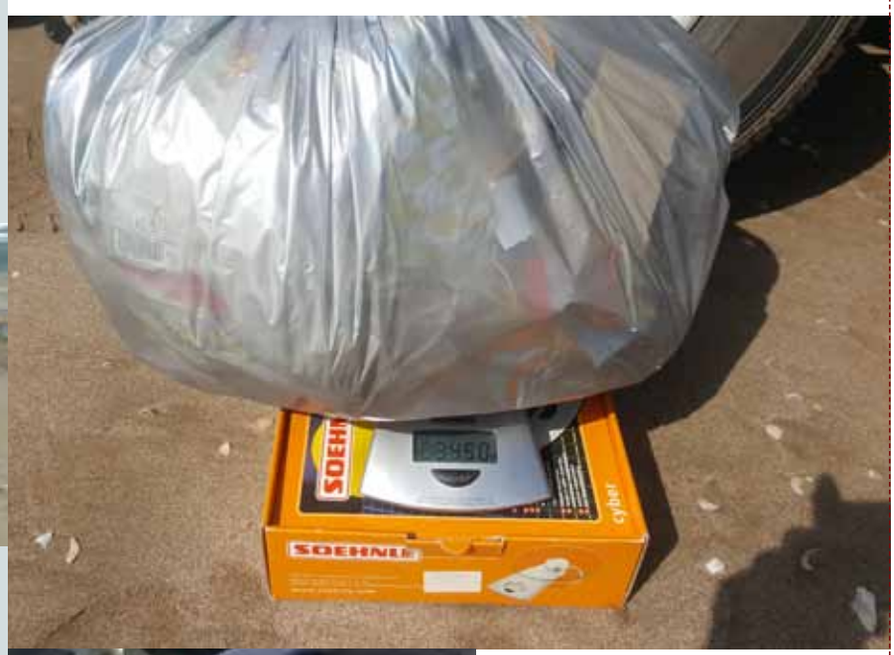
5 To Renew the tools and mechanism of beaches waste collection by finding modern ways to cope with the continuous depletion of the beaches by the residents and visitors.

6 To organize awareness contests and programs per capita daily consumption, aimed at promoting the slogan of beaches without waste which contributes to stopping or reducing the source of single-use waste, thus reducing the waste expected to remain on the beaches.

7 – To temporally and spatially expand the scope of assessment study for coastal human waste in the Sultanate and its impacts on biodiversity.

The results showed:

- **Plastic waste is the most prevalent and wood waste is the most weight**
- **The highest rate of pollution monitored in the beaches of Wilayat Barka and Wilayat Qurayat**



to their origin as waste from industrial processes, fishing activities or beach uses. The less common samples, which cannot be classified into one of the previous categories, are placed in the other materials category.

Results

- Three thousand 926 waste items were collected from the 1300-meter range, weighing 85.48 kg from 13 beaches scattered along the coastline of the Sea of Oman.
- The average number of pieces observed per meter was 3 pieces, at a rate of 65.75 g/m in front of the beach.
- Plastic remains waste is the most prevalent in terms of number (63%, 2 pieces / meter).
- Fishing waste (wood) is the highest weight of 47%, weighing 31 g / m.
- The extent of contamination recorded is number (69 - 643.5) Piece / 100 meters per beach.
- The weights of waste amounted to 99.2 (9.7) g / m in front of the shore.
- The highest pollution rate was recorded at the beaches of the Wilayat of (Qurayat and Barka) at a rate of 6.4 pieces / m and 4.8 pieces / m. The lowest levels of pollution were found in the beaches of Bousher and Matrah (1.5 m / m and 0.7 m / m).
- The highest weights of marine wastes were recorded at the beaches of the Qurayat and Al-Saib Wilayats, at a rate of 99.2 g / m and 94.1 g / m and the lowest were in the beaches of Boucher and Matrah Wilayats at a rate of 21.8 g / m and 9.7 g / m.

Environmental Study about The Black Widow Spider :

Calls for in-depth studies on this faction of spiders

For the first time in the Sultanate Omani researchers discover two species of black widow spider

Prepared by Reasercher:
Ali Abdulla Al-Jahdhami

Photo:
Ali Al-Raisi

Omani researchers have discovered two species of the black widow known as Latrodectus belonging to the Theridiidae family for the first time in the Sultanate of Oman. This study, in which these two species were identified as previously studied in the Arabian Peninsula Which were carried out by researchers B-Conflack and van Harten in 2002 recorded six species in both Yemen, Saudi Arabia and Kuwait and did not record any of the species in Oman, and compared the specifications of the reproductive and reproductive types of species according to descriptions of the species found in some countries of the Arabian Peninsula and Socotra. This species is characterized by its differentiated name between acute and medium (depending on the type of spider under this species) of mammals because it contains toxic proteins known as Latrotoxins, a neurotoxin that causes symptoms of Latrodectisim. Rarely, death is associated with a certain type of black widow.

Results

The study revealed two species of black widow spider in Oman:

(Latrodectus cincus), which is widespread in the northern regions of the Sultanate (samples were collected and observed in the governorates of Muscat, the interior, the north and south of the east and the north and south of Batinah and Buraimi and the phenomenon was not possible to do the survey in Musandam) Is different from the other species of

The study in the definition of these two types was based on a study by the researchers B. Conflack and Van Harten in 2002

The study showed the presence of the first type (Latrodectus (cincus) in many northern governorates of the Sultanate

The study recorded a presence of type 2 (Latrodactus geometricus C.L. Koch) in Dhofar Governorate only

the absence of the hourglass hour in the lower abdomen, but the presence of the red band in the middle of the abdomen from the upper side, and as the toxicity is not studied, but some reports that it is highly toxic, and was observed as a kind not aggressive.

2. Latrodactus geometricus: This type of record was recorded in the Kingdom of Saudi Arabia and the Republic of Yemen. The present study proved its presence in the southern Sultanate of Oman in Dhofar Governorate only. It was not observed in any of the northern governorates of the Sultanate. The toxic amount of this species is 57 µm and the LD 50 of the mouse is 233 µm. Thus, the sting symptoms of this type are local to the place of sting and the surrounding area, which is not a type. Aggressive.

Phenotypic variation

There is also the phenomenon of sexual differentiation of the species (Sexual dimorphisim), which falls under the genus of the black widow Latrodactus, where the male differs from the female, small size, and color varies according to stages of age development, and the species to which it belongs, often characterized by the characteristic black color and red band in the upper or ventral side of her abdomen. The presence or disappearance of red band in the abdomen, depending on the species, which expresses a warning signal to her predators. It is rare to notice the male and the female is often noticed that the nets of her house are woven in random and tangled threads in diameter ranging from 10 to 30 cm, and the texture is thicker compared to the fabric of other spiders living on the roofs of houses (Pholcidae).

Homes

The black widow spider builds its houses next to the cracks or holes in the corners of the walls, sidewalks, the walls of the outer houses, farms and protected agricultural houses where the cracks or holes take shelter in case of danger. Their homes are often in contact with or close to the earth, rarely seen at a height of half a meter from the ground. The black widow spider is a non-aggressive spider. The female rarely leaves her home except to move from one place to another. Therefore, the spider does not attack the victim only after touching the fabric or enter the scope of her home.

Palm trees protected Omani environment for more than 4,000 years

Palm Tree
Food and medicine

Annually: 45 million kilogram of carbon absorbed by palm trees in Oman

A number of experts and officials have emphasized the importance of the spread of the palm trees in the Omani environment. They say that the date palm was an essential component of the Omani environment for more than four thousand years ago and still it is the same. In addition the palm trees have maintained the sustainability of the surrounding environment for many decades and help in increasing the amount of oxygen in the atmosphere and absorb carbon. As per 2018 census, there are about 7.5 million palm trees in Oman and it absorbs approximately 45 million kilogram of carbon annually. For this reason His Majesty Sultan Qaboos bin Said instructed to cultivate one million palm trees in 2009.This is high realization from His Majesty for the importance of palm trees and their role in food security, economic value, environmental sustainability and the biodiversity of the Sultanate.

One Million Date Palm Project:

On the role of the palm in preserving the Omani environment, Saif bin Rashid Al Shaqsi, Director General of the One Million Date Palm Project at the Diwan of the Royal Court, said that His Majesty Sultan Qaboos bin Said›s directives to establish a One Million Date Palm Project in 2009 were a qualitative leap forward for the agricultural sector as a whole, particularly from date palms. The One Million Date Palm Project is considered one of the pioneering projects in the Sultanate of Oman which would help in ensuring food security and has massive economic, social, and environmental benefits. If latest scientific methods are used for the cultivation of date palms, manufacturing of date products and other related items, it would be a giant leap forward. It would add value to the Omani dates competing in the foreign markets and strengthen economic capabilities for Omani agriculture.

Al Shaqsi pointed out that palm cultivation has many direct and indirect environmental benefits. Palm trees help increase the amount of oxygen in the atmosphere. Scientific studies have shown that one tree absorbs about 6 kg of carbon annually and releases oxygen which is enough for two people. one acre of palm trees absorb about 2.5 tons of carbon dioxide per year.

Researchers agree that trees help in increased rainfall. Studies have shown that for exambole about 50 percent of the Amazon rain are due to the trees. As far as palm trees are concerned they provide environmental friendly bioethanol.

The Palm is considered as an important source of food security in the face of the expected climatic changes. Date palm trees are considered to be tolerant of adverse climatic conditions compared with the other crops.

Palm cultivation plays an important role in the management of natural resources and improving soil fertility. Palms also contribute in protecting the soil from erosion and work as desertification resistant. They improve local climate through moisture and humidification. They also play a positive role in enriching biodiversity and ecological balance.

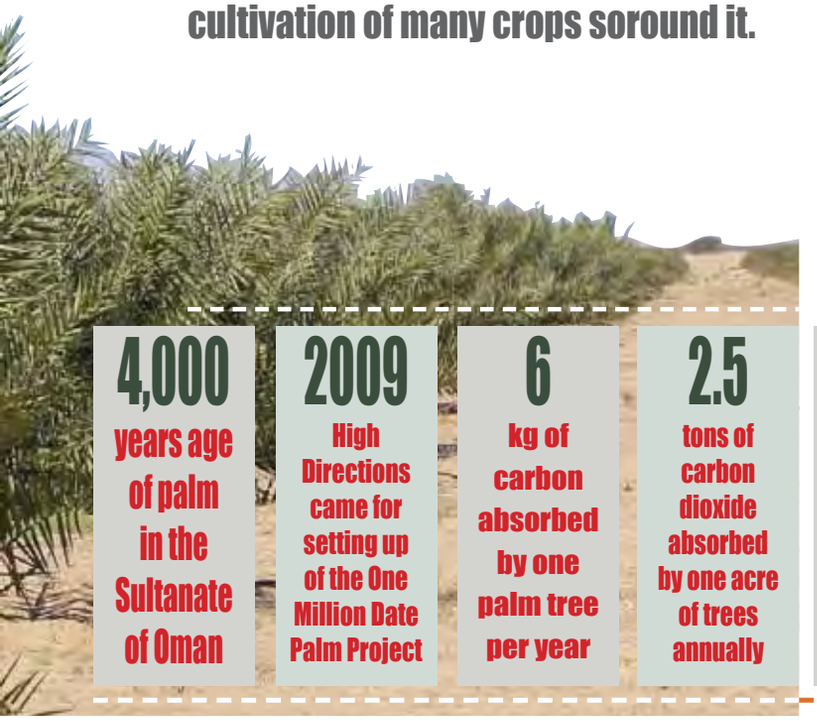
Al Shaqsi said that the One Million Date Palm Project›s farms were spread over vast areas of the Sultanate. They are considered clean farms. They operate in the form of integrated socio-economic production system. The project also owns the largest organic palm farm in the region where organic agriculture is defined as a system of sustainable agricultural production. Here, for the agriculture only natural resources are used and not the chemicals which are harmful for general health. The project takes into account the conservation of biodiversity in all sites where the project farms are located. Here old wild trees are not allowed to be cut. These farms directly contribute to the fight against desertification. They work for soil stabilization and reduce the spread of dust in the cities and villages, and create of an integrated vibrant ecosystem.

Integrated Environmental System

Engineer Haitham bin Badr Al Khanjari, Director of the date palm department at the Ministry of Agriculture and Fisheries, said that the Sultanate of Oman has always shown keen interest in palm. The palm has always been on the top in terms of crop of the country as well as an integrated environmental and agricultural system. He said that the date palm was a national

■ Dr Saif Al Shqasi: Scientific studies indicate that the palm absorbs about 6 kg of carbon per year

■ E. Haytham Al Khanjari: Date palms creates a good environment for the cultivation of many crops soround it.



4,000 years age of palm in the Sultanate of Oman

2009 High Directions came for setting up of the One Million Date Palm Project

6 kg of carbon absorbed by one palm tree per year

2.5 tons of carbon dioxide absorbed by one acre of trees annually

50% of Amazon rains are due to its forest

70,000 shots are produced by the Laboratory of tissue culture annually

■ Dr Abdullah Al Saadi: The project of planting one million palm trees has an ecological dimension. It would preserve the biodiversity of the Omani environment.

■ Dr Mahmoud Al Mahrouqi: The palm, with its various components, played an important role in providing natural materials so that the Omani environment becomes friendly good to the human being.

■ E. Saeed Al Sabahi: Palm trees made the atmosphere moderate and purified the air of harmful gases. It enabled the human being to live in the hot and dry climate of Oman.

wealth and is rooted in the social fabric of the country.

Al Khanjari said that the Omanis have always been interested in the palm and this tradition is inherited generations after generation due to its social, economic and financial feasibility. Al Khanjari said that planting of trees has many important environmental benefits, particularly if you plant date palm trees. Under these palm trees one can cultivate many crops as they create suitable environment for other crops as well. The Omani environment has got benefited from the palm. The cultivation of palm is linked with Aflaj system as a demographic environment of the Sultanate. There are many palm oases which attracted the population and villages came up alongside them due the food security these palm oasis provided. He added that the Omani environment has benefited enormously from all parts of the date palm, whether they are their products or biproducts.

Importance of the Palm

Abdullah bin Mohammed bin Saif Al Sadi, Dean of the College of Agricultural and Marine Sciences at Sultan Qaboos University, said that the Omanis have always cared about the date palm, which was an important source of food security. The palm was always used as a main source of food and parts of it in construction and as furniture for the house. The date palm continued to be main source of food security. The Government is making efforts to expand date palm farming. It is supporting production and manufacturing of dates. It also benefits from date palm waste in various eco-friendly industries.

On the environmental benefits of One Million Date Palm Project, he said: «The project was according to the vision of His Majesty, The Sultan, who realised the importance of the date palm for us and for our coming generations. It also has strategic importance as a cornerstone of food security and has economic importance. It also helps in preservation of the biological diversity of the Omani environment. The palm trees are a refuge for different types of birds. It also helps in containing some types of harmful gases and reduces temperature. It also helps in avoiding desertification. A large variety of unique and different types of micro-organisms live side by side with the palm. Some of these micro-organisms defend the palm from various diseases. Some of these micro-organisms have huge benefits for the environments surrounding the palm as they convert the organic materials into different other elements. On the efforts of the Sultan Qaboos University (SQU) regarding palm, the Dean of the College of Agricultural and Marine Sciences of the university, said that there are many researches that have been conducted at SQU, particularly in the field of palm trees. These researches focused on studying the pests of date palms and their treatment. In addition to this, some researches focused on the factors which increase the production of date and quantity of the palm, as well as the optimum use of fertilizers and irrigation water. Some researches were focused on the benefits of the date palm in different industries and some talked about the use of the wastes of palm. There are also research about the benefits of date in the processing of different food item as well as its effect on some human diseases. Many other related researches are still going on.

Friend for the Omanis Human

Dr. Mahmoud bin Saif Al Mahrouqi, Secretary of the Omani Agricultural Association, the head of the Al Dakhiliyah branch of the association said that the palm was a permanent companion of Omanis, especially as the source of their food, livelihood, and home. Omanis have always taken care of palms. The concerned authorities also given priority to palms, increased its products and set up laboratories and specialized environmental research centers such as the Palm Research Centre of WadiQurayat, Textile Agriculture Laboratory in Jamah in the WilayatBahla, and in addition to One Million Date Palm Project.

The president of the Farmers Association in Al Dakhiliyah governorate said that the palm was an integral part of human life in the governorate. The dates are comprehensive food which provides energy to the human being as they contain a lot of proteins, fiber, and minerals. He said that the palm contributed with its various components to the Omani environment and life of its people. It played a major environmental role for a human being. Omanis used it for their making their homes, tools and cooking food. Its trunk is used for the construction of traditional houses. Its fruits provided a healthy meal for Omani people and are the diet for animals related to humans.

The Palm has contributed to the improvement of the soil properties by providing soil organic materials which decompose fast. It helps in the improvement of soil texture and pores which makes it more fertile.

Essential environmental component

According to Engineer Saeed Bin Khamis Al Sabahi, member of the Omani Farmers' Association, palm trees are an essential component of the Omani environment. Most of the cities and villages of Oman are oases of palm trees. These oases provided an environment suitable for both humans and animals. When the atmosphere is very hot, its shades make it pleasant. It also purifies the air from harmful gases, enabling people to co-exist in the warm and dry environment of Oman. The Palm has played an important role in providing food in times of distress.

The palm also provides raw materials for the construction of homes. All its parts are used for the construction of homes. Even they are useful for making utensils. It plays major role in the prevention of desertification and protection of soil layers from erosion. It also plays an important role in air purification from dust and impurities and provided an environment suitable for the multiplication of many organisms, especially endemic and migratory birds.

His Eminence the Grand Mufti of the Sultanate:

Islam has a huge impact on the preservation of environment and the prevention of disasters

Islam strongly prohibits harming nature and does not allow anybody to be deprived of its benefits

Prayer has an impact on the environment and society because of its huge effect in self discipline

What threaten the environment threatens the human. Smoking as far as i know causes huge damage to the human

Muscat - Lynx:

His Eminence Shaikh Ahmed bin Hamad Al Khalili, the Grand Mufti of the Sultanate of Oman, said: «Islam is known for what is prescribed in it in the form of worships, morality as well as individual and social relations. All this has huge impact on environmental conservation and prevention of tragedies and avoiding whatever adversely effects it." Islam encourages humans to make the earth its vast ground for its movements and activities to extract whatever Allah has kept in it for them to enjoy, use and harness. It is also a bounty for all living things which walk and move on it or fly in its skies. It is not hidden from this amount of good things that preserved in the environment. When a human beautifies the earth by sowing or planting, it gets the return in the form of fruits and everything that is beneficial and good. This intensifies the human presence and increases the livestock, prevents the danger of famine and poverty and gives health, Allah willing.

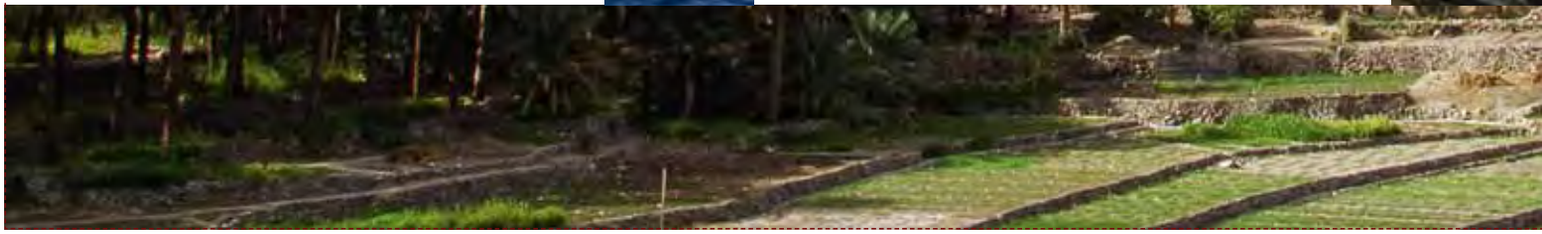
His Eminence the Grand Mufti said that the ethics of the Prophet Mohammad (peace and blessings of Allah be upon him) and his deeds were the best characters, righteousness, charity, justice, fairness, and kindness for all human beings and animals. All this was a reflection of his positive effects on environmental life in all its forms and shapes. The one who links himself with the prophet, peace be upon him, does good only to his personal behaviors and his social ethics.

Prayer and environment

His Eminence the Grand Mufti of Oman said that prayer has an impact on the environment and the soul. This impact is noble because it finetunes all human being so that they become the source of only of welfare for all and makes them think about whatever is the concern of the entire society and the community and encourages them to work for the general interest in the service of all.

Water, its purification has an impact on the environment

His Eminence the Grand Mufti said: «Water is the element of cleansing and purification». It is the origin of life. Keeping it clean from any impurities and keeping it safe from any external effect is important for the safety of life, a continuation of health and prevention from diseases or epidemics. Messenger of Allah, peace be upon him, has urged all to save it from any pollutants which take away its cleanliness. He has prohibited urinating in stagnant water and ablution in it as well as he has prohibited defecation in it. The pollution of water could cause lots of diseases and sometimes become an epidemic. The polluted water produces germs and parasites enough to make a human being sick, as it affects his stool or urine, especially it causes typhoid, schistosomiasis, hookworms, and other worms. The human feces and urine if contaminate the water, it affects human health. It is the same as dumping of factory wastes, dead animals and garbage in rivers, canals, and ponds. If clothes are washed in the polluted



or contaminated water, it causes a threat to the environment and its life. There is a general guidance of Allah in this regard. In Sorah Al Araf verse 56, Allah says: “And do not spoil the earth after it is repaired.” In Sorah Al Baqrah verse 205, he says: “When he turns his back, His aim every where is to spread mischief through the earth and destroy crops and catte, But Allah loveth not mishief”.

Protection for the trees

He said: The Prophet, peace, and blessings of Allah be upon him, he forbiddin from defecation and urination under fruit trees and in rivers. All this is to teach people to protect them from anything which pollutes them or harms them so that their fruits do not fall on earth and the cleanliness of the water is not affected. Similarly, there are teaching regarding roads and shades of trees. Islam is very strong in terms of its teachings about nature and whatever harms it. There are a strong warning against curring wild trees unnecessarily.

His Eminence the Grand Mufti said: «This a mercy undoubtedly. A Muslim cannot manipulate with nature or attack the environment, this is because it is his or her nature to pity everything and prefer good for all. He or she sees in everything a sign of manifestation of God the Almighty who did everything well. He does not offend against anything which Allah has created.”

Effects of smoking on humans and the environment

He said: «It is a known fact that the most important components of the environment are human being and whatever threatens it puts human life and its safety in danger. It is known that smoking is harmful to the human element. The earth, air, and the plants have a bad effect of smoking. Smoking leads to disruption of part of the land. Cultivation of tobacco creates obstacles in the way of its function. It is not useful at all. It has all sorts harms stored in it for humans and animals. It wastes some of the greatest wealth of earth which is water used for irrigation of this malignant plant. Water is important for the environment, and wasting it in irrigation of malignant plant is actually aggression on the environment.

It is known that tobacco smoke contains about 6,800 toxic substances in the forms of harmful gases. All of these toxins spread in the air. It is already proved that one cigarette produces approximately 500 mg of smoke from these 92% poisonous gases. They are nitrogen, oxygen and carbon dioxide which are 85% of the weight of the smoke.

A cigarette with a gram of tobacco produces 20 to 80 cm3 of carbon monoxide, and smoking pipe produces 19 - 53 cm 3.

Carbon monoxide is also produced, in addition to smoking, through household heating and car exhaust. Therefore, it is abundant in congested cities. It is very dangerous because it cannot be smelled or seen. The concentration of this gas in heavy traffic areas is between 50 and 100 ppm while its concentration as a result of smoking is 400 ppm.

As far as nicotine is concerned, if we assume that the cigarette has 20 mg of this substance, then only one part of it is burning and another part is rising with smoke and the rest is estimated at 20%, which is approximately 5 mg. The smoker inhales into his lungs nearly 23- mg and the rest gets exhaled outside. This and the calculations show that the remaining nicotine in the atmosphere is two-thirds of this dangerous toxic substance considering each cigarette is estimated to have more than 11 mg.

A smoker on an average smokes 20 cigarettes per day. In 30 years he consumed 11,000 packs or 200,000 cigarettes. If they are stuck together they would form a 20 kilometers long stick. That means that he smokes equals to 600 meters in a year. In 30 years, he smokes 160 kg of tobacco which has total of 800 grams of nicotine which is sufficient to poison a city with a population of 10,000 people.

Climate change phenomenon : threatening the globe

The global warming and climate change are long-term global problem involving complex interactions with natural, economic, institutional, social and technological systems. All assessment reports of the Intergovernmental Panel on Climate Change (IPCC) have confirmed the scientific consensus that climate change is a reality which has implications and impacts at the international, regional and national levels. According to the IPCC›s Fifth Assessment Report, the warming of the climate system and global warming is unambiguous. Since 1950s, many unprecedented climate changes were seen which have taken place for thousands of years, such as rise in atmospheric and oceanic temperatures, acid rain, devastating hurricanes, drought, desertification, increase in sea level, melting of ice and snow, and increase in concentrations of greenhouse gases.

Major impacts being faced by the countries of the world are:

- **Decreased rains and increased duration of droughts**
- **Decline in vegetation, loss of biodiversity and decreasing mangroves and coral reefs**

On the Sultanate of Oman›s efforts to limit the consequences of global warming and climate change, Ibrahim bin Ahmed Al-Ajmi, Director General of Climate Affairs at the Ministry of Environment and Climate Affairs, said: «The Sultanate has given huge importance to the issue of climate change, as it was one of the first countries to join several related international conventions, protocols and agreements. It established Ministry of Environment and Climate Affairs in 2007 as per the Royal Decree No. 90 / 2007. This was followed by setting up of the Directorate General for Climate Affairs to assess the vulnerability and risks of climate change, conducting studies and developing appropriate plans in the areas of adaptation and mitigation of climate change and strengthening cooperation at the national, regional and international levels. Ibrahim bin Ahmad Al-Ajmi said that similarly, a national strategy for adaptation and mitigation of climate change has been prepared. The ministry has implemented a project to prepare a national strategy for adaptation to climate change and mitigation of greenhouse gas emissions to determine its impacts and risks on some sectors of biological development. It is also for assessment of the implications and risks according to practiced international standards. It is also to propose plans and procedures for mitigating greenhouse gas emissions and adapting to the impacts and risks of climate change as well as training and building national capacity in the area of climate affairs. Al-Ajmi said that the Sultanate of Oman has supported international and national efforts for research and scientific studies on climate affairs in cooperation with concerned international organisations. On the effects of global warming and climate change on the Sultanate, Ibrahim Ajami said: "The Sultanate, like the rest of the world, is exposed to the risks and effects of climate change with the vulnerability of various sectors, ecosystems, social and economic life. The areas under the risks include depletion of some ecosystems such as vegetation, biodiversity, mangroves and coral reefs as well as decline in the fisheries. These implications is seen also in the form of change in the level of rainfall and increase in drought and desertification, reduction of agricultural production. Inaddition, threatening the lives of residents and infrastructures in the coastal areas due to a high level of sea and floods caused by heavy rains.

Beginning of the problem:

With the beginning of the twentieth century, there was a significant imbalance in the atmosphere as a result of human activities, including industrial advancement, transport and urban development. This all

■ The phenomenon has its implications at the international, regional and national levels

■ The Sultanate has given priority to the issue of climate change and has prepared a national strategy for adaptation and mitigation of climate change

The most important scientific indicators On the existence of global warming

1. **Increased concentrations of greenhouse gases in the atmosphere**
   Concentrations of carbon dioxide, methane and nitrous oxide gases in the atmosphere have increased to unprecedented levels in the last eight hundred thousand years. There is also concentration of carbon dioxide in the atmosphere increasing by 40% from the pre-industrial period.
2. **Change in temperature:**
   The average global surface temperature rise is estimated at 0.84 ° C during the period from 1880 to 2012.
3. **Change in sea level:**
   The global average sea level rose by 0.19 meters. The sea level rise is expected to reach 26 - 82 cm by 2100.
4. **Changes in snow cover:**
   The arctic glaciers have decreased by an average of 3.8% per decade since 1970. It is expected that the glaciers and snow cover in the Greenland will lose part of their size in the 21st century, because the melting rate will exceed snowfall.
5. **Effects on ecological and environmental systems:**
   The effects of climate change on a wide range of species, their natural habitats and genes, formation of their communities and on biodiversity in general were noticed.
6. **Changes in extreme condition such as warm waves, droughts, floods and hurricanes:**
   Since 1950, there have been changes in extreme weather conditions, such as increase in the number of warm nights and days, increase in heat waves, high rainfall and intensity of rainfall, increase in droughts and increase in tropical cyclones and their strength

began with the industrial revolution. All these activities were dependent on fossil fuels as the main source of energy and there was use of chlorofluorocarbons in industries which has led to increased global warming and the occurrence of so-called «greenhouse effect». This is due to the increase in concentrations of greenhouse gases from their natural levels in the atmosphere, causing climate change which was defined by the United Nations Framework Convention on Climate Change as:

A change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and be observed over similar time periods.

Contrast in degree of compliance:

«Climate change is one of the most important environmental challenges being faced by the entire world, and the Sultanate is not isolated from this,» said Hebatullah Abdul Aziz, dean of the Faculty of Economics and Business Administration at the German University of Technology. She said that the Sultanate›s commitment to both the Kyoto Protocol of 2015 and the Paris Convention of 2016 was the best proof of its concerns. The Sultanate is also committed to the sustainable development goals, the most important of which is the thirteenth goal on climate change. The primary reason for climate change is increase in the volume of carbon emissions - which, of course, are largely produced by the burning of fossil fuels. The Sultanate reflected this commitment to international frameworks in its vision 2040, which gave the environment and natural resources special importance.

She said: «The biggest challenge is the varying degree of commitment between the government sector and the private sector and the absence of an incentive system to meet these standards.» It is important to pay attention to the sectors in which economic diversification has been committed. Either they are logistics, tourism and manufacturing sectors as well as those closely linked to logistics strategies. There should be complete commitment to reduce carbon emissions. The Sultanate›s airports have been accredited by the Airport Carbon Accreditation Authority for its good management in this area.

«The government of the Sultanate is committed to whatever can help in reducing climate change. Now it is important to pay attention to the private sector, consumers and young people. They should be taught that it was very important and required by all of us to reduce climate change,» said Hebatullah Abdul Aziz.

Impact of climate change:

Dr Hamad Bin Mohammed Al-Ghailani, Director of Environmental Awareness at the Environment Society of Oman, said: «The most important challenge being faced by the environment in the Sultanate is climate change. This is causing increase in temperature, rise in sea level, changes in sea currents and natural conditions. Ghailani said that there was red tide in recently which led to the death of sea organisms. It result in pollution of the environment and emission of unpleasant smells. He said that changes in temperature, changes in sea level, melting of snow and other such happenings are related to the rise of carbon dioxide in the air. It means that there is a relationship between rising temperatures, rising sea level and the rise of carbon dioxide in the last 40 years. That climate change is one of the reasons which led to the extinction of some species of organisms in the Sultanate. Now there are certain species, such as Arabian Leopard, Egyptian vulture, as well as the loggerhead turule which are facing extinction. He said that the Environment Society of Oman participated with concerned authorities in some studies related to environmental changes and gave certain proposals. The society is always interested in protection of some species of organisms such as the Arab whale, which became one of the rarest whales in the world. Not more than 100 Arab whales are surviving now. It is also carrying out studies about birds like Egyptian vulture, and some times of turtles particularly loggerhead turule. It also prepared studies about certain types of frankincense trees, the number of which are going down in Dhofar governorate.

Intensification of awareness campaigns:

Dr. Maha Abdul Majid Al-Ani, Director of the Student Guidance Centre at the Sultan Qaboos University, said: The sharp changes in weather conditions such as temperature rise, which is one of the causes of climate change, lead to negative emotions in some people. For example, anger is extreme and productivity is low. There is anxiety, fear and leading to depression due to the climate change. These changes in weather conditions also affect human communication and their psychology. She said that the awareness campaigns in the various media platforms should be intensified to reduce the risks of climate change.

Environmental Event about The conclusion of «A Volunteer In My Environment» :

Conclusion of the first phase and graduation of participants of programme «A Volunteer In My Environment»

The first phase of the training program of volunteerism and training «A Volunteer In My Environment» organised training for the trainers in the area of environmental volunteerism in the Sultanate. It was organized by the National Field Research Centre for Environmental Conservation (NFRCEC) of the Diwan of Royal Court, in cooperation with Al Sharqiyah University. It was participated by a number of government organisations as well as the academic and research institutions of the Sultanate. It was held under the patronage of Prof. Fuad Shadid, vice chancellor of Al Sharqiyah University, in the presence of Dr. Saif bin Rashid Al Shaqsi, Chief Executive Officer of the NFRCEC and a number of officials of government organisations related to the environment. During the ceremony, the first batch of students of this program graduated. This programme has continued for more than two years.

There were 16 students of the Al Sharqiyah University in the first phase of the programme. As part of this programme, 85 activities, camps and works were organised. The programme won a number of awards at the local level including the fourth position in the Al Roya Award for Volunteerism. For this award, there were 89 entries at the level of the Sultanate. It was organised by Al Royanewspaper. Similarly, the programme also won Outstanding Project Award in Waiyyakum competition for environmental message organised by the Environment Society of Oman. The program achieved the second position in the voluntary work at the Gulf in Ihsan competition organized by the «Mobadiro Oman» in the Sultanate. It has also participated in a number of events, including the World Youth Volunteer Forum in Qatar, Forum of Voluntary Groups and Environmental Initiatives of the GCC countries in the State of Kuwait and the Forum of Youth Volunteer Initiatives of the Arab World in Kuwait.

Consolidating the concept of environmental education

Dr. Saif bin Rashid Al Shaqsi, CEO of the NFRCEC, emphasized on the implementation of this training program as an effort of the centre to create a generation to aware Omani youth which plays an important role in its environment and country and develop the culture of environmental education. This is from the light of the supreme approach of His Majesty Sultan Qaboos bin Said for engaging all segments of the society in the conservation of ecosystem of the country and protection of natural resources for sustainable development.

He pointed out that the program has significantly helped in inculcating the concepts of environmental education in various segments of Omani society. The idea is to train a group of young volunteers who love their environment and want to protect them utilising their scientific and practical capacities and skills. After training, they can also create awareness in the society about the importance of the entire ecosystem and its natural resources. At the same time, this also deepens and strengthens the concept of cooperation between the government and the society in the implementation of the programmes and activities.

Dr. Saif said: «The results of the first phase of the program were encouraging. They indicated that the programme was moving in the right direction. The number of programmes organised and the number of the beneficiaries as well as the awards and appreciation which the programme got locally and outside is the clear indication of its success. It also showed that it had clear planning and moved towards real objectives and goals. This is why the centre has decided to continue it in the next phase by expanding the ambit of universities and colleges which would participate in it. It would also scientifically and technically improve the programme, so that the objectives of creating environmental awareness is achieved in a wider scale and the principle of sustainable development is taken into account.

Participating Students

Amina Al Makhiniyah, a member of '«A Volunteer In My Environment» initiative, said: «The program had an enriching and stimulating activities and events. They

Objectives of the program

- **Developing cadres of Omani volunteers to work in the area of environment**
- **Increase awareness in the society about the environmental issues of the Sultanate and how to find appropriate solutions**
- **Promote positive environmental behaviour of individuals to serve the ecosystem of the Sultanate with the principles of sustainable development in all areas of its life**
- **Promoting environmental education and training in the Sultanate**
- **Activating environmental field research and promoting its values and principles in the Omani society**
- **Promoting joint work between government organisations, academic and research institutions and civil society in the Sultanate**

- **The programme is aimed for creating a generation of students of higher educational institutions to work in the field of environmental volunteerism and training.**
- **It is meant for developing positive environmental behaviors of individuals to serve the ecosystem of the Sultanate of Oman and its sustainability.**
- **The Programme won local and Gulf region awards in volunteerism**
- **More than 85 activities organised during the first phase**

helped me attain lots of skills and experiences. We also learned about the environment and the threats posed to it.

She added: We graduated from the programme with mixed feelings. This programme has gathered us as colleagues. We lived and had beautiful experience together. We learnt and taught others.

«A Volunteer In My Environment» programme was a turning point for me. It helped me discover my abilities and talents and made me integrated with society and environmental issues. It also fine-tuned my leadership and management skills. I am now proud to help members of the society to learn about their environmental issues and spread the culture of environmental conservation.

She said that she would just not stop at educating the society about the environmental issues but would continue her awareness campaign. The initiative is a starting point for the enlightenment of the society about the environment and its conservation.

Rashid bin Salim bin Rashid Al Athoubi, one of the students who participated in the initiative, said: «The program 'A Volunteer In My Environment' educated and trained us in the skills required for the society in the area of the environment and its conservation. The programmefine-tuned our skills. Through the field visits, we came to know the efforts made by the Sultanate in environmental conservation. We would continue to create awareness in the society, protect the environment and make the Sultanate a symbol to follow in the area of environmental conservation.

Aisha Bint Said bin Salem Al Mahraziyah, a student from Al Sharqiyah University, said: «We started the program in 2016. We are 16 students. We are trained to take the initiative of educating the society about the environmental concepts, environmental issues, and risks due to lack of interest in it, how to protect its resources so that our environment is clean for the coming generations. We were trained in Al Sharqiyah University and in NFRCEC. We also visited several governmental and private institutions and participated in activities inside and outside the Sultanate.

She said: «The initiative has received many awards, including at the Gulf level. Through this programme, as we learnt leadership and management skills. We fine-tuned our talents and increased our knowledge about various aspects of life, particularly the environment.

Mazin bin Said bin Abdullah Al Dhawi, emphasised on the importance of educating the society about the environmental aspects of life. He said: The dangers faced by the environment are numerous and have serious long-term effects. The «A Volunteer In My Environment» initiative taught me a lot and developed my abilities and skills. It helped me understand my strength as well as weaknesses which required improvement. The programme helped me understand how to deal with different segments of society through workshops. We have worked as a team throughout the programme and gained a lot. My goal is that the members of the society become aware of environmental threats and how to prevent them.

«I have a message that I would like to share through this platform,» said Al Dhawi. «We should join hand and utilise the skills of youth to create awareness about the environment." He said that every individual in the society has the responsibility of environmental conservation and creating awareness in the society about the threats posed to it.

Athari bint Khamees Al Dawoodiyah, another student and leader of "A Volunteer In My Environment" programme said: «There are a number of objectives of the initiative, including the training and rehabilitation of young people in environmental volunteerism and refinement of their knowledge and expertise. This is to make them effective for creating environmental awareness in their community. This programme is aimed at participation in making the Sultanate a sustainable environment.

She added: We are conducting training workshops for different segments of society. When we talk about sustainability, we as Omani youth must be aware of environmental issues and how to protect the environment. We should teach the society about the elements of the environment and the adverse behaviour which are harmful to the society and causing depletion of water and food.

«I have learned a lot about leadership skills and how to face the challenges and difficulties in my surroundings. I also learnt how to write official letters, as well as coordination with others. Despite the programme has ended, I want to continue increasing awareness. Currently, I have a plan to focus on creating awareness in the summer centres about various aspects of the environment.

Marwa Salim Al Siyabiyah, a student at Al Sharqiyah University and a member of «A Volunteer In My environment» initiative, said: «The program has refined my skills and capabilities. It made me a leader in my home and society. I have learnt to instill self-confidence in school students. I also learnt the environmental concepts, work of environmental workers and the importance of their work. I want to form a special team to educate the community about the environment. The next step is to teach what I have learnt to school students and the community in general.

Environmental Study about the Engineered Landfills :

- **Food shortage and illegal hunting threaten Egyptian Vultures**

Do the Engineered Landfills Maintain Biodiversity ?

Muscat-August:

A team of environment and biodiversity specialists led by the well-known researcher Michael J. Macgrady conducted a study on Egyptian Vultures at Muscat`s municipal landfill. The findings of the study which was submitted to Oman Holding Company for Environment Services (Beah) highlighted the vital role waste management and engineered landfills play; not only in keeping human life healthy and sound but also in contributing to observing biodiversity and providing food sources for birds. Furthermore, the study pointed out that the well-managed engineered landfills can be used in monitoring and tracking birds of all species.

Bird Study

according to the study that was carried out at Muscat Municipal Landfill at Al Amerat which is managed by Beah the landfills contribute to understanding the behavior of migrant birds to which they flock for food, and present a good location for bird monitoring throughout the year. This in turn provides information on the changes happen to the birds in their immigration. The Muscat located 15 km south of the built up areas, the Muscat municipal Landfill is well known among birdwatchers for the Egyptian Vultures that are the most common scavenging raptor to use this site and known for being usual to be seen at Southern Europe, North Africa and south Asia.

Study Tools

The study team used different-size binoculars and telescopes in counting the raptors scavenging at the landfill during the period

Engineered landfills contribute to counting and tracking Egyptian Vultures

458 Egyptian Vultures observed at Al Amerat engineered landfill

Study Recommendations

- **The importance of adopting a comprehensive waste management strategy that includes attention to wildlife**
- **The need to follow the methods of scientific research and monitoring and continuous monitoring in engineering landfills**
- **The importance of expanding in field operations and ensuring that the benefits and benefits of waste management are increased and public awareness is addressed**
- **In drawing up policies and legislation, the role of engineering corps in providing food for migratory birds**

November 2013- March 2015. The findings have been submitted to Beah in 29th January 2019, by Macgrady 458 endangered Egyptian Vultures have been observed at the site, where the adults represented 67% of the total count.

Migratory Birds

In addition to being a good source of food for migrant birds, the engineered landfills are approved to be a good site for watching and monitoring the migrant birds especially in the period from October to March. Furthermore, another species of vultures have been monitored; but in a small population and in winter only.

According to the study, the breeding of Egyptian Vultures was from 15 to 25 couples. However, the main reason of having the majority of breeds in the north of Oman is still unknown. So, the study stressed on the necessity of carrying out more research on the possible relation between the numbers of birds observed and breeding volumes of local birds. The study highlighted the significance of drawing a connection between the number and age group of Egyptian Vultures flocking to the engineered landfill in the autumn; in line with the number of the birds breeding in the far north of the Sultanate; as there is no sufficient information on the birds migrating to the landfill in winter.

Threats endanger Egyptian Vultures

The study concluded that the main threats that endanger Egyptian Vultures are: changes in food availability, illegal hunting and persecution, electrocution, inadvertent poisoning, diclofenac, targeted poisoning related to poaching, and traditional folk medication.

the study hinted to the fact that rapid urbanization the Sultanate is witnessing as the towns go bigger and turn to urban hubs and the growing population- the majority of population concentrates in Muscat- contributed to the availability of food sources for migrant birds at the engineered landfills.

Environmental Balance

The study concluded that adopting a comprehensive strategy for waste management and the availability of safe access for birds to food sources at the landfills provide answers to the issues of assuring sound public health and protecting Egyptian Vultures and the other migrant species at the same time. This in turn will contribute to establishing and maintaining the environmental balance required. Furthermore, wide-spreading awareness and educating local communities on the importance of keeping this environmental balance in a good manner will help saving these endangered species of birds.

Egyptian Vultures

Egyptian Vultures are partial migrants birds that breed in northern areas move to south for the non-breeding season. The juvenile Egyptian Vultures dwell in southern areas like Oman for some years before returning to their natal areas.

Breeding by Egyptian Vultures in Oman occurs mostly in the northern mountains (eastern and western Hajar mountains including Al Jabal Al Akhdar.

Many of bird watching lovers are very keen to visit landfills regularly; as these sites are a good source of food for birds. Subsequently, these landfills contribute to observing and watching different species of birds to know more about them.

Environmental Study about The Vehicle Exhaust and it›s Danger :

Vehicle Exhaust

In light of the rapid industrial developments experienced by modern transportation and the increasing number of vehicles on roads, the traffic fumes (exhausts) became a worrying issue that made the majority of competent authorities and local communities all over the world sounds alarm.

- **Environmental pollution caused by vehicle exhaust is an issue of global concern**
- **Vehicle exhaust imposes severe risks to human health, livestock and plants**
- **Local communities should be educated on vehicle exhaust risks**

The global efforts in this phenomenon excreted by researchers and specialists are directed to exploring the extent of risks and damages resulted from exhausts that were highlighted by the World Health Organization (WHO) which said in recent reports that air pollution resulted from traffic fumes causes the death of nearly 7 million people worldwide every year; including more than 2 million in the Western Pacific Region, one million in Africa, 500 thousand in Eastern Mediterranean, 500 thousand in Europe, and more than 300 thousand in the Americas. The leading-to-death diseases caused by air pollution were different in terms of being the direct cause of death as the follow: Pneumonia (21%), brain attack (20%), Ischemic heart disease (34%), Chronic obstructive pulmonary (19%), and lung cancer (7%).

Findings of Scientific Studies

According to a study conducted by Massachusetts Institute of Technology (MIT) in 2013, there were 53 thousand premature deaths annually in USA due vehicle emissions. Another study by MIT revealed that that vapors caused by traffic cause the death of 5000 people annually in UK. The Agence Francaise de Sécurité Sanitaire Environnementale (AFSSE) said that vehicle emissions attribute to 33% of air pollutants and cause the death of 6500 - 9500 people annually in France.

A recent study by German researchers revealed that vehicle exhaust gases have a significant impact on children›s health. «The risk of asthma and allergies is several times higher in children living in homes close to busy roads,» said Dr. Michael Kapisch, a specialist in Pediatrics at the Regensburg City Hospital in southern Germany. The researchers based their study on data collected from about 2,500 newborn babies and children of different age groups under 18.

A Swedish study by a group of researchers at Umeå University pointed out that people living in areas with a lot of vehicle exhaust gases are more likely to develop Alzheimer›s compared to ones living in areas with clean air.

Vehicle Exhaust Components

The findings of a study conducted by the Jordanian Ministry of Energy and Mineral Resources, in cooperation with a number of establishments concerned with studying pollutants, the most dangerous gases and pollutants resulted from vehicle exhaust are: Nitrogen oxides caused by the combustion of fuels that converts nitrogen and oxygen into nitrogen monoxide and Nitrogen dioxide that in case of high level of concentration affects the lungs.

Nitrogen forms 78% of air while the rest of components are the nitrogen oxide emitted from the soil into air. There are another components containing nitrogen that are emitted as a result of human activities, such as nitrogen monoxide, nitrogen dioxide, dinitrogen trioxide, nitrogen tetroxide and dinitrogen pentoxide which are pollutant gases.

As a result of the fuel composition, the diesel engine produces 222 pounds of nitrogen per 1,000 gallons while the gasoline engine 113 pounds per 1000 gallons of fuel. The nitrogen in the atmosphere arises mainly from combustion of various hydrocarbon fuels in engines.

Carbon monoxide which is a toxic gas resulted from internal combustion. It is a deadly gas as the exposure to a high concentration leads to death; the feeling of exhaustion and headache, and slow response during driving. The concentration of carbon monoxide is higher in tunnels, garages and heavy traffic. Carbon monoxide is a colorless, odorless, and tasteless flammable gas that is slightly less dense than air. It is

is a globaly environmental phenomenon that sounds the alarm

Vehicle Exhaust Impacts

- Air pollution causes, globally, the death of around 7m people annually
- Many health risks to humans, including the damage of the respiratory system
- Direct impact on environment, plants and fisheries
- Nitrogen oxides, carbon dioxide emitted from vehicles contribute to global warming
- The interaction of nitrogen oxide and hydrocarbons with sunlight damages the ozone layer

Periodical maintenance of vehicles is one of big steps forward attenuating exhaust effects on environment

considered one of the biggest air pollutants; as it represents 50% of the total volume of air pollutants.

The above-mentioned study revealed that each vehicle produces 3.2kg of carbon monoxide per day; with concentration level up to 12.85 ppm in downtown, where a 99.98% of this amount of carbon monoxide is emitted from the exhauster itself. Furthermore, vehicle exhausts contains lead which is a toxic heavy metal and can cause neurological damage.

Vehicles in Oman

According to data released by the National Centre for Statistics and Information (NCSI), the number of vehicle travelling in the Sultanate of Oman increased in 2019 (to May 30th) to 1,516,943; representing a 3.7% increase compared to 2018. By the end of May 2019, there were 1500 - 3000cc 804,272 vehicles; 3001 - 4500cc 340,957 vehicles; 4500+ cc 11 vehicles; and 0 - 1499 cc 121,810 vehicles.

Commenting on the risks of vehicle exhausts, Salim al Alawi, a certified traffic expert and the founder of Al Amanah Centre for Traffic Safety Services, said: Oman`s Traffic Law prohibited driving a vehicle emitting heavy smoke, or unpleasant odors that harm health; although of that, there are a few number of vehicles violating this rule. The issue is not limited to the smoke emission cause, as this involves health effects on humans, whether from direct inhalation or from food contamination that accumulates on fruits, such as palm and fruits due to the accumulation lead atoms emitted from vehicle exhaust.

"The damages and harms from vehicle exhaust are caused by the combustion of vehicle fuel, such as gasoline or diesel which causes carbon emissions and evaporation during vehicle movement, such as carbon monoxide, nitrogen oxides that are resulted from the incomplete combustion of hydrocarbons. When the smoke emitted by vehicle exhaust is unusual, it is an indication that there is a defect in the engine of the vehicle; this emission is more harmful to humans and the environment. The harmful toxins emitted by vehicles add another increase in air temperature to the summer days. The environmental pollution caused by volatile gases from vehicle exhausts has become an issue of concern to the world, so that some countries have banned the use of vehicles in big cities. There are some cities where people suffer from lack of breath, so they are wearing protective masks. In Oman, we have to not wait until we find ourselves in the same situation", concludes Al Alawi. Nasir al Amri, a Mechanical Engineering specialist at a private establishment said: the combustion of fuel in vehicles produces a lot of harmful gases, especially solid ones. These residues have a direct impact on the natural environment. Furthermore, the increase in population means more vehicles all over the world, especially in crowded cities.

"The impact of the exhausts emitted from vehicles that have been manufactured for more than ten years is bigger; as the percentage of errors in the operating values of the internal combustion system becomes higher; and thus toxic gases become more harmful to the environment. Nitrogen oxide and carbon dioxide are dangerous components emitted from vehicle exhaust, leading to global warming and the interaction of nitrogen oxide and hydrocarbons with sunlight causes severe damage to the ozone", said Al Amri.

Steps to Attinate Pollution

Many studies recommended a number of procedures to attenuate vehicle exhausts; to reduce harm and damage resulted, as the follow:

1- Periodical maintenance and changing broken down parts on time.

2- Observing speed limits allowed lowers combustion of fuel; as higher speed produces more toxic gases released into the air.

3- Avoiding traffic as possible.

4- Increasing landscape, plants and trees in cities.

5- Using hybrid or electric vehicles.

6- Extending public transport networks and promoting people to use them.

Raise awareness

Regarding the importance of spreading the awareness of vehicle exhaust damage, Shaker al Azzawia vehicle machinery Engineer said: everyone in society should feel the danger of vehicle exhaust and preserve the environment. All governmental and private organizations and the civil societies should participate in wide-spreading environmental and cultural awareness to keep society safe and observe the environment. The emission of vehicle exhausts is higher in the old vehicles. There should be regulations and laws to attenuate the risks of vehicles exhaust.

Marine Pollution

Marine pollution is one of the main factors in elimination of many organisms, and has significant impacts on human health on the one hand and the economy on the other. Oil pollution is the most dangerous type of marine pollution, resulting in huge problems and the death of many aquatic organisms. Countries and international bodies need to exert all efforts to get rid of the oil spills on the sea.

With the increase in overseas trade, the establishment of free industrial zones, ports and desalination plants and the pollution they can cause, Countries had to study their environmental impacts and enact stringent legislation and laws that would reduce pollution.

Results of International Studies

A number of studies have been conducted in this respect, which has demonstrated the risks and consequences of this contamination. In an Investigative study published by Science Journal, included 159 coral reefs in the Asia-Pacific region, researchers estimated that 11.1 billion pieces of plastics are tangled with coral reefs. This figure is expected to increase by 40% in the next seven years alone. In another study published in the Marine Pollution Bulletin, scientists recorded a disturbing development with regard to the intake of plastics by marine biologists. They pointed out that there is a countless number of evidence that marine creatures are eating up plastic debris, especially Micro-Plastic Materials, as food taken by mistake. A recent UAE study confirmed that marine wastes and residues pose a significant threat to green sea turtles. According to the study conducted by the Scientific Research Department at the Environment and Natural Reserves Authority in the Emirate of Sharjah, 86% of the turtles that are stuck, swallowed marine residues, mostly plastic, including ropes, weaving, cotton sticks, plastic woven bags, yarns, hooks, nets and traps for fishing. Another study conducted by a research team from the College of Engineering at Sultan Qaboos University on the assessment and simulation of the spread of oil spills in the coastal area of the Sultanate, that the sea water suffers from oil pollution, especially near the port of Sultan Qaboos, Muscat and Oman LNG plant, as shown by chemical analysis The highest concentration of lead was found to be around 0.050 ppm and vanadium about 0.006 ppm. These concentrations are very high when compared with other parts of the world. (global lead concentrations: Central Atlantic: 0.00005 ppm on average). It is worth mentioning that the study aimed to determine the amount of oil pollutants in the water along the Omani coast and to study the remedial measures. The Guardian newspaper, also published researches which revealed that plastic pollution in the world›s oceans, costs the international community billions of dollars each year through its impact on human resources, with fisheries, aquaculture and recreational activities particularly affected, as well as what the pollution causes in terms of losing what is estimated by 1.5% of the benefits that humans get from the oceans. The study revealed that an estimated eight million tons of plastic pollutants enter the world›s oceans every year. Plastic trash accounts for 80% of what flows into these oceans from rivers.Pottles make up to 14% of the visible elements of trash. The food packaging 12%, cigarette butts 9% of fresh water pollutants, as well as disposable food containers that make up to 6% of all ingredients, followed by cotton buds and ready-made cups with 5% and 4%, respectively.

Classification of Pollutants

In addition to talking about plastics as one of the most prominent pollutants of the sea, the most dangerous types of marine pollution in the world are classified to include natural pollution, which changes the properties of natural water due to changes in temperature, where the increase in the amount of evaporation of water increases its salinity as well as it causes the water to become

Remedial Solutions

Remedial solutions of the marine pollution problem are represented in the need to treat waste water before it reaches the soil or natural water surfaces, such as seas and oceans, in addition to cleaning the seas from oil spills resulting from the collisions of giant marine vehicles, especially oil tankers, through mechanisms determined by experts. The resulting damage can be prevented or minimized by halting urban sprawl on the beaches, preserving beach sand that is home to sea turtles and other marine organisms, and rationalizing fishing operations, as well as the awareness of the importance of environmental culture for all individuals so that responsibility is shared between individuals, institutions and concerned bodies and that will benefit everyone.

Major Causes of Marine Pollution

- Throwing away waste and excess remains.
- Increased overseas trade and oil pollution is the most dangerous type of pollution.
- Establishing of free industrial zones, ports and desalination plants.

a risk that requires combat and minimizing its effects

Marine pollution hinders marine tourism, affects the countryıs productivity and the national income

The Sultanate is the most vulnerable country to marine pollution in the region because of its geographical location

Oil pollution is the most dangerous type of marine pollution

smelly, and lead to change water colour and taste. The second category is the chemical contamination that results from the impact of waste water, agricultural residues and the subsequent insecticides and many wastes that are dumped into the water and affect the aquatic organisms that are then consumed as food. Oil pollution is the most serious type of marine pollution, which causes huge problems and the death of many aquatic organisms, and countries and international bodies need to make many efforts to get rid of oil spills on the surface of the sea. The reasons for this type of pollution include technical errors in the systems operating in the production of oil, the lack of capabilities for production, maintenance, and the leakage of oil during smuggling operations through the sea and ocean, as well as the overturning of oil tankers due to weather conditions or a malfunction that caused it to explode and leak oil. Added to this is the biological contamination that results from the mixing of the waste of wild organisms such as humans and animals living on land near sea water, causing the spread of micro-organisms that cause many diseases, which affect humans when washed by the water or fed from the meat of fish, and these microorganisms such as bacteria,parasites, viruses and algae, cause many serious human health diseases that are difficult to treat. The algal blooms which is known as the “red tide” is a natural phenomenon that results from the growth and persistence of large concentration of aquatic microorganisms and unicellular algae. The occurrence of the red tides is attributed to natural factors, such as increasing seawater temperature, the movement of marine currents and Monsoon, especially at this time of year, and human factors that are related to the increasing human activities along the coasts, such as establishing tourism cities, factories, desalination plants, and fish farms.

Effects and Damages

Marine pollution causes huge economic losses that require the world to spend billions in order to find solutions and protect the environment from further damage. These include the damage caused by the floating oil layer on the surface of the water resulting from the different marine pollutants that draw the amounts of oxygen dissolved in the water and blocking the sunlight from reaching the water, so the plant fences can not able to carry out photosynthesis that depends on the presence of Sunlight, carbon dioxide dissolved in water, chlorophyll, which produce carbohydrates, resulting in the disappearance of large marine organisms of high nutritional and economic value to humans. These effects also extend to waterfowl, leading to poisoning and the death of many of them gradually. Also, chemicals spoil the natural properties of water and are highly concentrated in water, the mater that leads to poisoning of water and consequently the death of marine organisms. In addition, fisheries are affected by petroleum products of various kinds, which they call oil spills, hazardous substances and leaks as a result of ship accidents leading to the death of fish, thus affecting an important food resource. This also prevents attracting tourists to coastal areas due to the pollution of the seas resulting from oil pollution and sewage pumping, as well as the impact on productivity and national income of the country due to accidents of ships and offshore rigs and oil spills that lead to the suspension of work.

The Reality of Local Pollution

As for the marine pollution situation in the Sultanate, 94 reports have been identified since the beginning of this year, among them is 21 oil pollution, in addition to 8 other reports of shipwreck and collision incidents, and 5 reports of some people transporting sand from the shore. In addition to one report on the red tide and 59 other reports on other types of pollutants. The Ministry of Environment and Climate Affairs pointed out that the volume of reports this year has witnessed unevenness. 25 reports were monitored during the first quarter of this year, 20 others were reported during the second half, while for the third quarter, 23 reports were received and 25 others in the last quarter of Year. By virtue of its geographical location overlooking a number of seas and oceans, the Sultanate is classified as the most vulnerable to marine pollution in the region due to the active maritime traffic in addition to the illegal practices carried out by ships in the territorial waters and in the private area of the Sultanate. In this context, the Sultanate has moved to plan how to protect its waters in particular and its environment in general through the enactment of a number of laws to ensure this. Article 29 of the Law of Environmental Protection and Pollution Control, provides for the necessity to make environmental planning an integral part of overall development planning in order to achieve sustainable development in addition to the Marine Pollution Control Law No. 35 / 81 and the establishment of the Environmental Protection and Pollution Control Council in 1979.