



The National Field  
Research Centre for  
Environmental Conservation  
About innovative Environmental Research

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Sultanate of Oman  
Diwan of Royal Court

Issue 29

# Mobile Environmental Research Unit (MERU) ... Nature Exploration Trip in « Jabal Samhan »





point of view

## Balance of power

**Dawood Sulaiman Al Balushi**  
Editor-in-Chief

The struggle between development and the environment has always existed. Economists demand a lot of urban, commercial and technological expansion at the expense of natural and environmental resources. They believe that the growth and progress are achieved through rapid development for increasing income. Whereas, environmentalists urge that the technology and economic projects should not overlook natural resources. If this infringement continues, this can cause massive destruction of the earth and degradation of ecosystems.

What raised the subject to my self is the request of one of economical investors to the sultanate to reduce some environmental rules, terms and conditions imposed on investors to facilitate more investments in large areas of lands, wadis and mountains. There are certain conditions which make mandatory for the investor to protect natural resources and do safe dumping of solid, liquid and gas wastes. They think that the development of the country lies in increasing the number of large factories and attracting foreign investments for industrial projects.

We are not against rapid development and technological advancement. But there has to be a balance of power between the development and environmental and natural resources of the country, so that one side does not dominate on the other. If balance of power between the two axes is disrupted, it would destroy ecosystems. There are many global examples where there were development which disregarded the environmental aspect. The result was that they lost most of their natural habitats. Vegetations were totally destroyed. There was also extinction and degradation of wildlife. Now they are spending millions to restore their natural ecosystems.

The Sultanate, thanks to the wise vision of His Majesty Sultan Qaboos bin Said, has recognised its importance since the beginning of the Renaissance. The development and conservation of natural resources were made two parallel lines which are together in the developing the country. Therefore, It is imperative for us, as government organisations or private institutions, to complete the process of building and development, and to maintain the balance of power between development and environment to preserve the ecosystems and wildlife of the country. This is necessary if we and the future generation have to enjoy a clean environment free from all kinds of pollutants.

## Environmental education

### Concept:

This is the aspect of the education which helps people in their successful life on the planet earth. This is known as the environmental orientation of education. Environmental education also teaches how to manage and improve the relationships between man and his environment in a comprehensive and enhanced manner. Environmental education also means learning how to use modern technologies, increase their productivity, avoid environmental hazards, eliminate environmental damage and make rational environmental decisions.

### Definition of environmental education:

The definitions of environmental education, especially at the global level through environmental conferences, are varied. For example, the Northern University of

Illinois, United States of America, has taught environmental education as «a pattern of education aimed at understanding of values, clarification of concepts and development of the skills required to understand and appreciate the relationships between human beings, culture and biophysics. It is also practiced for decision-making and the development of a code of conduct on issues related to the quality of the environment. In a conference in Tbilisi in Georgia of the former Soviet Union, the environmental education was defined as a «the process of reorientation and linking of various branches of knowledge and educational experience for the integrated understanding of problems. It allows rational actions to participate in the responsibility of avoiding environmental problems and improving the quality of the environment.»

## Ministry of Education towards to equip its buildings with renewable energy

The Ministry of Education has signed a memorandum of understanding to equip its buildings with renewable energy by implementing technical services and training as part of energy conservation program in accordance with the ISESCO rules. The Ministry is making efforts for optimum use of renewable natural resources to control gas emissions which are harmful for the local environment, and reduce consumption of electricity in its buildings by using the latest technology. The project to equip Ministry's buildings with renewable energy will be divided into two phases. The first phase is a study on how to rationalise the consumption of electricity by making a control mechanism to reduce excessive electricity consumption which is due to air conditioning. In addition to this, it would change all its



traditional lightings with high quality LEDs which have longer life span of five years without changing. It is expected that after the implementation of this stage, the annual consumption rate will be reduced 20 - 30% In the second stage of the project, solar system would be established to provide electricity for a

number of buildings belonged to the Ministry of Education. It would produce 50% of the daily consumption of electricity. Therefore, it is expected after the completion of the two phases of the project as mentioned above, it will cover at least 60% of the annual energy consumption used in the Ministry premises.

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**Depending on what new technologies have proven during their study of behavior**

# PLANTS INTELLIGENCE

## Studies confirm that plants hears and communicates with it's gender

Prepared by: Saeed Al-Rashdi

A number of modern researches and studies have proved that plants communicate with each other. In June 1983, Science magazine published an article on a scientific experiment to test a hypothesis put forward by chemist Baldwin and the biologist Jacques Schultz about the existence of chemical contact between plants through the air. At that time, botanists and other experts of the world of plants became more mature and they changed their views about them after an era of inertia and lack of interaction with the environment. This is how the researchers started study of the behaviour plants resulting in emergence of new branch of botany which is called plant physiology (Plants' physiology = Plants' behaviorology) which is similar



many receptors and sensors through which it can receive messages about the environment in which the plants live. More than 700 sensory receptor of the plant were found during the study. They can sense what is around it clearly. They are more sensitive than those of a human being. There sensors are diverse. They are mechanical, light, heat and chemicals. With the light sensor, plants can feel more than human vision. Unlike human being, they can sense wavelengths, including ultraviolet and infrared radiation.

### Communication:

Some plants release their compounds as a kind of chemical signal to communicate with their surroundings as well as with roots. Some plant species invoke insects to get rid of aggressors and intruders. Some plants can also identify the plant next to it and compete with them for resources of water, light and air. Some researchers have called this type of communication a «plant identification». However, the question remains about the whereabouts of the brain of this plant.

### Balance devices:

The discovery of the ear of the plant which is responsible for the balance in the sixties of the last century was exciting. It was based on the granular grains of some plant cells, which move according to the weight, which teaches the mother tree by bending.

A group of researchers studied 11 species of plants, which have stems from the base. This brought the outcome that these plants do not rely on gravity in straightening the curve. Many of the clips measure the curvature of the parent tree. As the cells affect each other at the length of the trunk, closest to the closest, to correct the position of the trunk and

### Tree muscles:

As a result of the advancement in techniques of imaging and their analysis used in the study of fluids, researchers can now track the movements of the plant, which is more related to cells. Researchers have noticed through these techniques that the plant cells of the trunk correct the position of the plant from time to time, so that the space between the cells increase and decrease depending on the severity of the pressure. This movement resembles with the movement of the muscles and adapts to the surrounding environment and provide basic needs closer to them.

### Allergy:

The cucumber plant climbs on plants with long stalks because it can not rise more than 30 cm from the surface of the earth and so, it does not receive the right amount of sunlight. Therefore, a cucumber plant was developed which is known as the twists or lattices which wrap around the stem of the long plant in loops or rings and goes up with it to a place where sunlight reaches. These twists work with a sense of touch, which one of the researchers said that from these epithelial membrane proteins come out with every mechanical stirring of the plant.

### Corn starch:

A researcher at the University of Western Australia tested the yellow maize plant after it was grown in a nutrient environment. Sound waves was focussed on it at different frequencies to grow the plant in the direction of the source of sound at the frequency of 200 Hz. According to what the researcher found, there was possibility of a method of communication between plants related to sound and frequencies, although there are many scientists who doubt this idea.

to animal physiology but only it is based on plant observation.

### Modern techniques:

Many new techniques have helped in the study of the behaviour of plants and the messages sent by them into its surroundings. For example, invasive gas chromatography has enabled the analysis of messages and gas concentrations released by plants in certain areas. They accelerated films after monitoring the plants for long periods. It clarified many of the changes which affect the plants and which are not normally noticed by the human eye. There are also many studies which showed that the plant has



tree after that. This is what one researcher described as saying: «We were surprised when we learned that the plant has objective awareness»

### Defense support:

When the tobacco tree is exposed to enemies from among insects, this plant calls its bodyguards by inviting the natural enemies of the aggressor insects. Studies have shown that the nicotina attenuate plant sends HIPV compounds which increase the chances of insects biting the larvae which feed on the tobacco plant. There are plants which produce tobacco to reduce their leaves.

## 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:

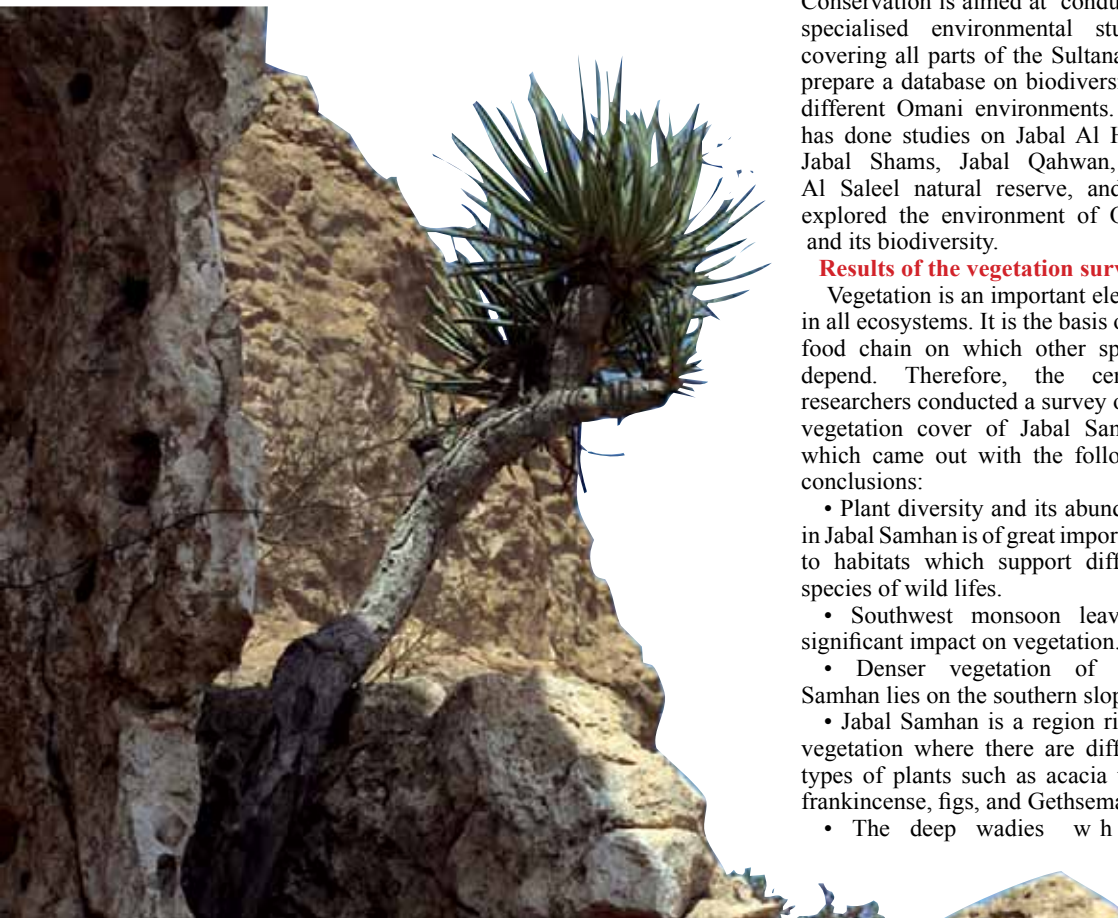
Vegetation is an important element in all ecosystems. It is the basis of the food chain on which other species depend. Therefore, the centre's researchers conducted a survey of the vegetation cover of Jabal Samhan, which came out with the following conclusions:

- 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 w h i c h

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 bury 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 sensed 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.

**Will embrace the ideas of «Manaf'e» benefits**

## »» «Manaf'e» source of promising innovative environmental ideas



A marathon of biodiversity ideas for '«Manaf'e»' was organised by the Oman Animal and Plant Genetic Resources Centre of the Research Council, with 20 participants forming four working groups of researchers, innovators and entrepreneurs interested in the environment sector. They presented four ideas in four areas related to biodiversity in the Sultanate. They were world of plants, world of animals, world of micro-organisms and world of marine life. The

ideas emanating from '«Manaf'e»' were to be adopted by the private sector companies and business centres. The participants also had supervision of experts from the area of biodiversity in the Sultanate. They helped the participating teams in developing their ideas and meet the challenges they could face. The ideas were also presented to the jury comprised of investors and stakeholders in the area. The «Manaf'e» program was aimed at discovering young talents from the society

to introduce them to biodiversity and its social and economic importance. The Oman Animal and Plants Genetic Centre intends to create a scientific and practical society and provide it opportunities for business ideas, and encourage research and innovations as well as attract investment in diverse genetic resources to achieve the vision and objectives for which it was established. The marathon «Manaf'e» is the first platform to motivate young people to create environment friendly products from local genetic resources of global standards. The teams participated in the marathon brought innovative ideas. One of the teams was for use of the scales of fish in the manufacture of environment friendly plastics. The second team had the idea of converting organic waste into organic fertilizer with high specifications of aerobic bacteria using the initial residues of engineering landfills. This will recycle the wastes and reduce the environmental hazards by a beneficial product. The third group had the idea of manufacturing jewels of the environmental raw materials of the Sultanate, serving the tourism sector and culture together. The fourth group talked about the production of a box of health supplements derived from Omani plants inspired by Omani traditional medicines.

### Saudi Arabia

#### Students invent an environment friendly car

Saudi students of the King Saud University in Riyadh invented cars with high fuel efficiency and other alternatives. Dr. Walid Zahid, Dean of the Faculty of Engineering at the King Saud University, said: "The students worked making on two cars, one with the lowest proportion of gasoline named as " Riyadh "and the other with electric power, named as Viber.

### Kuwait

#### Environment launched a project to rationalise water consumption

The Environment Public Authority (EPA) of Kuwait is preparing to launch a national project to rationalise water consumption in Kuwait. The project will include all public facilities in ministries and government organisations and institutions, such as mosques, schools, hospitals and health centres. The EPA, in a statement, said that the project includes displaying guidelines to rationalise water consumption and provide the necessary maintenance. It will also carrying out a comparative study between the rate of consumption recorded after a month of displaying guidelines, and the rate of consumption recorded in the same period of previous years. It is hoped that this project will be successful in the rationalisation of water consumption. It pointed out that the project was part of the strategy of the EPA for the conservation and rationalisation of water and implementation of part II of the fourth chapter of the law of environmental protection No. 42 of the year 2014 with the amendments by Law No. 99 of 2015 and its executive regulations. The EPA has to play its role in the pursuit of everything related to preservation of the environment in its general and particular sense, and to ensure the achievement of sustainable development and protection of water sources of all kinds.

### Bahrain

#### Establishing first wind power station

The Electricity and Water Authority of Bahrain has set up a pilot plant to produce electricity from renewable energy. The plant will produce approximately 3 MW of solar energy and 2 MW of wind power. This project is in line with the National Renewable Energy Plan approved by the government last year to get 5% of renewable energy from total energy consumption in Bahrain by 2025.

### UAE

#### Environment begins building coral gardens

The Ministry of Climate Change and Environment of the United Arab Emirates (UAE) has launched the first phase of its initiative to spread new coral gardens in the marine environment, as was announced earlier this year. For the purpose, it is constructing 3 coral gardens for total 850 square meters of coral gardens spread over Ras Al Khaimah, Umm Al Quwain and Ajman.

### Qatar

#### National Library promotes environmental awareness in March

The Qatar National Library organised a set of cultural and educational activities targeting various segments of society to promote awareness about the environment and enabling society to play its role in protection of its sustainability. These events on sustainability and self-reliance began with the «Science, Technology, Engineering and Mathematics Day» which coincided with World Water Day on March 22

## » Cape Town waiting for a day when tap water would run dry

The strict water-saving regime in Cape Town, a welcome postponement of severe drought, helped in delaying the "Zero Day" when the flow of water from the taps in the city would stop. South Africa has declared a national calamity due to the drought which has hit southern and western regions, including Cape Town, which means that the government may spend more money and resources to deal with the crisis. Cape Town, which attracts about two million visitors a year, wants to have more ability to deal with the situation being faced by the people as effects of climate change, as in other dry areas like Melbourne and California. Officials have earlier said that severe drought was adversely affecting the number of tourists and a booming economic of its kind. According to South Africa's weather service, two of the most drier seasons ever recorded in the city, since the start of observation in 1921, have occurred in the last three years: in 2015 when the rainfall reached 549 millimeters (mm) and last year, the record driest year, when the annual rainfall reached to 499 mm.

## » Hedgehogs are threatened of extinction in Britain

The number of the local hedgehog have declined sharply since 2000, according to a recent report on hedgehogs in Britain published in 2018 jointly by the British Society for the Conservation of Hedgehogs and a Society for the Protection of Endangered Species in the country. According to Scottish newspaper the Scotsman, recent studies have shown that the number of hedgehogs in rural areas were declining sharply, halving in the past two decades. This has indicated that the numbers have fallen by one-third in British cities and towns during this period. Environmentalists say there were several factors leading to this decline in the countryside, but the expansion of agriculture is the main reason. The report called for contribution to the recovery of hedgehogs by working to restore lost habitats, leaving piles of foliage, supporting wildlife-friendly farming as well as reducing the use of agricultural pesticides.



## PDO opens a solar station (Miraah)

Petroleum Development Oman (PDO) and Glass Point opened solar power 'Miraah' station for steam generation situated in the Amal oilfield, in the south of the Sultanate. Once completed, it will be one of the largest solar projects in the world. The first four blocks of Glass houses of the station has already been completed. For this, all safety rules were abided, the budget was allocated and the timetable was set for the delivery of steam to the Amal oilfield network. There was also an official inauguration of the visitors' centre, a permanent exhibition where work of this huge project can be seen. HE Salem Al Afi, undersecretary of Oman's Ministry of Oil and Gas, said: This day is marked as an important turning point for Oman, as it will be a regional leader in the field of energy convergence and the unification of renewable and traditional energy industries. The use of solar energy in

Oman's oilfields will reduce consumption of natural gas in the industry. It will prove to be a huge sustainable economic development for the Sultanate.» The construction activities of the 'Miraah' project were carried out on a schedule of 1.9 million man-hours since the project started in 2015. The first four blocks of Glass houses successfully became operational. The facility is now working daily to deliver steam to the Amal oilfield. The total capacity of the first four blocks of Glass houses is more than 100 megawatts which will provide 660 tons of steam per day. It will help in saving significant quantity of natural gas. Once the one-gigawatt plant is completed, it will consist of 36 blocks of in-built Glass houses which will deliver solar steam to the PDO. With the passage of time, it will gradually increase production to meet the demands for steam in the Amal oilfield.



## UNESCO to support conservation of Lake Chad

The UNESCO presented a project aimed at conserving the Lake Chad through, inter alia promotion of available knowledge about it, rehabilitation of wetlands and wildlife migration corridors and strengthening sustainable activities and income-generating. The project was presented at the international conference on Lake Chad, held in Abuja, Nigeria. The UNESCO-led biosphere and heritage project in Lake Chad was launched in partnership with the Lake Chad Basin Commission on the first day of the conference. A round table meeting was organised, which was participated by a group of representatives from the UNESCO, the Lake Chad Basin Commission, political officials, scientists and representatives of local communities in the lake basin, to discuss the salient features of project.



Environmental Vocabulary

## The king of the desert

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Good manners are glory and pride, the opposite is humiliating and shameful. Some of the good manners and characters of an animal became proverbs for a human. Some animals are known for their good manners, some of them for their bad manners. These manners are considered as built in behaviors in their innate nature. The dog born as a dog with its loyalty, the lion as a lion with its courage and strength, and the wolf born as a wolf clever and intelligence. Its behavior is imposed on its environment instinctively rather than acquisition. Since ancient times, mankind has mixed with animals life and discovered their behaviors and knew the ways of living with its simple perception, and made a logical comparison with good manners of animals to those of humans. Therefore, proverbs were created and the praise was replete with the finest words.

The wolf was known for its bravery and strength. Often it seen by the shepherds running very fast (up to 60 km), it headed towards a sheep in the centre of the herd that selected as a prey from a distance and even sometime through the darkness. It can easily recognizes human if carries tool of death or tool of peace. One group of wolves may cooperate in one prey. The Arabian wolf is characterized by large ears and smaller size than the other types of wolves, and weighs up to 20 kg while height up to 70 cm. The Arabian wolf lives in its own desert kingdom, which is its flock of eternal wife and children in an environment where it smells prevents interference of other wolf groups.

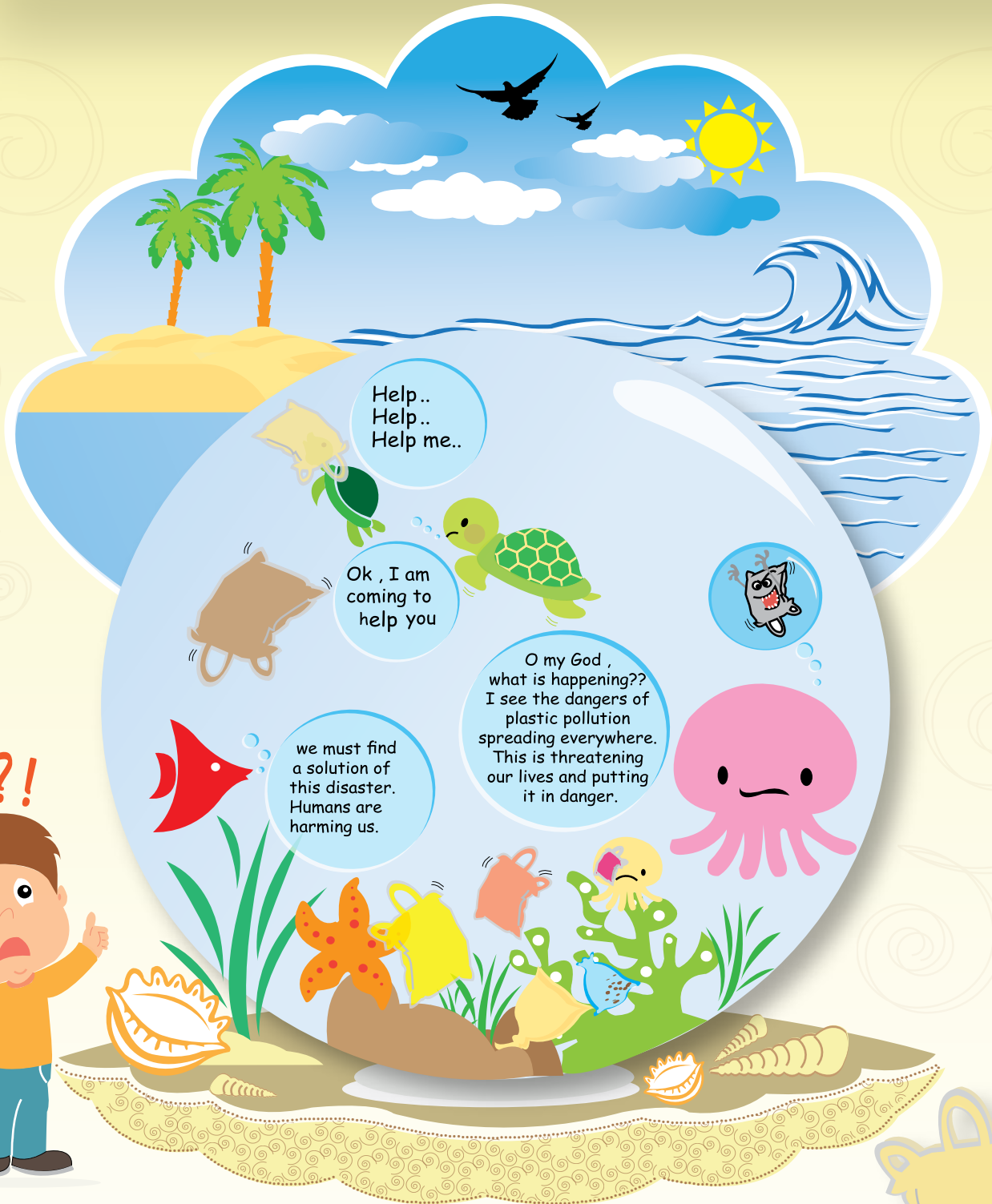
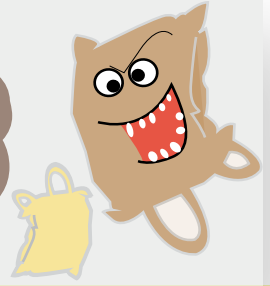
After one year from its born became ready for mating and starts to search for an equivalent and strong female from other groups to build a new group and kingdom. Its natural manner prevents it from marrying the wombs. Female wolf gives birth 3 to 7 puppies after two months of pregnancy, and the female continues for two months to breastfeed her puppies in a place which is surrounded by protection in her tricks and intelligence, which are usually superior to male. It is not of its weakness that the fire is its enemy, so if the wolf become close to the fire it absorbs a body like a barrel of burning oil. Perhaps the fire is a means of warning it about the existence of human and on other hand protecting human from his evil.

The camera traps have given us evidences of its presence in the Hajar Mountain range, in the central deserts of Al Wusta and in the Dhofar governorate. Its existence gives good indicators of the healthiness of the Omani environment, so this encourages us to raise the roof of wildlife protection programs in general.

The Arabian wolf carries good manners and behaviors that well described in old books and proverbs, some of which are still striking the imagination, some of which have been proven unquestionably by science. It has its privacy on the desert platform, characterized by ferocity, ingenuity, strength and intelligence. It is not a strange or flawed to likening the man to a wolf.

# Plastic Bags

Design: Saalma Al-Rabani



Let us  
learn dear  
children

Plastic bags are not decompose. It is a burden for the place where it is found. Many plastic wastes end up in seas and oceans. This adversely affects fishes, birds, tortoise. It harms fish which eats it. To prevent this pollution, we should replace plastic bags with bags made of clothes or paper as a healthy and non-harmful alternative. These paper and clothes bags can be recycled in paper industry. There should also be awareness campaigns for human being about the harms of the plastic bags.

