

DHOFAR

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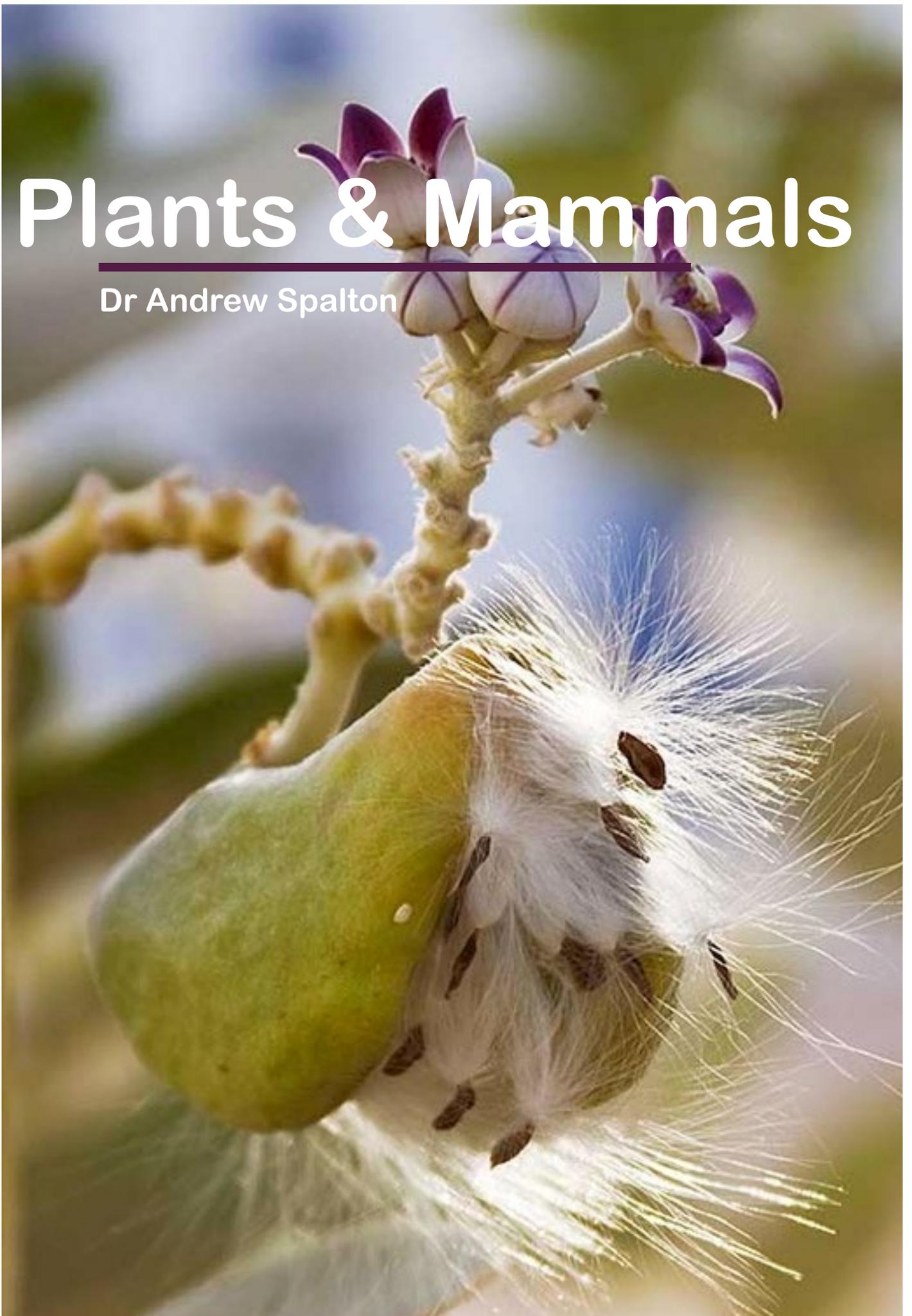
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Plants & Mammals

Dr Andrew Spalton





The geographical position of the Governorate of Dhofar, being only 600 kilometres from the Horn of Africa, combined with the climatic influence of the *Khareef* or Southwest Monsoon has resulted in a unique flora and fauna that is amongst the most diverse of the Arabian Peninsula.

Of Oman's 1407 plant species, 867 are found in Dhofar, including 41 species of plants that are not found anywhere outside Dhofar. To the north of the mountains are found species that are typical of the Arabian deserts (known as the Nubo-Sindian zone) while species occurring to the south, and directly impacted by the summer monsoon, more closely resemble the flora of northeast Africa (the Somalia-Masai zone).

Similarly, the presence of some mammal species, such as the Indian Crested Porcupine (*Hystrix indica*), is evidence of strong links with Asia. However, much of Dhofar's fauna reflects ancient links with Africa. For example, the Rock Hyrax (*Procapra capensis*) has a largely African distribution, evidence of former times, perhaps 100,000 years ago, when the Strait of Bab el Mandab formed a land bridge between Africa and Asia.

Plants

Most striking and best known is the flora of the so-called green mountains of Jebel Al Qara and Jebel Al Qamar; the western and central massifs of the Dhofar mountains. On the steep south-facing escarpments is the true cloud forest dominated by *Anogeissus dhofarica*, usually referred to

by its local name *Şğót*, a regional endemic only occurring in Dhofar and across the Oman-Yemen border. *Şğót* is a deciduous tree and comes into leaf in June, at the beginning of the monsoon. Other trees growing alongside *Şğót* include *Delonix elata* and south Arabian endemics such as *Euphorbia smithii*.

At mid-elevations the *Şğót* forests are replaced by open tall grasslands dominated by *Themeda quadrivalvis*, that can grow to 2.5 metres when left ungrazed. These grasslands are most developed on Jebel Al Qara and in many places stretch over the rolling hills to a horizon that is only rarely broken by ancient Fig (*Ficus vasta*) trees.

They are rich in species; on Jebel Al Qamar 112 species have been recorded and of these 11% are unique to the region and five occur only in Dhofar.

In places, the south-facing escarpments escape the summer monsoon and are dominated by arid land species. For example, above Wadi Afal and Wadi Al Mughsayl, the slopes and horizons are dotted with the endangered Arabian Dragon Tree (*Dracaena serrulata*), a close relative of the famous dragon's blood tree of Socotra. Also found at exceptionally high densities is *Aloe dhufaren-sis*, an endemic that is one of the most important

medicinal plants.

In the east lies the towering mountain of Jebel Samhan and although clouds are often seen along the high escarpment there is very little precipitation; Şġót is almost absent and is replaced by an open woodland community dominated by *Acacia* species.

Above the escarpments, the plateau of Jebel Al Qara is dominated by short grasslands with open woodlands including stands of ancient Wild Olive (*Olea europea*). The plateau of Jebel Al Qamar is more scrubby and dominated by *Commiphora* species as well as Desert Rose (*Adenium obesum*). In the east the summit of Jebel Samhan is arid but there is a sparse but very interesting flora including four species that are endemic to Jebel Samhan.

North of the mountains lies the Najd which includes the northward-flowing wadis and continues north into the open desert. It largely lies beyond the influence of the monsoon and consequently vegetation cover is typically sparse. The upper wadis of the Najd are sometimes referred to as the Frankincense (*Boswellia sacra*) zone as it is often the only tree species. As the wadis flow north the landscape becomes more open with *Acacia* species, *Maerua crassifolia*, *Moringa peregrina* and tamarisk trees. The most conspicuous plant is the Dwarf Palm *Nannorrhops ritchieana*. This was one of the most important plants for the pastoralists and was used to make numerous household items from rope to camel milking bowls.

In the far north of Dhofar the sand seas of the Empty Quarter are characterized by very low species diversity. Trees are absent from many areas but the iconic Ghaf tree (*Prosopis cineraria*) is found around the outer margins and in drainage lines and pans. After rainfall the sedge *Cyperus conglomeratus* and the beautiful yellow flowered *Tribulus omanensis* are more common. Both species are highly valued as fodder for camels and as the traveller Wilfred Thesiger wrote the pastoralists will not burn *Tribulus* 'for it is venerated as the best of all food for their camels'.

Mammals

Dhofar has 67 species of wild mammal, 49 terrestrial and 18 marine, including the world's smallest species, the White-toothed Pygmy Shrew weighing less than 3 grams and the world's largest species, the Blue Whale weighing up to 150 tons.

Terrestrial Mammals

Carnivores are at the top of the food chain and of these the Arabian Leopard (*Panthera pardus nimr*), Striped Hyena (*Hyaena hyaena*) and Arabian Wolf (*Canis lupus arabs*) are the largest.

Of the medium-sized carnivores Caracal (*Caracal caracal*) is the largest and a large male might almost reach the size of a small Arabian Leopard. There are three fox species; the shy Blanford's Fox (*Vulpes cana*) is found only in the mountains, Rüppell's Sand Fox (*V. rueppellii*) in sand and gravel habitats while the Red Fox (*Vulpes vulpes*) is increasingly ubiquitous.

There are two small cats; the African Wildcat (*Felis lybica lybica*) and the Sand Cat (*Felis margarita*). Common Genet (*Genetta genetta*) occurs only in Dhofar while two species of mammal known to raid farms and gardens are the ferocious Honey Badger (*Mellivora capensis*) and the White-tailed Mongoose (*Ichneumia albicauda*).

Of five species of herbivore three are ungulates; the pale Arabian Sand Gazelle (*Gazella marica*) is a species of the true desert, though few remain in the wild, while the darker Arabian Gazelle (*Gazella arabica*) prefers the gravel plains and the Nubian Ibex (*Capra nubiana*), often depicted in ancient petroglyphs, is a true mountain ungulate. The Rock Hyrax is a gregarious creature and important prey of the larger carnivores while the Cape Hare (*Lepus capensis*) is a most adaptable animal and able to survive where there is a minimum of vegetation.

Dhofar has five insectivores; two species of hedgehog and three species of diminutive shrew. Desert Hedgehog (*Paraechinus aethiopicus*) prefers lowland areas and avoids the higher elevations where its cousin the Brandt's Hedgehog (*Paraechinus hypomelas*) is found. Shrews are

Arabian Shrew (*Crocidura arabica*), Dhofarian Shrew (*Crocidura dhofarensis*) and White-toothed Pygmy Shrew (*Suncus etruscus*).

Of Dhofar's 10 species of rodent the Indian Crested Porcupine is by far the largest. There are nine species of rat, mice, gerbil, jird and jerboa; most are nocturnal and therefore difficult to see. Most common is the Arabian Spiny Mouse (*Acomys dimidiatus*) that shares its range with the Golden Spiny Mouse (*Acomys russatus*); one species comes out at night and the other in the daytime.

There are at least 17 species of bat; all but one is insect-eating and most are found on the monsoon mountains. Largest and most easily seen is the Egyptian Fruit Bat (*Rousettus aegyptiacus*) with a wingspan of approximately 60 cm. One of the smallest is the Dhofarian Pipistrelle (*Pipistrellus dhofarensis*) that is the size of a human thumb. It is widely distributed but does not venture into arid areas that are the domain of the Desert Long-eared Bat (*Otonycteris hemprichii jin*), that has huge ears to help it listen for ground-living prey such as scorpions.

Marine Mammals

The rich coastal waters of Dhofar are home to nine species of whale and nine species of dolphin.

Amongst nine species of whale that occur in Dhofar's waters, the Arabian Sea Humpback Whale (*Megaptera novaeangliae*) is the best known. This magnificent mammal grows up to 15 metres long and weighs up to 36,000 kilograms. It is a baleen whale, having no teeth, that filters krill, small fish and plankton through specialised feeding plates. The Arabian Sea Humpback remains in the Arabian Sea all year round where it feeds and breeds, making it the world's only non-migratory population. In Dhofar it is most likely to be seen in the waters of the Hallaniyyat Islands.

Other whale species that might be encountered include the Bryde's Whale (*Balaenoptera edeni*).

The deep-diving Sperm Whale (*Physeter microcephalus*) can be found further offshore; even larger than the Humpback Whale, Sperm Whales are toothed whales and may dive to depths reaching 1500 metres in search of food.



The coastline of Jebel Al Qamar at the height of the monsoon.

Typical wadi in the vast Najd region.



The rare but widespread Northern Indian Ocean Blue Whale (*Balaenoptera musculus indica*) is most likely to be encountered in deeper waters.

Of Dhofar's 9 species of dolphin, three are most likely to be encountered. The Indo-Pacific Bottlenose Dolphin (*Tursiops aduncus*) lives in close-knit family groups and is found close to shore, particularly between Hadbin and Hasik and on the Al Hallaniyyat Islands. The Indian Ocean Humpback Dolphin (*Sousa plumbea*) can also be observed close to shore, especially off the coast at Hasik and Salalah. It seems to prefer shallow water and thus does not venture far offshore while feeding on fish, squid and crustaceans. The Indo-Pacific Common Dolphin (*Delphinus delphis tropicalis*) is more likely to be found in deeper water, especially between Sadah and Shuwaymiyyah.

Conservation

Dhofar is celebrated for its biodiversity but wild species of plant and mammal are under pressure from human activities, particularly overgrazing of

rangelands and some fisheries and shipping activities at sea. This wonderful region has great potential to become a renowned nature-based tourism destination but care needs to be taken to ensure that its wild places and wild species are managed in a sustainable way.

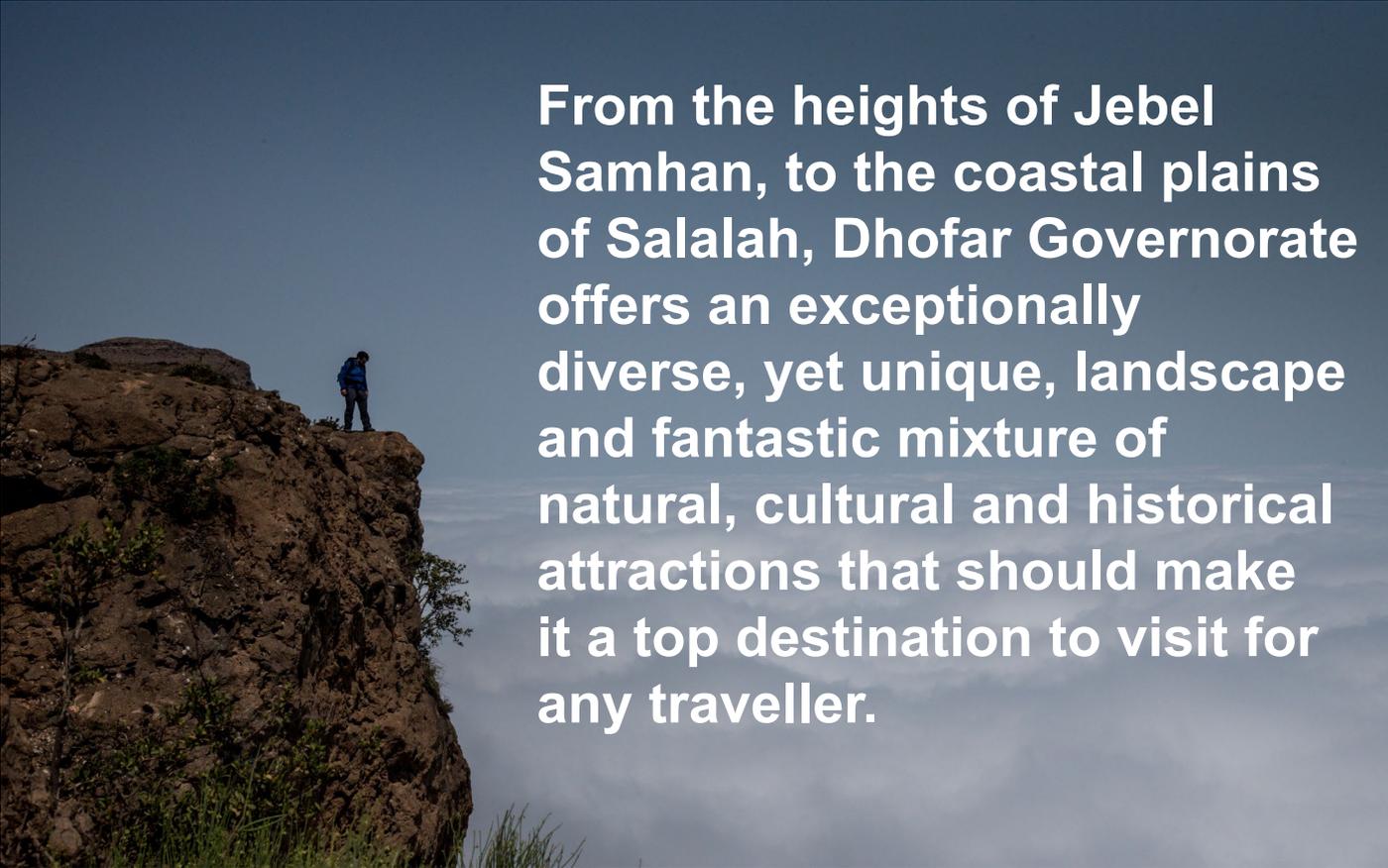
About Dr Andrew Spalton

Dr Andrew Spalton is a wildlife biologist who went to Oman in 1987 to join a team reintroducing the Arabian oryx to the Jiddat Al Harasis. His work in Dhofar began when he established the Arabian Leopard Conservation Programme in 1977. He has also studied the bats, rodents and eagles of Dhofar as well as rangeland management and climate change. He retired from the Diwan of Royal Court in December 2020 but continues to live in Oman. He is a founding member of the Environmental Society of Oman.

A scenic landscape at sunset. In the background, a range of mountains is silhouetted against a bright, hazy sky where the sun is setting. A white pickup truck is parked on a grassy plain in the middle ground. The foreground is filled with tall, golden-brown grasses and some purple flowers, slightly out of focus. The overall mood is peaceful and natural.

Tourism

Ali Hassan Mohammadi



From the heights of Jebel Samhan, to the coastal plains of Salalah, Dhofar Governorate offers an exceptionally diverse, yet unique, landscape and fantastic mixture of natural, cultural and historical attractions that should make it a top destination to visit for any traveller.

Dhofar is the largest, and the southern most, of Oman's eleven governorates with Salalah as its capital city. Dhofar's landscape can also be considered one of the most diverse out of all the governorates in Oman, with stunning coastline straddling the Arabian Sea in the South, to the coastal plains at Salalah which roll up into hills that end up to the plateaus of Al Qara' and Jebel Samhan Mountain ranges. The mountains slope further Northwards to a vast pebbly plain, home to Wadi Dawkah and the famous frankincense trees, before connecting to the tips of the Rub' Al Khali (Empty Quarter Desert) which runs all the way along the border with Saudi Arabia.

Throughout the past years, and especially among local travellers and guests from neighbouring Gulf countries, tourism in Dhofar has been synonymous with the 'Khareef' season in Salalah – the time of year from mid-June to September where Salalah and the coastal plains are exposed to the monsoon from the Indian Ocean resulting in rain, cooler temperatures and a complete transformation of the landscape to a beautiful and lush green paradise. However, Dhofar has many more attractions and adventures making it a must-visit destination year-round, and not just during the Khareef season.

One such location is Jebel Samhan, the highest peak in Dhofar. Jebel Samhan is a fantastic destination for hiking, photography, adventure – or a combination of all of these. The rugged landscape dotted with numerous native flora (such as the Dhofari desert rose - *Adenium obesum*, and the Arabian Dragon Tree - *Dracaena serrulate*), on a plateau with numerous precipitous cliffs that jut thousands of feet down opening up to stunning views across the plains to the South and the Indian Ocean (if the view is not shrouded with the monsoon mist!). Jebel Samhan is also home to the critically endangered, Arabian leopard (*Panthera pardus nimr*) – which is so elusive that it is practically impossible that you may encounter it, but trekking at the cliff-side edge in tracks that are traversed by such elusive creatures is a fascinating experience for anyone. This is also the reason that the majority of Jebel Samhan is a nature reserve off-limits to visitors except for parts of it.

Besides mountains, there are numerous wadis in Dhofar worth exploring – the most famous and popular of which is probably the stunning Wadi Dirbat. With its chiselled limestone rocks, stunning waterfalls (during the rainy season), long lakes and thick lush green cover - Wadi Dirbat offers a wonderful and enchanting experience that may make visitors wonder if they are really

still in Oman! The wadi has activities suitable for families (such as kayaking, picnic spots, etc.), but is also a fantastic destination for seekers of adventure who can explore more stunning landscapes by trekking deeper into the canyon. Water at Wadi Dirbat flows all the way into the ocean at Khor Rori, an estuary with surrounding hills that also happen to be the location of the ancient port city of Sumhuram. This brings us to another aspect of Dhofar's unique tourist offerings – its frankincense. Dhofar has been known since time immemorial for its frankincense trade,

Frankincense”.

Thousands of years later, Dhofar is still known for the quality it produces of this precious resin extract, and a visitor to Dhofar can no doubt get a fascinating insight into the importance of frankincense by visiting these outposts and culminating them with a visit to the traditional Souq Al Haffah, where Dhofari frankincense is still sold and traded in large quantities to this very day. The above sights are just a glimpse of the



with Roman scripts mentioning the importation of this precious resin, extracted from *Boswellia sacra* trees, from the Dhofar region. UNESCO has also included several ancient settlements in Dhofar (Al Balid, Shisr and Wadi Dawkah – besides Sumhuram hiram ruins) in its World Heritage List, appropriately naming it the “Land of

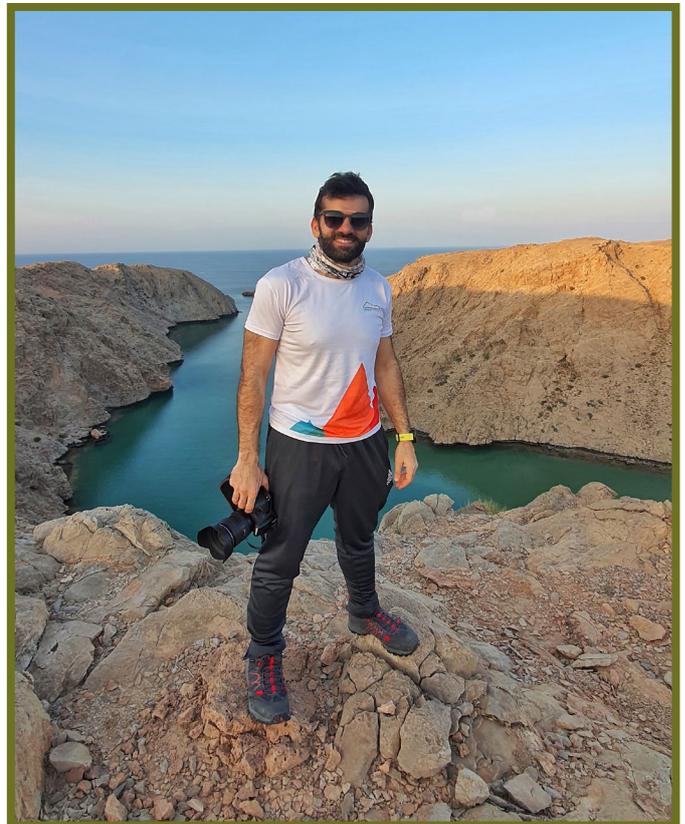
fascinating attractions and activities in store for visitors to Dhofar, which also has numerous springs, caves, stunning beaches and dazzling drives (including the fantastic coastal road to Sha’at).

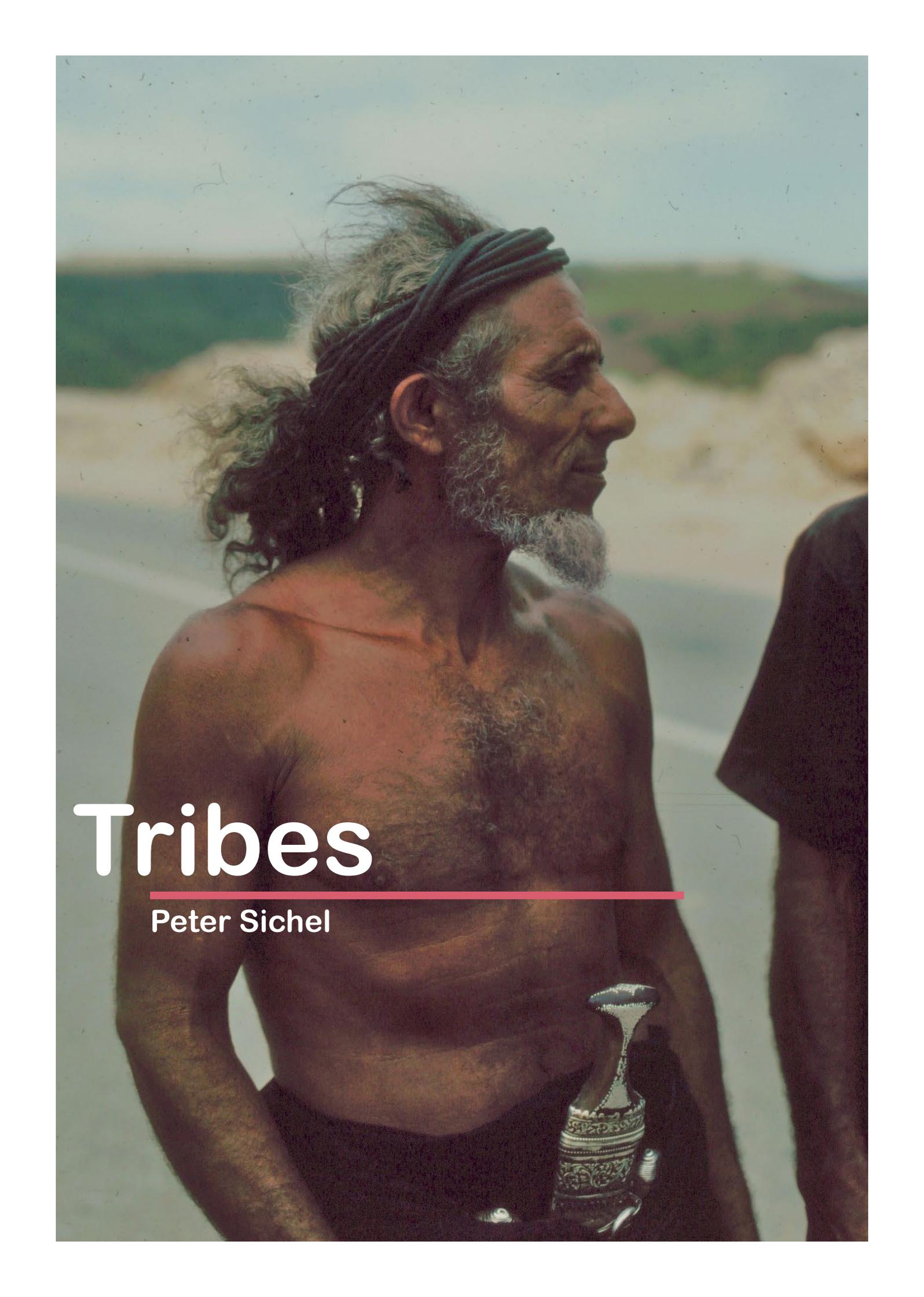
All of these offer endless opportunities for lovers of nature, adventure and culture to make Dhofar on top of their next destination list, once the world slowly starts to recover from the impact of the Covid-19 pandemic, be it as part of a trip to Oman or even as a stand-alone destination.



About Ali

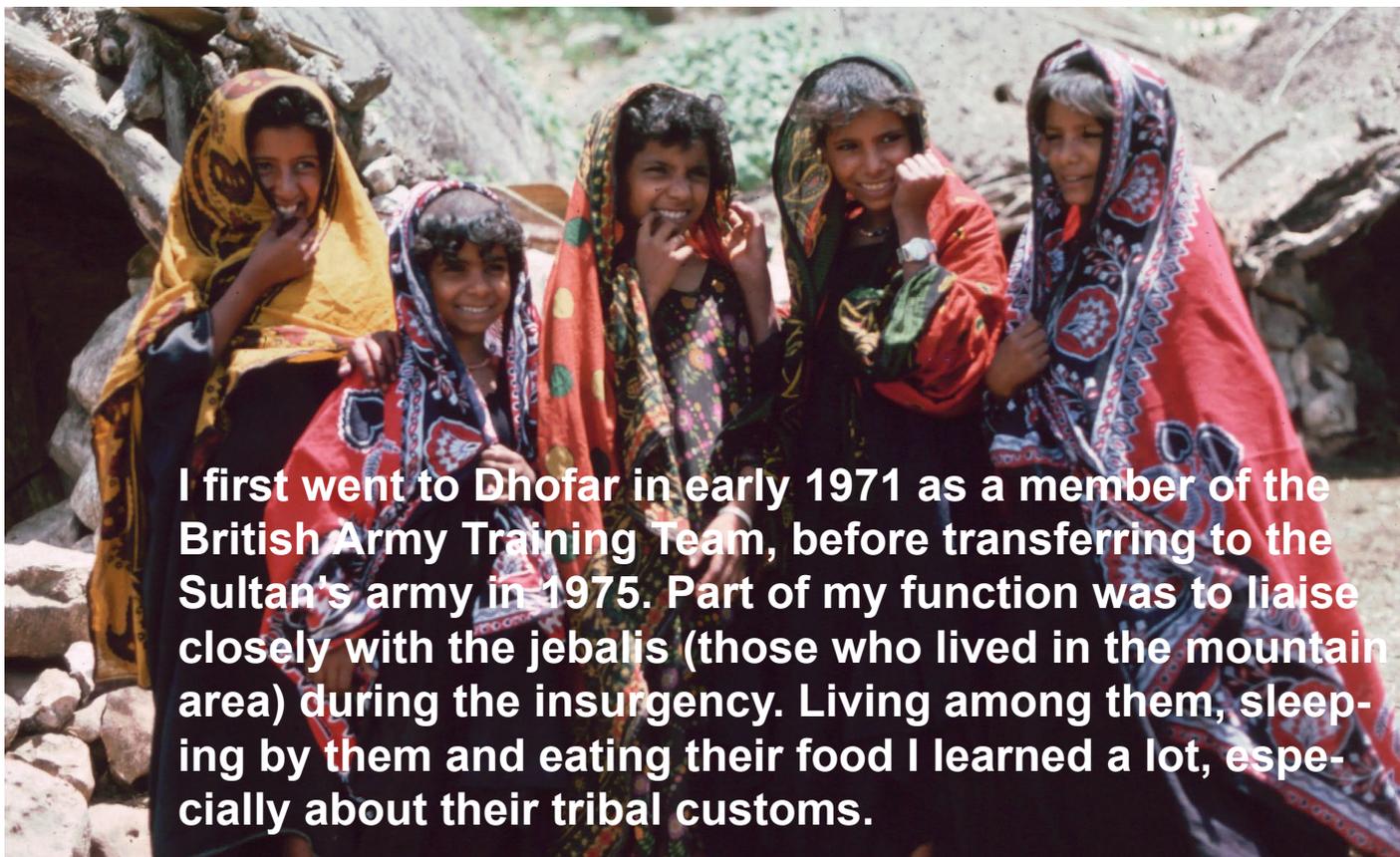
Ali Mohammadi is the founder of OmanTripper, a travel & tour service organisation based out of Muscat, Oman. Ali is a chemical engineer by training with degrees from the University of Canterbury and the University of Cambridge, and works full-time in a company in Muscat. Besides his demanding job, Ali also runs the OmanTripper platform with the objective of offering the most rewarding and authentic travel experience for visitors to Oman, combining adventures to Oman's hidden gems with a taste of its rich heritage and generous hospitality. Ali is very passionate about nature, the outdoors and photography, and attempts to reflect these passions in the tours offered through his OmanTripper platform. You can check out OmanTripper at www.omantripper.com





Tribes

Peter Sichel



I first went to Dhofar in early 1971 as a member of the British Army Training Team, before transferring to the Sultan's army in 1975. Part of my function was to liaise closely with the jebalis (those who lived in the mountain area) during the insurgency. Living among them, sleeping by them and eating their food I learned a lot, especially about their tribal customs.

After their own and their families interests, their own tribe is the most important. The tribal boundaries are known down to the last rock and ridge and are rigidly defended.

On the 4th of December 1975 the jebel was declared safe for civil development, and I transferred to the Civil Aid Department (CAD), a department of the Wali's office whose function was civil assistance to the Dhofaris in three areas – the Nejd, the sand and gravel plain to the north of the jebel, the coastal villages, and the jebel where most of the strife had taken place. On the jebel the assistance took the form of developing government centres in each of the separate tribal areas. Each government centre consisted of a water bore hole and distribution network to standpipes and troughs, a school, a shop, a clinic and a mosque. It also gave out government assistance in the form of tarpaulins and tents, and foodstuffs such as rice, tea and sugar, and cement and sand to refurbish waterholes in wadi bottoms. I was made responsible for overseeing the development of the jebel.

The first thing I realised was that in order to do my job effectively and fairly was to find out where the tribal areas were, the tribal subdivisions, the village locations, water sources, numbers of families, cows, goats and camels and where they

moved to with the changing of the seasons. The only tarmac road across the jebel was the Midway Road which ran south to north from Salalah to Thumrait. There were few other motorable tracks, so a lot of my movement was on foot.

The mountain area of Dhofar is divided into three distinct areas – Jebel Qama in the west, Jebel Qarra in the centre and Jebel Samhan in the east. The most notable thing about the western area was that there were no tribal boundaries – the various tribes largely intermingled, unlike the central and eastern areas, whose tribal boundaries generally ran north to south across the jebel. There were ten principle tribes on the jebel, and many subdivisions.

The other main tribal groups were the Al Kathir, who mainly lived on Salalah Plain (Jarbaib), south of the jebel, and were generally traders farmers and fishermen; and the Mahra and Bait Kathir, who lived to the north of the jebel and herded camels and goats.

A day would start with a mandoub (Government-appointed tribal representative) requesting that I visit a particular village which had a problem of some kind. On the way I would ask him which tribe it was, what places were called and so on.

On arrival I would count the number of houses and any livestock I could see. By this means I gradually built up a knowledge base so that when I travelled alone I could pick up a jebali needing a lift and question him about place names, tribes in residence etc. They were often suspicious and evasive, so I would state that such and such a village was occupied by a certain tribe, knowing it to be wrong. He would then indignantly deny it and explain in detail who lived there. I stored it away in my mind, and as soon as he had dismounted I would write it all down. In this way I was able to cross-reference my information and double-check. It was interesting that tribes living in view of a given feature had different names for it, and sometimes asked me to tell them what their neighbours called it!

into the Indian Ocean and built several fortifications along the Dhofar coastline to protect the water supply essential for their ships. The Shahra appealed to the Qarra, who at that time lived in Yemen, for assistance.

The Qarra arrived, intermarried, and eventually subjugated the Shahra, taking their tribal areas, language and way of life. They herded cows and goats and some camels, and moved within their tribal areas depending on the season. Their winter and monsoon accommodation consisted of circular beehive-shaped houses (Strit or Rijima) with rock walls and thatched roofs grouped together in villages (Hokub) high on the jebel.

In summer they moved further down the ridges in



During the four years I worked for CAD I visited every village on the jebel several times and built up a huge data base which became my demographic survey. Following this it was all typed out. It was by tribal areas, and listed the villages by name and grid reference, the sub-tribe living there, approximate numbers of livestock and where they moved from season to season. It also included the first tribal breakdown of the jebel area of Dhofar, and details of the way of life.

I was told that the original inhabitants of the jebel were the Shahra, who have their own unique language.

In the 15th century the Portuguese expanded

search of grazing and lived in tent-like structures (Moothla) made from thin branches and straw. At the end of the summer the jebel grass had been almost totally grazed away, so the jebalis would move back to the monsoon villages and purchase dried sardines (Ooma) from the coastal dwellers, and feed them intact to their cattle.

The men traditionally wear an 8 foot long plaited leather thong around their heads (Mahfeef) and a long indigo shawl (Sbeaka) wrapped kilt-wise around the waist, the free end being thrown over the shoulder. The free end of the Mahfeef usually has a piece of rag impregnated with perfume in it. A belt (Istibawt) secures the sbeaka, and supports a curved knife (Jimbiya) in a silver-cov-

ered leather and wooden sheath.

The women wear a black Thawb, which when laid out on the ground is rectangular with a square hole in the top for the head and a hole in each side at the top for the arms. The front hem is higher than the back by three or four inches. On their heads they wear brightly coloured shawls called Loosi. Their faces are uncovered, except sometimes in the town when the traditional Birka is worn. Their noses and ears are pierced for rings, and the scalp has a strip of skin removed about half an inch wide, from front to back in the centre, called Minzarot. This practice, carried out at puberty, has died out.

The survey was translated into Arabic and a copy retained by the Wali's Office. The original documentation is held by the Middle East Centre Archive at St Antony's College, Oxford.



A close-up photograph of a small bird, likely a yellowthroat, perched on a thin, light-colored branch. The bird has a bright yellow head and neck, a black eye, and a black beak. Its body is primarily yellow with black streaks on its wings and back. The background is a soft-focus natural setting with green grass and brown twigs.

Renewable Energy

PDO

The annual monsoon, or 'Khareef' as it is known in Arabic, strikes Dhofar in early July, transforming the region into a tropical lush green paradise; the hills are enveloped in a refreshing mist, light rains cool the air and a gentle breeze flows across the mountains, wadis and deserts.



Dhofar is well-renowned for its unique climate, spectacular landscapes and unparalleled eco-diversity that not only attracts thousands of tourists every year but also makes it particularly promising for sustainable energy initiatives. Petroleum Development Oman (PDO) has invested heavily in green energy projects in Dhofar as part of its commitment to environmental sustainability, supporting its transition to a fully-fledged energy company with a greater focus on renewables.

uses high reflector mirrors to reflect the solar radiation into a focal glass tube containing water, this focused heat from the sun (with temperatures in excess of 300C) converts water to steam and the steam is then used for Enhanced Oil Recovery (EOR). EOR is a generic term for increasing the amount of oil that can be extracted from an oil field by injecting a substance into existing oilfield reservoirs to increase pressure and reduce the viscosity of the oil, effectively making it easier to pump to the surface. The Miraah project now covers an area of over 3km², roughly

'The need to decarbonise the power market in the face of mounting climate change realities while ensuring we continue to meet rising energy demands both at home and abroad presents us with a significant challenge, but I am confident it is one we can meet.'

Raoul Restucci, Managing Director, PDO

Capitalising on the unique environment Dhofar offers, and the environmental goals mentioned, PDO is responsible for a number of pioneering and exciting initiatives in the region including the 'Miraah' project that captures solar thermal energy at the Amal field, the Amin solar project and the wetlands at Nimr.

The Miraah project, officially inaugurated in 2018, is a 1,021 MW solar thermal facility and is one of the world's biggest solar plants. Miraah

the size of 360 football pitches and consists of 36 glasshouse modules. It will save 5.6 trillion British Thermal Units (BTUs) of natural gas each year. To put this into context, this saving could provide residential electricity to 209,000 people in Oman each year and reduce CO₂ emissions by approximately 80,000 tonnes.

Building further on the solar opportunities of Dhofar is the Amin 100 MW project, officially commissioned in May 2020, it is the first utility-scale

Independent Power Producer project (IPP) in Oman and the world's first utility-scale solar project to have an oil and gas company as the sole wholesale buyer of electricity. The project has received one of the lowest tariffs in the history of solar IPPs worldwide after it received competitive bids from highly reputed developers in the renewable energy sector. This project again covers a huge area, over 4km², or about 480 football pitches. It contains more than 366,000 solar PV panels and saves 137,000 tonnes of CO₂ emissions each year. It will produce enough energy to power 10,000 houses.

The Nimr water treatment plant (NWTP) is the largest constructed industrial wetland system

over a 10 year period and reduction of carbon emissions of more than 1.5 million tons of CO₂.

NWTP's lowering of Oman's overall emissions totals a 4.26% reduction in national emissions. This means that this project alone covers Oman's planned emissions reduction goal which was set at 2% reduction of greenhouse gases by 2030 under the Sultanate's Intended National Determined Contributions. By contributing to national emissions reductions, projects like NWTP not only put Oman on track but see it even surpassing its commitments under the United Nations Framework Convention on Climate Change.

On top of fulfilling international goals, NWTP



anywhere in the world that treats produced water from an oilfield. Currently, it treats 175,000m³ per day and includes 490 hectares of surface flow constructed wetland and 800 hectares of downstream evaporation ponds. As a result of this project, PDO has been able to shut down seven high-pressure pumps that were used to dispose of produced water from the oil field into deep-lying aquifers, with energy saving in the range of 35 MW per day.

Considering also that the NWTP is a gravity-based system with close to zero energy demand for the water treatment processes, it is estimated that the energy saved could add up to the equivalent of around 23 billion ft³ of gas

contributes to Oman's national environment and biodiversity. The wetland system and the series of evaporation ponds under NWTP provide valuable habitats for migratory and resident birds and other wildlife. Routine monitoring campaigns and incidental observations so far resulted in the identification of that more than 120 different bird species in and around the wetland cells and ponds.

Given that the site is located in the middle of the East Asia/East Africa flyway, such a large water body in the middle of the desert represents an attractive island refuge, especially for those birds migrating between Asia and Africa.