

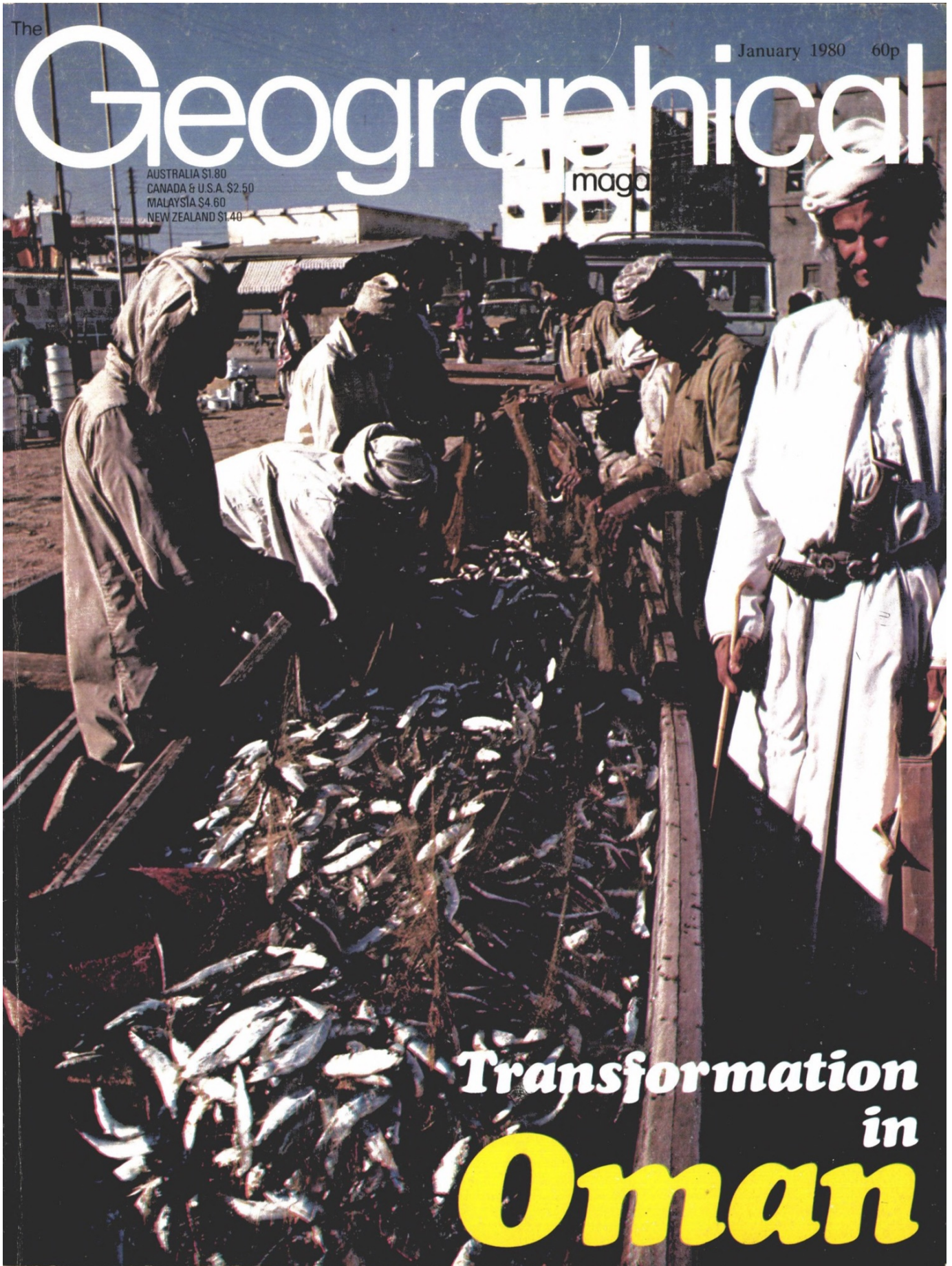
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Transformation in **Oman**

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Throughout the whole of China's history, her welfare and progress have depended on her ability to make use of her water resources for agriculture and transport. Dr Ting Yi-Lan discusses the country's current plans to maximize benefits from this resource

Water is the Chinese life force

by Ting Yi-Lan

FEW FACTORS HAVE had as consistent an influence on China's development as the relationship between its people and the country's water resources. Chi Ch'aoing, in his book *Key Economic Areas in Chinese History*, published in 1936 and now frequently quoted, showed how throughout China's long history, dynasties flourished or declined according to their skills in directing water to serve agriculture and shipping. During the past thirty years, no other Chinese venture has so nearly fulfilled both their own aims - achievements through self-reliance - and the Western picture of Chinese masses labouring determinedly in their millions. In 1971, the Chinese reported that 8,000,000 people were engaged in winter water-conservancy projects, and had completed 150,000 with large numbers still in the planning stage. The success of a large number of these schemes has been responsible for the country's improved agricultural programme.

China has an enormous number of rivers, more than 1500 of which have drainage basins exceeding 1000 square kilometres. Together, they carry 2700 cubic kilometres of water annually, representing 8.5 per cent of the world's total fresh water. The five major rivers - Changjiang (Yangtze), Huang He (Yellow), Heilung, Pearl and Hai He - flow west to east and empty into the Pacific. The Changjiang and Huang He together drain an area of 2,500,000 square kilometres. Only last year did the Chinese finally establish the source of the Changjiang, 6380 kilometres long, the world's third longest after the Amazon and Nile. Flowing through nine provinces, this river supports an estimated population of 300,000,000 people. Its importance can be imagined.

The problem child is unquestionably the Huang He. Rising in the Bayan Kara Mountains on the Chinghai-Tibet Plateau, it is the most unruly of rivers. 5464 kilometres long, it was the political and economic centre of China's early culture, and 110,000,000 people live along it today. The upper and lower-middle reaches of this river also contain the world's largest loess highland, 430,000 square kilometres of rolling hills and loose soil - a major source of problems dating from at least the 7th century BC as historical records show. The sediment-laden river, with the colour and near-consistency of mud, carries millions of tons of silt to the lower reaches each year, or as the Chinese have estimated, sufficient silt to build a dyke one metre high and one metre wide, long enough to encircle the equator twenty-seven times! But the problem of how best to cope with vast quantities of silt remains one of compromise. Its excellent fertilizing qualities, composed largely of top soil, has been utilized by farmers for thousands of years. New plans, announced in January, advocate creating new farmland at the foot of hills along the Huang He, by damming gullies which will be filled with the rich silt.

Chinese utilization of water resources is, of-course, governed by climatic factors. Despite the massive land mass, the uneven distribution of annual precipitation makes the western half of the country practically non-arable, with an average precipitation of around 200 millimetres. In hot rainy seasons, the rivers are liable to flood at short notice, whilst during the rest of the year, the problem is coping with great shortages. During the summers of 1977 and 1978, the Chinese press constantly carried reports of battles against droughts. Northern China, for instance, had a dry spell which lasted more than 200 days, which in terms of length and area affected was the worst for two decades. This was followed by persistent downpours which produced serious water-logging there.

Records of efforts to curtail nature's watery forces run continuously throughout Chinese history, and this was a primary concern for the present government after coming to power in 1949. On an extensive tour along the Huang He in 1952, Chairman Mao told the people that 'work on the Huang He must be done well,' pointing out that irrigation was the lifeblood of agriculture. This was sufficient to mobilize whole provinces into action. The aim was a three-pronged attack - small water projects on a local scale, the building of complete irrigation and drainage systems by communes and major projects such as dams and the notable Sanmen Gorge reservoir, on a national scale. In a lengthy report, issued in 1976, the official Chinese news-agency Xinhua announced that 70,000 reservoirs

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Ancient Oman is transformed by H. Bowen-Jones

Ancient land of Oman has for centuries prospered through trade with neighbours and these contacts have influenced her coastal settlements. The interior has developed a more independent lifestyle. Recently, attempts have been made to unify these differing areas politically. H. Bowen-Jones explains how the dual regions may be integrated through new-found oil wealth



European contacts with Oman were made first by Portuguese fleets in the 16th century. Waterfront of Muscat (above) contains Jelali fort, built by the Portuguese in the 17th century to guard the harbour, the Sultan's palace and the British embassy

SINCE SULTAN QABOOS Bin Taimur Al-Said became ruler in 1970, the Sultanate of Oman has experienced changes as dramatic as, but more fundamental than, any that had occurred throughout its history. There are also strong themes of continuity, many of which stem from classic human responses to opportunities and limitations.

Oman's long coastline faces the Indian Ocean, giving easy access to the riches and variety of southern Asia and eastern Africa. The peak of maritime power was reached between 1820 and 1856 under the reign of Sultan Sayyid Sa'id. During this truly imperial period, Omani ships thronged the Indian Ocean. This was the high-water mark of ship-building and of mercantile entrepreneurship based on Muscat, Dhofar, which had been seized in 1829, Sur, Sohar and other coastal settlements, and of course on Zanzibar, Madagascar and Indian ports. This period represents only the furthest extension of Omani overseas interests and ventures, because from the third millennium BC onward evidence from coastal fishing settlements and mineral working, including copper mining inland of Sohar, from that there were strong contacts with the Makran coast of Iran and the Indus valley to the east, and with Arab and African lands to the south-west.

From the third millennium BC onward cultural links with what are now the United Arab Emirates and points north became extremely important to trade and politics. After the rise of the Sassanian empire in Persia in the 3rd century AD, much of eastern and southern Arabia was brought under Persian domination during the 5th and 6th centuries. From across the waters of the Gulf and the

Straits of Hormuz, Carmathian, Kirmani Seljuk and Shirazi Mogul conquerors essayed into Oman in the Islamic period. Periodic Omani excursions into the Gulf, both peaceful and warlike, redressed the balance and during the golden ages of the 9th and 10th centuries and in the last years of the 15th century Omani ships were well-known between Basrah and Hormuz, and people wrote admiringly of the prosperity and culture of the fertile land of Oman.

For millenia, Oman has had outside influences on its culture and economy, with its coastal communities actively exposed to global changes in an ever-widening fashion. At the beginning of the 16th century the Portuguese fleets violently introduced Europe to the coastlands of Oman as evidenced by the forts of Jelali and Merani which still command the bay and town of Muscat. Within a century English fleets and representatives of the East India Company followed. By the 1830s J. R. Wellstead could write of Muscat: 'In few parts of the world can the necessities, nay even the luxuries of life, be attained in greater profusion'.

These cosmopolitan trends were and still remain especially characteristic of the coastlands. Westward of the cliffs and embayments of the Muscat region lies the Batinah, a wide curved coastal plain between the Hajar mountains and the sea. Here the prevailing aridity, broken only by sporadic, highly variable and light winter rains, together with temperatures ranging between 35 and 18°C, severely limit human activity. However, ground-water derived mainly from the higher precipitation on the



Fishermen living along the Batinah plain (above) and also from the coastal settlements south of the Salah exploit rich fishing grounds. (Below) women fill water pots from a falaj, or oasis, channel in an interior village. In the last decade many attempts have been made to modernize fishing and agricultural practices and to bring domestic water supplies to villages





Sumail gap (above), which runs through the Hajar mountains, is the main link between the coast and the northern interior. It follows a fault zone and is the route of the metalled Batinah-Nizwa road, oil and gas pipelines, and traditional falaj and springline oases. Near Izki, at the western end of the gap, a new bridge (below) carries the road across a wadi or valley with a rare permanent water flow. New housing and facilities are sited on barren areas between irrigated date-palm gardens.





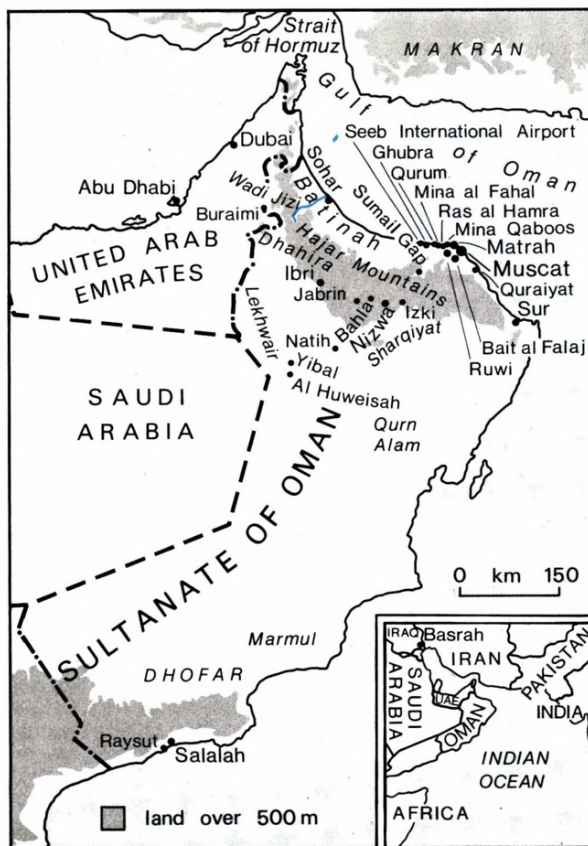
First oil strikes were made in the early-1960s and in the 1970s attempts have been made to spread benefits brought by oil wealth more evenly within Oman. New highway out of Muscat (above) enables cars and trucks cheaply and rapidly to penetrate interior Oman with goods, ideas and powers of central government. Modern port of Mina Qaboos (below), built between 1971 and 1976, provides warehousing and improved facilities for import of grain and cement. Matrah is being rebuilt behind the waterfront



mountains - 200 millimetres a year - flows seaward in the coastal gravels and silts to give a shallow water-table belt five kilometres wide along the coast. Traditional ox-walk pulley wells, now supplanted by motorized pumps, supported an almost continuous coastal belt of cultivation and settlements. Rich inshore fishing waters further supplemented food supplies and helped sustain this narrow populated area 200 kilometres long. Dates, limes and fish were in exportable surplus and Sohar and other settlements grew into vigorous commercial centres and bases for generally independent but periodically united sheikdoms.

East and southward, fishing and trading ports including Matrah, Muscat, Sur and Quraiyat, each with its own small supporting area of farming, occupied bays and wadi creeks sporadically and increasingly sparsely south of the Batinah plain. The fortunes of these coastal oases communities were dependent on overseas ventures and trading links to the interior via rugged mountain passes. By contrast, Salalah and the little port of Raysut lay in a larger isolated embayment on the Dhofar coast.

The interior of Oman, whilst never completely isolated from outside influences, has always been more strongly tribalized and introspective than the coastal areas. Folk history emphasises early migration links with central and western Arabia and these live on today in tribal names and rivalries. Between the 2nd and 7th centuries AD the tribal groups collectively termed Yamani moved from the west to dispute land occupancy with indigenous groups and with the Sassanian Persians. During the same period Nizari groups came from the north and became further rivals for territory. From these early conflicts grew many complex divisions which later became the basis of the tribal alliances of the interior - the Hinawi and the Ghafiri.



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In the interior, pastoralists and peasants clustered around the *falaj* oases which were remarkable responses, developed from the pre-Islamic period onward, to the hydrological conditions found between the mountains and the deep deserts. From the bare Hajar mountain slopes in northern Oman runoff flows mainly in temporary wadis away from the sea, descending not into a well-defined piedmont sediment zone as on the Batinah plain but into a more confused interdigitation of fans, wadi washes, finger hills and rock outliers. Here groundwater flow is more highly channelled than on the Batinah and the levels of the water-table highly variable. In addition, temperature regimes are more extreme and life-support more precarious than on the coast. The *falaj* system tapped underground galleries fed by major groundwater sources and flows and conducted water down-slope to the surface in areas which had reasonably cultivable soils. Each irrigable area supported sedentary cultivators and provided dates and grain, the staples without which a nomadic Bedouin group would not survive.

Separated by wide expanses of gravel desert each community was independent and self-sufficient, traits strengthened by the prevailing nomadic pastoralism in which the islands of cultivation were set. Clan and tribal separatism was to some extent limited by participation in overland trade along the highland edge and across the mountain passes to Batinah. Where *falaj* water was plentiful and routes encouraged trading there grew strong, fortified agro-towns which extended from Buraimi in the north through Ibri, Jabrin, Bahla, Nizwa, Izki, south to the Sharqiyah. Some of the passes which connect through the Hajar mountains the western line of *falaj* settlements and caravan route with the Batinah coastal zone have long been of major importance. The Wadi Jizi track between Buraimi and the coast just north of Sohar has been used since the early third millennium BC whilst the great tectonic Sumail gap, between Izki and the southern extremity of the Batinah and leading to Muscat, allows easy movement and has supported settled agricultural and trading communities for centuries.

Southward from Sharqiyah sand deserts alternate with undulating gravel outwash plains and barren hills which rise forbiddingly around the Salalah plain. In the Dhofar summer weak monsoonal rains support a short-lived savannah-type exuberance of grasses. Here life is at its harshest and simplest; small groups of pastoralists, groups difficult to dignify with the word tribe, live isolated lives, but are dependent on the few coastal communities.

The roles played by coast and interior in Omani history have been the most profound formative factor. There are many other rich and dynamic elements in Omani life and travellers and scholars can find a lifetime's fascination in their observation and study but it is the changing balance between the outward call of the sea and the wide world, and the introversion of the desert and the oasis that attracts geographers.

Only during the last few decades has the process of forging a unified nation-state effectively got under way. This has meant the triumph of central government over tribal forces which for many centuries fought for minimal interference with their traditional ways of life - particularly during periods in which the rulers of the coastal region seemed to have little to offer the tribes of the interior, including the aftermath of the division of the Omani empire in 1856. The great changes came from 1967 onwards when oil revenue began to flow into the national treasury and in 1970 when a new development-orientated

and administratively organized system of government replaced traditional personalized rule and tribal allegiances.

In 1937 the revenue of the Sultanate was 50,000 Rials Omani; by 1967 this had risen to 1,000,000 and had reached 500,000,000 in 1977. This rate of increase in wealth was enormous but so was the increase in development expenditure. During the first half of the 1970s more than 90 per cent of such expenditure went in building a modern physical and social infrastructure almost from scratch. Since the first Five-Year Plan was inaugurated in 1976 greater attention has been paid to income-yielding investment in agriculture and industries. Throughout it all, the fundamental characteristics of Oman are strong.

Hard-top and graded arterial roads knit the regions of Oman together but except for details of alignment they follow the caravan routes established early in history. Mina Qaboos, the modern deepwater port, lies in the bay which for centuries sheltered the sailing ships which called at Matrah. International land links with Dubai and Abu Dhabi run through the Wadi Jizi and, in the interior, follow the ancient frankincense route south through Buraimi, Ibri and Nizwa to Dhofar. There is a difference in the scale of movement, not in the direction. There are twenty times more trucks and cars registered in Oman today than in 1970 and almost every settlement in northern Oman lies within a few hours' journey from the capital. Land Rovers have replaced camels and police patrol cars are more common than caravans.

For centuries some Omani men from the interior and from the coast have travelled from their villages and tribes; today at least three-quarters of the males aged fourteen or over in almost every village at any one time are either just returned from, about to leave for, or are absent at distant places of employment. The Gulf Emirates are a great attraction but so are the opportunities within Oman - in government service, the army and police and in the recent mushroomed Capital Region: from hill-girt Muscat through Matrah and Ruwi to Seeb International Airport, there are twenty-five kilometres dotted with stores and offices, housing and industries. Continuity of settlement is clear: the oil company township of Ras al Hamra sits on headlands first occupied 5000 years ago; the ancient names of Bait al Falaj and Qurum emphasise the newness of Medinat al-Qaboos. Metropolitan urban growth has again changed the scale - of population concentration, of building density, and of all the supporting public utilities and services to the point where the Five-Year Plan announced the objective of discouraging 'mass immigration to already densely populated areas'.

Regional diversity of life style is being complemented by a policy of reducing regional inequalities and this is being achieved to a considerable degree, at least in the field of social provision. In 1970 there were two schools, two post offices and no hospitals in a country the size of England and Wales. Now there are 200 schools, sixteen hospitals and scores of clinics and dispensaries, a national bus company operates on the main northern routes, and television, radio and telephone networks provide domestic coverage. Low-cost projects are providing housing transformation in ten non-metropolitan settlements.

All this has been made possible by the two genuinely new elements in the saga of Oman: a modern political will, and the oil and natural gas which provides the means. The first oil strikes were made in the early-1960s at Yibal, 300 kilometres south-west of Muscat in the pastoral desert interior. Oil is piped through the Sumail route-gap to the marine terminal at Mina al Fahal from one group



Light industries, assembly and fabrication shops, and showrooms have expanded (above) on the western edge of greater Matrah



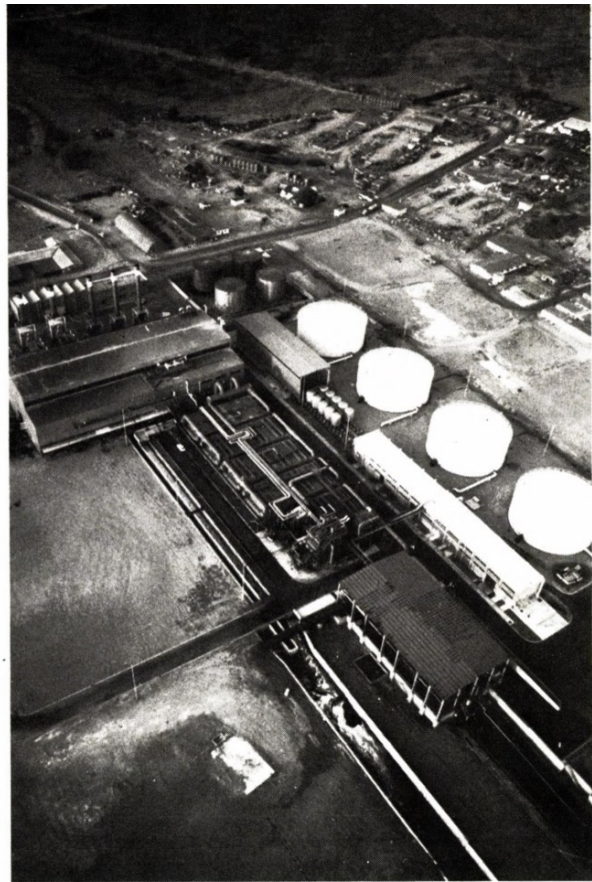
As Oman has opened up to visitors the need for residential development has grown. Inter-Continental hotel (above) at Qurum is the newest of four modern hotels in the capital region. At Ruwi (below) there are ministries, offices and shops. High-rise blocks make it the second largest residential area in Oman



of fields in a triangle between Lekhwair, Natih and Al Huweisah and another 200 kilometres to the south-east around Qurn Alam. This year new fields already proven in the Marmul area of Dhofar will be connected to this northern pipeline, along which route small but significant oil reserves are still being found. Oil is for export as crude and for revenue - there is insufficient justification for refinery building - and the main contemporary interest is in maintaining present production rates for one or two decades to sustain present levels of income and expenditure.

Natural gas, presently in the first phase of exploitation at Yibal and piped to the coast, provides energy for the Ghubra desalination plant on which the capital region is becoming dependent and is a potential energy source for industrial and other activities. New technology, new employment prospects and a revolution in human opportunities can be based on this new resource; these are critically important because otherwise Oman has few unutilized resources. The copper of northern Hajar is of value but the scale of potential exploitation is very limited. What remains is that wealth of land and sea, in agriculture and fisheries, which, if properly conserved, is the least ephemeral of riches.

During the last seven years many studies of agricultural and fisheries potential have been carried out and the pace of development is quickening. Two-thirds of the indigenous population is dependent on agriculture and fishing and efforts are being concentrated on improving productivity, the range of products and commercial viability. Oman has no large unexploited resources of land and water; the traditional skills of falaj builders, well-diggers, farmers and pastoralists have ensured that all accessible agricultural resources have already been utilized. Attention must be concentrated on changes in land use on the 40,000 hectares of cultivated land and this means encouraging changes in attitudes and motivations as well as in production technology. Farm holdings, invariably irrigated, are normally two hectares or less in size and whilst some larger and more specialized production units



Increasing demand for water by people living in the capital region is met by the Ghubra desalination plant (above)

Transformation of agricultural methods is initiated at a government centre (below) near 'Salalah. As lifestyles change from mule to moped (above right) the educated village girl finds a new role in a changing society (below)





are being developed at Salalah and on Batinah the small farmers' response to change is critical.

This response is influenced by the underlying geographical realities. On the Batinah plain most farmers own their holdings and the economic individualism associated with well-irrigation has been strengthened rather than weakened by the growth of modern communications. The datepalm gardens remain but alfalfa and vegetables are grown for market on the new peripheral fields and farms. Moreover, the northern Batinah looks ever more strongly to Abu Dhabi and Dubai for its commercial contacts. In the interior, the falaj, with all that it implies in terms of collaborative organization, is still dominant for hydrogeological reasons and the freedom of the individual to change land use radically is severely constrained. Local market influence of Ibri, Bahla and Nizwa remains well-marked but the links between the UAE and the Dhahira are being strengthened along the new roads which follow ancient routes whilst the Capital Region extends its influence through and beyond the Sumail Gap and into Sharqiyah.

The same applies to fisheries. An Oman National Fisheries Company has been established to develop deep-sea commercial extraction and major storage and distribution centres, while inshore fishermen, who still exist in thousands although their number is declining, are being assisted to improve their viability. Here is still epitomised a basic duality, between the centre and the periphery, between rapid institutional and functional change and slower and more varied adjustment. Many of the changes and adjustments are new in form and technology but, in human terms, in regional variety and in spatial expression, are fundamentally similar to those earlier experienced by the peoples inhabiting these lands. What is fundamentally new is that in the Sultanate of Oman an ancient cultural identity is being transformed into a modern nation-state.