

Task Two:

Summarise the nine issues (A to I) in the grid below. Then, using their letter code, place them in

- Order of most concern
- Order of ease of management

A	B	C
D	E	F
G	H	I

Most concern	Easy to manage
Least concern	Hard to manage

Task Three:

There are a number of different ways in which Oman could try to manage these problems and issues. None of the strategies on the next page are perfect in every way and none would solve all Oman’s water problems. Instead you should look for management strategies that have fewer negative impacts and more positive impacts.

Study the parameters outlined in the box below, along with the various management strategy options in the separate booklet and on the next page.

Your Parameters:

- You have a budget of 1000 WSP (Water Security Points) to spend. You do not have to spend all of your budget.
- You should aim to make the most sustainable choices for the future of Oman.
- You should aim to have your choices make the longest lasting impact.
- You will need to consider the impacts your decisions will have **economically, socially and environmentally.**

Option	Cost	Econ.	Env.	Soc.
1. Do nothing	0 WSP			
2. Invest in a new desalination plant and pumping station	500 WSP each			
3. Invest in aflaj building scheme	600 WSP			
4. Invest in an education programme on water wastage	100 WSP			
5. Import water in bulk carriers from overseas	250 WSP			
6. Invest in the specialised treatment of oil production water	200 WSP			
7. Charge Muscatians extra for their water supply	50 WSP			
8. Invest in a widespread cloud seeding programme	800 WSP			
9. Place a limit on tourist numbers	50 WSP			
10. Introduce a tourist water premium	100 WSP			
11. Tax high water using industries	100 WSP			
12. Fine citizens who waste water	100 WSP			
13. Invest in building recharge dams	600 WSP each			
14. Make birkat conservation grants available to local people	400 WSP each			
15. Give incentives to farmers who practise good water usage	300 WSP			
16. Provide grants to house builders for water saving devices	250 WSP			
17. Invest in the construction of fog nets	400 WSP			
18. Encourage Omani people to have fewer children	150 WSP			
19. An option of your own design - your teacher will quote you a cost price for it.				

For each of the strategies, shade the end columns using a traffic light system to indicate whether it would have a positive or negative impact economically, environmentally and socially.

Red = Negative impact Yellow = No impact Green = Positive impact

Water Security Management Options

<p>1. Do nothing</p> <p>This option allows Omani people, their homes and their industries to carry on as they are now. Whilst this inevitably saves the country money, many would question whether this option is fully sustainable in the long term.</p>	<p>2. Invest in a new desalinisation plant and pumping station</p> <p>These highly technical and complex plants convert sea water into fresh, potable water by removing the salt. In doing so, a highly concentrated effluent is released into the sea, affecting the local ecology.</p>	<p>3. Invest in aflaj building scheme</p> <p>Aflaj are ancient water channels built underground, transporting infiltrated ground water to the surface. Many of the older aflaj have been concrete-lined but leakage through these channels is common. Any improvements and additions will involve large scale earth movements.</p>	<p>4. Invest in an education programme concerning water wastage</p> <p>A widespread education programme in schools, public institutions and in the media can inform a public whom might otherwise be ignorant of the impact wasting water has on their futures and on the environment.</p>	<p>5. Import water in bulk carriers from overseas</p> <p>At times when Oman is likely to experience a water deficit (demand exceeds supply) it may be possible to import water via large bulk carriers from overseas. Importing water from other areas in the Middle East requires strong socio-political relations.</p>	<p>6. Invest in the specialised treatment of oil production water</p> <p>Oman's oil industry uses a high level of water which as a result becomes highly polluted. This water requires specialist treatment to make it reusable within oil extraction again. But should the oil industry be made to pay for this expensive treatment themselves?</p>
<p>7. Charge Muscatians extra for their water supply</p> <p>With the vast majority of Omani living in the cities, and especially in Muscat, the country's urban spaces receive a grossly unequal share of the country's water. Charging those people more for their water may be a fairer way of managing resource use.</p>	<p>8. Invest in a widespread cloud seeding programme</p> <p>Cloud seeding involves spraying a cloud with chemicals (such as silver iodide) that quicken the process of condensation. This causes the cloud to release its rainfall before it might do otherwise. Neighbouring countries may not favour this method as it can artificially 'starve' them of rain they rely on.</p>	<p>9. Place a limit on tourist numbers</p> <p>The extra pressure of more people in certain seasons can cause unmanageable water deficits. By limiting tourist numbers in the peak season, one may be able to spread the flow of tourists more evenly throughout the year and as a result not strain the supply of water in peak season.</p>	<p>10. Introduce a tourist water premium</p> <p>Tourists to Oman come with high expectations of the standards they find in their hotels and camps and so many continue to use water in the same way they would at home. Asking tourists to pay a premium on arrival will offset some of the costs of supplying the extra water they demand.</p>	<p>11. Tax industries that use high volumes of water</p> <p>It may seem fair that one asks for higher taxes from industries that use the most water. That extra income can then be used to invest in improving water supply. However, will this move discourage the growth of new industries and therefore jobs for Omani people?</p>	<p>12. Fine citizens who waste water</p> <p>Making water wastage a criminal offence sends a strong message to people about the importance of looking after this resource. However, the difficulty remains in how to police this initiative and how one defines when water is being truly wasted.</p>
<p>13. Invest in building recharge dams</p> <p>Wadis (ancient and seasonal streams and rivers) hold distinctive paths through the upland areas of Oman. Building small scale dams in sites along their course will mean that in times of high rainfall there is the capacity to store some of the water at surface level.</p>	<p>14. Make grants for maintaining birkats available to local people</p> <p>Birkat cisterns are natural hollows or human excavated chambers that can store flood water above ground. Many are hundreds of years old and so in need of ongoing maintenance by the local communities they were originally designed to serve.</p>	<p>15. Give incentives to farmers who practise good water usage</p> <p>Farmers who invest in modern irrigation systems, reuse water where they can, use appropriate cropping patterns and who choose crops that are not naturally water thirsty can be rewarded for their efforts in the form of subsidies and extra payments when they sell their crops.</p>	<p>16. Provide grants to house builders so they will install water saving devices</p> <p>Installing water saving taps and toilet systems can be expensive and builders may choose cheaper and water wasting devices in order to increase their profits. Providing grants may incentivise land developers to think about water saving from the design outset.</p>	<p>17. Invest in the construction of fog nets</p> <p>Fog harvesting involves the erection of large nets on hillsides that experience rolling fog. As the moisture hits the nets, it condenses and flows off the nets and into storage casks or ponds. It is not yet known the kind of impact this may have on flora and fauna close to where the nets are erected.</p>	<p>18. Encourage Omani people to have fewer children</p> <p>At a very simple level one could argue that the reason for Oman's ongoing water deficits is the fact that there are just too many people using a single resource. Encouraging people to have fewer children through campaigning and financial incentives may buy Oman more time to manage its water problems more effectively.</p>

Managing Water in Sharqiya

DME Feedback

Look back carefully at your work.

Which task are you most pleased with?

.....

Why is that? What did you do especially well in that task?

.....

.....

Is this something that you know you are good at? In what piece of work that you have done previously have you used these same skills?

.....

.....

Now think about ways you could improve this piece of work.

If you could do the exercise again, which task would you try most to improve?

.....

Why is that?

.....

.....

What steps would you take to improve in this task?

.....

.....

.....

Are there any other pieces of work you can think of where you could use these skills if you improve on them now?

.....

.....

.....

Managing Water in Sharqiya

DME Marksheet

	Max. Mark	Actual Mark
Task One: Nine problems or issues facing the players identified.	3	
Task Two: Issues summarised clearly and concisely.	3	
Task Two: Issues placed in different orders of priority.	2	
Task Three: Management strategies rated suitably for their economic, environmental and social impacts.	3	
Task Four: Chosen management plan described. Clear evidence that student has read the Strategy option sheet.	2	
Task Four: Chosen management plan justified.	4	
Task Four: Identification of the groups of people most affected by the chosen management plan.	2	
Task Four: Clear reference made to the economic, social and environmental impacts of the chosen management plan.	3	
TOTAL	22	

Comments:

Student: I did well in task number because I

Teacher: You also did well in task number because you

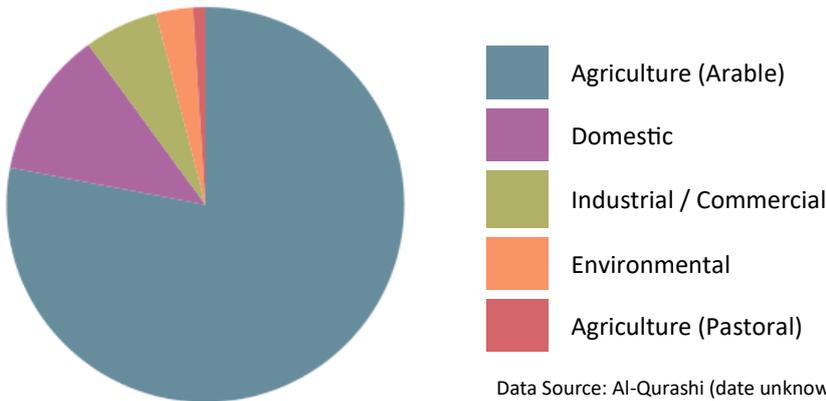
Student: I could have improved in task number by

Teacher: You could also have improved in task number by

Managing Water in Sharqiya

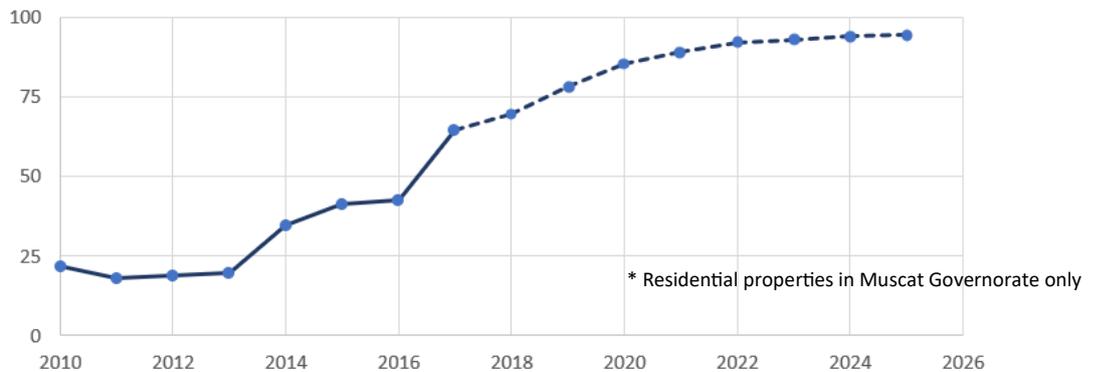
Water Security Resource Pack

Water Use in Oman by Sector



Data Source: Al-Qurashi (date unknown)

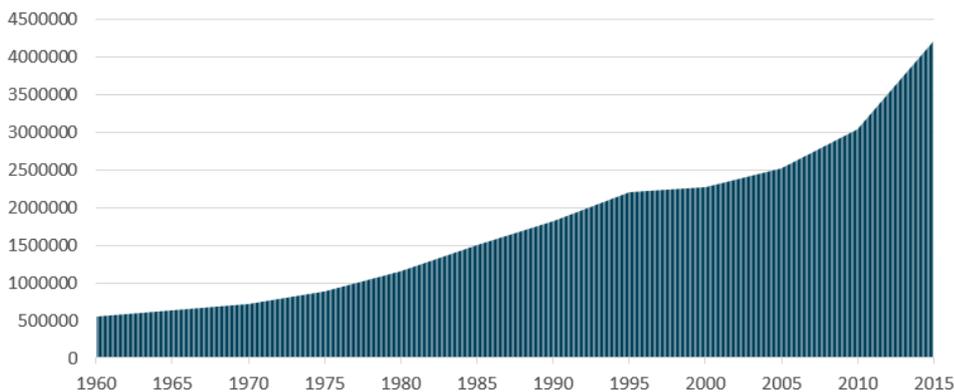
Domestic properties connected to sewer networks (%)



* Residential properties in Muscat Governorate only

Data Source: Mselhi (2014)

Population of Oman

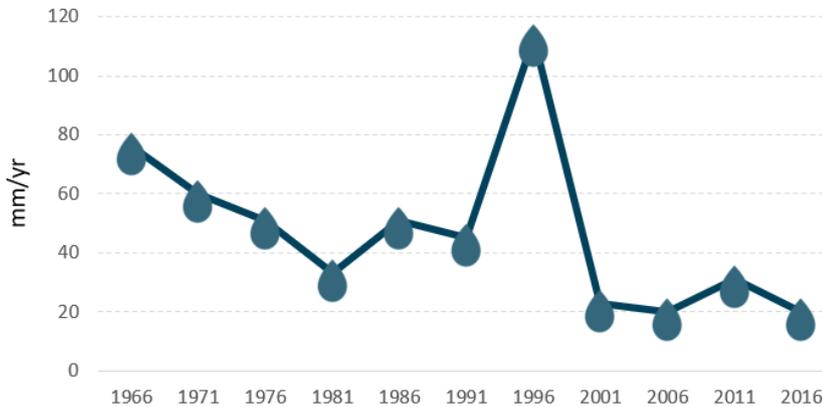


Data Source: World Bank Data (2017)

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Oman National Rainfall Index



The NRI is the total annual precipitation weighted by its long-term average. It can be used as an indicator of the quality of the agricultural season.

Data Source: [knoema.com/public data library](http://knoema.com/public-data-library) (2017)

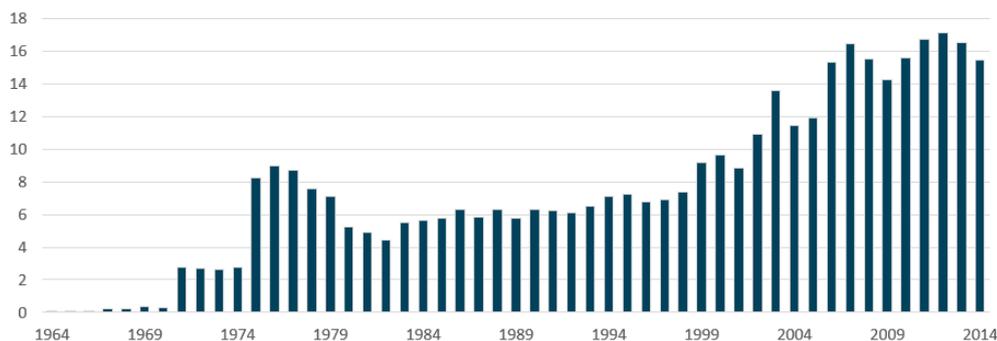


Oman experiences two seasons: winter, where rainfall falls in the eastern parts of the country, and summer, in which a southwest monsoon affects the far south of the country. In May and December cyclones provide rain in the south and east.



Data Source: Al-Qurashi (date unknown)

CO₂ emissions (Metric tons per capita)



Data Source: World Bank Data (2017)



Around 80% of Oman's total rainfall (7,585 million m³) is lost to evaporation before it has any use to human inhabitants.



Data Source: Al-Qurashi (date unknown)

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Water Security Resource Pack

Royal
Geographical
Society
with IBG

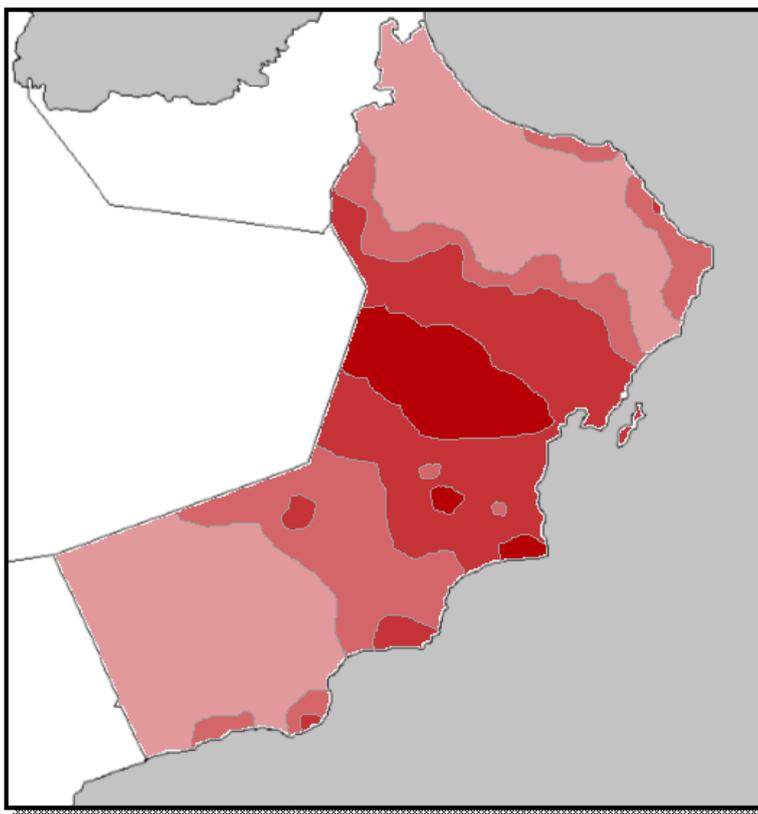
Advancing geography
and geographical learning

“

Evaporation rates can be up to 2200mm a year in the interior and daily evapotranspiration rates regularly exceed 12mm.

”

Data Source: Al-Shibli (2014) and Al-Qurashi (date unknown)



Groundwater Salinity



Data Source: Al Shibli (2014)

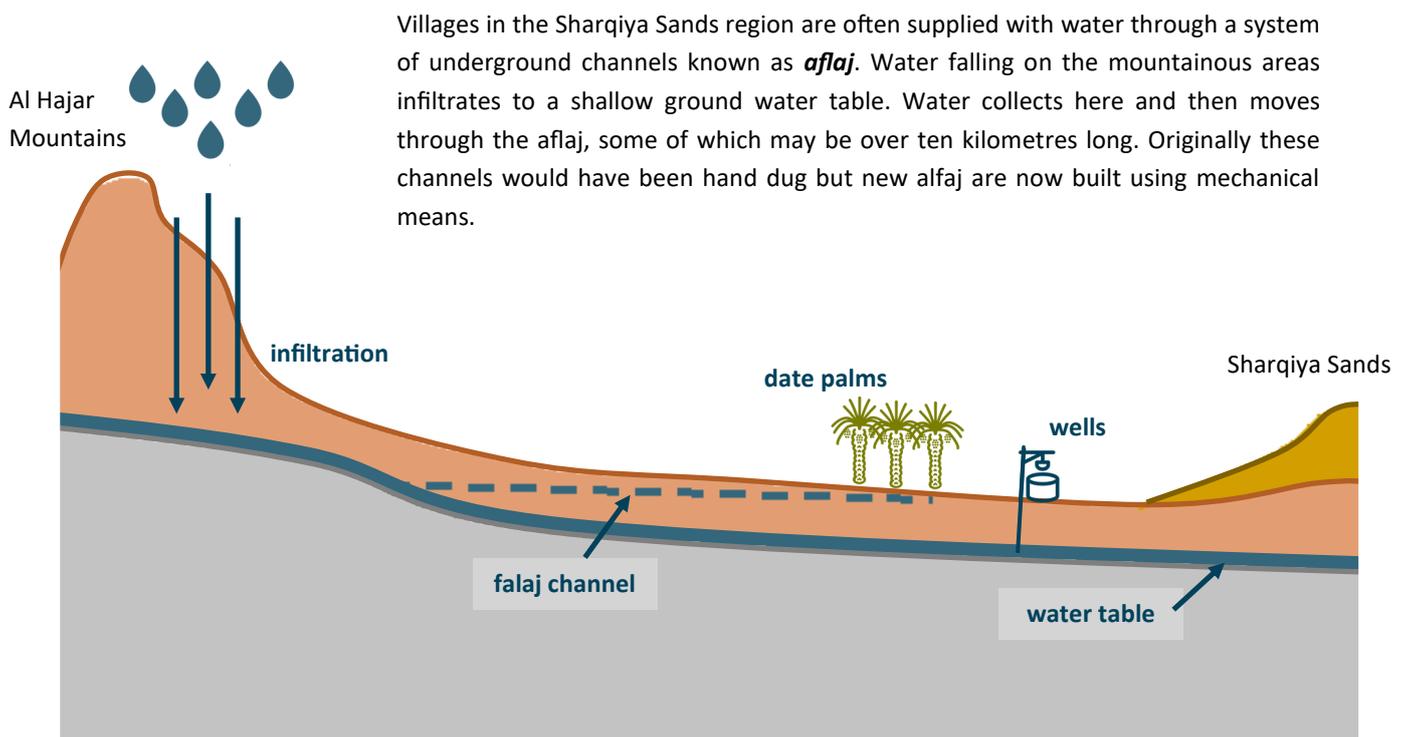
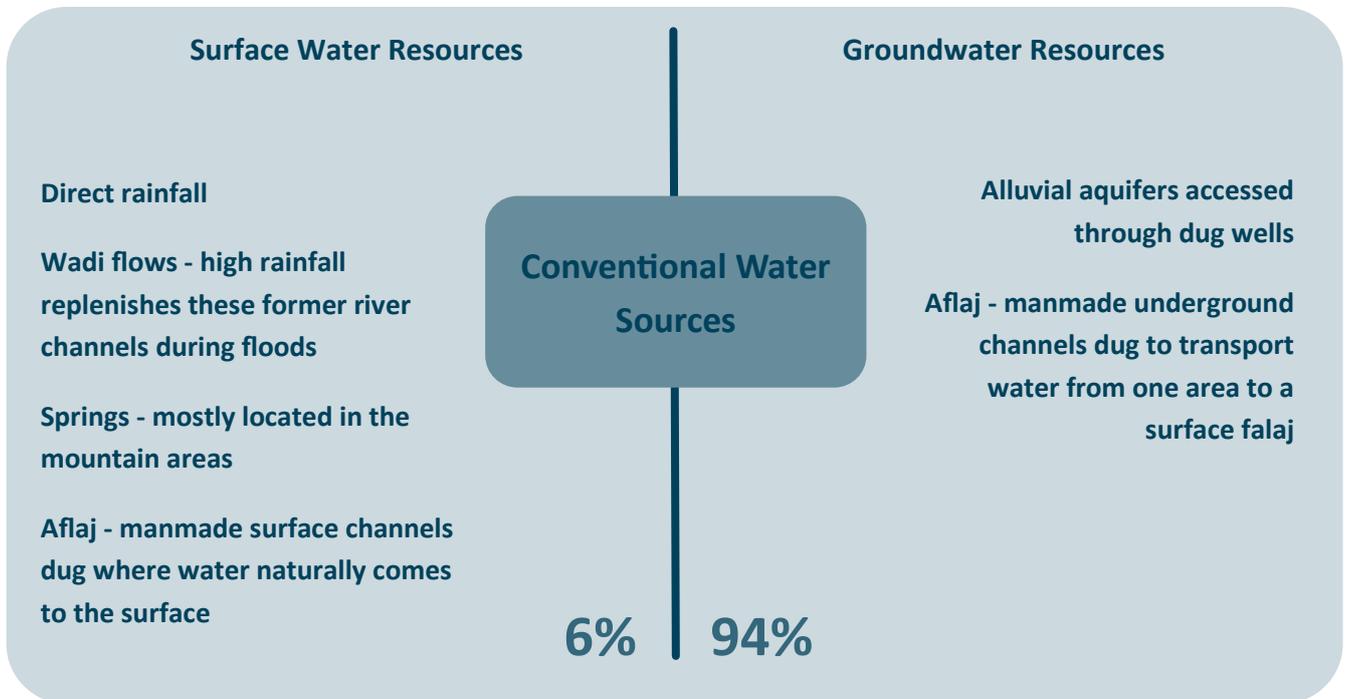
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93% of land in Oman is thought to be infertile due to the salinity of the soils and the water scarcity that causes this. As a result there was a 4.7% decrease in agricultural land in the country between 2006 and 2010.

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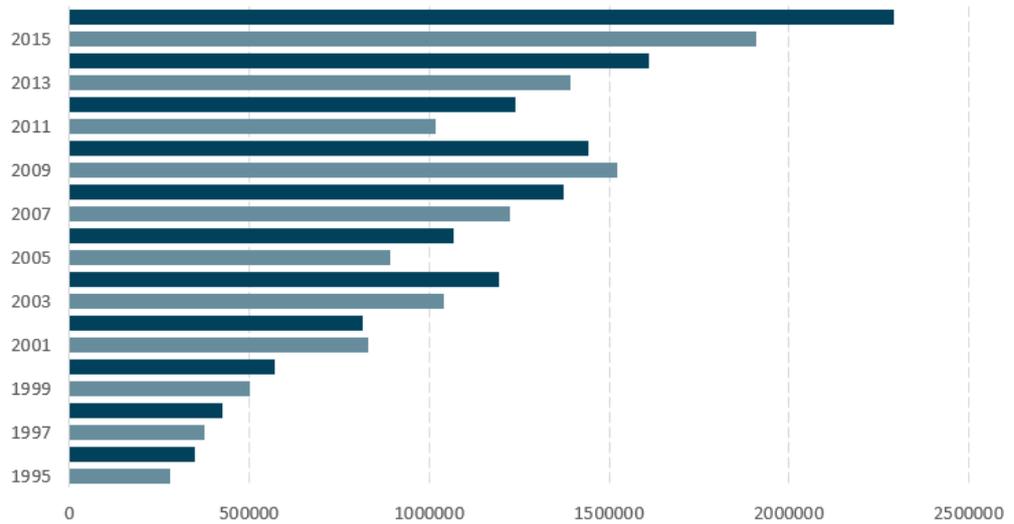
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Water Security Resource Pack

International Tourist Arrivals



Data Source: World Bank Data (2017)

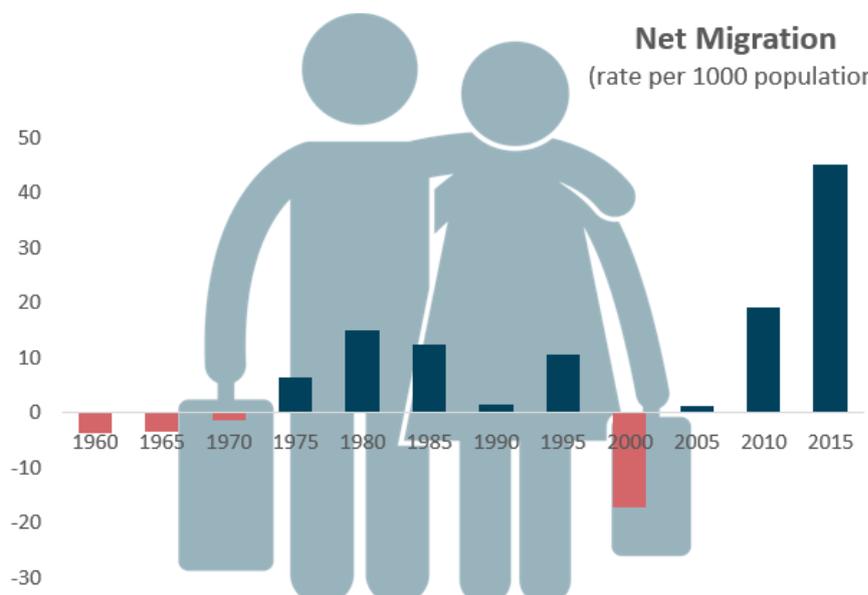


Consumption of water by commercial sectors (including tourism) increased 300% faster than the other sectors combined between 1998 and 2007.



Data Source: Al-Qurashi (date unknown)

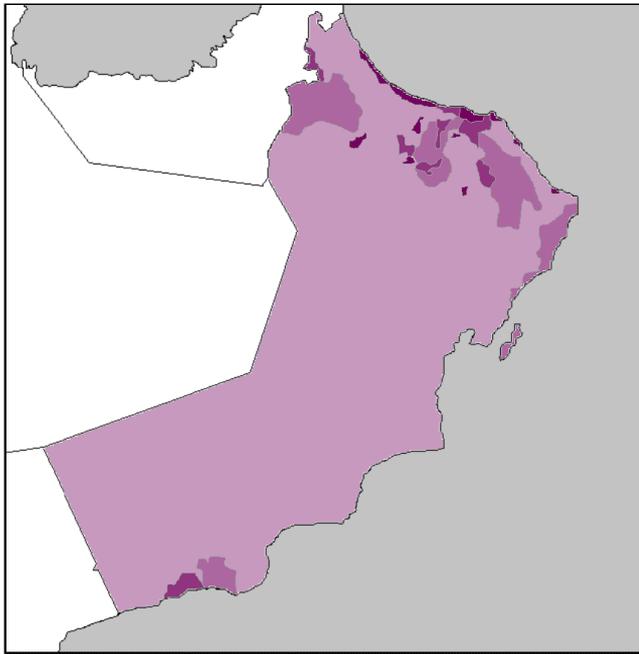
Net Migration
(rate per 1000 population)



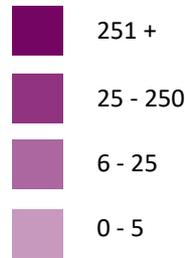
Data Source: knoema.com/public data library (2017)

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Water Security Resource Pack

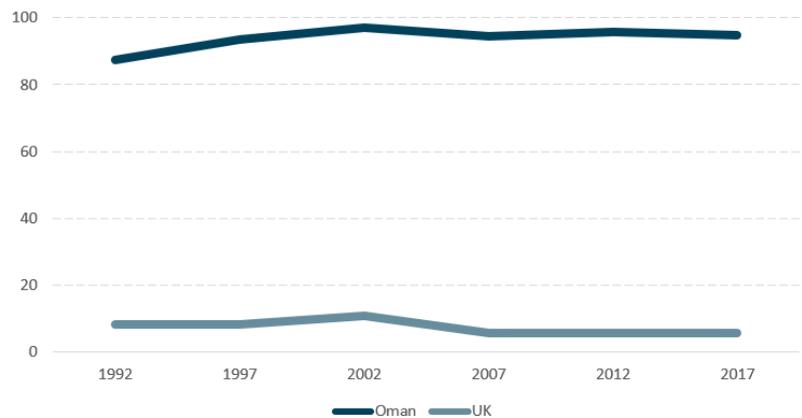


Population Density (people per km²)

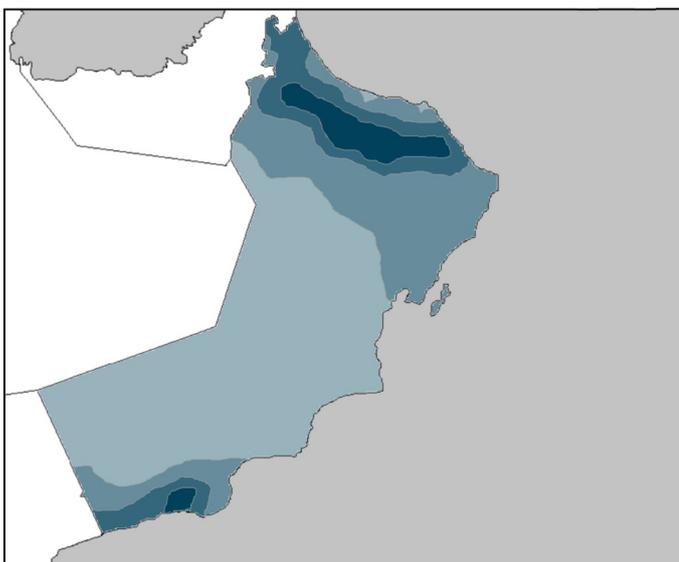


Data Source: SEDAC (2000)

Total water withdrawals
(as % share of internal resources)



Data Source: knoema.com/public data library (2017)



Average annual precipitation



Data Source: Al Shibli (2014)