

SNAPSHOT

Middle East faces a thirstier future

Population growth and climate change will push the Middle East into a water crisis by 2050, with per capita availability slashed by half in some parts, according to the most detailed water forecast for the region so far.

With some portions of the Middle East now receiving an average of less than 10 cm of rainfall per year, water resources are already scarce and, in many places, they have reached their limit. The rapidly growing demand over the next 40 years for water for drinking and other non-agricultural purposes will only be met by building expensive desalination facilities or reallocating water from agriculture, says Jonathan Chenoweth, a water-policy analyst at the University of Surrey, UK. Furthermore, the problem could herald major social or political change and risk exacerbating regional tensions, he warns.

Climate change will add to the region's water woes. Chenoweth and his colleagues used the high-resolution regional climate model, PRECIS, developed by the UK Hadley Centre, to compile the first nation-by-nation estimate of how changes in precipitation expected under the Intergovernmental Panel on Climate Change's A1B warming scenario might affect per capita groundwater and surface water availability during the twenty-first century (*Wat. Resour. Res.* **47**, W06506; 2011). In that scenario, world population growth peaks mid-century, economic growth is robust, and global average temperature during the last decade of this century is about 2.8 °C warmer than it was between 1980 and 1999.

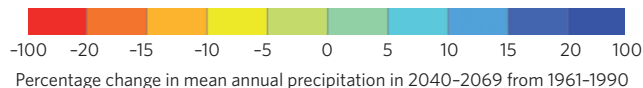
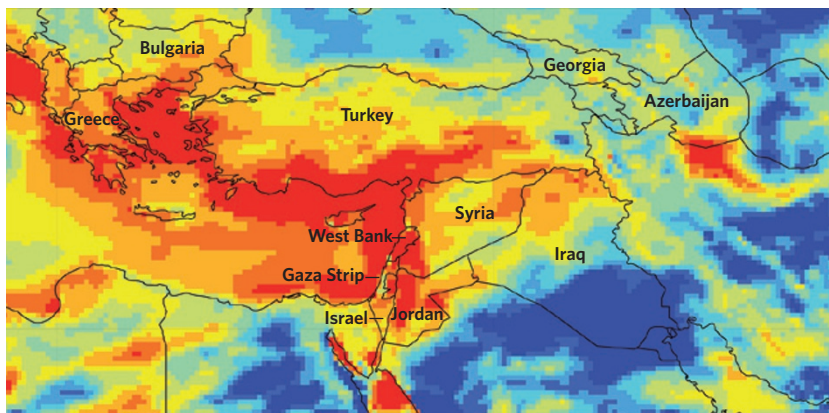
In a swath that stretches from the southern Balkans to western Iran and southward to the Sinai Peninsula, average annual rainfall between 2040 and 2069

will be about 10% lower than it was from 1961 to 1990, the researchers estimate. Between 2070 and 2099, average yearly rainfall will be about 11% lower than that seen during the same baseline.

Not all parts of the region will be afflicted equally, the researchers report. In southeastern Europe, where water is plentiful and population growth is expected to be minimal, per capita water resources will not decrease significantly. However, in Jordan, Lebanon and the Palestinian territories, for example, average annual precipitation between 2070 and 2099 will be more than 20% below that seen between 1961 and 1990. Meanwhile, populations in these areas are expected to grow by at least 50% — and possibly double — by 2050. Water availability in Jordan, for example, is set to shrink from 108 m³ to 56 m³ per person per year by 2050.

Today, about 22% of the region's water needs are met with 'virtual water', in which food and other goods that use water in their production are imported from elsewhere. Unless the efficiency of water use improves by mid-century, more than half of the region's water requirements may need to be met with virtual water.

Desalination is an option, but it's an expensive one. To make up the shortfall in regional precipitation expected by the end of the century would require annual expenditures of about US\$26 billion, or about 1.5% of the region's gross domestic product in 2008. And that hefty price tag doesn't include the costs of pumping desalinated water inland to areas where it would be needed, the researchers say.



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