

# 2009 Australia-Israel Hawke Lecture

## Water Security and Climate Change: Israel and the Middle East, with Australian Reflections

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Thank you very much to my hosts this evening for giving me the opportunity to speak at the prestigious *Bob Hawke Prime Ministerial Centre at the University of South Australia*. Thank you to Ms. Elizabeth Ho, Director, and the Bob Hawke Prime Ministerial Centre and to the co-host, Mr. Allen Bolaffi, Chair, Australia-Israel Chamber of Commerce. I also must say thanks to Mr. Robert Schneider, CEO of JNF-Australia for sponsoring my trip to Australia as a part of the JNF Environmental Scholars Program.

This is my first visit to Australia and it is indeed a pleasure to be here. Before I begin on the topic of my talk, which is a subject hotly debated around the world and one that is particularly relevant to both Israel and Australia: climate change and water, I would like to first say that it is significant to me to be giving this talk in South Australia. I come from the south of Israel. I live near the city of Beer Sheva, the capital of the Negev desert. There is a strong linkage between the city of Beer Sheva and the Negev with that of Australia. This linkage has both historical significance and is also one about the importance of water in an arid environment.

A key battle, that helped turn the tide of the war during World War One, occurred at Beer Sheva. By the beginning of 1917 Turkish forces were driven out of Sinai and were retreating across Palestine. A key objective of the Allied forces was the taking of the position at Gaza, on the Mediterranean. Gaza anchored the Turkish defence line that ran 50 kilometres south-east inland to the town of Beersheba. Two attempts to take Gaza in March and April 1917 failed. Allied commanders then decided to outflank Gaza by turning the Turkish line at Beersheba. This battle, involving the Australian Light Horse, was arguably the light horse's finest moment, the charge of the 4th Light Horse Brigade at Beersheba. Beer Sheba was a key objective also in terms of water resources. The battle took place on the 31st of October, 1917. By the end of the battle, most of the city's wells were captured intact and a complete Turkish division, the 27th, was destroyed. The fall of Beersheba opened the way for a general outflanking of the Gaza-Beersheba Line. Gaza fell a week later and on 9 December 1917 the city of Jerusalem was captured.

Beer Sheba in English means seven wells. It was here where Abraham negotiated for water for his flocks over 5,000 years ago. Today, water remains the critical natural resource for civilization to survive and flourish in semi-arid and arid environments. One of the reasons that water is so important is that it

is essential for our, and for most of the planet's survival. Further, unlike other natural resources such as oil, there is simply no substitute for water.

Water and its availability are intricately linked with climate through the hydrological cycle. The distribution of water around the planet is determined by climatic conditions such as temperature. A change in temperature can mean a change in the availability of water-prolonged drought for example. Human systems, especially agricultural systems are highly sensitive to water availability. This is especially the case for agriculture in semi-arid and arid climates. Both Israel and Australia fall into this category. Our ability to grow food for our citizens rests on our ability to ensure stable amounts of water in order to grow our crops. Invariably, this involves irrigation and reliable water resources. Climate change can alter this.

Today, both Australia and Israel are going through a prolonged drought. Our ability to continue to supply a secure food supply to our citizens is being severely taxed by a reduction in water on one hand, and growing demand on the other. Both countries are seeing their water systems declining with concomitant environmental and economic damage. It has been said that the grievous consequences of drought and climate change are more visible and dangerous in Australia than in any other industrialized nation. According to a report I read by the organization, Circle of Blue, crops across southeast Australia's Murray-Darling Basin, one of the planet's most productive food growing regions, are failing and once prosperous rural cities are in decline, where suicides in farm families occur at a rate twice the national average.

My visit to Australia is to learn about the water and climate issues that you are facing, which I understand to be similar to what we are facing in Israel. I propose to spend the rest of my talk on the situation in Israel and the Middle East and to close with some reflections on how together; both countries may overcome these problems by working together.

Israel is a tiny country compared to the vastness of Australia. Our available water resources are also quite puny. Israel subsists off of one surface water resource-the Jordan River system and a series of aquifers. A complicating factor that Israel has to contend with, unlike that of Australia, is that most of our water resources are shared with our neighbours. This means that water allocation for Israel is not simply one of balancing supply and demand; it is also one of politics, and the allocation of scarce water resources among the countries sharing the water.

Israel, together with Jordan and the Palestinian Authority, has growing populations which of course means greater demands for water. The population density of Israel is estimated at 348 people per square kilometre. In Australia, it is less than three people per square kilometre. So the demands for water are increasing and a changing climate is adversely affecting an already over-taxed system.

Firstly, how do we expect climate change to affect our region? According to the research that I am familiar with the following scenarios are projected for Israel by the year 2100:

- Mean temperature increase of 1.6° to 1.8°C
- Reduction in precipitation by (-4)% to (-8)%
- Increase in evapotranspiration by 10%
- Delayed winter rains
- Increased rain intensity and shortened rainy season
- Greater seasonal temperature variability
- Increased frequency and severity of extreme climate events (flooding, runoff, soil erosion)
- Greater spatial and temporal climatic uncertainty.

This, for a region whose water resources are already severely degraded. The Jordan River watershed which is shared by five countries: Syria, Lebanon, Israel, Jordan and the Palestinian Authority are one of the most over-taxed river systems on earth. Water diversions for domestic and agricultural use, mostly by Israel and Jordan, have left the Jordan River itself to a mere trickle and the Dead Sea shrinking by one meter every year. The Israeli National Water Carrier pumps water out of the Sea of Galilee which is north of the Jordan River at an average rate of 400 mcm/year. Jordan diverts a slightly smaller amount via the King Abdullah canal. Today, drought conditions and continued pumping have caused the Sea of Galilee to drop to its lowest level ever, to the point where continued pumping may cause irreversible ecological damage to the lake.

Dealing with the effects of climate change on water resources is essentially developing a program that can limit variability in supply and yet still meet demand. Israel has embarked on a strategy to diversify its water resources. About 50% of Israel's water comes from a series of aquifers. The mountain aquifer system, that is mainly recharged in the West Bank, and is thus a very important resource for the Palestinians as well. The coastal aquifer system along the Mediterranean coast is the second aquifer that is being used. Approximately 35% of Israel's water comes from surface water, the Sea of Galilee. The third source, which currently makes up 15% of Israel's water supply, is from desalination along the Mediterranean coast. Israel currently desalinates around 150 mcm/year from two desalination facilities.

In order to balance the water budget in terms of supply meeting demand, Israel is looking at where reductions in freshwater can be made and what alternatives can be provided for instead. The largest consumer of water in Israel, and for Australia as well, is agriculture. In the past water for agriculture constituted more than 70% of the country's total supply. Today it is less than 60%. Yet reductions of water to agriculture have actually seen a rise in agricultural productivity. This has been achieved by shifting farming away from freshwater and into recycled waste water, the implementation of water efficient irrigation technologies such as drip irrigation and a shift to more water thrifty crops. The savings made in freshwater is then redistributed to the domestic sector where demand is growing as a function of population growth.

More than 70% of Israel's domestic sewage is treated up to a tertiary level. This treated waste water is then re-injected into groundwater as a form of groundwater recharge. At a later stage it is pumped back up as a source of irrigation water. In actual fact Israel is placing a cap on freshwater to agriculture and the message to farmers is that any expansion in agriculture will only come via the use of irrigating with treated wastewater.

Demand management has also been instituted in terms of water pricing. Israel uses a block rate water pricing system whereby the more you use the more you pay. Israel also encourages farmers to make the shift to recycled wastewater by pricing water in terms of its quality. The more saline the water resource for example, the cheaper it is. These economic incentives help to drive innovation in the agricultural sector in terms of adapting new dry-land adapted plants to cash crops. One example of this is research being carried out at my institute, the Arava Institute, on the nimh tree from Morocco. This tree, indigenous to Morocco has never been cultivated. Yet it provides valuable oil for both the food and medicinal sectors. Nimh oil has been used by centuries by semi-pastoral peoples in Morocco. Today we are seeking to introduce the nimh tree as an alternative crop that can subsist on marginal water and soil yet provide an economic return to the farmer.

Further demand management is achieved through infrastructure efficiencies. Israel has a single national water grid that connects the surface, ground and desalinated water supplies. This grid supplies 90% of the population. Water leakages are at around 10%, one of the lowest in the world.

In sum, Israel's water strategy for a world dealing with climate change is to invest in new technologies such as desalination for the domestic sector and in technologies and wastewater treatment for the agricultural sector. The challenges that Israel and Australia face in terms of water and climate change are similar. I believe that these challenges create opportunities for collaboration between our two countries. During my visit here I have learnt how Australian cities like Sydney are using recycled wastewater for indirect potable use in the domestic sector. I think that Israel can learn from this experience and should consider how to implement it in the Israeli context. Similarly, the efficiencies Israel has achieved in the agricultural sector can be transferred to the Australian context where inefficiencies still exist in irrigation such as the continued use of flood irrigation and the growing of water thirsty crops like rice. Finally, both countries can benefit from sharing knowledge and expertise in the desalination sector in terms of better and more efficient membranes and ways to reduce the energy and carbon footprint of desalination facilities.

To close, both countries are taking steps towards an integrated approach to water management under the impact of climate change but integration cannot occur without cooperation and I look forward to many cooperative opportunities between our countries in jointly seeking a sustainable water supply for the benefit of everybody.

Thank you for attention.