

IWVWD General Manager's Column  
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## **“Sharing Denmark’s Groundwater Experience”**

**By Don Zdeba**

I recently returned from a fact finding trip on water resource management in Denmark. At the invitation of the Danish Ministry of Foreign Affairs, myself and thirteen others from various California water districts and agencies were educated on lessons learned as a result of Denmark experiencing conditions similar to those experienced by California during the recent prolonged drought -declining groundwater levels and water quality. Denmark’s groundwater issues were not caused by drought, but more related to over-pumping and issues related to lack of regulatory oversight of agriculture. Despite being surrounded by seas, Denmark is 100% dependent on their groundwater resources. Denmark’s groundwater issues surfaced in the 1990’s and resulted in significant changes, not only in how they view their groundwater resources, but how they view their environment in general.

The population of Denmark is approximately 5.6 million. The country is largely agricultural accounting for about 62% of land use. There are well over 20 million pigs (though I didn’t see a single one the entire week) and 580,000 dairy cattle in the region. There are 87 public water companies and 2,400 private water companies providing service. There are some 40,000 small private wells that are regulated. Lack of oversight years ago resulted in pesticides and high nitrate values showing up in over 25% of the wells. The issue was so prominent, the government undertook an extensive national groundwater mapping initiative from 1999 until 2015. As the English proverb states, “Necessity is the mother of invention.” Research conducted by Aarhus University in the Danish city of Aarhus resulted in development of the SkyTEM airborne geophysical system. Suspended from a helicopter, the system collects and delivers accurate and detailed maps of the earth’s subsurface quickly and economically. The system can identify, map and characterize -- in 3-D images -- subtle variations in electrical conductivity and magnetization from the near surface to depths of up to 1,500 feet over an area one-third the size of a football field at any given time. The mapping effort was financed by a \$0.10 per cubic meter (about 264 gallons) charge to customers on their water bills. At the same time, the government began an outreach program to educate farmers on the use of pesticides and began establishing protective zones around wells; a 10 meter diameter security zone and a 300 meter zone where cultivation is banned (no manure or pesticides). In 1986 the first Pesticide Action Plan was introduced followed by two further action plans. The main goal has been to reduce the use of pesticides and the negative effects on health and the environment, including protection of the groundwater. There has been a shift in the type of pesticides used and a number of substances that have previously polluted the groundwater have been withdrawn from the market.

To make a long story short, today Danish National Groundwater Policy states, “Production of drinking water should be based on clean groundwater – no advanced

treatment.” Simple treatment consists of aeration and sand filtration before it is distributed to consumers. There is no chemical treatment. Groundwater is considered a national resource, not property of the landowner. Production wells are permitted by the government and subject to periodic review to assure they can continue to pump without negative consequences before the permits are renewed. During the past 20 years, water taxes and water saving campaigns have reduced groundwater pumping by more than a third. If you are interested in learning more about the challenges faced by the Danes and how they addressed them, you can find more information at [http://www.geus.dk/program-areas/water/denmark/vandforsyning\\_artikel.pdf](http://www.geus.dk/program-areas/water/denmark/vandforsyning_artikel.pdf)

I share this because the Danish government will be signing a Memorandum of Understanding (MOU) with the State of California in Sacramento September 22<sup>nd</sup> to share collaboration on water policy and solutions. With signing of the MOU, it is expected Stanford University’s Groundwater Architecture Project will go forward. The project involves aerial geophysical surveys using SkyTEM of three California basins: Butte County, San Luis Obispo County, and Indian Wells Valley. The \$2.1MM project is to be funded jointly by the Danes, the State, and the local basins. The Board of Directors of IWVWD has approved supporting this project and there are financial commitments from other stakeholders as well including Coso Operating Company, Mojave Pistachios and Meadowbrook Dairy. The deliverables will be the data acquired, development of a data management system, and a revised hydrogeological conceptual model. We are very fortunate to have our basin included in this important study. More information will be forthcoming once the MOU is signed and a decision on the status of the Stanford Project is made.

I encourage you to regularly visit the District’s Facebook page (IWV Water District) for updates as well as information on local and state water issues.