19. The Restoration of Ancient Water Cisterns

Sheila Saia
PhD student, Department of Biological and Environmental Engineering, Cornell University, Ithaca, U.S.A.

Abstract

Water scarcity is a complex and emerging issue in the Mediterranean region. Local governments like the Municipality of Lasithi in Crete, Greece, must strive to achieve European Union directives for water quality and quantity while adapting to reductions in rainfall and meeting growing demands for water from agriculture, tourism, and domestic uses. One potential solution to this growing demand could include coupling modern water resource management strategies and publicly defined goals with the restoration of urban water cisterns. A combination of new and old water conservation strategies may benefit the local community as well as the groundwater supply.

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In the village of Karydi on the Greek island of Crete, an elderly farmer stops to chat with me and my friend Giannis as we inspect the old stone cisterns that capture rainwater (Fig. 1 and 2). The farmer tells us how important these man-made, stone-lined pits once were to the socioeconomic health of her local community. She is worried about the municipal water supply, which was first installed about fifty years ago. The system has led many of her fellow villagers to lose touch with their land and limited water resources. “Everyone used to rely on the cisterns for their crops, but these days young people aren’t interested in farming,” she says. “They move to the cities in search of jobs and leave people like me to care for the fields and cisterns.”

Despite recent pressure from the European Union (E.U.) to implement natural resource conservation policies, water over-abstraction continues to be an issue throughout Greece. According to figures published by the Organization for Economic Cooperation and Development in 2005, freshwater abstractions in Greece increased 73 percent between 1980 and 2002. While Greece is among the region’s “water-rich” countries with an average per capita water availability of 6,765 cubic meters per year – compared to values of less than 1,500 cubic meters in most Eastern and Southern Mediterranean countries – water scarcity is becoming more common on a local scale, especially in the Aegean Islands. Yet, in general, few Greeks are aware of the pressure on their local water resources (see Ch. 17 and 20).

This disconnect between policy and reality can be ascribed to the interaction of many complex factors. Officials must consider projected yearly rainfall reductions of 5-20 percent, while balancing population growth with the expansion of tourism and agricultural development. As different industries grow, large-scale groundwater extraction from deep-drilled wells is replacing small-scale traditional water supplies, like cisterns and shallow wells. This makes it more difficult for community leaders and their constituents to understand and overcome the impacts of their decisions on the aquifer, a natural resource they cannot see but which is directly connected to the springs they use.

For example, increased irrigation demands for agriculture in the Messera Valley in southern central Crete have lowered the groundwater table by nearly 45 meters in the past 10 years. In addition to reducing the water availability, over-pumping the aquifer draws seawater into wells near the coast. As a result, local governments spend more to meet current water quantity and quality demands.

From as far back as the Bronze Age, Cretan communities have relied on man-made rainwater cisterns and spring-fed wells to supply water for irrigation and domestic needs. As groundwater extraction technologies improved and Greek communities aspired to the same living standards as their western neighbors, groundwater wells became more and more common. Deep-drilled wells were first introduced in the 1960s and 1970s as shallow well pumps no longer met agricultural and domestic water demand.

Adjusting to growing demand

Most of the inhabitants of Karydi are still farmers, though a growing number are finding jobs in nearby urban areas such as the coastal city of Agios Nikolaos. The villagers rely on publicly supplied groundwater from deep-drilled wells to meet their domestic and agricultural water needs. Unlike many Greek islands, where local communities depend fully on imported water, Karydi’s local aquifer capacity is expected to meet projected domestic water needs and current...
agricultural demand for the next ten to twenty years. However, this projection does not account for potential reductions in rainfall due to climate change or shifts in tourism and agriculture. Like elsewhere around the Mediterranean, tourism is a major income generator in Greece, but also a large consumer of water. Around 15 million tourists visit the country of 11 million every year – the majority during the dry summer months – placing added pressure on water resources. Agriculture is still by far the largest water consumer in Greece, using 80-85 percent of the country’s water resources. Irrigation has increased exponentially over the past 50 years, covering 41 percent of cultivated land today (see Ch. 17).

Reintroducing the old

As an E.U. member, Greece has committed to meeting the guidelines proposed in the European Union Water Framework Directive by 2015. Specifically, the directive outlines fair water-pricing policies that promote sustainable water use (see Ch. 18). In other words, water utility prices should reflect the costs of water abstraction, distribution and treatment. While working under these guidelines, and realizing the necessity to address rising demand and the growing threat of climate change, community leaders are trying a new – or should we say old – approach to water conservation.

Nikos Kastrinakis, the deputy governor of the Municipality of Lasithi, collaborated with a team of students and professors from Cornell University to establish a water resources management plan that links traditional and modern water conservation methods and identifies associated areas of improvement (see Ch. 20). Several projects have been proposed, including plans to restore urban water cisterns and use them to water municipal parks. These self-sustaining, restored cisterns will help the local community reconnect to their water resources. Additional benefits of this restoration project include historical and cultural preservation, job training, community education, and backup water supplies.

Besides the restoration of cisterns, local leaders are considering three modern water resource conservation methods including interdisciplinary management, public participation and the establishment of quantitative and qualitative goals. By understanding the quantity and quality of their water resources as well as the community’s perceptions and values, local leaders can better encourage citizens to become active caretakers of their local environment. The overall challenge of their efforts is to balance groundwater recharge with groundwater extraction (see Ch. 17). Only then will they have a viable solution that will meet the current and future needs of humans and surrounding ecosystems.

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