

A Water-Conserving Garden for 'Aqaba

Arid lands technology transfer involves Arizona and Jordan

By Susan McGinley



Karen Vitkay

Desert dwellers value gardens for the lushness, shade and beauty they bring to a dry landscape. Yet native species are often shunned in favor of water-guzzling exotic plants that are poor choices where water is naturally scarce. Ecologically appropriate designs that include native or other low water-use plants, drip irrigation and reclaimed water can benefit both the environment and the human community.

That is the goal of a water-conserving demonstration garden for 'Aqaba, Jordan—a project that brings together professors, students and engineers from two deserts half a world apart—the Sonoran Desert and the Sudanian Desert. Faculty and students from the UA College of Agriculture and Life Sciences and the School of Landscape Architecture are working with the 'Aqaba Special Economics Zone Authority (ASEZA), a municipality in southern Jordan, to transform a neighborhood park.

The project is sponsored by the International Arid Lands Consortium (IALC), which includes the University of Arizona and the Badia Research and Development Program. The project is funded by the US Agency for International Development.

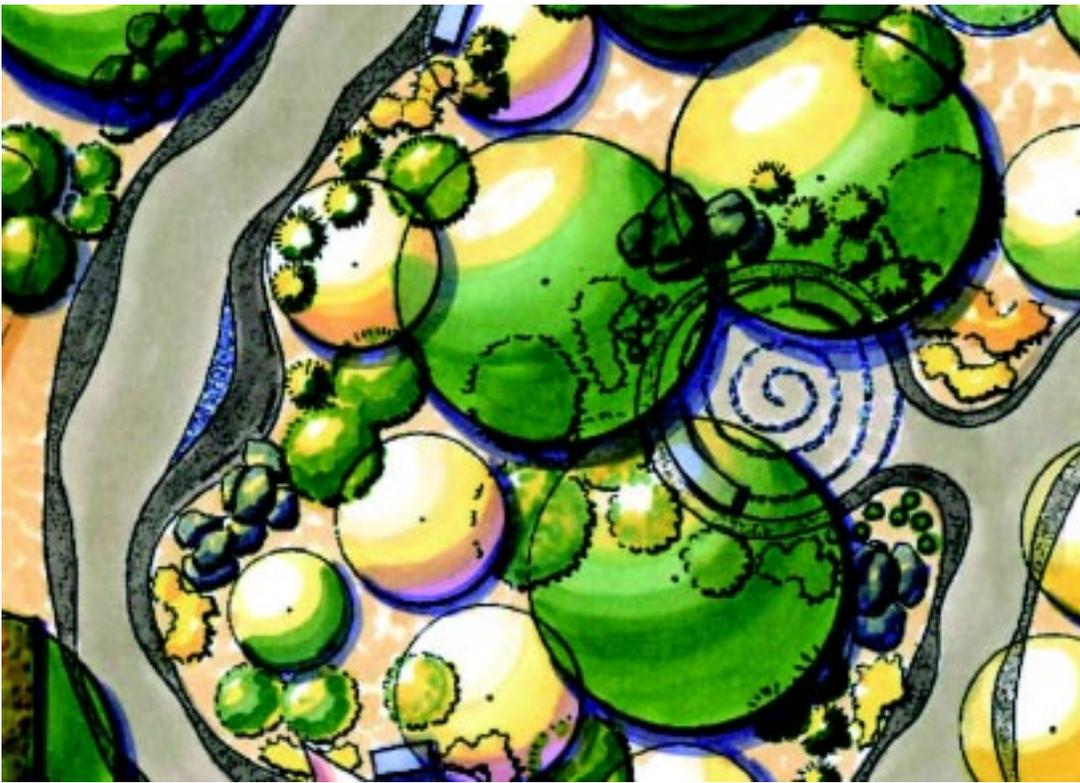
“This is an example of technology transfer of Southwest water-saving techniques to the Middle East,” says Robert Freitas, director of the IALC’s Sustainable Development of Drylands in Asia and the Middle East Project. “It’s using UA experience and knowledge to fulfill a promise made two years ago. Although 'Aqaba

draws water from the high quality DISI aquifer, it is a finite source so it’s important to take conservation measures now.”

Located on the southwestern tip of Jordan at the top of the Gulf of 'Aqaba at the north end of the Red Sea, 'Aqaba is Jordan’s only port and thus is very important for trade. Egypt, Israel and Saudi Arabia also border the Gulf. A large fertilizer-loading wharf, a critical marine habitat and the potential for increased tourism make water conservation and environmental guidelines a priority. In particular, nutrients in runoff could harm the sensitive coral reef. 'Aqaba’s climate is similar to that of Yuma, Arizona, although it has considerably less rainfall than the Sonoran Desert. Local residents number less than 100,000, but the area is also visited by Jordanian and international tourists.

“The goal is to convey water conservation information and to create a variety of outdoor spaces which effectively communicate low water-use strategies to the residents and visitors of 'Aqaba,” says Karen Vitkay, a graduate student in landscape architecture who designed the park as her master’s project.

Vitkay, and landscape architecture professor Margaret Livingston researched the needs of the community, assessed the requirements for growth, and identified the materials and plants that are available in the area. Vitkay then developed and drew a set of designs for the garden that she has presented to local municipal and governmental groups for approval. The designs have been enthusiastically received.



The design includes a native plant garden near a “wadi” pathway (shaded gray) that winds through the entire site like a desert wash.

Vitkay and Livingston visited the park in ‘Aqaba several times in 2003 and 2004 to survey the needs and desires of local residents, including men, women and children, and to work with members of ASEZA. The resulting design incorporates environmental, social and cultural principles suited to the region, including tensile structures that recall Bedouin tents, fragrant plants from classic Islamic gardens, and other elements.

The garden occupies two acres near the coast and the main road near the hotels. It’s already functioning as a park with a high-density residential area around it, but sections of the park are overgrown, others are underused, and the area—though surrounded by a wall—is subject to vandalism. Vitkay’s design drops the walls and invites visitors to move through a series of spaces connected by a flowing walkway that recalls the Arab concept of a wadi, or desert wash.

“The garden is called the Wadi of Knowledge, with eddies or pools of knowledge,” Vitkay says. “Each section of the garden offers a different learning opportunity. It starts like a spring in the desert and concludes with an oasis at the end.” Sections of the garden include an orientation plaza called the Spring of Knowledge; native plant garden; recreational field, water harvesting area; formal garden based on historic Islamic design; youth play area; graywater infor-

The International Arid Lands Consortium (IALC)

an independent, nonprofit organization formed in 1989, promotes cooperative arid and semiarid lands research and the dissemination of knowledge necessary to apply that research in the United States and abroad. The IALC funds research, educational and training initiatives, demonstration projects, workshops, and other technology-transfer activities related to the management, restoration, and reclamation of arid and semiarid lands. Eligibility for funding is determined by the IALC Member Institutions.

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Sustainable Development of Drylands in Asia & the Middle East Project

is funded under a cooperative agreement with the U.S. Agency for International Development (USAID) and the International Arid Lands Consortium (IALC). This project supports the sustainable development, management, and restoration of arid and semiarid lands in Afghanistan, Pakistan, Jordan, India, and Yemen.

mation area, where drinking fountain water runoff is distributed onto plants; modern garden; amphitheater; Oasis of Knowledge, which is an existing building that can serve as an education center; and horticultural classroom. The plantings and structures at each stage fit with the theme for that component of the garden.

“The essence of this project is conveying water conservation in a format that is easily interpreted by many audiences. That’s one of the gifts or strengths of the profession of landscape architecture,” Livingston says. “We’re trying to show people how they can conserve water in their own lives, their own landscapes. They really need an example to look at. Part of our mission is that we don’t just want it to be water-conserving, but we also want the garden to be attractive, to draw them in. The design of the garden shows the research in a visual format.”

The inclusion of water-saving plants plus water-saving practices and irrigation techniques would not only give the people living in ‘Aqaba ideas for conserving water in their own homes, but it would also offer visitors from arid and semi-arid regions a way to do the same. The design incorporates the seven principles of xeriscape (landscaping for dry areas): planning and design; plant selection; wise use of turf; soil and mulches; alternative sources of water, such as reclaimed water; maintenance; and efficient irrigation methods.

“The plant palette needs to be extended a little further,” Livingston says, referring to the predominance of exotic plants already in ‘Aqaba. “We don’t want to repeat the exotic species, but rather find out which native species we can get people to grow.”

Vitkay notes that her plans are only a schematic design, and that the details need to be worked out by the engineering company involved with the project.

Pete Waller and Mulluneh Yitayew, faculty in UA agricultural and biosystems engineering, are designing the irrigation system for the garden. Waller conducted an economic assessment of different irrigation methods in ‘Aqaba and presented a paper on this topic at the International Water Demand Management Conference at the Dead Sea, in Jordan. ‘Aqaba City managers, after looking at the economic assessment of installation and maintenance costs, decided to use subsurface inline drip irrigation laterals for trees and shrubs, and sprinkler irrigation for turf. The park will use high quality reclaimed water for irrigation, similar to Tucson’s reclaimed water, once the new wastewater treatment plant is completed.

“There is a legal requirement that pipes carrying reclaimed water must be painted purple, and they didn’t want to have purple pipe in all the medians, so they decided to use subsurface drip,” Waller explains. The irrigation system will use local equipment and an automated system that will enable city managers to evaluate plant water requirements if money is allocated for this task.

Akrum Tamimi, professor and project coordinator for the Sustainable Development of Drylands Project’s Jordan component, serves as a local contact in Jordan. He has facilitated meetings with municipal and government officials, presented a conference on alternative water sources at Jordan University of Science and Technology, and is conducting a wastewater reuse balance study with Waller, ASEZA and the new water authority of ‘Aqaba. He will present the documents for the garden project to ASEZA, the government of Jordan, and USAID.

“ASEZA will be using the design knowledge and other technologies in this garden to landscape the medians in ‘Aqaba and possibly other public parks,” Freitas says. “We hope these water-con-

serving aspects will be used throughout Jordan. This is the use of science and technology as a fulcrum to influence positive change. The water conserving garden is one of this project’s activities. Throughout all of this is training and technology transfer, which is flowing both ways; some techniques have come from the Jordanians. There are things they are teaching us, too.”

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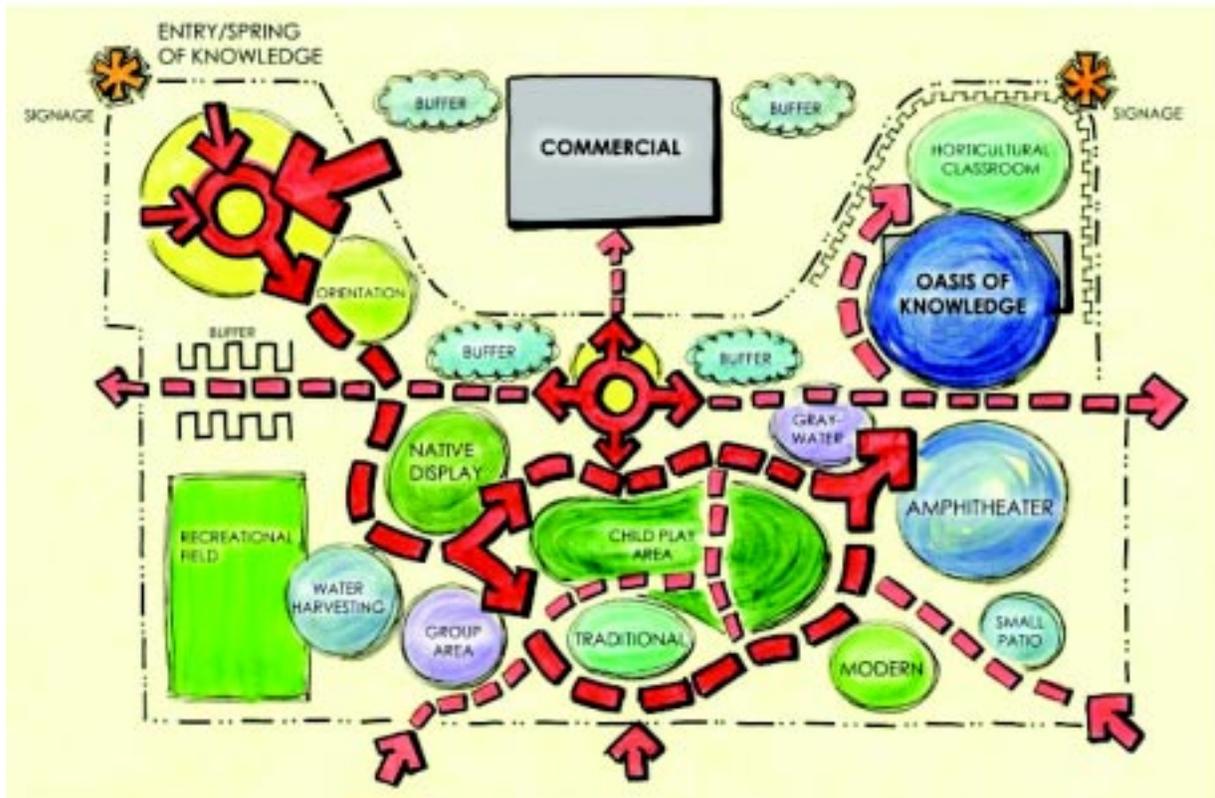


Diagram shows pedestrian circulation through various areas of the garden.