

Tree rings tell of climate in Turkey, Jordan

By Melanie Lenart

After putting the finishing touches on a 660-year climatic reconstruction for Turkey, LTRR research specialist Ramzi Touchan moved one step closer to his dream of creating a long-term climate chronology for the Middle East region.

Touchan, a researcher with the lab since 1991, previously completed a 396-year climatic reconstruction for southern Jordan with LTRR colleagues, research specialist David Meko and professor Malcolm Hughes. Now he will turn his attention to the samples collected in Turkey, Syria and Lebanon this past summer.

The results from Turkey showed spring droughts tend to be short-lived, at least relative to North American dry spells that tree rings indicate can last decades. It's rare for a drought to last more than five years in southwest Turkey, judging from Touchan's preliminary results.

Drought durations appear similar to results for Jordan, which show winter-spring droughts rarely last more than five years. These proxy records of drought, revealed through the pattern of small annual growth rings in trees, can prove especially important in the Middle East because continuous instrumental climate records for these desert ecosystems generally go back only about 50 years.

"Water is the main issue for all of the countries in the Middle East," Touchan noted. "For the local people, the issue is one of understanding drought patterns."

The project to expand knowledge of regional drought regimes and fit the Middle East into long-term regional climate patterns has taken Touchan to the Middle East for the past two summers. He hopes to continue the research for at least another five years, working to train local foresters and educators in the science of dendrochronology.

Touchan's vision also calls for developing a university-based tree-ring laboratory that will be affiliated with the University of Arizona, at least to start. Already officials in Turkey, Jordan, Lebanon and Syria are vying for the opportunity to provide buildings and faculty support for this purpose, he said.

Touchan hopes U.S. funding agencies and private philanthropists will recognize the value of furthering the ongoing collaboration he has initiated with support from the National Science Foundation's Earth Systems History section.

The education effort is already paying off. Touchan was assisted in the field this past summer by two overseas colleagues – Adib Rahme, College of

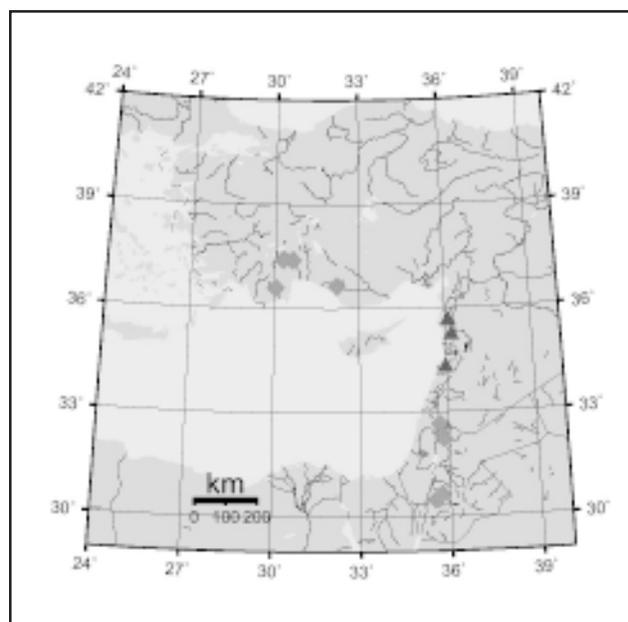
Agriculture dean at the University of Aleppo in Syria, and Nesat Erkan of the Southwest Anatolia Forest Research Institute in Turkey – who learned about tree-ring techniques during a one-month visit to the LTRR earlier this year. In the coming year, Touchan plans to train a scientist from Lebanon's Ministry of Agriculture.

"My strategy is to depend more on local people once we train them," he said. "We're trying to get a mixture of collaborators of scientists in those regions."

UA geosciences undergraduate Brian Wallin also joined Touchan on both sample-gathering trips. Wallin took the field work in stride and found people from the different cultures fascinating and friendly.

"It was my first time out of the country, except for Mexico. I have to admit I was a bit nervous. But everyone was very friendly," Wallin said. "This year, going back to Turkey was like going back to see old friends."

Touchan and Wallin were in Damascus, Syria, when they heard the news of the Sept. 11 tragedy.



Researchers led by the LTRR's Ramzi Touchan have collected tree-ring samples from the Middle East sites shown on the map at left. Diamonds indicate analyses are already underway, while triangles show sites of collections that have not yet been analyzed.

Map created by Ramzi Touchan

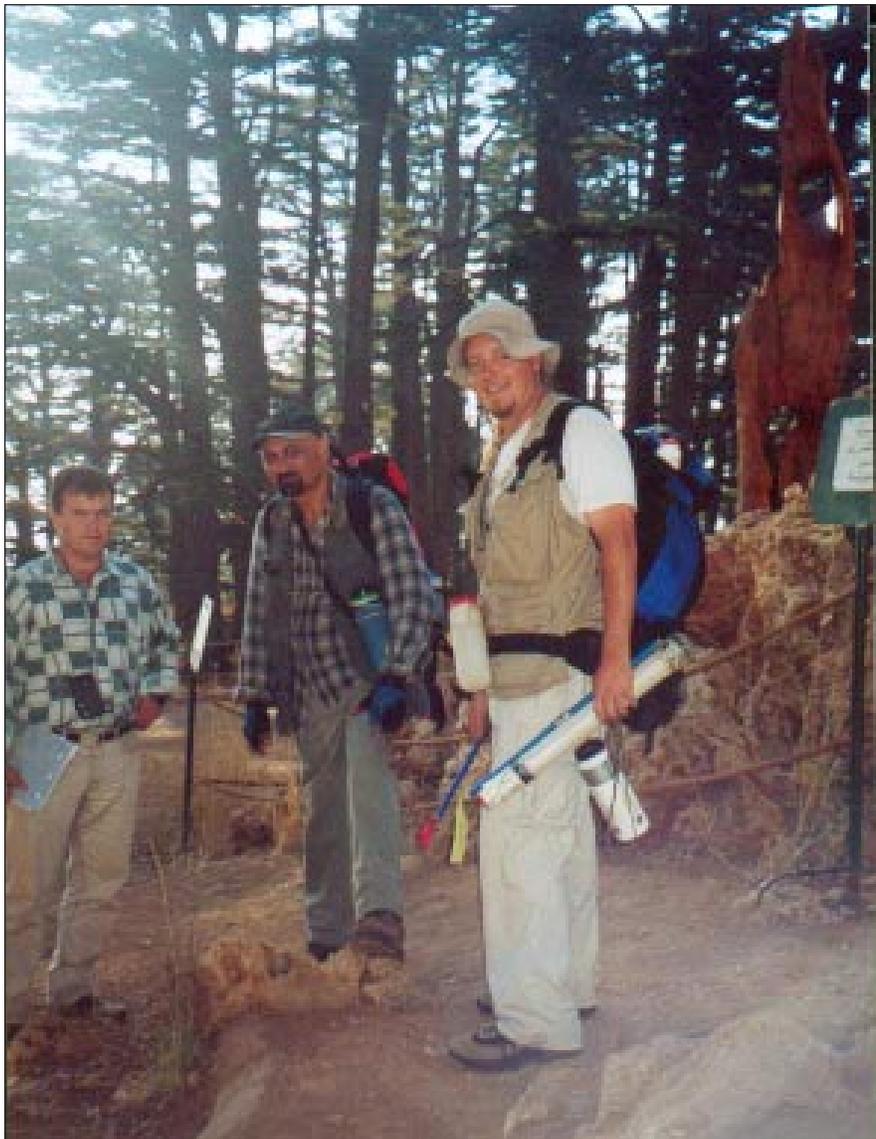


Photo by Jean Estephan of Lebanon

Ramzi Touchan, center, prepares to sample trees in a cedar forest in Lebanon with help from UA geosciences major Brian Wallin, right, and Abedllah Khatib, a graduate student with the University of Aleppo in Syria. A sculpture, in back, adorns the visitor's area.

Although saddened, they were also touched by the sympathy expressed by colleagues and even people they had never met.

“People over there were shocked and saddened by the tragedy and the loss of innocent American civilians,” Touchan reported. “When they knew we were from the U.S., they came up to us

and offered their condolences. On the way to my sister’s house in Syria, the cab driver expressed sorrow and didn’t want to charge me for the ride.”

The two returned without incident. Since then, they’ve been hard at work crossdating tree cores by matching the patterns of narrow and wide rings in a variety of trees to the

actual year.

Although Touchan plans to analyze the tree-ring data from many other sites before reaching any conclusions, he has high hopes that a regional signal will emerge from the collections. Previous research by others using instrumental records (1930-1991) indicates that Turkey’s winter rainfall is influenced by the North Atlantic Oscillation (NAO), a pattern of global air circulation known to affect winter temperatures in western Greenland and northwestern Europe.

In addition to helping to refine understanding of how the NAO affects the Middle East, Touchan plans to apply the research to learn more about the Siberian High and other atmospheric circulation patterns. The Jordan results indicate a strong correlation between dry winters and the western extension of the Siberian High, for instance.

As part of a future five-year plan, Touchan and dendroclimatologist Mary Glueck would like to extend the collection efforts and analysis to countries in North Africa, such as Tunisia and Algeria. They also want to update and expand the tree-ring chronology developed for Morocco by Charles Stockton, a retired LTRR professor. Eventually he plans to apply the analytical techniques to defining long-term streamflow of the Euphrates. The underlying goal for all this research was described succinctly in the summary of purpose written by Touchan:

“The Mediterranean is a water-deficit region and in parts of the region there is a history of conflict over natural resources. This information will aid in anticipating and, it is hoped, lessening the likelihood of conflict over scarce water resources.”

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