

# The Alien Saltcedar

By PETER FRIEDERICI  
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**Tough, prolific, and exclusionary, the tamarisk is "planta non grata" in the Southwest, but it's apparently here to stay.**

**I**t's probably just as well that the name of the first person to plant a saltcedar in the Southwest is lost to history. He, or she, was no doubt praised some 200 years ago for the inspiration that brought a source of shade and wood to the sun-baked desert. But today's reaction would be quite different.

In two centuries the alien saltcedar has established itself along numerous rivers and reservoirs, where biologists and land managers regard it as a noxious plant pest. It stands accused of degrading wildlife habitat, ruining the recreational amenities of riparian areas, wasting scarce water, and even increasing the severity of floods. Its impact has been especially great on riparian woodlands, which support the greatest quantity and diversity of life—both animal and human—in the desert landscape, and which are among the most imperiled ecosystems in North America.

Saltcedar's negative effects are a direct reflection of exactly those qualities early settlers in the Southwest found so positive. Its roots stabilize streambanks against the flooding typical of desert washes and rivers. Its foliage provides precious shade for poultry and livestock. It can be cut for firewood. Its abundant sprays of white or pink flowers provide some ornamentation in an area where the vegetation often seemed alien, if not outright hostile, to new immigrants.

And it is remarkably hardy. "It'll grow anywhere it can get its feet in water," says Mary Irish, director of horticulture at the Desert Botanical Garden in Phoenix. "It's extremely tolerant of any soil, including salty soil, and it doesn't mind the heat at all."

The tamarisk family is native to southern Eurasia, and over time, several species were introduced here. One—the evergreen athel tamarisk or *Tamarix aphylla*—grows at least 50 feet high and is a valued shade tree. Beekeepers say its flowers produce excellent honey. The other species, which are deciduous, are referred to as *Tamarix chinensis*,

*T. ramosissima*, and *T. parviflora*. Because they appear to hybridize, and are virtually impossible to tell apart, some botanists consider them all to be members of the same species.

This is the shrub or tree called saltcedar, a name whose latter half refers to tiny, scaly leaves that resemble cedar scales. And it is saltcedar because the plant exudes salt from glands on its leaves. Grab a branch, and you end up with a residue thick enough to taste. When the leaves drop in the autumn, they pass that salt to the soil, which may eventually become too saline to support most native plant species.

Given ample water and space, a saltcedar can become a medium-sized tree—the largest known in the U.S. is a 44-footer in New Mexico. In the wild, though, it more commonly forms dense thickets of many-branched shrubs, all growing to a height of 15 or 20 feet. The foliage is so dense that almost nothing can grow under it.

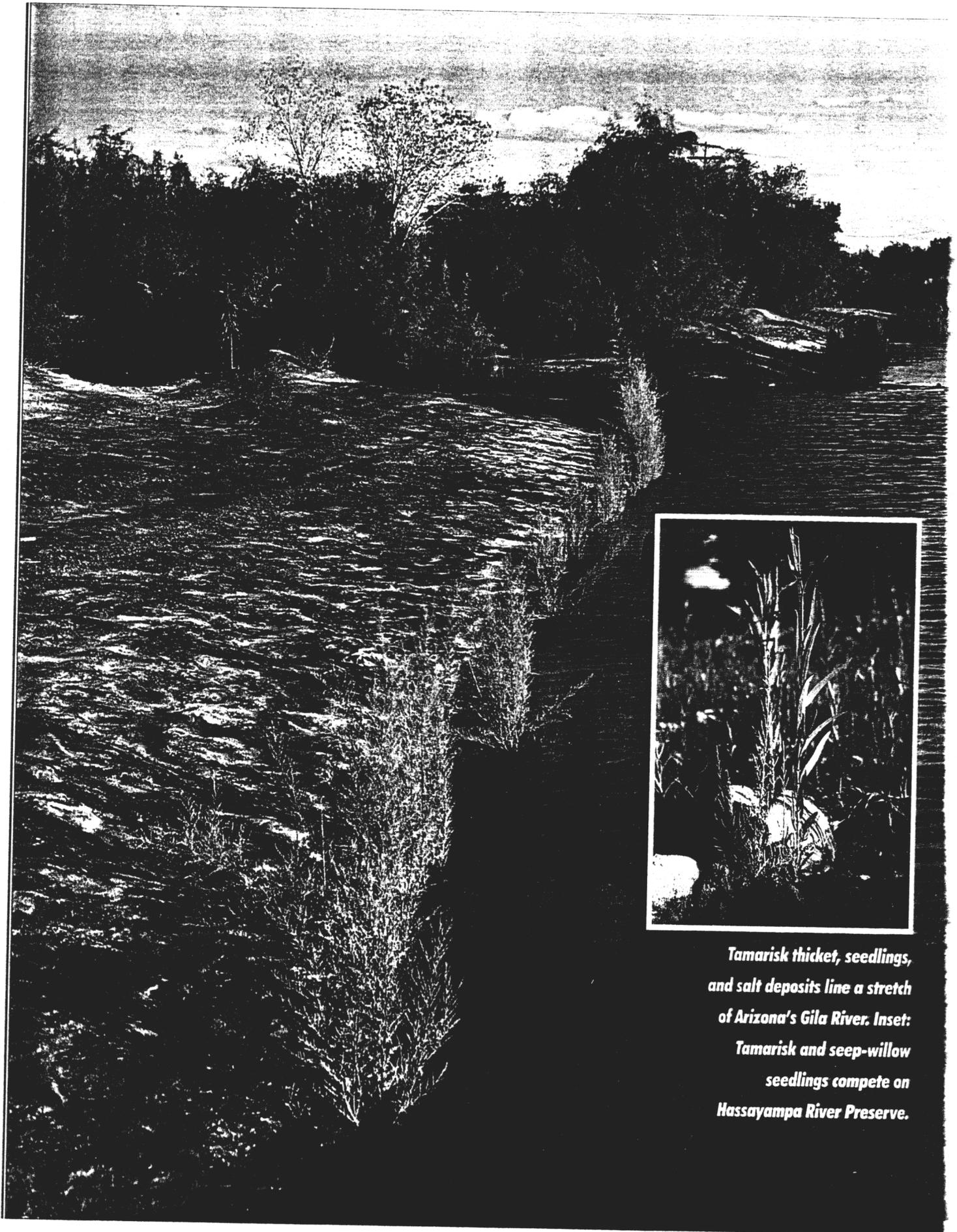
Saltcedar is not really adapted to aridity. It grows only where water runs near the surface, and it is spendthrift—a large specimen uses perhaps 200 gallons a day. It has been estimated that all the saltcedar in the Southwest uses, per year, twice as much water as all the cities of southern California.

Dense stands of saltcedar trap sediment during floods, narrowing water channels and perhaps increasing the severity of subsequent floods. Along the Colorado River, saltcedar thickets have overgrown many beaches long favored for camping and recreation.

Wildlife is far less abundant in saltcedar thickets than in sup-  
planted native woodlands, largely because native plants act as host to many more insect species. A study along the lower Colorado River showed that during the winter an undisturbed native woodland of cottonwood and willow supported an average of 154 birds per 100 acres. Only four birds lived in an equivalent area of saltcedar. Few birds nest in saltcedar, perhaps because the feathery leaves do not provide the same protection from intense summer heat as do the broad leaves of cottonwoods and willows.

It is extremely difficult to destroy an established thicket. "After any environmental calamity

**PETER FRIEDERICI—  
a freelance writer specializing  
in nature and conservation  
topics, writes a quarterly  
nature-education leaflet for  
the Roger Tory Peterson  
Institute of Natural History.**



*Tamarisk thicket, seedlings,  
and salt deposits line a stretch  
of Arizona's Gila River. Inset:  
Tamarisk and seep-willow  
seedlings compete on  
Hassayampa River Preserve.*

## The Alien Saltcedar

### **It has been estimated that all the saltcedar in the Southwest annually uses twice as much water as all the cities of southern California.**

it comes back stronger than before," says William Neill, a saltcedar-control advocate in southern California. "It is not balanced by natural predation or diseases, so it displaces the native species. It survives extreme environmental conditions very well—fire, salinity, immersion, drought, dense shade."

And its reproduction is copious: A single saltcedar can produce up to half a million winged seeds in a year—seeds so tiny it takes 100,000 to make up a gram. When they sprout, the seedlings can grow up to 10 feet in a year.

Given such profligacy, it's no surprise that saltcedar escaped the homesteads and pastures where it had been introduced; by the early 20th century it was spreading quickly. On Lake McMillan, a reservoir on New Mexico's Pecos River, saltcedar was unknown before 1912. By 1915 it had spread to 600 acres of delta land. By 1925 it covered 12,300 acres.

In 1960 the most comprehensive survey to date estimated that saltcedar covered 900,000 acres from Oklahoma to southern California, Colorado to Sonora. Today experts place that figure at about a million acres. Though it thrives best in hot areas below 4,000 feet in elevation, it has been seen as far north and east as Idaho, Oregon, and Nebraska.

**B**otanists have typically ascribed the plant's phenomenal spread to its aggressive growth and prolific reproduction. But recently some ecologists have asked why it did not spread explosively until the turn of the century.

One of those scientists is Duncan Patten, a plant ecologist at Arizona State University. He believes saltcedar exploited changing environmental conditions that put native species at a disadvantage. "If you want to get rid of tamarisk," he says, "you have to stop grazing and building dams."

As evidence Patten points to the Nature Conservancy's Hassayampa River Preserve, a five-mile stretch of well-preserved riparian forest in the Sonoran Desert of central Arizona. The woodland has been free of cattle grazing since the preserve was established in 1987. And because the Hassayampa is an undammed river, floodplain vegetation is wiped out periodically by high water.

Patten has monitored vegetation changes on the preserve since 1988 and has seen seedling cottonwoods and willows thrive and saltcedars decline. Some of that is due to a saltcedar-eradication program organized by the Nature Conservancy, but Patten thinks a

larger ecological shift is underway.

Patten believes native cottonwoods and willows can outcompete saltcedar under a natural flooding regimen, in part because the natives release their seeds earlier in the year than the invaders do. Shaded out of higher parts of the floodplain, the saltcedars are left to seed the lowest, wettest, least stable areas.

The cessation of grazing in the woodland has had an effect also, because cattle prefer the taste of cottonwoods and willows.

William Neill disputes Patten's belief that returning rivers to a natural flooding regime and reducing or eliminating riparian grazing will be enough. "What's going to make the difference is removing the big seed trees," he says. "The natural trend is for more tamarisk and fewer native species, unless there's proactive human involvement."

Neill, a petroleum engineer, became interested in saltcedar in the late 1970s during a visit to Death Valley National Monument. Eagle Borax Spring had been a verdant, marshy oasis—critical wildlife habitat in the dry heart of the Mojave Desert. But by the 1960s, dense saltcedar growth had caused surface water to disappear, native grasses and reeds to dry up, and nearby mesquite trees to suffer from groundwater depletion.

The National Park Service staff began burning saltcedar as part of a control program in 1972. For the next 10 years, rangers and volunteers cut back the resprouting saltcedar and dosed the stumps with a systemic herbicide that kills the root system, the only effective way to kill saltcedar. By 1982 the saltcedars were gone, water was pooling on the surface, grasses and reeds were coming back, and the mesquites were healthy again.

What was good for Eagle Borax Spring was good for other areas too. "I started seeing tamarisk all around," says Neill, who has become saltcedar's most energetic enemy. "It gradually got to be a bigger and bigger part of my life." He received a herbicide application license and convinced the Bureau of Land Management to let him institute control programs on its land. He also organized volunteer work parties at various preserves. Neill's *Tamarisk Newsletter* publishes the latest findings on cutting saltcedar groves and applying herbicides, and periodically announces the temporary repulsion of the invader from selected springs and riparian areas in southern California.

These labor-intensive techniques work well at isolated desert springs and preserves, where saltcedar may cover only a few acres. But in areas such as the lower Colorado River corridor, saltcedar monocultures cover an estimated 50,000 to 60,000 acres—far too



*A prescribed burn is one way to control saltcedar thickets. Inset: Scouts cut tamarisk at the Nature Conservancy's Hassayampa River Preserve.*



NATIONAL PARK SERVICE/INSET: THE NATURE CONSERVANCY

much ground for even the most dedicated volunteers.

Some large-scale control efforts have proven successful. The federal Bureau of Reclamation, concerned that water corralled for human use by its dams is shunted into the atmosphere by saltcedars, experimentally bulldozed one large saltcedar stand with a deep plow that cut roots about 15 inches below the ground. Native shrubs were replanted on the exposed ground. Bird and mammal populations increased. The experiment was successful, but the project cost a prohibitive \$2,000 per acre. Still, the Bureau has continued such projects at scattered sites.

**A**t Bosque del Apache National Wildlife Refuge in New Mexico, preserve officials bulldoze or burn thickets in late summer, then flood the area with water from the Rio Grande. The technique has the dual benefit of controlling saltcedars and providing habitat for wildfowl but is practical only because a large-scale water-diversion system was already in place.

Creative biologists have suggested a number of alternative control techniques, from dusting cut-off stumps with saltpeter to suffocating whole plants in giant plastic bags. More practically, researchers have been searching for biological control agents.

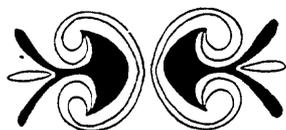
Researchers from the U.S. Department of Agriculture's

Agricultural Research Service have been working with overseas entomologists to identify insects that damage saltcedar and determine which might be safely imported. Because saltcedar has no close relatives in North America, it may be possible to introduce control organisms that will not harm native vegetation. The USDA may begin limited field trials as early as this year of a mealybug, collected in Israel, that harms saltcedar. At least a dozen other insects are undergoing laboratory tests.

Perhaps the best control method found to date—and one most ecologists don't like—has been suburbanization. It's hard to find anyone willing to say anything positive about the saltcedar these days, but those who are willing tend to be native Arizonans who nostalgically think of it as a plant of their childhood, cloaking irrigation ditches and other wet areas. Today many of those rural areas have succumbed to urban development.

No one foresees eliminating saltcedar from North America; it has become too well established. Even insects long-adapted to feeding on it can only cut down on its numbers, as they do in Eurasia. "The hope, eventually, is that biological control might cut down on thicket density so that other species can survive," says William Neill.

In effect, that means conceding saltcedar a place in the ecosystem of the Southwest. Ultimately, it means accepting that humans too have a major role to play in the workings of ecology, in the Southwest as everywhere else. AF



## Water Vapors

We received email this month from Paul Marsh of the Center for Environmental Studies at ASU. "AZ Wat. Resour 3(6): 9 says American Rivers has closed its Phoenix Office. Not according to Conservation Associate Pamela W. Hyde, who continues to work at that location. True, Gail Peters is no longer with American Rivers, at least that's what we've been told."

There is some confusion about who is doing what for American Rivers these days. What we have learned is that the Phoenix office remains open, with Conservation Associate Pamela Hyde there part-time. She can be reached at 602-264-1823 or 602-265-9173. Dale Pontius, who has run the Tucson office since last summer, will be returning to the private sector as of April 1. The Tucson office will be closed at that time. For now, Dale can be reached at 602-318-1087. It isn't clear who will replace Dale, or from what office he will operate.

### Don't Drink the Water?

In an effort to counter perceived national and state-level legislative campaigns to weaken drinking water standards, a coalition of environmental and public interest groups released reports and studies containing a blizzard of alarming statistics. Among the claims: one in five Americans drank tap water contaminated with bacteria or that was too cloudy last year; bad drinking water causes a million illnesses and 900 deaths per year; 494,000 Arizonans were exposed to contaminated drinking water last year; and most of Arizona's regulated water systems are out of compliance with federal standards.

### Don't Drink the Beer?

Miller Brewing is suing the San Gabriel Water District over plans to recharge treated effluent into the aquifer that serves as the water supply for

Miller's Irwindale brewery. Miller claims the recharge may contaminate the San Gabriel aquifer; water district officials note the aquifer is an original Superfund site. Currently, the effluent is dumped into the ocean.

Seems to us Miller should chill. Recharging aquifers with treated effluent is mature technology. Besides, Annheuser-Busch uses the Mississippi as source water for its St. Louis brewery, and last time we looked at a map, St. Louis is downstream from half the wastewater plants in the country.

### Foreign Correspondent

Nothing puts domestic water problems in perspective like a quick glance around the globe. Most of Europe has been hit by floods, except the Iberian Peninsula, where drought persists. Drought also persists in Bulgaria, where water has been rationed in the capital, Sofia, for three months. The government now is considering declaring a state of emergency and evacuating some residents.

Droughts and floods come and go, but the water quality problems being revealed in Russia will haunt that country for decades. A recently-released report from the Russian Academy of Sciences estimates that three-fourths of the nation's water is undrinkable. Sources of contamination include surging bacteria levels in rivers and lakes from poorly maintained wastewater plants, a cold war legacy of radioactive waste, and oil leaking from deteriorating pipelines.

### Every Mushroom Cloud has a Silver Lining

Great news from the Nevada Test Site — surface-disruption features resulting from underground nuclear testing (aka "craters") may increase the potential for groundwater recharge in areas that normally would produce little, if any, recharge. The potential practical applications of this discovery boggle the mind! And now we can put to good use all the aging nukes the U.S. is buying from Kazakhstan.

In a similar vein, researchers from the University of Nebraska-Lincoln have come up with a low-cost alternative to air strippers for removing volatile organics from groundwater. They have announced that small-nozzle, fine-spray irrigation sprinklers can remove over 98 percent of the TCE from contaminated water. Now if they can figure out how to set up center-pivot irrigation systems in the middle of industrialized urban centers... It seems to us a better solution is outdoor misting systems around every patio.

### Factoid of the Month

From the January issue of *American Forests* — "It has been estimated that all the saltcedar in the Southwest annually uses twice as much water as all the cities of southern California."

But not for long. The Los Angeles City Council is considering new water rates that would give breaks to households in hot areas, on large lots, or with large families — in other words, households that use lots of water.



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#### *Arizona Water Resource* Staff

Editor: Joe Gelt  
Reporters: Barbara Tellman  
Mary Wallace  
Calendar: Holly Ameden  
Publisher: Gary Woodard

WRRC Director: Hanna J. Cortner

#### *Arizona Water Resource*

Water Resources Research Center  
College of Agriculture  
The University of Arizona  
350 North Campbell Avenue  
Tucson, Arizona 85719  
602-792-9591; FAX 602-792-8518  
Email: [wrrc@ccit.arizona.edu](mailto:wrrc@ccit.arizona.edu)