Pueblo Grande Museum

Profiles No. 15

A River Ran Through It

Introduction

The Salt River Valley, where the modern Phoenix metropolitan area is today, has attracted people with its resources for thousands of years. The resource that dominated this area is the Salt River, which was a perennial stream until the early 20th century, and offered water to support a rich and varied riparian ecosystem. Upstream stretches of the Salt River are still perennial, but most of the river is impounded by dams and is regulated through pipes and canals to provide a reliable supply to a thirsty metropolitan area.

Riparian ecosystems are communities of plants and animals that are dependent upon continuous supplies of water. Most riparian species are found only along natural watercourses such as rivers, springs and streams. Riparian ecosystems can also develop in areas where the ground water is perched high enough to allow the roots of riparian plants access to water. In these cases there is no visible surface flow, only underground flow. Occasionally marshes or (cienegas) develop when the subterranean water reaches the surface at springs and seeps. Precipitation runoff stored in bedrock tanks (tinajas), farm ponds and cattle tanks can supply water to thirsty riparian communities.

During the Hohokam period (A.D. 1 - A.D. 1450), the Salt River provided water to the prehistoric people for agricultural and other domestic uses. Hohokam farmers, like subsequent historic and modern farmers, diverted river water into canals and into their gardens. Thousands of hectares (area of land measuring 100 m x 100 m) were under cultivation during both the prehistoric and historic periods. Agriculture irrigated by Salt River water is still a major economic activity in this area, with cotton, alfalfa and various vegetable crops being grown. Controlling the river for at least part of the year enabled farmers to feed an ever increasing population. As the modern population increased, more water was needed to irrigate cleared land to accommodate agricultural demands. Soon most of the water was diverted and the riparian forest community that grew along the river was greatly reduced. In many areas the river channel has been modified, moved, lowered or lined, and water flows through the Phoenix metropolitan section of the Salt River only during periods of unusually heavy rain or snow melt on the watershed.

What was the Salt River like when the Hohokam lived in the Salt River Valley? To answer this question archaeologists and environmental historians use biological specimens collected during archaeological excavations, guided by early historic records, to piece together a picture of the Salt River Valley at about A.D. 1200.

The Salt River Valley Environment, Circa A.D. 1200

Recent archaeological excavations in the Salt River Valley have recovered thousands of biological specimens from Hohokam sites that give archaeologists data to help them reconstruct the prehistoric riparian environment. Examples of cottonwood, willow, mesquite, arrowweed, cane wood charcoal, and cattail pollen are commonly collected. All of these species possessed important economic benefits to the Hohokam and it can be assumed that these species were grown and collected from the area under study.

Cottonwood, willow and mesquite trees are indicator plants for a riparian forest ecosystem at the elevation found in the Salt River Valley. Tree species such as ash, juniper, sycamore and pine were also recovered at Salt River sites, but these trees grow at higher elevations. It is assumed that these species were driftwood washed down during a flood. This phenomena still occurs on the upper, unregulated stretches of the Salt River. However, driftwood was probably an important source of wood for the Hohokam.

Cattails and cane are usually found rooted in submerged soil or very moist banks within shallow protected areas, like sloughs, oxbows, or lagoons. These areas are marshy or swampy and generally have relatively slow river current flowing through them. Cattail, cane and arrowweed provide excellent cover and substrate for a number of animal species as well as raw material for artifacts and houses. Whereas cattail and cane prefer emergent soils, arrowweed grows better in drier soil.

Cottonwood and willow trees generally grow along the streamside and can tolerate wet soil. Even through they can tolerate some variability in soil moisture they do best when their roots are firmly placed within the groundwater portion of the stream. Adjacent to the cottonwood - willow forest and in drier soil, mesquite trees dominate. (See Figure 1.) More tolerant to moisture variability than either cottonwood or willow, they grow bigger, more arborescent and produce more fruit when their roots are within the groundwater level. Mesquite that depends solely upon rainfall for moisture, is smaller and bushy. They do produce fruits but not in the quantities of those mesquites growing along the river. The fruits, mesquite pods, were probably the most important wild food resource for the Hohokam and other native peoples where they occur in exploitable numbers.

Early historic records reinforce what we have learned from the archaeological data. On January 1, 1852, Boundary Commissioner John Russell Bartlett recorded his impressions of the Salt River Valley at about 19 km (12 miles) above the confluence of the Salt and Verde Rivers.

The bottom, which we crossed diagonally, is from three to four miles wide. The river we found to be from eighty to one hundred and twenty feet wide, from two to three feet deep, and both rapid and clear. In these respects it is totally different from the Gila, which, for the two hundred miles we had traversed its banks, was sluggish and muddy, ... The water is perfectly sweet, and neither brackish nor salt, as would be inferred from the name. We saw from the banks many fish in its clear waters, and caught several of the same species as those taken in the Gila. The margin of the river on both sides, for a width of three hundred feet, consists of sand and gravel, brought down by freshets when the stream overflows its banks; and from the appearance of the drift-wood lodged in the trees and brushes, it must at times be much swollen, and runs with great rapidity. The second terrace or bottom-land, varies from one to four miles in width, and is exceedingly rich ... At present it is covered with shrubs and mezquit [sic] trees, while along the immediate margin of the stream large cotton-wood trees grow (Bartlett 1854, 2:240-241; see Hine 1968:Plate 37 for Bartlett's sketch of the Salt and riparian vegetation farther upstream near its confluence with the Verde River and Four Peaks in the background). (See Figure 2.)

Other surveyors and explorers recorded similar impressions. In 1868 a cadastral survey was conducted to establish township/range and section lines for part of central Arizona. During the project George and Wilfred Ingalls reported large numbers of cottonwood and willow trees with occasional stands of arrowweed along the river. Flanked on both sides of the river were mesquite bosques (forest).

Today, the total riparian forest in the Salt River Valley is only a small percentage of what was present during the prehistoric and historic periods. A few vestige tracts with willow, cottonwood, arrowweed and cattail can be found where the water table is perched high enough for their roots, or where irrigation, seepage, or runoff occur regularly.

The area south of the Pueblo Grande platform mound, known as the Park of Four Waters, still supports a small mesquite bosque, one of the last remnants of the great mesquite bosque that existed in the Salt River Valley. Lowered water tables, land clearing and development have eliminated most opportunities for mesquite and other riparian species to grow in the Phoenix metropolitan area.

Zoological remains, such as bones, teeth, and scales, from archaeological sites can provide insight into environmental conditions. Beaver, muskrat, cottonrat, raccoon, fish, frogs, mud turtles, ducks, geese, and coot are all animals that depend upon open water for their survival, and have been recovered from Salt River Valley archaeological sites. Hohokam hunters collected many of these species for food and artifacts, though some undoubtedly ended up in the sites by accident.

The presence of beaver and their dams along the Salt River helped create a landscape where cane and cattail flourished. Beaver dams slow water velocity and form quiet pools where soil is trapped. Besides making places for plants to grow, fish, insects, turtles, and frogs find the beaver pools ideal habitats. In addition, beaver dam areas offer opportunities for water to infiltrate down through the sediments and contribute to groundwater flow.

James Ohio Pattie, beaver trapper and explorer, visited the Salt River Valley in 1826 and recorded in his diary the following:

It [Salt River] affords as much water as the Helay [sic] [Gila]. In the morning on the first of February, we began to ascend Black River [Salt River]. We found it to abound with beaver. It is a most beautiful stream, bound on each side with high and rich bottoms (Pattie 1833:91).

Bird life along the Salt River was quite varied. Riparian ecosystems generally provide a good habitat for birds of all kinds. Today the riparian forest along the Salt River upstream from the metropolitan area supports most of the species recorded in the Salt River Valley during the last 100 years. Various herons, flycatchers, tanagers, orioles, finches, ducks, kingfishers, raptors, owls and shore birds normally associated with coastal areas are seasonally present. Occasionally, examples of all of the above birds can still be seen in the Phoenix area, particularly at the Phoenix Zoo, which attracts thousands of native birds each year.

Frank Hamilton Cushing, archaeologist and ethnologist, visited the Salt River Valley in 1887. In February of that year he recorded the following:

This was the first specimen of the superb white crane so common in the Salado [Salt] and Gila valleys I have seen. We learned later that it was their habit to roost in certain tall cottonwood trees down in the river bottom not far from our camp. They, with numerous wild ducks, wild geese and even occasional pelicans were a feature of this desert region. (Cushing n.d. [Actually 1892]. Cited by Ackerly 1989:34).

The white crane mentioned by Cushing was probably the Great Egret, which is still a common winter visitor on the Salt and Gila Rivers.

Phoenix area birdwatchers can still come up with impressive lists of native birds found locally. The composition of species is different now and the life styles have been adjusted to meet new feeding and competition strategies brought about by exotic vegetation and the drying of the river. Fortunately, the native birds still present show how remarkably resilient they are in adapting to novel environmental challenges.

Mud turtles and several kinds of frogs were present in the slow moving backwaters of the Salt River. These animals' preferred habitat consists of open areas of slow moving water with plenty of plant cover, i.e. algae, cattail and cane, to hide from predators, and to feed and stay cool during hot weather.

Modern visitors and inhabitants of the Phoenix area might find it incredible that the Salt River once supported at least ten species of fish. Fish, like the Gila topminnow and most suckers, prefer slow moving protected water, but squawfish, bonytail chub and razorback suckers tolerate fast moving currents. All these fish are exquisitely adapted for survival during

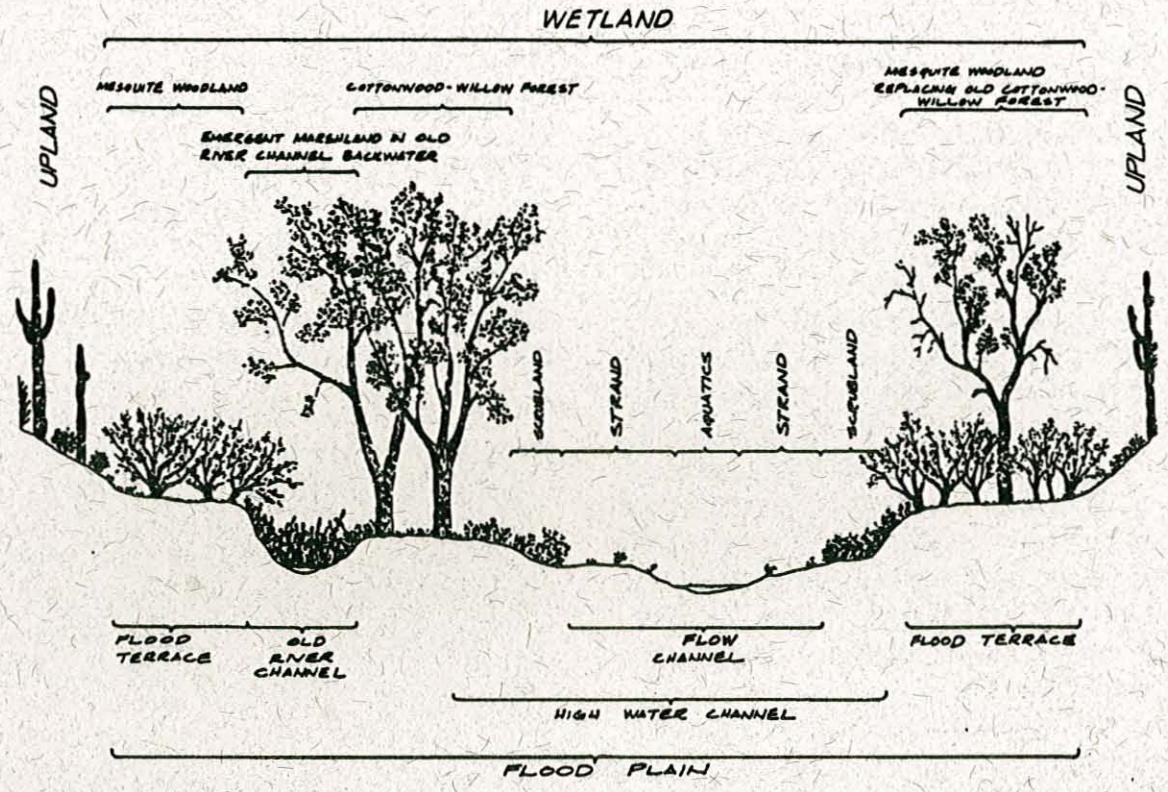


Figure 1. Semi-diagrammatic Representation of Riparian Communities in Warm Temperate to Subtropical Habitats of the American Southwest. (Brown 1994)

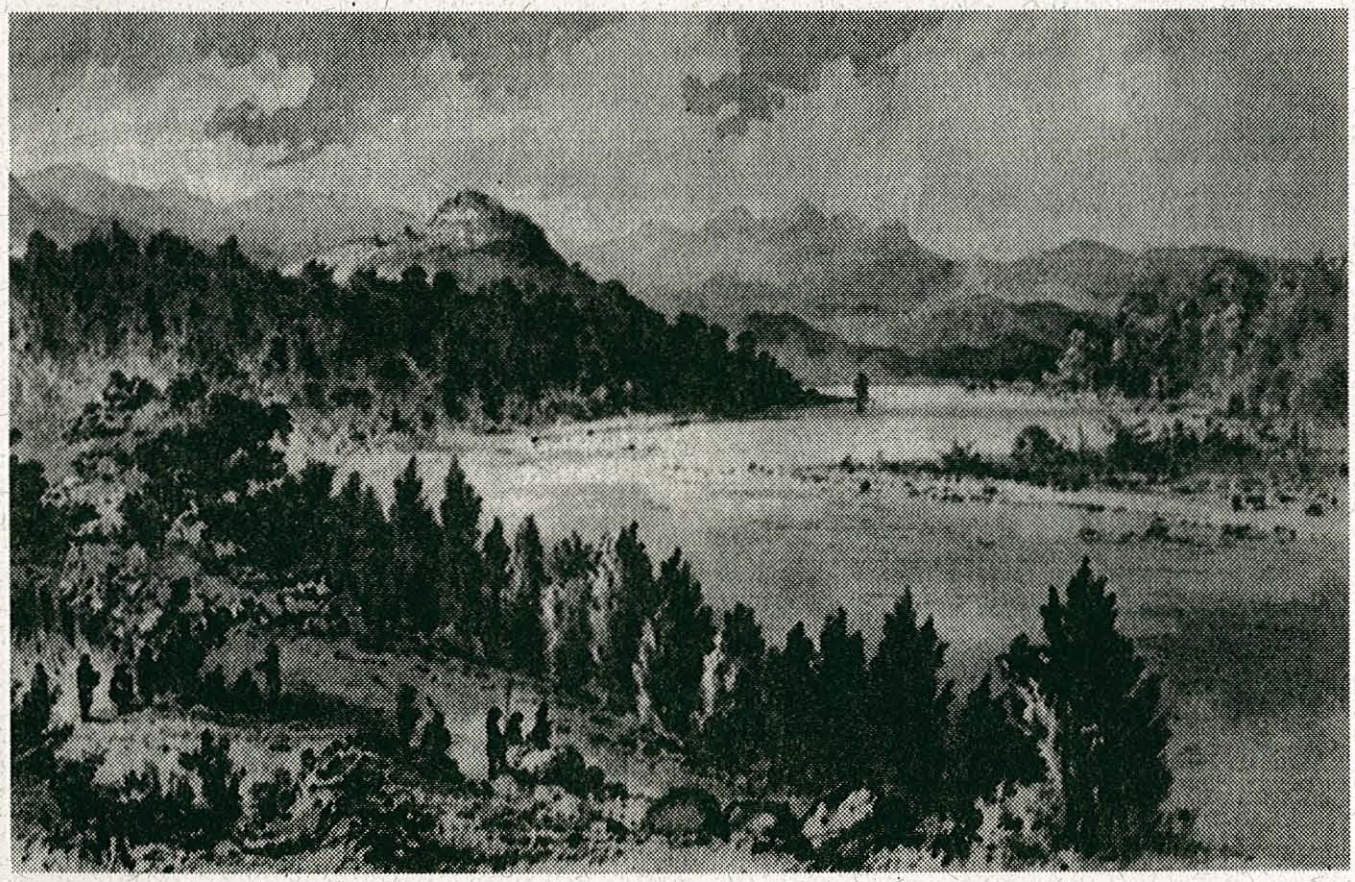
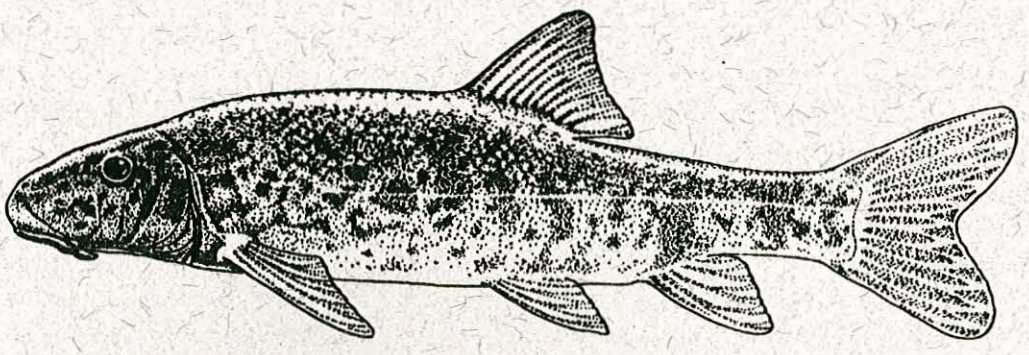
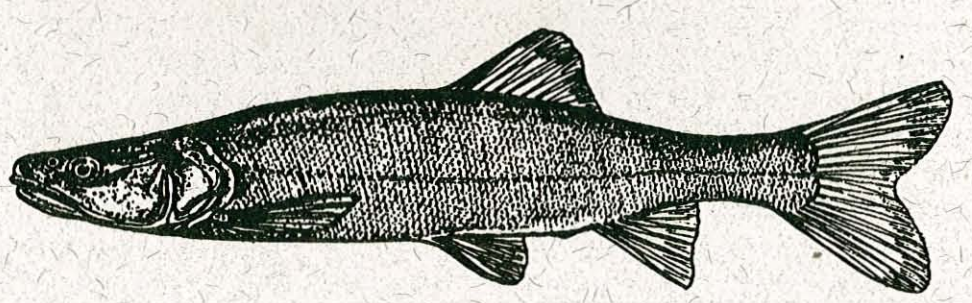


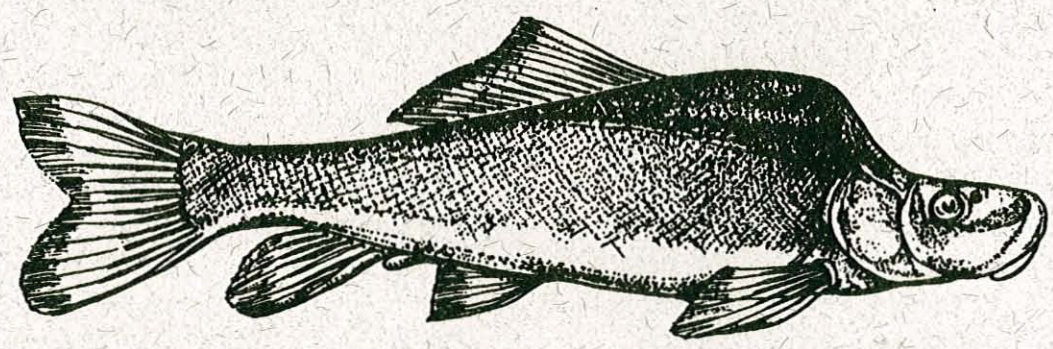
Figure 2. On the Salinas [Salt], North of the Gila, New Mexico. (Pencil and wash by John Russell Bartlett, 1854; Hine 1968)



Pantosteus clarki, Desert Mountain Sucker. Maximum length 12 inches or 30.5 cm.
Courtesy of the artist, Randy Babb, and the Arizona Game and Fish Department.



Ptychocheilus lucius, Colorado Squawfish. Maximum length 70.9 inches or 1.8 m.
Drawing courtesy of the artist, Mary Hirsch.



Xyrauchen texanus, Razorback Sucker. Maximum length 29.5 inches or 75 cm.
Drawing courtesy of the artist, Mary Hirsch.

Figure 3. Some Salt River Fish.

extreme fluctuations in water velocity and quality. Bonytail chub and razorback suckers evolved a special body form, a muscular hump on their backs between their eyes and dorsal fin, which houses muscles for swimming and navigating through fast current and boulder covered river bottoms. Varied environmental conditions like shallow sand and gravel lined riffles, beaver ponds with submerged aquatic and terrestrial plants, or fast moving spring flood waters all provided these fish critical habitat.

Native peoples, like the Hohokam of Pueblo Grande, as well as historic explorers and settlers caught and ate fish from the Salt River. During the spring many species of squawfish would swim upstream in schools to spawn, thus the common name Colorado River salmon. (The squawfish is actually a minnow that can grow to nearly 2 meters or about 6 feet long.) Large schools of squawfish and suckers often got caught in shallow streams and canals and were simply scooped out by hand or, as one account states, with pitchforks and placed in baskets for delivery on wagons. During the last century and until 1910, a commercial fertilizer business was developed from the easy availability of these species of fish.

On June 14-22, 1864, chronicler F.A. Cook, while on one of the King Woolsey's expeditions, reported of the Salt River, near its confluence with Tonto Creek:

We made a willow drag and caught about 200 fish. The largest ones looked very much like Cod but had no teeth, and would weigh from 10 to 20 lbs. This kind of fishing was new to many of us but was very fine sport for we had to go into the river and in some places it was up to our necks but the weather is very hot and the waters warm. (Reeve 1949:104)

June 21

Made 4 or 5 hauls with our willow drag & caught about fifty fish all suckers, but very sweet. I think the best I ever tasted. Perhaps it is because we have no meat for we have nothing but flour & coffee.

June 22

For the past five or six days about half our living has been fish. Our only trouble is that we have not got lines strong enoug[h] for the large fish which weigh from 10 lbs. to 40 lbs., neither can we catch many of them in our willow drag. (Reeve 1949:104)

Cook may have not been exaggerating when he reports fish weights from 10 to 40 pounds (4.5 to 18.2 kg). Squawfish of 1.8 m in length weighing about 45 kg (about 100 lbs.) have been reported. Razorback sucker specimens have been recorded to be around .75 m long and weigh up to 5 or 6 kg (11-32 lbs.). (See Figure 3.)

In addition to fish, the Salt River had a varied molluscan community. California floater clams, fingernail clams and assorted snails have been recovered from local archaeological sites and can be found on the surface of abandoned Hohokam canals. The most interesting of the clams is the California floater clam. Once abundant throughout the southwest, today it is only found in a few localities. The clam, which grows up to 7 cm (2.75 inches) across, has a parasitic larval stage. Glochidia, larval clams, infect the gills of fish until they become adults and begin to produce their valves (shells). At this stage they fall to the river bottom and continue to grow. Being quite edible, they are found in archaeological sites and historic river otter middens.

All rivers have periods when the water flow is so great that the river floods its banks and washes out great quantities of soil and vegetation. This situation results in the modifications of stream course, depth and species diversity. Fortunately areas such as oxbows and other isolated areas offer protection for many species that can easily recolonize modified areas. These species have evolved to cope with seasonal variations in flow by living in various habitats. Paleo-stream flow reconstructions, using tree ring data, indicate several episodes of severe flooding and drought conditions occurred on the Salt River drainage.

Hohokam Perceptions of their Environment

The Hohokam left behind a rich legacy of artifacts that provide clues about how they viewed their environment. Stone, shell and ceramic fetishes, and painted pottery vessels indicate various kinds of animals were important to them. From about the Snaketown through Sacaton Phases (ca. 650-1150) animal depictions were quite common on Red-on-buff pottery. Most notable in references to water are the numerous illustrations of waterbirds (particularly herons), turtles, and occasionally fish. Hohokam petroglyphs found in nearby mountains illustrate herons. Terrestrial animals such as quail, deer, bighorn sheep, lizards, and snakes are represented and doubtlessly possessed some cultural significance. Some archaeologists believe the portrayal of water animals signifies religious significance to water; perhaps the creation of art forms with water associated animals was part of a ritual that would help invoke supernatural assistance in delivering ample supplies of water. The Hohokam, who had thousands of kilometers of canals and about just as many hectares of farm land under cultivation, had a substantial investment in the land. Too many droughts would leave their civilization in despair.

People tend to integrate different facets of their culture. Cultural traits such as art, religion, economics, architecture, and social status become reflections of each other. We do not need to look back too far in Western European history to see how major religions influenced art, politics and architecture. The great cathedrals of Europe are a good example of this behavior. The Hohokam probably expressed their culture in a similar manner.

Conclusion

There is no doubt that the Salt River was a perennial stream supporting a dynamic riparian ecosystem during the Hohokam period. The presence of various plant and animal remains in Hohokam sites indicates that these ancient people were part of this ecosystem. Based upon biological remains, the Salt River was variable in flow and velocity, and able to support a variety of species. Fast moving current can be demonstrated by the driftwood recorded in the archaeological and historic records. Fish capable of living in fast flowing current, such as squawfish, roundtail and razorback sucker, also demonstrate this phenomenon. However, much of the time the Salt River was slow moving and shallow, allowing beavers, muskrats and various emergent vegetation, cane, and cattail to become established. Beaver dams helped create quiet pools where other forms of wildlife forage and seek shelter. Sucker fish, Gila topminnow, clams, snails, wading birds and many other species find this habitat essential to their survival.

The Hohokam also found the river with its varied habitats essential. The riparian ecosystem provided water, food, fuel and material for shelter. Some habitats were crucial enough to expand their range into new areas. Constructing thousands of kilometers of canals created new riparian zones throughout the Salt River Valley. Active only part of the year, these new zones provided additional riparian resources, in addition to water for irrigation. Water was the glue that held Hohokam civilization together. It linked communities and provided avenues of communication. It is no surprise that many archaeologists speculate the Hohokam abandonment of Salt River was influenced by changes in the river itself. Either too much or not enough water would change the dynamics of their system enough to disrupt their society.

Recommended Reading

Ackerly, Neal W.
1989 Changes in the Study Area during the Historic Period. *In Prehistoric Agricultural Activities on Lehi - Mesa Terrace: Perspectives on Hohokam Irrigation Cycles*, edited by Neal W. Ackerly and T. Kathleen Henderson, pp. 18-45. Northland Research, Inc., Flagstaff.

Anderson, R. Scott and Susan J. Smith
1994 Paleoenvironmental and Cultural Analysis of Pueblo Grande, Phoenix, Arizona, using Pollen Analysis. In *The Pueblo Grande Project: Environment and Subsistence*, edited by Scott Kwiatkowski, pp. 6.1-6.77. Soil Systems Publications in Archaeology, No. 20, Vol. 5, Soil Systems, Inc., Phoenix.

Bartlett, John Russell
1854 *Personal Narrative of Explorations and Incidents in Texas, New Mexico, California, Sonora, and Chihuahua Connected with the United States and Mexican Boundary Commission, during the Years 1850, '51, '52, and '53.* 2 Vols. D. Appleton, New York.

Brown, David E. (editor)
1994 *Biotic Communities of the American Southwest-United States and Mexico.* University of Utah Press, Salt Lake City.

Davis, Goode P., Jr.
1982 *Man and Wildlife in Arizona: The American Exploration Period, 1824-1865*, edited by Neil B. Carmony and David E. Brown. Arizona Game and Fish Department, Phoenix.

Hine, Robert V.
1968 *Bartlett's West: Drawing the Mexican Boundary.* Yale University Press, New Haven and London.

James, Steven R.
1994 Hohokam Hunting and Fishing Patterns at Pueblo Grande: Results of the Archaeo-faunal Analysis. In *The Pueblo Grande Project Environment and Subsistence*, edited by Scott Kwiatkowski, pp. 7.1-7.118. Soil Systems Publications in Archaeology No. 20, Vol. 5, Soil Systems, Inc., Phoenix.

Kwiatkowski, Scott
1994 Prehistoric Biotic Communities and Ecosystem Dynamics near Pueblo Grande. In *The Pueblo Grande Project: Environment and Subsistence*, pp. 2.1-2.59. Soil Systems Publications in Archaeology, No. 20, Vol. 5, Soil Systems, Inc., Phoenix.

Miller, Jo Anne
1994 Pueblo Grande Flotation, Macrobotanical and Wood Charcoal Analysis. In *The Pueblo Grande Project: Environment and Subsistence*, edited by Scott Kwiatkowski, pp. 5.1-5.155. Soil Systems Publications in Archaeology, No. 20, Vol. 5, Soil Systems, Inc., Phoenix.

Pattie, J.O.
1833 *The Personal Narrative of James Ohio Pattie of Kentucky, T. Flint*, ed. John H. Wood, Cincinnati. 300 p.

Reeve, F.O.
1949 War and Peace: Two Arizona Diaries (of the Woolsey Expedition, 1864). *New Mexico Historical Review*, 24:95-129.

Pueblo Grande

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