Watershed News
GILA WATERSHED PARTNERSHIP
News of the Gila Watershed Partnership
Volume 12 Number 5
May 2013

Prehistoric Hanging Canals of the Safford Basin

By Don Lancaster, Synergetics

Some recent studies have investigated the scale and scope of a remarkable series of late classic prehistoric (est. 1350 CE) water management structures found in the Safford Basin of Arizona's upper Gila Valley. These canal systems are uniquely characterized by their being literally "hung" on the edges of steep sided, gently sloping mesas formed from remnant Quaternary age bajadas. The mesas today are characteristically rocky, sparsely vegetated, thinly soiled, mostly undeveloped, rather impermeable, and largely infertile.

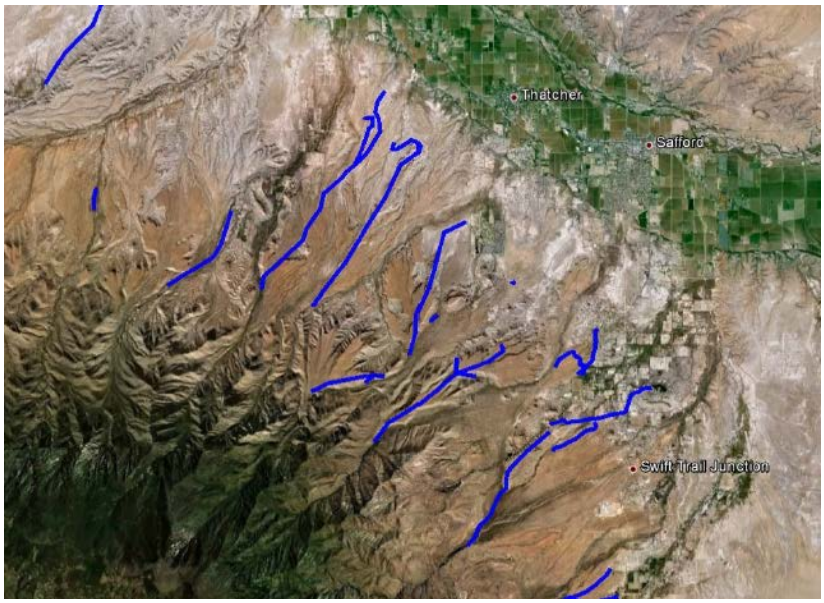
A prehistoric "hanging canal" carved into side of mesa.

At places, the hanging structures can be located as much as 60 meters above their surrounding drainage basins. It is clear that the highest feasible points on mesas were carefully selected for canal routes on purpose. In several cases, any direct drainage routes seem to have been clearly avoided.

It is also quite clear that extreme energy efficiency was a major goal during the canal construction, owing largely to an absence of beasts of burden or means of transporting heavy materials significant distances. Two credible reasons for these unique hanging routes are that their slope could be made largely independent of their surrounding terrain, and that much of the construction effort could be efficiently made across, rather than along, the canal routes, thus minimizing any energy robbing cuts and fills.

Twenty or more distinct hanging canal systems have recently been identified. Many trend from southwest to northeast, eventually leading northward to the Gila River valley proper.

The total system length is estimated at more than sixty kilometers. The canals seem to totally exploit Mount Graham perennial streams that include Jacobson, Marijilda, Deadman, Frye, Spring, Shingle Mill, Ash, and Lefthand. These present stream flow rates are often in the fractional CFS range. All these canal systems are clearly distinct from the Gila River bottomland canals.



Traces of the prehistoric canal system coming off Mt. Graham.

Associated with the hanging canals is at least one above-grade solid aqueduct of significant height and length, along with some apparent elaborate methods of purposeful switching of the water routes between major delivery drainages. In sum, these systems appear to represent a major understanding and a very careful exploitation of both hydraulic fundamentals and extreme energy efficiency.

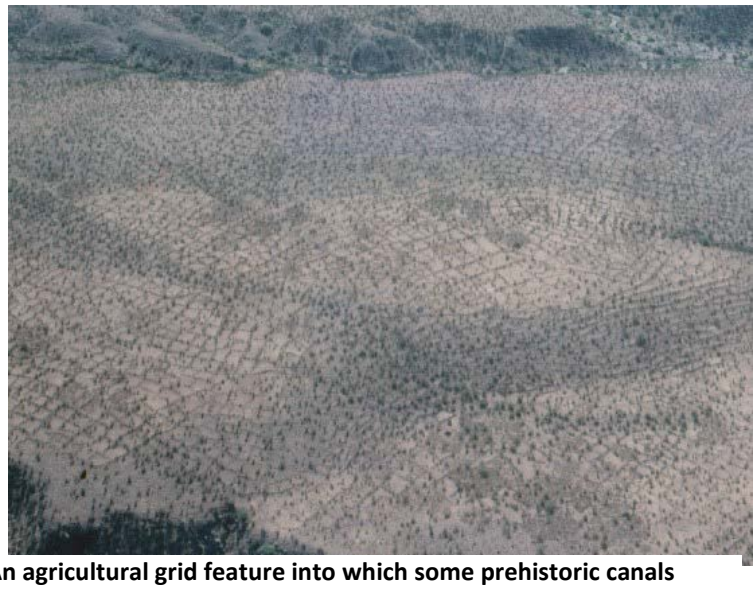

A stretch of a surviving prehistoric canal showing clearly defined bed.

The typical canal cross sections might be one meter wide by twenty centimeters deep. Their use seems to be primarily associated with long distance water delivery to conventional northerly fields. Most mesas reveal little other agricultural activity.

Assisted by historic rebuilds, several reaches of the canals still flow to this day. Other portions of most of the systems remain largely pristine, although currently filled with fine grained and loess-like or sedimentary depositional sands.

Some are reminiscent of French Drain constructs. The canals are known or presumed to eventually end up in areas characterized by habitation sites and agricultural structures such as grids, mulch rings, field houses, linear features, or field areas.

Most systems seem to have a "breakaway" initial diversion point, at which major flood damage would appear to be easily and quickly repaired without significantly impacting the main structural portions of the canals themselves.



An agricultural grid feature into which some prehistoric canals drained.

At present, some twenty or more canal candidates have been investigated.

When taken within the context of available stone age tools, techniques, and energetics, these prehistoric grids and hanging canals clearly illustrate many examples of comparably superb and exceptionally world class engineering.

Current Ongoing Work

A Dragonfly Drone for aerial mapping of area would be ideal.

Many of these hanging canals appear endangered. A crucial present issue is an accurate mapping of the entire area to acceptable resolutions far better than what is readily web available. It is possible that one or more Dragonfly Drones might be suitable for this task.

A web published and open sourced detailed master index of all prehistoric agricultural features in the area would also be highly useful.

As with most southwestern archaeology, any funding is sorely limited. As is the manpower needed for further study and interpretation. Dr. James Neely, professor emeritus at the University of Texas at Austin, is a long term researcher with publications. Several additional publications are in process and studies are ongoing. Additional champions and more support are urgently needed.

For more information visit www.tinaja.com/tinsamp1.shtml

Watershed News May 2013

SAVE THE DATE! JUNE 1st, 2013

The **Gila Watershed Partnership**

and the **City of Safford** are pleased to announce

A Water Conservation Fun Festival

…To Raise Awareness about Water Conservation

When: Sat. June 1st, 2013 from 10 am to 4 pm

Where: Town Square

There will be booths, food, entertainment, and kid's activities.

Upcoming Projects

Upper Gila Water Supply Study

…from the Bureau of Reclamation (BOR)

- to identify water resources and water management strategies to meet future water supply needs in the communities of the Upper Gila River Watershed

Youth Pathway Project

…from the National Fish and Wildlife Foundation (NFWF) Great American Outdoors Grant

- to encourage careers in conservation and land management on public lands, through on-the-ground activities for school age kids high school through college

Clifton Restroom Project

…from the Arizona Department of Environmental Quality (ADEQ)

- to install restroom facilities at the gateway to recreation on the San Francisco River in Greenlee County to reduce the E.coli in the river
- this grant project has just been awarded!

Also at the May meeting…
Anahi Ocampo-Melgar will present an invitation to participate in the "PRACTICE" program, a program aimed at Prevention and Restoration Actions to Combat Desertification, an Integrated Assessment, through the University of Arizona. Through this program she will be interviewing locals and interested about the history of land management interventions in the San Simon watershed.
If you are interested in participating in these interviews or know someone who is, please contact Anahi Ocampo Melgar at anahiom@email.arizona.edu.

Current Project Updates

… FOR MORE INFO -- WWW.GILAWATERSHEDPARTNERSHIP.COM

Upper Gila Watershed Riparian Restoration Project

…funded by The Walton Family Foundation (WFF)

- will replace invasive tamarisk with native species to preserve natural habitats
- the greenhouse kit has arrived and construction is scheduled to be completed by early June

Master Watershed Steward Program

…funded by the Arizona Department of Environmental Quality (ADEQ) in Graham County and by Freeport-McMoRan Copper & Gold Foundation in Greenlee County

- educating the public on watershed and riparian issues specific to our watershed
- "Ecology of the Gila River" course in Graham County completed classes and field trips, finalizing Google Maps research project documenting sediment control structures that impact Gila River, project results under review before submitting to ADEQ
- the San Francisco-Blue-Eagle Creek class in Greenlee County course classes begin in June, publicity about classes beginning, open to teens and adults

Gila River Water Conservation Education Program – Water Counts

…funded by the Arizona Water Protection Fund (AWPF)

- educating our community on low-water usage in homes and business, including water audits to save water
- planning booth and activities for the Water Conservation Fun Festival on June 1

Graham County Fairgrounds Project

…funded by the Bureau of Reclamation (BOR)

- recently purchased and installed low-water use toilets, urinals, faucets and sprinklers to reduce the amount of water consumed by the facility
- installation of the water filtration system and pressure release valve has begun, after which project will be completed

Ely Fence Replacement

…funded by the Arizona Water Protection Fund (AWPF)

- will repair or replace fencing between the San Carlos Apache Reservation and the U.S. Forest to prevent livestock from entering Eagle Creek
- waiting for approval from the State Historic Preservation Office for approval of the cultural clearance, expect to begin construction soon

Eagle Creek Riparian Restoration at Filleman Crossing Project

…funded by the Arizona Water Protection Fund (AWPF) and the U.S. Fish and Wildlife Service (USFW)

- will construct a river crossing in an area where the road washes out frequently, benefiting both residents and wildlife
- expecting the permitting process to be completed soon

Apache Grove Project

…funded by the Arizona Water Protection Fund (AWPF) and the U.S. Fish and Wildlife Service (USFW)

- removed levies in order to restore optimal river flow, control erosion, and manage invasive species, while preserving threatened agricultural land for the owner
- AWPF and USFW Partners program have agreed to fund a pipeline and the rehabilitation of a well to supply additional water for the project
- in continuous monitoring, need to replace regrowing invasives

Friends of the Frisco

…funded by Freeport McMoRan Copper & Gold, Inc., Graham County United Way and other Greenlee County businesses

- educating the public about river related issues, and organizing clean-up events
- upcoming event - San Francisco River Festival and Community River Clean-up on Saturday, May 25th, in Clifton

Watershed News May 2013

"Our attitude towards others determines their attitude towards us."

- Earl Nightingale

Calendar of Events

Saturday, May 25th, 2013 - Friends of the Frisco event at the Clifton RV Park Ramada – 9 am–12 pm Community River Clean-Up, 12-1 pm free lunch for volunteers, 1 – 3 pm San Francisco River Festival

Saturday, June 1, 2013, 10 am – 4 pm The GWP and the City of Safford will be holding our first ever ***Water Conservation Fun Festival*** at Town Square downtown.

Wednesday, June 12th, 2013 at 7 pm -GWP monthly meeting in the Graham County General Services Building - Carol Telles, a District Ranger for the Apache-Sitgreaves National Forest Clifton Ranger District, will present "Archaeology in the Gila Watershed".

Our partners include:

Arizona Department of Agriculture
Arizona Department of Environmental Quality
Arizona Department of Transportation
Arizona Game and Fish Department
Arizona Geological Survey
Arizona State Land Department
Bureau of Land Management
City of Safford
Town of Thatcher
Town of Pima
Town of Clifton
Town of Duncan
Gila Valley NRCD
Eastern Arizona College
Farm Bureau
Freeport McMoRan Copper and Gold Inc.
Graham County
Greenlee County
Gila Valley Irrigation District
Natural Resource Conservation Service
University of Arizona Cooperative Extension
University of Arizona NEMO Project
U.S. Fish and Wildlife Service
U.S. Forest Service – Apache-Sitgreaves and Coronado Forests
U.S. Bureau of Reclamation
And many community members

Get involved in your watershed

For more information, contact Jan Holder at the Gila Watershed Partnership,
711 S. 14th Avenue, 85546, or email
gilawatershed@gmail.com

www.gilawatershedpartnership**.com**