

The River as an Organizing Principle

Presentation to AWRA-Albuquerque Chapter, August 18, 2009

By Steve Harris

One hundred years ago last month, a freshly-minted forester named Aldo Leopold arrived in Albuquerque to launch a career that brought a measure of restorative thinking to manifest problems of clear-cut forests, badly-grazed rangelands and dis-equilibrium in populations of game animals, which he perceived as suffering from the unrestrained resource exploitation, as the frontier of the western United States was tamed. In 1936 he visited the Rio Gavilan in northern Chihuahua and was moved to write a brief sketch, entitled Song of the Gavilan.

Here is an excerpt from Leopold's essay:

“The song of the river ordinarily means the tune that waters play on rock, root and rapid. The Rio Gavilan has such a song. It is a pleasant music, bespeaking dancing riffles and fat rainbows laired under mossy roots of sycamore, oak and pine.....

The song of the waters is audible to every ear, but there is other music in these hills, by no means audible to all. To hear even a few notes of it you must first live here for a long time, and you must know the speech of hills and rivers, Then on a still night, when the campfire is low and the Pleiades have climbed over the rimrocks, sit quietly and listen for wolf to howl, and think hard of everything you have seen and tried to understand. Then you may hear it-a vast pulsing harmony-its score inscribed on a thousand hills, its notes the lives and deaths of plants and animals. Its rhythms spanning the seconds and the centuries. The life of every river sings its own song, but in most the song is long since marred by the discord of misuse.....

There once were men capable of inhabiting a river without disrupting the harmony of its life...for their works are everywhere.”

“One of the facts hewn to by science is that every river needs more people, and all people need more inventions, and hence more science; the good life depends on the indefinite extension of this chain of logic. That the good life on any river may likewise depend upon the perception of its music and the preservation of some music to perceive, is a form of doubt not yet entertained by science.”

Going on to muse on the relationship of science to nature, he writes: “A professor...if he listens for music...must never admit it to his fellows, for he is constrained by a ...taboo that decrees that the construction of instruments is the domain of science, while the detection of harmony is the domain of poets.”

Since Leopold's time, and at least partly because of Leopold, the seeds of a conservation ethic have been growing in our society, until today there exists something like a consensus among the general public that the advance of American Civilization into the

far corners of western North America has not been without some unfortunate consequences.

Over the past generation, this trend has been reflected in new laws that seek to mitigate some of the more obvious consequences of our restless, pioneering past, such as the degradation of the healthfulness of water and air, the waste of natural resources and loss of the ineffable quality of wildness, which are the common legacy of all. It is time now to turn our attention to the river.

I come to this gathering as a self-confessed “river worker”, who started canoeing as a youngster; I became, by happy accident, a raft guide; then, thinking I could do it better than the outfitter for whom I worked, started a small business called “Far-Flung Adventures” whose mission is “putting people and rivers together” mostly on the Rio Grande and mainly on inflatable boats, but occasionally with unplanned swims in cold, swift water. Later, discovering that my skill set matched a need for trained water rescuers, I became engaged in a sideline- teaching swiftwater and flood rescue techniques to fire rescue agencies, field researchers and river guides. More recently, having noticed that our society treats rivers in a rather cavalier manner, I have been trying to figure out ways to conserve some of what I’ve found valuable about rivers, which are at some risk of being lost.

Given this esteemed audience of water resources professionals, I am hoping to share some observations, which may or may not be of value or importance in your own professional lives.

Observation #1: The river is kind-of like an organism. It is self-organized. It has a body: composed of its valley, a body, in fact, comprised of its whole watershed basin from rim to rim. It is motile and moves around.

It has tissues: the sand banks and cobble bars and other specialized structures. It is composed of cells- particles of sediment and molecules of water. It has organs: wetlands, recharge zones, riparian forests and meadows.

For its nourishment, it eats mountains and, like higher organisms, it receives its nutrients via a circulatory system. Its vital fluids course through large vessels- a main channel and smaller, tributary streams of various orders.

Every river is identifiably an individual. It has a character, dictated by its location and the nature of landscape it drains; it is the embodiment of patience. It has will and intention: to flow, to reach the sea, and the sky. It has not yet been discovered to have consciousness, though I wouldn’t swear it does not.

The river faithfully obeys the laws of physics. In its spare time, which is nearly endless, it is available to teach the laws of physics to the receptive student. (You can dandle your feet in the water as you receive your lessons). Although it is a most excellent engineer, storing, releasing and delivering water, the river has acquired a host of human critics,

who imagine that they can “do water” better. This, to me, feels like a most dangerous conceit. For, any being that can carve the Grand Canyon will almost certainly win the battle of the engineers.

Some societies, including perhaps those who preceded us in this place, consider the river to be a sacred being, worthy of a priesthood to study the mystery of its ways, interpret its signs and dispense the ancient wisdom they are able to discern about how we should live our lives.

Our present-day science would dispute the suggestion that rivers are organisms. According to our taxonomy, they are ecosystems, though one might fail to see how this distinction makes the river any less worthy of our respect.

Observation #2: River ecosystems are incredibly resilient, but there are limits to the abuse they can withstand. For over 60 generations, humans have manipulated rivers to serve our own survival needs and economic aspirations. It is only in the past four generations that we have achieved the technological competence necessary to transform rivers into water and waste conveyance systems.

The Hohokam people of the Salt and Verde River valleys, like the ancient Persians of the Tigris and Euphrates valleys or the Egyptians of the Nile River Delta, have given mankind an incredible heritage of irrigated agriculture. Their water diversions works were primitive by our standards, but they were effective at growing crops and at growing the first agricultural civilizations. For the task of diverting water from a river, it was only necessary to build enough of a barricade to raise the hydraulic head to equal the elevation of the surrounding lands. Dams behind which to stop and capture the flow of a large river required massive amounts of material, and the elegantly engineered structures we think of when we hear the word “dam” awaited an engineering revolution in the 1870’s to appear upon the world stage.

Floods were a given occurrence to early irrigation societies. In fact, they depended upon the frequent flooding of fields to renew fertility necessary to produce crops. The notion of controlling floods was a pipe dream, until the late 17th Century, when dikes and levees could be built high enough to keep river flows out of floodplains. Even then, it was a very risky proposition to locate capital improvements on the floodplain of a mighty river. The advent of the flood control reservoir followed after the 19th century’s development of the modern, engineered big dam.

After 1900, the human race went “dam crazy”, building an average of 3000 big dams each year, world-wide.

We’ve also inherited a curious, but fairly recent, tradition of flushing away human and industrial wastes on the river’s flow, safely away from our immediate environment, where the shit- and the river- are easily forgotten. And we’ve gotten into a great deal of trouble with sanitary sewers, as a bewildering array of toxins from up the stream end up in the water supply of the unfortunate folks below.

The precarious state of the 21st Century Rio Grande is a microcosm of the history of western society's love-hate relationship with rivers. In 1847, this river, our river, found itself at the center of the onward rush of American Empire. Realizing the myth of Manifest Destiny required a powerful incentive to lure settlers to possess thinly populated western lands. The carrot was a promise of wealth: the opportunity to turn forests, grasslands, ore bodies and rivers into dollars, with no immediate penalty for the consequences. We in this room and our 600 million fellow citizens are still following the downward trajectory of this wild epoch.

In 1851, the first irrigators settled the Rio Grande's San Luis Valley; by 1890, the entire flow of the river's headwaters could be, and at times was, diverted to sub-irrigate 350,000 acres. Elephant Butte Reservoir was built in 1912 almost in self-defense to prevent the farms of Paso del Norte from drying up and blowing away, and "incidentally" another 400,00 acres could be irrigated.

The railroad penetrated to Alamosa and Santa Fe around 1880 and great swaths of forest were cleared for ties. The hispanic subsistence rancher was rapidly displaced by capitalists chasing an irresistible opportunity to drive 10,000,000 or so sheep onto the range. The sheep got the grass and rain got the topsoil, which went south down the Rio Grande. There, with the diminished energy of the depleted river, it settled in the middle Rio Grande's channels. At San Acacia, the elevation of the riverbed rose 25 feet in a few decades, leading to increased flood frequencies, which led to a call for levees which, when that didn't solve the problem, led to construction of drains, and bigger, better levees. Thence to the placement of 300,000 jetty jacks to fix the river channel, then to construction of the Low Flow Conveyance Channel and ultimately to Cochiti Reservoir and its cousins at Abiquiu, Galisteo and Jemez Canyon. By one estimate, we have spent \$150 billion in 1974 federal dollars on "improvements to the Rio Grande", with little that could properly be called improvement in sight.

Did I mention ecosystems? Along with altering the structure and function of the channel, our economic uses of the river have reordered the biota. The big, charismatic native sturgeon, eel and redhorse are gone from the Rio Grande. By 1920, a suite of four little native fish had been extirpated or extincted, leaving one survivor, the notorious silvery minnow to fill an ecological niche. Progressively, the floodplain has become host to dense stands of non-native plants. The last whooping crane was spotted in 1998 and the status of five or six migratory songbirds is very much in question. And, as evidence that the Rio Grande is truly overallocated, the river sometime goes dry as a stone, in four discrete reaches.

This is not the river that anyone desires and it may very well cease to serve our ambitions for it, if we continue to neglect its well-being.

Observation #3: We need to change our minds about the river. The time is here for a new philosophy of water management, with the river more nearly at its center. We live in a world in which our water comes from the tap, electricity comes from wall sockets, food

comes from cartons.... a world where experiences are, increasingly, virtual. In such a culture, it is perhaps understandable that so many of us have become estranged from the river.

But ours is an uncomfortable vantage point from which to face a future in which an overallocated resource must face new uncertainty about how much water the sky can be relied upon to supply and with the burden of continuously increasing demands. Perhaps the task of changing the collective mind to better align society with the natural world might seem a little less daunting if we consider how short a time it has been since we fell from grace: just four generations have elapsed since the western mind succumbed to the illusion that humans could control the natural river.

The fate of the Rio Grande and many other disturbed rivers now hangs in the balance, as the next increment of river development keeps rolling. Continued equivocation over what we can do to protect the river is, in itself, a decision... to let the river slide. Those of us who value our river must act deliberately, even courageously, if that river is to return to its rightful place in our lives. Clearly, we must embrace the conviction that we are not trapped by past politics or the legal regime that surrounds water. People made these decisions and, when conditions have changed sufficiently, people can make new decisions.

A new philosophy. “A philosophy of water management must pay heed to the fact that the hydrologic system is a highly interconnected plumbing network,” said Luna B. Leopold, the eminent hydrologist, “To test whether the system is operating satisfactorily by economic and legal criteria alone will not guarantee its continued health. What is needed is some deeper feeling. Speaking of the Persians who dominated Asia Minor in the 5th century B.C., Heroditus said, ‘They never defile a river with the secretions of their bodies...nor will they allow others to do so, as **they have a great reverence for rivers.**’ It is that last phrase that deserves our attention. The river is resilient and can absorb changes imposed upon it, but not without limit.”

Here are a couple of modest ideas to move in the direction of respecting the limits imposed upon us by the river:

1. Leave the Southwest’s few remaining free-flowing rivers alone. The Yampa is the last river in the Colorado River Basin without a dam. The whole of the Four Corners area should rise up as one and rebuff Shell Oil’s recently-announced plan to dam it and use the water to extract oil shale in Northwest Colorado. Likewise, the Gila: let us not be a party to diverting any of the 14,000 acre-feet to which we have recently become entitled, from the New Mexico’s last free-flowing major river. But let’s also be smart and reserve that water for local contingencies.
2. Train up soft engineers. By this I don’t mean engineers who don’t visit the gym, but those who can design features that harmonize with the natural system. Soft flood control engineering would mean encouraging flood waters to stay longer on the landscape, thereby attenuating the flows.

I anticipate we will soon hear a great hue and cry to strengthen the flood control system, to which our Congressional delegation may be quite susceptible. Let's insist that there be no new levees in the Middle valley, at least not until we have looked carefully at locations where the present levee line can be set back or deconstructed and the Rio Grande be allowed to occupy more of its historic floodplain.

3. Manage our rivers' hydrographs. Here's a way that dams can make reparations to the rivers they have altered. Once upon a time, the natural system was harmonized to the seasonality of floods and rivers seldom went entirely dry. If, to gather a spring flood or mitigate increased depletions from late Summer flow augmentation, a supply of water is needed, we may need to extend the Strategic Water Reserve to include leases from willing forbearers and water gained by efficiency and conservation in whole districts. We will also need to improve our understanding of the whole "interconnected plumbing system" so as to prevent unintended impacts to others.

4. Listen to the river. Deep in our collective psyche, perhaps in our very DNA, all people respond positively, even ecstatically, to flowing water. We instinctively know when a river is healthy or failing. That is why, over the past 25 years so many river restoration initiatives have sprung up in so many venues.

Consider that our first step in restoring to the river what health may be possible lies in restoring ourselves to the river.