

## Option Submittal Form

Contact Information (optional):

Keep my contact information private

Contact Name: _____	Title: _____
Affiliation: _____	
Address: _____	
Telephone: _____	E-mail Address: _____

Date Option Submitted: 01/14/12

Option Name:

Assisted Irrigation

Description of Option:

In order to balance water supplies and demand, water must be measured and compared to scientific, flexible irrigation water budgets. Numerous states support weather stations whose principal purpose is to inform irrigation managers of when to irrigate. But recent research indicates that a very small portion of large water users "swallow" this now decades old best practice, best prescription (Bautista, Needham, and others). Since the early 1980's, aware, thoughtful people have known the ET methods were rife with error, demanding regular ground-truthing. This option addresses that failure in the interest of good science, and more water left or diverted back to the streams. Not pumped or treated saving huge amounts of energy.

In short, Wi-Fi mesh networks arrayed across the interface between agricultural and urban landscapes measure soil moisture at up to three depths, concurrently with valve-discrete flow monitoring, all played out in a GIS, for the whole world to observe, and contemplate. Those observers are implored to "Jump on Board", at their separate risk, to the sensor and conditions nearest and which most resemble their own situation. Watch in wonder what happens!

- Allows the transfer of water to other uses to meet critical needs for water supplies;
- Forces a reversal of the mind-set "use it or lose it"

**Location:** Describe location(s) where option could be implemented and other areas that the option would affect, if applicable. Attach a map, if applicable.

Naturally, Palm Desert, Prescott, Tucson, Phoenix greater metro, Las Vegas, Boise, Fresno, Medford, San Diego, and Disneyland.

**Quantity and Timing:** Roughly quantify the range of the potential amount of water that the option could provide over the next 50 years and in what timeframe that amount could be available. If option could be implemented in phases, include quantity estimates associated with each phase. If known, specify any important seasonal (e.g., more water could be available in winter) and/or frequency (e.g., more water could likely be available during above-average hydrologic years) considerations. If known, describe any key assumptions made in order to quantify the potential amount.

Acres/Inches Conserved (left or put in streams); 2013 - 12/5; 2014 - 40/6; 2014 - 300/6; 2015 - 3000/6; 2016 - 9000/6.

As USBOR is probably aware, the Phoenix AMA (AZ Dept. of Water Resources) has reported that the AMA has reversed over-draft, and established safe-yield (as required by Congress). This is temporary, but it should not be dismissed. Municipal and agency water conservation programs, though never value-audited, have improved public awareness. But root-zone management is really very complex, and cities could never do more than "pout about" how they developed lots of pretty brochures. For independent for-profit designers and water managers, the cities hold all the water use data by meter address, and this constitutes extremely valuable information for a for-profit firm, with honorable intentions, to contact those water users with inordinate water use....to see if we could study their situations and perhaps make recommendations.....for a fee, of course.

## Additional Information

**Technical Feasibility:** Describe the maturity and feasibility of the concept/technology being proposed, and what research and/or technological development might first be needed.

Environmental monitoring of landscapes by for-profits began in Arizona and California in the '70's. It is way beyond new constructs; we have held all the best keys to economical agroecological water management since 1990. Still, like in 2005, we found out that Mesquite can store water in roots, and then supply vegetative growth in times of drought. Also, (sensor, analysis and communication technology) x (cost) has improved at least an order of magnitude.

**Costs:** Provide cost and funding information, if available, including capital, operations, maintenance, repair, replacement, and any other costs and sources of funds (e.g., public, private, or both public and private). Identify what is and is not included in the provided cost numbers and provide references used for cost justification. Methodologies for calculating unit costs (e.g., \$/acre-foot or \$/million gallons) vary widely; therefore, do not provide unit costs without also providing the assumed capital and annual costs for the option, and the methodology used to calculate unit costs.

Budget for Trees, Turf and Bushes Have Rights Too !  
(McClintock High)

	Quantity	Unit Cost	Ext'd Cost
Flow sensor	10	\$200.00	\$2,000.00
Data logger with software	10	\$1,500.00	\$15,000.00
Soil sensor (SM, EC, Temp)	60	\$120.00	\$7,200.00

**Permitting:** List the permits and/or approvals required and status of any permits and/or approvals received.

Permits are required to install Wi-Fi upon street light standards and tap off power.  
Is is more a will thing, not a permit thing.

**Legal / Public Policy Considerations:** Describe legal/public policy considerations associated with the option. Describe any agreements necessary for implementation and any potential water rights issues, if known.

Really, beyond this scope, water trading must be defined and accelerated. We are probably already five years late moving swiftly. Executive Order.

**Implementation Risk / Uncertainty:** Describe any aspects of the option that involves risk or uncertainty related to implementing the option.

There is absolutely no way that common appreciation of uniform water management (by zone) will fail. This is the paradigm shift to define paradigm shift.

**Reliability:** Describe the anticipated reliability of the option and any known risks to supply or demand, such as: drought risk, water contamination risk, risk of infrastructure failure, etc.

Obviously, this is a loaded question. Without feedback, I would ask whomever drafted it "Compared to what?"

**Water Quality:** Identify key water quality implications (salinity and other constituents) associated with the option in all of the locations the option may affect.

The way we blithely allow as much as 60% of applied nitrogen fertilizer to vaporize adding to green house gas concentrations is like, so stupid. I'm sorry. There's just no better word for it. The first, obvious place to correct this on-farm. Sub-surface drip irrigation delivered nitrogen to the plant in spoon-sized shares, combined with pocket-sized analyzers, yielding simple tissue monitoring for determining whether or not the rates are adequate. It's like, if you don't like the hammer in your hand hitting your face, stopping swinging the hammer at your face. But where irrigation is properly delivered according to plant demands, nitrogen can be delivered by surface-drip irrigation systems with amazing

**Energy Needs:** Describe, and quantify if known, the energy needs associated with the option. Include any energy required to obtain, treat, and deliver the water to the defined location at the defined quality.

Energy Required	Source(s) of Energy
-10%	all forms used to move and treat water

**Hydroelectric Energy Generation:** Describe, and quantify if known, any anticipated increases or decreases in hydroelectric energy generation as a result of the option.

Location of Generation	Impact to Generation
-5%	Lower emissions

**Recreation:** Describe any anticipated positive or negative effects on recreation.

Locations	Anticipate Benefits or Impacts
tbd/unknown	

**Environment:** Describe any anticipated positive or negative effects on ecosystems within or outside of the Colorado River Basin.

Locations	Anticipated Benefits or Impacts
All highly populated or farmed areas in region.	Restoring flow to streams; lower GHG; healthier landscapes; happier society

**Socioeconomics:** Describe anticipated positive or negative socioeconomic (social and economic factors) effects.

The EPA, NRCS, and private enterprise market forces are creating plenty of momentum towards water conservation. Why we have to remind them that where water is waded, energy is saved, and where energy is saved, water is saved. But worse still, we have to remind them that the urban forest and agricultural landscape provide immense environmental services.

I think somebody needs to step up and get angry about the critical, but certain, benefits from good irrigation management. Farms are infinity complex, so we avoid them? Who believes planting and nurturing trees isn't a beneficial use of water? Who questions that wildlife utilize farmlands?

**Other Information:** Provide other information as appropriate, including potential secondary benefits or considerations. Attach supporting documentation or references, if applicable.

This all plays out on central Arizona High School campuses. One campus in 2012-13. Juniors combine facility energy management course content with landscape ecology and agroecology. Their Junior year they develop the concepts and a Plan. Their Senior year they Construct the improvements and commission the systems, just like they are planned to perform for the new facility management systems. A very large energy service company handles certain resource issues.

Different school districts join. Soon, all of Maricopa County is practicing precision irrigation/fertigation, Kids are teaching parents. The BOR and NRCS are part of the team, but this is mostly a private-sector-driven concept. A new identity for Arizona; Lord knows we need it. The NRCS already makes room for Technical Service Providers. That's a bright beginning.