GETTING ATMs RIGHT – WE CAN AND SHOULD – WILL WE?

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(<www.colorado.edu/ibs/eb/wiener/ -- more information available; research proposal in preparation)
Not representing any agency or institution in this comment or in the posted essay.

Updated for Colorado Water Congress and DARCA Friends, 2017 – recent references added; see also slides for workshop and meeting – new climate change and work helped by Brett Bovee, P.E.

Western irrigated agriculture is an essential and highly valued part of the mosaic of land uses, but the combination of urban growth, weather and flow variability and difficult farm economics threatens large losses of irrigation from more reliable (senior) water rights. These are often held on earlier-irrigated best lands, rapidly disappearing into urban sprawl, and increasingly consolidated into giant corporate operations. Farmers in workshops held by the Ditch and Reservoir Company Alliance (reports posted; website below) have shown great skepticism of the **incremental and small changes in ATMs** for many reasons. They need ways to re-think farming systems that in many cases are barely getting by – transition to long-term viability in increasingly difficult times will be difficult and not free. But, **conservation of good productive land will be a great investment!**

What is **not being undertaken** is work on supporting them in **re-thinking the agricultural landscapes for increased resilience, ecosystem services and water supply, and conservation of productive capacity**. The urban water suppliers demand permanent supplies – why not take seriously the goal of permanent, resilient agriculture and farming families? The posted essay proposes reasons and actions; **now we need to get started.** Ag. **researchers talk about "farming systems" – irrigators think very carefully about the ways all parts of the enterprise relate. Cities and water suppliers are anticipating changed water resources – now they must also anticipate regional values and needs.**

The importance of high-quality soil for productivity, water conservation, water quality, and carbon in soil organic matter is enormous for the farming, and it is increasingly known to be a critical part of the climate system. In the near future**, the value of good soils and farming will very likely be much higher, as climate change accelerates,** and we approach or cross "tipping points" which are likely to cascade. If fossil fuel use and C and CH^4 releases also accelerate, the value of productivity and capacity to adaptively manage will be far higher. The new science is very alarming, especially for soil conservation and yields.

There are a set of things we need to know about. If we try to work with only one or two, we may be **trying to jump a six-foot ditch one foot at a time**! The farming systems are hard to change but it can be done and must be done – carefully and with risk managed. A shrinking but critical near half of Colorado land in farms and private ranchland has "small and medium" sales and often at high financial risk. Keeping agricultural water available will not be enough if we lose farms for other reasons. **The bottom line**: Landscape-scale, multi-farm diversified agriculture with net profit is likely necessary to conserve remaining productivity, resilience to weather and market variability, preserve remaining water quality and ecosystem services (e.g. de-nitrification of agricultural run-off), improve food security and preferences, and conserve amenity, recreational and real estate values. And, we should enable use of **farming system changes to support large or multi-ditch water-sharing transfers from viable farms**.

WHAT WE NEED TO LEARN MORE ABOUT WHAT WE CAN DO:

Long-term economics of diversified farming and rotation systems: Converting to different kinds of production has costs, but how long does it take to pay off and begin profits for more complicated rotations, more cover crops, more diversified production and lower-input farming? Evidence is mounting that **low-input and more diversified** cropping restores soil and increases long-term profitability, but this is not adequately known nor is there adequate support for transition. Not so long ago, farming was much

more diversified. Resilience to weather and market surprises included more eggs and more baskets! Marketing for local sales has improved dramatically, but we need **integration of alternative and conventional agriculture** experience into forms of information that producers and Extension use. Demonstration is the most valuable dissemination. Stewardship of the land is a huge farmer value; enable it! ATMs can't be evaluated outside of **farming systems**.

Right-Sizing for Net Profits: If a group of farmers try something new, can they right-size capital investments in different kinds of equipment? Cities own a lot of equipment and do a lot of maintenance; cash is not the only thing to exchange. Local custom operations? Benefit corporations or cooperatives? Lower cost and higher net is critical for resilience.

Long-term Financing: Our topsoil and long-term productive capacity is being lost to annual or short-term planning horizons and short-term pressures for cash profits. Other basic infrastructure uses long-term finance, typically 30 years, from home mortgages to water supply construction, to match costs to benefits over the life of things. We should be using **municipal-multi-ditch water sharing** with farm-to-institution sales of food and fuel, and farming improvements and water transfers with **low-cost capital**.

Land and Soil Potential: In the long term, we want to be working **with the terrain** and with the ecology for soil conservation, for wind breaks, integrated pest and pollinator management, drainage and filtration management, and conserving amenities and such benefits as wildlife (and hunting income). There is no doubt that the **landscape scale** works far better for conservation than the rectangular grid.

Land, Houses, and Tax Management: Rural residential development breaks up the landscape and management choices and also costs counties typically far more for services than the taxes pay for – we lose all ways. People love open space, near-by basics and retail; there are opportunities for high-quality low-cost "smart growth" that supports and fits with farming See CO Ag Dept. David Carlson's Ag Preservation and Development Assns.: http://aic.ucdavis.edu/research1/Conserv.ag.pdf .

Water Law, Efficiency and Agricultural Stability: Private property rights are the basis for markets and we can **increase their value** and the values of conserving. **Long-term security** can increase with more support for public benefits that include avoiding expensive and environmentally dangerous thresholds like total maximum daily loads. **Keys to efficiency** include making innovation easier, lower **transactions costs and less expensive burdens of proof** – such as presumptive figures rather than all new engineering, and reasonable kinds of **reversibility** if we are badly surprised. Stability can come from **taking farming in safer directions**. For example, rotational fallowing must also accommodate **cover cropping. Diversification** can accommodate fuel crops in the mix, providing safer and cost-controlled city and farm supplies. The **new technologies** of measuring and following flows are an opportunity we should take. Usable water supplies are not likely to increase. (Summer 2016 U of Denver Water Law Review – Howe and Wiener article has more on water law issues we can address.)

We need progress in all of these parts to build towards a future where our grandchildren will want to and be able to farm. Ideally, a wide range of institutions can **begin working with ditches on their preferences for "what is the best we can do here for all of these resources into the future?"**

DARCA (the Ditch and Reservoir Company Alliance) has held long-day workshops on planning and ATM concerns and we propose that **a practical start** is to work with willing ditch companies on discovering their long-term goals, and then meshing water sharing that helps succession, stewardship, and safe transition to farming systems that will provide resilience and long-term viability.
The powerpoint essay, GETTING ATMs RIGHT is a referenced approach to these issues and proposes a way forward. Please see www.colorado.edu/ibs/eb/wiener/ → presentations, and updates for the Colorado Water Congress and DARCA, new slides and references for these claims.

Selected references for John Wiener's presentation slides at Colorado Water Congress, in the Ditch and Reservoir Company Alliance Workshop:

Due to keeping slides suitable for pdf format, the references for some claims are provided here. These are largely selected from **recent publications** from 2016 and this is not an exhaustive survey of the relevant journals. First, on the economics; second set recent on agriculture issues.

On the costs of climate mitigation, adaptation and damages and some related items:

If you see only one item, this is from the world-famous author of the United Kingdom's "Stern Review" in 2008-2009, which the author now regards as very badly underestimating the costs of climate change and thus underestimating the value of reducing emissions and undertaking adaptation. There has been a great deal of new thinking now that people are starting to work with **multiple tipping points**.

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