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Water Conservation Principles: Depletion, Diversion & Value

Zohrab Samani, Ph.D.

Civil Engineering, NMSU

&

Rhonda Skaggs, Ph.D.

Ag Economics & Ag Business, NMSU

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The Multiple Personalities of "Conservation"…

- Greatest good for the greatest number in the long run?
- Utilitarian, long-run sustainable use?
- Nonmarket valuation of the natural environment & preservation?

"Conservation of natural resources has meant different things to different people."

John V. Krutilla, 1967

Water Conservation?

- “An act or policy that will result in additional water for other uses or users”
- Depletion & diversion are confounded.
- Much of what is called “water conservation” **doesn’t make more water available**.

Will increased agricultural irrigation efficiencies make more water available to other users?

Depletion…

- ET from a watershed's surface is **water lost** to a hydrological basin.
- Water applied in excess of ET not always lost – goes back to the basin.

- An upstream user's *inefficiency* is a downstream user's *supply.*

Diversion…

- Water removed from its natural course through a physical location by canal, pipe, etc. is **water lost** to the basin.
- Basis of water allocation & water rights.

- Perceived water losses often based on benefit an observer attaches to a particular diversion or use.

Depletion vs. Diversion?

- Depletion principle is hydrologically correct
  - But goes against conventional wisdom
  - Jars popular notions of “efficient” water use

- Public policies & public/private investments seek to solve water scarcity through increased efficiency and reallocation of water.

Value of Water?

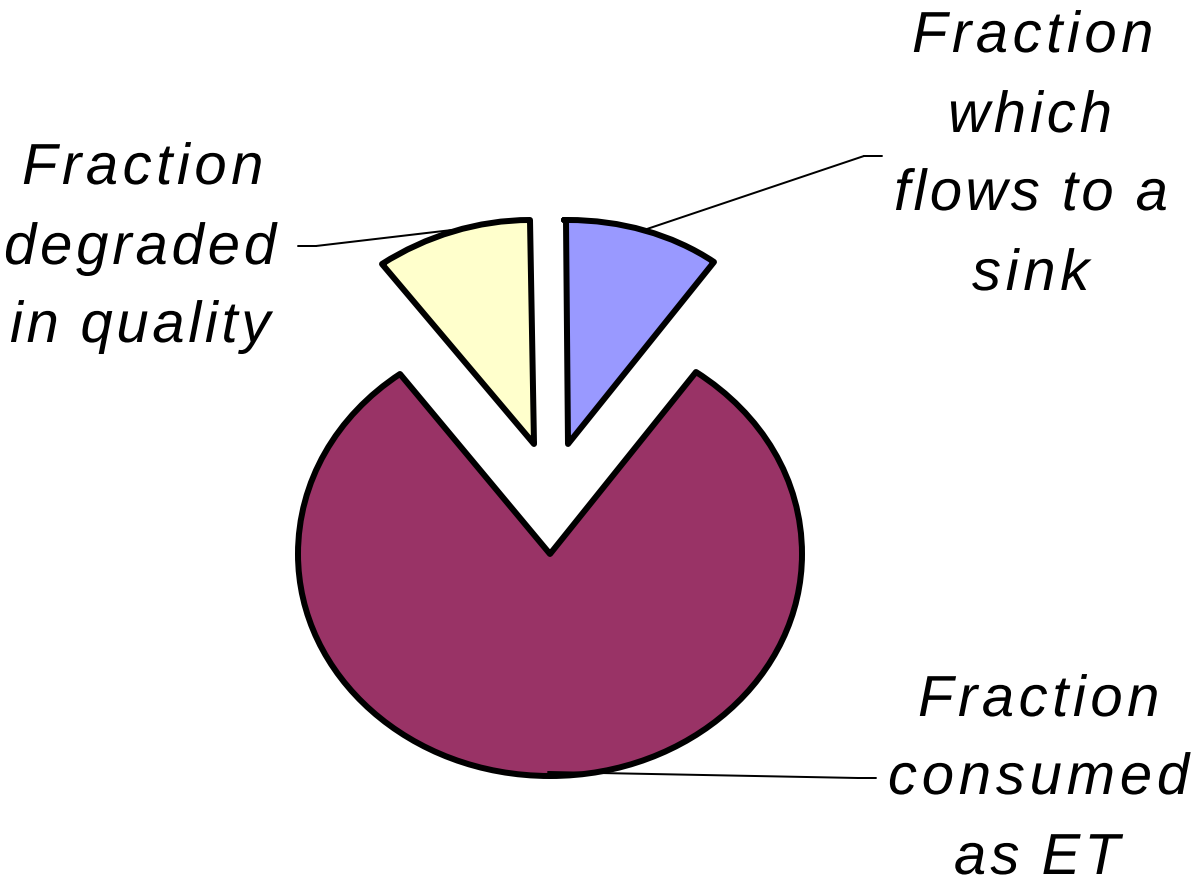
- "Value" is highly subjective
  - Social, economic, environmental, political terms
  - Global, societal, individual accounting stances
- Water flows uphill to money.
  - Golf courses, M & I uses

Conventional Wisdom…

- Idea or explanation that is generally accepted as true by the public.

1. Water conservation is good.
2. Low irrigation efficiency is bad.
3. Low irrigation efficiency = wasted water
4. ↑ ag irrigation efficiency = ↑ water conservation
5. More water for other, new users
6. Everybody's happy!

Integrated Water Resource Systems



The Case of Drip Irrigation…

- Technology that can increase on-farm efficiency.
- Precise water application to plant's root zones.
- Southwestern farmers typically deficit irrigate.
  - Yields are suppressed
  - On-farm efficiency relatively high
  - Unmet demand for water in crop production

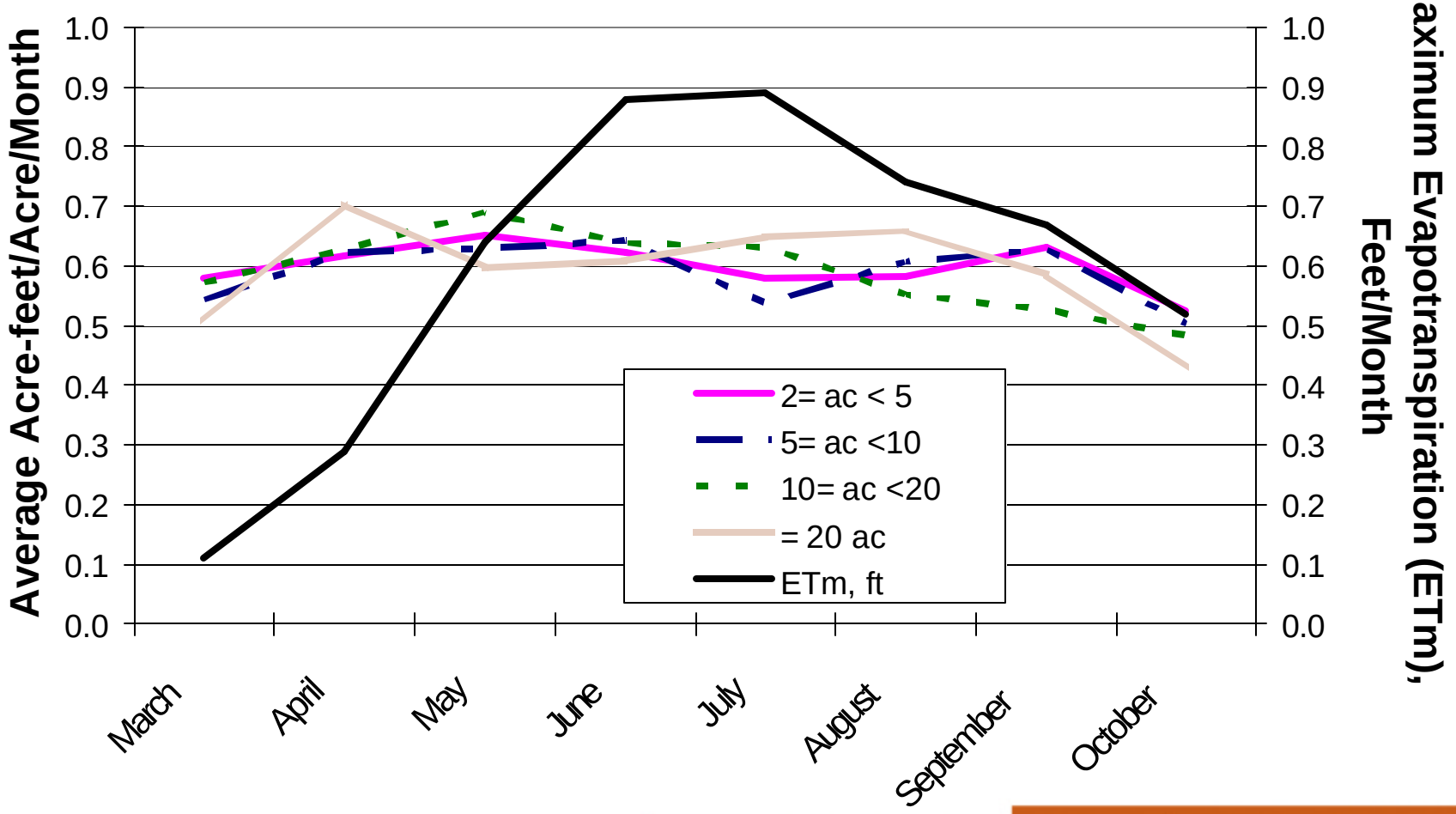
- Drip irrigation = ↑ consumptive use = ↑ yields
- ¯ **water for downstream & future users**

The Case of Irrigation Scheduling…

- Applying water to plants in line with consumptive use needs.
- Proper scheduling can significantly increase yields & crop quality.

- Optimal scheduling can also result in
  - ↑ consumptive use
  - ¯ **water for downstream & future users**

Under & Over Irrigation – Pecans Southern New Mexico



The Case of Canal Lining…

- Canal lining reduces water “lost” during the delivery process.
- Canal lining = more efficient diversion
  - Transformation of diverted water into yields
  - In a deficit irrigated environment?
  - ↓ in-stream flow & ↓ return flows
  - ↓ water quality
  - ↑ net depletion
  - Dry wells?

The Fallacy of the “Magic Bullets”

- International in scope
- ***ET sustainment***
  - **Magic bullets can - total depletions**
- In a closed basin, “sloppy” water mgmt. usually is the source of someone else’s water supply.

Conclusions

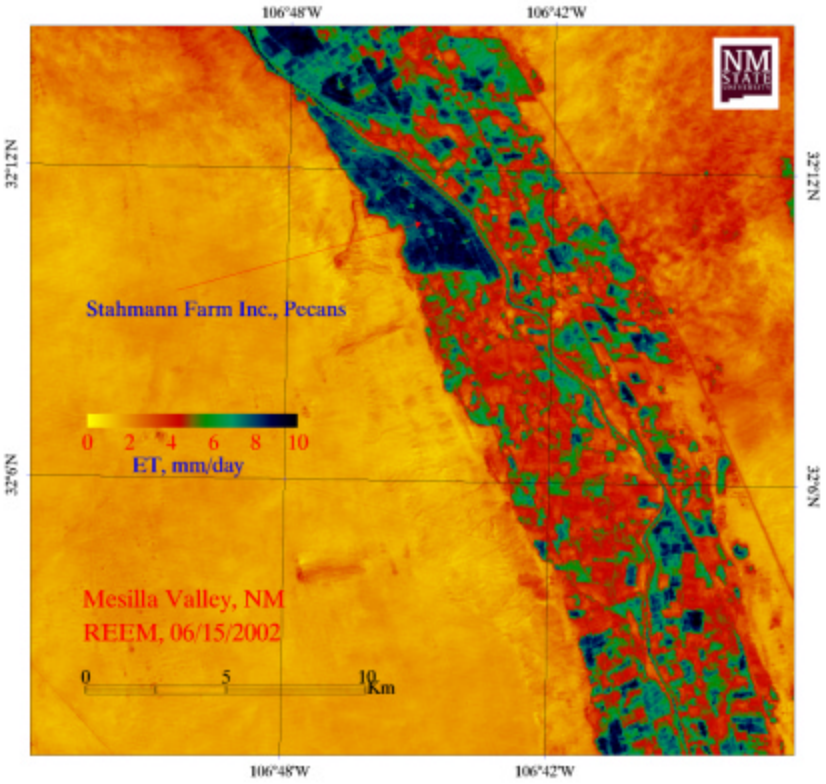
- Many definitions of “water conservation”
  - “Sound” or “wise” management ?
  - Increased “value” of water in golf courses?
- Sound water management is location, time & objective-specific.
- Investments in water conserving technologies need to be carefully assessed.

- Assumptions about ag irrigators?

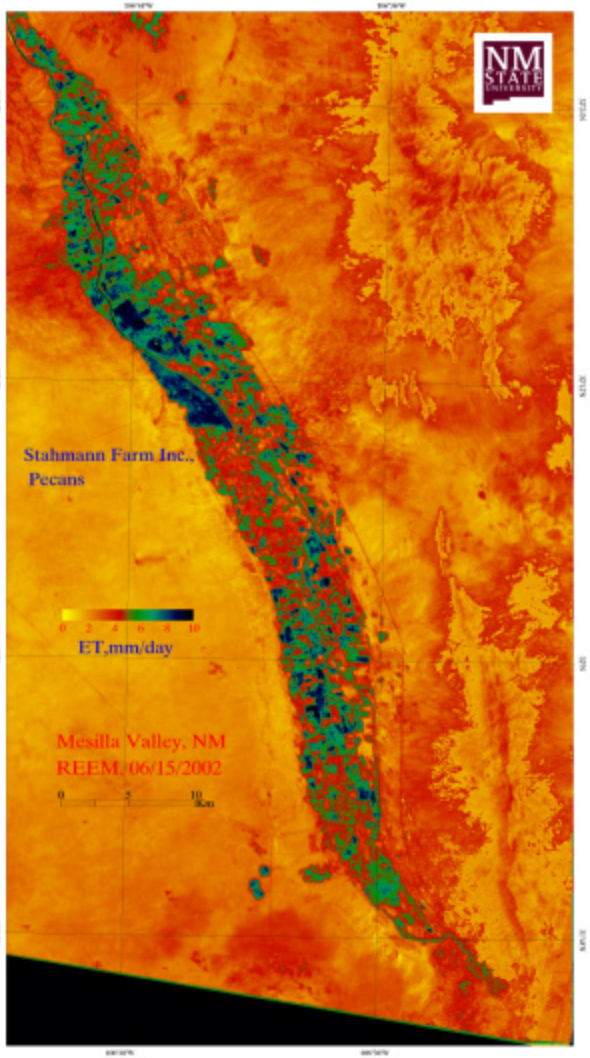
Is there any way to create “new water” in a closed basin?

- Need for **accurate accounting** of actual water use.
- Increased accountability by water users, irrigation districts & state authorities.
- Improved techniques for measurement of water use will contribute to ↑ accountability.

Evaluating Pecan Water Use through Remote Sensing



by
Samani,
Bawazir,
Bleiweiss,
Piñon,
Tran,
& Skaggs



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