Accelerating Irrigation Systems of the Future

Conventional Irrigation

Current Modernization

Resilient Microgrids

Improved Water Management

Electrified Farm Equipment

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IWUA
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Agenda

- Opportunities from irrigation modernization (Thomas)
- IrrigationViz, a master planning tool (James)
- Irrigation and watersheds (Thomas)
- Discussion (what insights are needed?) (Thomas)
Given that this group is broader than just irrigators:

- What insights do you need about irrigation to inform other water use decisions?

- What insights from other watershed decisions should be incorporated into a tool like IrrigationViz?
Federal investment in water enabled the West as we know it

- **Example:** Minidoka Dam in SE Idaho enabled agriculture, electricity, commerce, and recreation for the region.
- Reclamation projects provide water to one-third of the population of the American West.

Built by the Reclamation Act of 1902

- 125,000 irrigated acres
- 16 MW of energy
- Regional recreation
Benefits of investing in aging infrastructure

- Operations and maintenance is expensive
  Modernization reduces these costs
- Loses 30 to 80 percent of water
  Modernization enables more water to be left in rivers
- Requires extensive pumping
  Modernization reduces costs and diesel consumption
- And the list of benefits goes on...
Irrigation is 37 percent of all water use in the U.S.

- Irrigation uses 846 million gallons per day.¹
- Crops from irrigated land are ~50% of crop market value in U.S. ($106B in 2012)
Re-investment in irrigation systems can achieve diverse benefits

- **Rural economies** – More revenue for farmers; well-paying, multi-year construction jobs; increased recreation opportunities
- **Environment** – Increased water for fish and other species; pollinator corridors; less chemical use
- **Renewable energy** – Increased opportunity for hydropower and solar PV; local energy ownership and benefits
- **Climate** – Lower carbon agriculture; increased water supply reliability

### Annualized average value for two case studies

<table>
<thead>
<tr>
<th></th>
<th>Central Oregon includes hydro</th>
<th>East Fork no hydro</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduced district OMR</td>
<td>$70,000</td>
<td>$248,000</td>
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<tr>
<td>Reduced patron OMR (total)</td>
<td>$810,000</td>
<td>$347,000</td>
</tr>
<tr>
<td>Increased agricultural income (total)</td>
<td>N/A</td>
<td>$1,516,000</td>
</tr>
<tr>
<td>District energy generation</td>
<td>$2,378,000</td>
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</tr>
<tr>
<td>Environmental benefits</td>
<td>$6,097,000</td>
<td>$295,000</td>
</tr>
<tr>
<td>Per district subtotal</td>
<td>$9,600,000</td>
<td>$2,445,000</td>
</tr>
<tr>
<td>Per patron subtotal</td>
<td>$437</td>
<td>$1,882</td>
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</table>
The roles and opportunities for energy generation are changing

- Small hydropower used to enable modernization through generation revenue.
- Today, energy solutions involve a mix of generation types and offer diverse values.
Design stage planning is critical first step to modernization, but also a challenge

- Expensive
  ~$100K to do master planning study

- Requires specialized knowledge
  Irrigation district managers know their systems best, but may want help analyzing modernization options

- Many, diverse stakeholders
  No simple, user-friendly tool to communicate across perspectives
Recap: overcoming barriers to modernization can create diverse benefits

- Our irrigation systems are already creating enormous value to individuals, communities, and our Nation
- They’re also past their design life

- Reinvestment can achieve diverse 21st century objectives:

  **Sustainable water resources**
  - Secure water resources for agriculture and enhance community and environmental benefit
  - Adapt to unavoidable impacts of climate change

  **Community wellbeing**
  - Increase agricultural revenue
  - Create multi-year well-paying jobs
  - Reinvest in rural communities
  - Promote environmental justice and sustainability

  **Decarbonization**
  - Generate community-owned renewable energy
  - Enable precision and low-carbon agricultural practices
  - Reduce fuel consumption
  - Increase energy efficiency for farmers and ranchers
IrrigationViz helps solve challenges

- Quantify benefits of irrigation system reinvestment tradeoffs
- Enable robust conversations around multiple modernization pathways
- Identify commonalities and opportunities for scaling-up benefits across Western U.S.
DEMO
IrrigationViz Benefits

Project Planning:
- Pre-engineering estimates
- Reduces cost/time

Standardized estimates for project benefits

Insights for project selection, funding application

Facilitates informed dialog among diverse stakeholders
IrrigationViz - Future

Continued module development
  e.g. *Groundwater recharge, recreational benefits*

Further customization
  e.g. *additional user inputs and overrides*

Comprehensive Planning
  e.g. *Master planning, full district analysis*
Recap

User inputs

Data models

Datasets

High-level estimates
Tension between different uses of water continues, and will likely persist.

Tensions escalate in Klamath Falls as southern Oregon water crisis deepens.

Severe drought threatens Hoover dam reservoir – and water for US west.
Modernization is especially critical in this context

USDA Invests in Innovative Management of California Water Supply

New pipe connects watersheds to improve supply reliability

Investment is also reducing ground water depletion in Arkansas

And increasing water conveyance efficiency in Idaho
We want to hear your perspectives

Given that this group is broader than just irrigators:

• What insights do you need about irrigation to inform other water use decisions?

• What insights from other watershed decisions should be incorporated into a tool like IrrigationViz?
Send us a note if you have questions!

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