Evaluating Historical Impacts of Surface Reservoir Storage on Catchment Memory Across the US

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Within the contiguous US there are roughly 2,000 large dams and 91,000 total structures

- **National Inventory of Dams (NID)**
  - 91,000 structures in the US
  - Total storage in the US: 2,000,000 MCM

- **National Anthropological Barriers Dataset (NABD)**
  - Cleaned up version of NID
  - 52,254 entries
  - Total storage in the US: 600,000 MCM

- **Global Reservoirs and Dams (GRanD)**
  - Global database using ICOLD standards
  - Including only large reservoirs
  - 1,906 entries for US
  - Total storage in the US: 800,000 MCM
Reservoirs are constructed for many purposes across the country, and this influences operations.

<table>
<thead>
<tr>
<th>Storage Classification</th>
<th>Storage purposes (NID codes)</th>
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</thead>
<tbody>
<tr>
<td>Flood control</td>
<td>Debris control (D), Flood control(C), Grade stabilization(G), Navigation(N), Tailings(T)</td>
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<tr>
<td>Water Supply</td>
<td>Fish and Wildlife pond(F), Irrigation(I), Fire Protection/ Stock Pond(P), Water Supply(S)</td>
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<tr>
<td>Hydroelectric</td>
<td>Hydroelectric(H)</td>
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<tr>
<td>Other</td>
<td>E(unidentified), Blank(NA), Other(O), Recreation(R)</td>
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Flood control is most important in eastern US while water supply and hydroelectric are more important in the west, but most reservoirs serve multiple purposes.
Challenge:

• We know that reservoir operations have dramatically reshaped watershed behavior across the country

• Reservoir location and construction is well documented in multiple databases, but historical operations are not centrally recorded

• As a result most national modeling and analyses rely on optimized or generic operating policies.

Goal:

• Assemble a national database of historical reservoir operations that can be used to evaluate historical reservoir impacts and derive data operating policies
Data assembly progress so far

• Operations data for 350 Reservoirs
• From four different federal agencies and 14 different local offices – Tennessee Valley Authority, Army Corps of Engineers, Bureau of Reclamation
• Most reservoirs include daily and monthly inflows outflows and change in storage
Next steps: Making a FAIR database for historical reservoir operation analysis

**Database construction:**
- Processing/standardizing all input data
- Adding metadata and attributes
- Linking to NABD and Grand Databases
- Linking to HydroSheds stream reaches

**Version control and workflow tools:**
- Constructing database through GitHub taking advantage of version control
- Including workflows for data processing and analysis

**Hydrologic applications**
- Implementing operations in a national hydrologic framework
- Developing tools for visualizing and sub-setting data interactively for a variety of users