Assessing Performance in multiple-use in large irrigation systems

Daniel Renault
• Auditing performance of irrigation systems
• Introducing the concept of Service Oriented Management [SOM]
• Planning for modernization

MASSCOTE Approach
VISION for the agriculture and water systems
Service Oriented Management [SOM] = 3 basic flows
WATER - INFORMATION – MONEY

Service Provider produces SERVICE delivers to USER

- Remunerates
- Controls the offer
- Adjusts the demand
- Measures
- Charges

Money

Water

SERVICE

Information
• is for service management!

• not for MUS!

• SERVICES are seldom specified and contracted
Attributes of services

- Target
- Tolerance
- Measurability
- Measures for defaulting (compensation, etc.)
- Information (scheduling, …)
- Charging procedure!
- Flexibility in adjusting the service!
Service to farmers/crops
What service?
Services to fishermen?

Fisheries in small reservoirs (tanks)
Serving homestead/households
Service to domestic uses? Yes/No
Service to productive uses

Power generation unit along a Canal Naryanpur Karnataka India

Power generation at main dam Badra KNNL India
Service for Cattle
Service to Environment
30 large irrigation systems audited
Command Area over 4 Million ha
About 15 Million people
FAO survey on 30 Large irrigation systems

- 17 Multi Purpose Reservoir
- 5 Multi Purpose Network
- 19 MU Irrigation +
- 7 MU Seq
- 3 Multiple Function
- ONLY 2 systems true SINGLE USE
PERFORMANCE INDICATORS for MUSF?

Purposes are improving:
* governance
* equity
* environment
* services to rural poor
* management cost-efficiency
The degree of MUS

[STEP 0: MAPPING the water services]

Listing and Numbering Uses/Functions assessed/reported!

Multifunctionality in rice fields

- Religious landscape values
- Biodiversity enhancement in human-dominated landscapes
- Climate air temperature
- Prevention of soil erosion
- Rice production
- Fish
- Ducks, frogs, snails
- Water storage, lowering of peak floods, groundwater recharge
Next are the shares per service

- Share of water used
- Share of benefits generated
- Share of cost of MOM
PI 2 Water shares

- Quantum of use, especially consumptive use
- Quality dimension
- Energy dimension
- Partitioning of non-process use: e.g., evaporation from same water body vs tourism, environment, fisheries, flood protection.
- Function/service with no consumption (e.g., drainage, flood protection)
<table>
<thead>
<tr>
<th>Characteristic of the Use</th>
<th>Definition</th>
<th>Example of such use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consumptive</td>
<td>Water leave the system (hydrological cycle) and return to atmosphere</td>
<td>Irrigated crops, Homestead garden, Perennial natural vegetation</td>
</tr>
<tr>
<td>Non-consumptive</td>
<td>Water is not consumed. Water maybe diverted and used but is returned after use.</td>
<td>Hydro-power, Domestic water (recycled), Animals</td>
</tr>
<tr>
<td>Depletive</td>
<td>Water is depleted from the natural resources</td>
<td>Diversion schemes, Groundwater Pumping</td>
</tr>
<tr>
<td>Non-depletive</td>
<td>Water is used on its site without any diversion</td>
<td>Recreational use in aquasystems, Landscape tourism</td>
</tr>
<tr>
<td>Process</td>
<td>Water is needed by the associated producing process.</td>
<td>Crop growth, hydro-power</td>
</tr>
<tr>
<td>Non-process</td>
<td>Water consumed is not part of the process, but rather a side effect</td>
<td>Fisheries and evaporation from water bodies, Tourism, recreational value</td>
</tr>
<tr>
<td>Beneficial</td>
<td>Positive externalities</td>
<td>Groundwater recharge</td>
</tr>
<tr>
<td>Non-beneficial</td>
<td>No added value. Negative externalities</td>
<td>Pollution from agriculture areas.</td>
</tr>
</tbody>
</table>
PI 3 Share of benefits

• Definition of benefits of water service?
• Usually benefits = Monetary (gross production) for agriculture! or any productive activity as electricity, fishery, etc...
• Domestic ?? Households served for domestic,
• Environment ??
• Jobs for small business,
<table>
<thead>
<tr>
<th>Use/function</th>
<th>Estimator of Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delivery to farms</td>
<td>Crop yields</td>
</tr>
<tr>
<td></td>
<td>Gross production $/ha irrigated</td>
</tr>
<tr>
<td></td>
<td>Gross production $/m³</td>
</tr>
<tr>
<td>Domestic water</td>
<td>Cost paid by service users</td>
</tr>
<tr>
<td></td>
<td>Estimated cost of an alternative solution</td>
</tr>
<tr>
<td></td>
<td>Number of capita served</td>
</tr>
<tr>
<td>Drinking water for cattle</td>
<td>Value of annual animal products</td>
</tr>
<tr>
<td></td>
<td>Number of households</td>
</tr>
<tr>
<td>Homestead garden</td>
<td>Value generated by the garden</td>
</tr>
<tr>
<td>Support/recharge to natural surface streams (surface and groundwater) &amp; environment</td>
<td></td>
</tr>
<tr>
<td>Industry and Hydropower</td>
<td>Economical value generated, employment</td>
</tr>
<tr>
<td>Tourism, fishing, recreation, wild animals &amp; natural parks</td>
<td>Economical value generated, employment</td>
</tr>
<tr>
<td>Control of vector-born diseases in waterbodies</td>
<td></td>
</tr>
<tr>
<td>Flood control</td>
<td>Population and assets protected</td>
</tr>
<tr>
<td>Control of drainage return flow</td>
<td></td>
</tr>
<tr>
<td>Transport</td>
<td>Quantum transported</td>
</tr>
<tr>
<td></td>
<td>Economical value, employment</td>
</tr>
</tbody>
</table>
PI 4 Share of COST of MOM

- Specific cost to produce the service.
- Deliveries, water level, access to water, ensuring a specific function, etc...
## PI 5 Internal indicator for MUS

### Integration of MUS in management

<table>
<thead>
<tr>
<th>Indicator value</th>
<th>Management attitude</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Ignoring or denying MUS and/or its magnitude</td>
</tr>
<tr>
<td>1</td>
<td>Blind eye on MUS practice by users</td>
</tr>
<tr>
<td>2</td>
<td>Positive marginal practices to support MUS</td>
</tr>
<tr>
<td>3</td>
<td>Integration of other services concerns into the operation</td>
</tr>
<tr>
<td>4</td>
<td>Integration of Multiple Uses Services into the management and governance.</td>
</tr>
</tbody>
</table>
Degree & Integration of MUS

30 systems studied
Institutional and legal performance

- Institutional performance: Mechanisms to remunerate the service providers by users and beneficiaries whoever they are; Mechanisms to take decision at system level.

- Legal performance: Legal arrangements for MUS
Performance/Governance

Shareholder process

Value per Uses/functions
LIS and MUS

- **Objective**: Methodology for preliminary auditing of MUS  
  FAO MASSMUS
- **Set of methods** for assessing further and monitoring the MUS process  
  (Valuing mechanisms,...)
- **Target** is 2010.
Thank you