Domestic water supply and sanitation module of MASSMUS

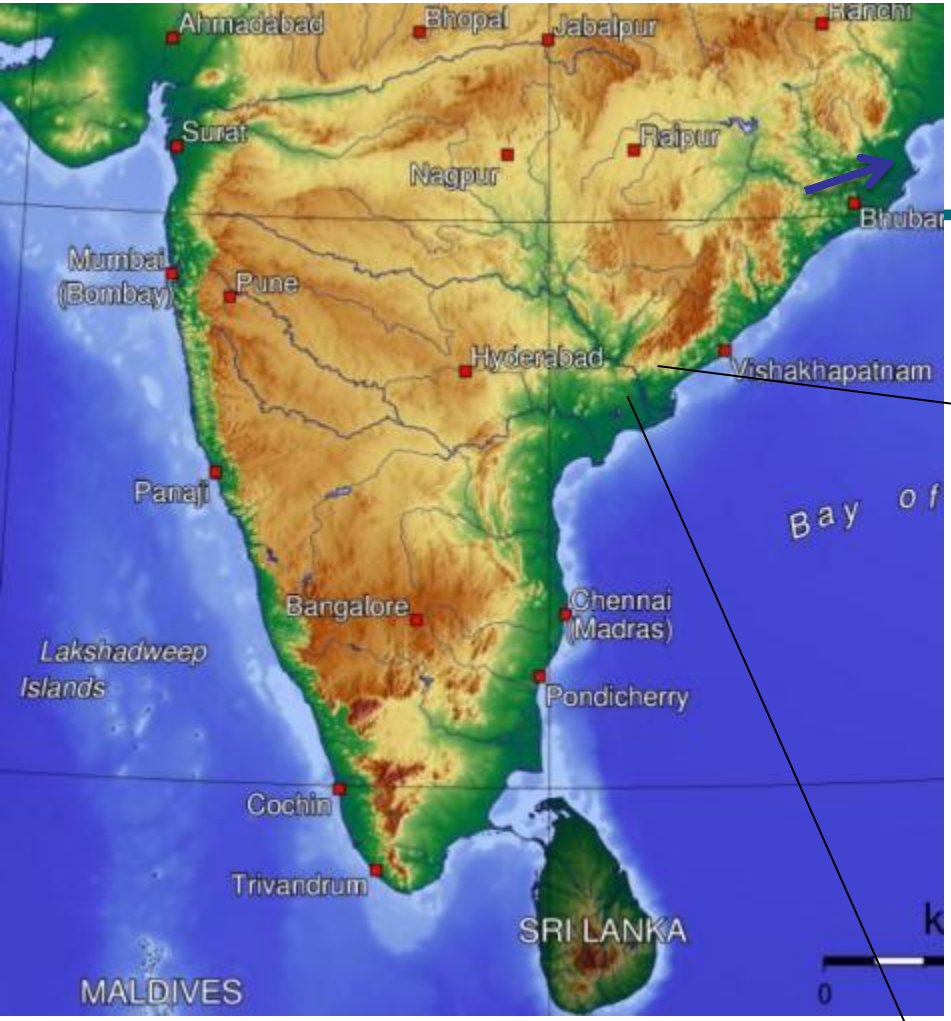
Findings from the Krishna Western Delta, Andhra Pradesh, India

Background

- MASSMUS to assess multiple uses of water in large irrigation systems
- With the view towards modernizing irrigation system management
- Technical exchange visit through the MUS Group to:
  - Provide inputs into the domestic water and sanitation module
  - Test it in the Krishna Western Delta (KWD), Andhra Pradesh

KWD

- Large canal irrigation system (228.000 ha)
- Few other water sources, also due to saline and fluoride contaminated deep groundwater
- Access to rural water supply is 70%, below the average for AP, with many villages only partially covered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Jabalpur
Ranchi
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Raipur
Nagpur
Bhubar
Mumbai (Bombay)
Pune
Hyderabad
Vishakhapatnam
Panaji
Bay of
Bangalore
Chennai (Madras)
Lakshadweep Islands
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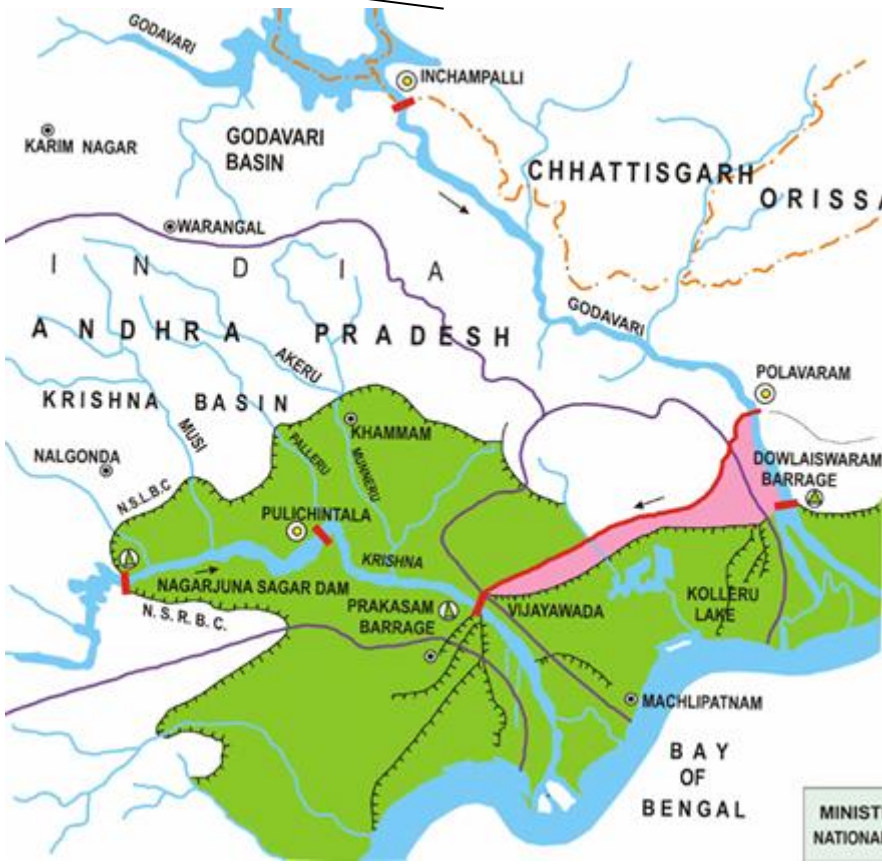
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PRAKASAM BARRAGE
VIJAYAWADA
KOLLERU LAKE
N. S. R. B. C.
MACHLIPATNAM
BAY OF BENGAL
MINIST
NATIONA

Assessment framework

- Differentiate types of domestic use
  1. Direct (bulk) supply to towns and communities
  2. Direct (in-stream) use of irrigation infrastructure for domestic purposes
  3. Indirect use via groundwater
  4. (Use of domestic systems for homestead production)
  5. Wastewater discharge and its reuse
- For each, assessment of service characteristics
- Implications for service delivery from irrigation department's perspective
- Identify recommendations for improvement

1. Direct supply to towns and communities

- It is a common practice to provide water in bulk to towns and villages, through:
  - Direct pumping from canal into tanks and reservoirs (around 95 tanks)
  - Filling of tanks and reservoirs from the canal
  - Covering 768 hamlets and villages, 3 towns and 1 city (Guntur), representing around 1.7 million people
- Managers and engineers do recognise this as an explicit obligation and try and respond to this in operational practices


RAW WATER PUMP

Service characteristics

- Quantity: in total 55.5 MCM, representing 1 % of total discharge
- Quality: irrigation department provides raw water, after which municipalities or panchayats are responsible for treatment, even though not always done properly.
- Reliability of supply:
  - Filling of reservoirs and tanks is continuous activity, except during 1-2 months of canal closure for non-irrigation period
  - Tail-end issues could not be verified
  - Reliability of supply within villages and towns is not guaranteed, as witnessed by the many private tubewells in cities, towns and villages as back-up source

Implications for irrigation service delivery

- Costs: cost of providing raw water expected to be low as these are proportional to the total volume provided
- Payment:
  - Department of Irrigation receives a small annual amount from RWS at State level as contribution to infrastructure development
  - But no payment by municipalities or panchayats for raw water supply, due to unclarity on payment for such a tariff
- Management:
  - The irrigation department communicates with municipalities (and panchayats) before canal closure, so that these can fill up reservoirs for the dry period. In addition there are quarterly meetings between RWS and Irrigation Department
  - Irrigation and RWS departments have records of reservoirs and tanks to be filled, but not of quantities actually supplied
  - No institutional representation of bulk users in irrigation management and governance, apart from quarterly meetings; neither are domestic users part of WUAs for their respective branch canals

2. Direct use of irrigation infrastructure for domestic purposes

- Irrigation infrastructure, particularly branch and distributary canals, is used for in-stream uses, such as watering buffalos, fishing, laundry, washing
- There are access facilities observed in parts of the system - difficult to assess whether that is sufficient and implemented everywhere
- Managers and engineers are aware of the need of such facilities

Service characteristics

- Quantity: negligible as it is mainly in-stream use
- Quality: mainly a concern in the dry period when formal supplies dry up, and people might use canals for drinking as back-up source. For other uses like laundry quality should not be a problem
- Access: facilitating infrastructure, such as stairs or washing slabs, and cattle ramps are observed
- Continuity and reliability of supply: not clear yet what back up exists in the case of canal closure.

Implications for service delivery

- Cost: costs of specific infrastructure (steps etc) are mainly sunk costs of when the system was developed and gradually improved. There might be costs for future infrastructure development but likely to be negligible
- Payment: not likely and probably too little to be worthwhile the efforts
- Management:
  - Villages are warned of upcoming canal closures. But it is not clear what back-up sources exist for them

3. Indirect use via groundwater

- Around 300.000 people rely on private tubewells for primary supply
- An unknown number of people in villages and towns have tubewells (with either handpumps or motorized pumps) as back-up supplies in addition to piped water supply
- Literature suggests that this shallow groundwater is highly dependent on irrigation management, which contributes a lot to recharge – exact amounts not known, as they require further hydrological studies

Service characteristics

- Quantity: estimated consumption of 6.1 MCM for primary supply plus an additional amount for back-up supply.
- Quality: requires careful management as saline groundwater can be found from a few meters of depth
- Access: this service seems to be used in many cases as a back-up, and probably for those without any other form of access to drinking water. Little competition with other groundwater users as there is little conjunctive irrigation use
- Continuity and reliability of supply: shallow groundwater is fluctuating with irrigation practices; drilling deeper wells is not possible due to the underlying saline aquifer.

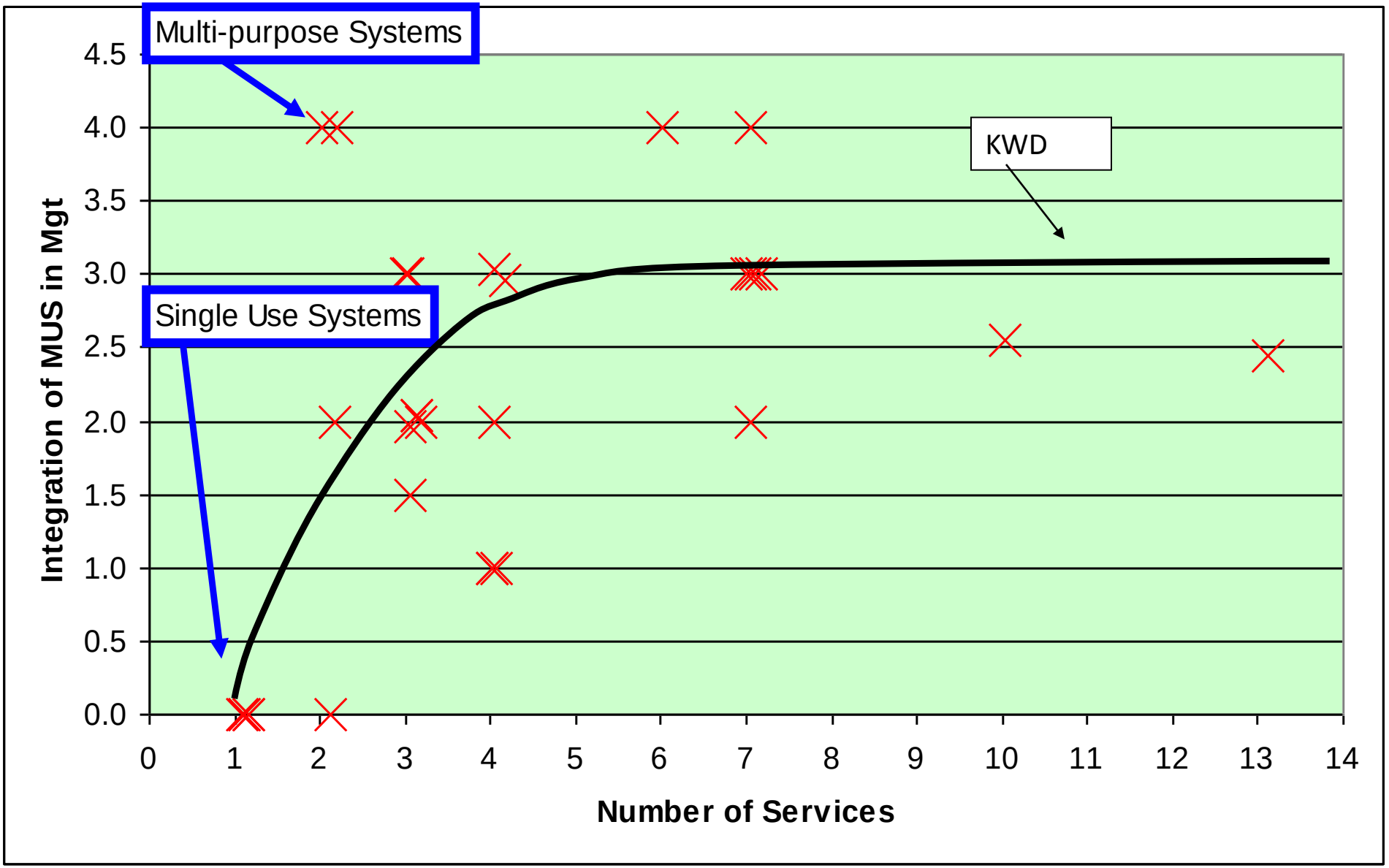
Implications for service delivery

- Cost: there are mainly costs to individuals to invest in such tubewells as back-up. There are no costs to the irrigation agency except for the cost of raw water “lost” due to seepage
- Payment: this is not likely that this will be possible as difficult to measure or to specifically attribute
- Management:
  - Individual management by owners of tubewells

Scoring (from domestic perspective)

Indicator value	Management attitude	Reasons for score
0	Ignoring or denying MUS and/or its magnitude	
1	Blind eye on MUS practice by users	
2	Positive marginal practices to support MUS	
3	Integration of other services concerns into the operation	Managers are aware of the direct supply to towns and villages and see that as their prime responsibility. Water systems for towns and villages are developed in such a way that they can only be fed by canal water and provide specific delivery of water before canal closure, and sometimes even emergency supplies during longer droughts. Also the systems has at many points specific entry points such as stairs and slabs. Indirect uses e.g. through pumping of seepage water are less clearly recognised just as reuse of wastewater However, domestic users are not represented in the governance or management of the irrigation system. There is only a payment of the water supply department to the irrigation department but this only is a token fee.
4	Integration of Multiple Uses Services into the management and governance	


GUNTUR Dist.,
BELLAMKONDA PROJECT
ESTIMATE COST Rs: 263.75 Lakhs
17 HABITATIONS. 1995-97.
BELLAMKONDA BRANCH CANAL (N.S.CANAL)
HYDERABAD


Multi-purpose Systems
Single Use Systems
KWD
Integration of MUS in Mgt
Number of Services
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14

Overall conclusions

- The most important contributions irrigation makes to domestic supplies are through:
  - Direct supply to city, towns and villages
  - Indirect use via groundwater
- In this way providing water supply to around 2 million people, with only 1% of total water diversion of KWD
- Although other linkages occur, these are smaller in terms of occurrence, volumes involved and people served. Yet, locally they may be important, e.g. for tail-ends, unserved villages and people around cities

Overall conclusions

- Irrigation management only formally recognises the direct supply to towns and villages and tries to meet these demands; but further work needed to understand whether and how these demands are really met in case of drought and back-up options
- Other domestic services are largely unrecognised but seem to be easily accommodated in KWD operations:
  - Through the system design, which facilitates access to canals and infrastructure for direct use
  - Productive use of domestic water included in domestic water supply operations not in irrigation operations
  - Indirect use is important but difficult to manage
- Reuse of wastewater is only happening in limited way, as apparently the amounts concerned are too small to really address scarcity challenges. But locally it could be important also in addressing sanitation situation

Overall recommendations

For irrigation department

- Recognise the contribution irrigation management makes to domestic supplies, not only through direct but also indirect supplies and other facilitating measures
- Ensure that those linkages that are functioning well now remain in any modernization plans
- Promote better consideration of domestic users in WUAs, or otherwise create institutional linkages

For RWS, municipalities and panchayats

- Drastically improve efficiency and equity in supplies
- Carefully consider whether to use groundwater or surface sources in future development
- Start addressing wastewater management with view towards reuse

Reflection on MASSMUS guidelines

- Useful to break down “domestic water and sanitation” into its 5 components, particularly for a management perspective
- Ideally needs to be collaborative assessment between irrigation and water supply authorities
- Short period to compare “what should be” and “what is”