Water and irrigation in sub-Saharan Africa: investment and management challenges

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Food security and irrigation expansion policy in SSA

Continent-wide strategy
- 7.2 million ha of irrig / supplement irrig (5% agric land)
- NEPAD, Commission for Africa, World Bank ‘Sleeping Giant’: to double irrigated area → 15 million ha
- Estimates ~ 2 billion US$ over 10 years
Country example

- Malawi – Green Belt Initiative (A presidential initiative)
- World Bank spending 52.7 US$ million from 2005 to 2012.
- “When all are completed, we expect 3200 hectares of land to be irrigated. This will significantly help ensure food self sufficiency at household level”. World Bank's Country Manager for Malawi.
- = $16,000/ha of irrigation
- Malawi's plans for irrigation expansion: "We don't eat much rice but we are going to produce a lot of rice to feed the rest of the world.“ President Mutharika 2006.
Distinguish between atomistic ‘micro’ home systems and small/medium-scale (yet coalescing) systems

<table>
<thead>
<tr>
<th>Bucket and small pumps</th>
<th>Smallholder–owned systems</th>
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<tbody>
<tr>
<td>Valley bottom/wetland irrig. Pongola floodplain, SA</td>
<td>Smallholder paddy system, Usangu, Southern Tanzania</td>
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<td>0.2 ha per family group</td>
<td>10 to 3000 ha per intake</td>
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Micro-technologies – caution (ICRISAT “African Market Gardens”)

- Entry technology for poorest in some circumstances (✔)
- Row crops – perishable veg & fruit (✔)
- Near urban centres (✔)
- Lift of <0.5 metres ideally (✔)
- Private sector/commerce to supply market (✔)
- Treadle work-effort equiv 0.5 ha = 0.6 million Joules/day (✗)
- $20-$100 bucket kits = Cost US$5-10K/ha (✗)
- Cumulative irrigated area can deplete small catchments (✗)
- Governance of diffuse vs point demand (✗)

Treadle pumps

Super-MoneyMaker
pressure irrigation pump

Operation Manual

Micro-irrigation kits
Challenges

- In expanding irrigated areas, caution:
  - If grain/carbohydrate/oilseed field crops are our focus
  - Groundwater and power/energy is intermittent
  - Environment is semi-arid = highly variable, unpredictable
  - Depletes 70–90% freshwater withdrawals surface waters/rivers
  - Appropriate scale, type and entry points for infrastructure support
  - Donor experiences on technologies & costs (<$10K/ha)
  - Limited institutional / organisational strengths amongst WUA’s
  - Partial expertise in advisory groups on tech’ and inst’ issues
  - Lack of administrative reach / fiscal constraints
  - Many thousands of farmers collectively influence water patterns
  - Small-scale domestic storage/reticulation not done in parallel
- How to roll out irrigation support while allocating/distributing water to other sectors (env, power, urban, domestic)
- Positive/negative connections to water and sanitation
Linkages between increasing water depletion (via expanding irrigation and rainwater harvesting for agriculture) and food, nutrition and WASH

River hydrograph

Wet season water feeds irrigation = greater abstraction

‘Blue water’ harvested to top-up green water

Reduced runoff from upstream irrigation & RWH > acute during dry season

Negative urban ‘WASH’ impacts if relying on surface water without upstream regulation & local supplies

Domestic abstraction reduced, esp dry season

‘Grey water’

Irrigated agriculture

Food and nutrition, services, labour

Irrigation expansion

Rainfed agriculture productivity

‘Blue water’

Rainwater harvesting (RWH) for agriculture

Rainfed productivity +/- from WASH impacts or RWH
Aims and affordability of expansion programme
Irrigation – considerable water during growing season
Throttling back abstraction during dry season and droughts
Environmental and WASH impacts of excessive expansion
Water rights and abstraction technology/caps
Role of local knowledge, artisans & water user associations
Technological packages for irrigation and domestic mix
Governing collective & coalesced areas – concerns about quantity and quality of water technical & institutional deliberative support services?

Thank you.
Facilitating water management – role of experts mediating local policies

Devolving responsibility
- Facilitating local ownership
- Local bye-laws
- Problem resolution
- Technological choice

Top-enders ↔ Tail-enders
Controlling costs: putting users into water policy and delivery

- Current costs for irrigation new-build & rehabilitation (FAO, WB, JICA, EU) approx $10,000/ha
- Local artisanal engineers to keep costs of irrigation investments below $5000/ha, while aiming for less than $2-3K/ha

Formal designed irrigation headworks – too expensive?
Seek & build upon location of irrigation success

Put users at centre of water and irrigation policy