URAdapt
Managing Water at the Urban-Rural Interface: The key to climate change resilient cities

Water supply–demand management for GAMA in light of climatic and non-climatic drivers

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POLICY ROUNDTABLE-ACCRA
Coconut Grove Hotel, Nov. 30, 2012
Study objectives:

1. Evaluate water supply-demand gap for Accra under current conditions and plausible future scenarios.

2. Model the impact of climate change on surface water availability in the Densu Basin.

3. Determine the implications for bridging the water supply-demand gap of GAMA.
City water supply-demand modelling with VENSIM
Water Demand

Water Demand (MCM/yr)

- Low Scenario: 3.1% x 80lpcd
- Moderate Scenario: 4.6% x 120lpcd
- High Scenario: 5.8% x 140lpcd

Year: 2011, 2016, 2021, 2026, 2030

- 2011: 109 MCM/yr
- 2021: 207 MCM/yr
- 2030: 631 MCM/yr
Modelling Framework

- Climate Change Scenarios (Downscaled) RegCM4

- Historical Climate Data
  - Historical Flow data
  - Watershed Parameters

- HEC-HMS Model (Calibration & Validation)

- Model parameters

- HEC-HMS Model (Impact Assessment)

- Densu Basin water availability
Supply – Demand Gap

Low Scenario
Moderate Scenario
High Scenario
Current Water Supply

Water Supply/ Demand (MCM/yr)

Supply
Demand

2011
2016
2021
2026
2030
Response to the supply-demand gap

Improve/Expand the water supply and distribution system
Implications for supply-demand gap management

CC impact on Densu water availability

Predicted inflow to the Weija lake for the A1B CC scenario
**Current surface water abstraction in the Densu basin:**

<table>
<thead>
<tr>
<th>Water abstraction points</th>
<th>Abstraction (million m³/yr)</th>
<th>% of estimated basin runoff</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper catchments</td>
<td>2.96</td>
<td>1</td>
</tr>
<tr>
<td>Weija</td>
<td>93.09</td>
<td>33</td>
</tr>
<tr>
<td>Total</td>
<td>96.05</td>
<td>34</td>
</tr>
</tbody>
</table>
Implications for supply-demand gap management III

Holistic basin WRM

- involving all stakeholders
- Promoting water conservation and use efficiency

In short: Implement IWRM plan in the basin.
## Lower Volta water availability

<table>
<thead>
<tr>
<th>Climate change scenario</th>
<th>Annual renewable water for the Lower Volta ($10^9$ m$^3$) (de Condappa et al., 2008)</th>
<th>Water withdrawals for GAMA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Volume ($10^9$ m$^3$)</td>
</tr>
<tr>
<td>Baseline</td>
<td>29.1</td>
<td>0.157</td>
</tr>
<tr>
<td>Dry scenario</td>
<td>24.2</td>
<td>0.157</td>
</tr>
<tr>
<td>Wet scenario</td>
<td>33.5</td>
<td>0.157</td>
</tr>
</tbody>
</table>
Abstract more from the Lower Volta

- Consider more use of groundwater (GW) – require further studies on:
  - GW availability and reliability
  - Potential for artificial GW recharge

- Encourage rainwater harvesting for both potable and non-potable use – requires feasibility studies to determine:
  - How much can be harvested
  - Cost effectiveness of RWH
  - Efficient RWH systems
  - RW quality and quality improvement
Conclusion

There is a municipal water supply-demand gap for GAMA well into the future.

Climate change impacts would exacerbate this condition.

An integrated approach coupling the Densu and Volta basins, and balancing upstream water abstractions in the Densu is recommended to manage this gap.
Thank you

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