Irrigation Investment

The case of Ethiopia
1. Brief Profile of the Country

1.1. Land
Ethiopia covers an area of 1.14 Million km square.

1.2. Location
Situated in North Eastern Africa
Bordering With Sudan, Eretria, Djibouti, Somali and Kenya

1.3. Topography
- Ethiopia is land of natural contrasts
  - Highest 4620M above seal level
  - Lowest 148 M below seal level
1. Profile

1.4. Population
   Estimated over 77 Million
   - About 50% are below age 20
   - Average number of inhabitants (Density) per square kilometer is 49

1.5. Economy
   About 85% of the Country's Population earns Living from Agriculture
   - Agriculture is thus the backbone of the national economy and a source of principal export items
   ‘Agriculture:
   - 47% of GDP
   - 85% of employment
   - 13% growth rate since 2003/04
1. Profile

- **GDP**
  - US$245 per capita, lower than the SSA average
  - GDP growth rate >11% for past four years
- **Poverty**
  - Poverty from 46% in 1996 to 38% in 2005
2. Challenges

- Despite good recent economic performance, Ethiopia faces a number of significant development challenges
  - High poverty
  - High population growth, high population pressure in highlands
  - Dominance of rainfed agriculture:
    - Dependence of agriculture and national economy on rainfall
    - Agricultural growth based on extension of area
  - High level of land degradation
  - Food prices growing at an annual rate of 24 percent in recent months

- Weather shocks: 10 percent decline in crop production could lead to a 3 percent decline in GDP
Ethiopia: rainfall, GDP and Ag GDP

- Rainfall variability
- GDP growth
- Ag GDP growth

Year:
- 1982
- 1983
- 1984
- 1985
- 1986
- 1987
- 1988
- 1989
- 1990
- 1991
- 1992
- 1993
- 1994
- 1995
- 1996
- 1997
- 1998
- 1999

Rainfall variability
GDP growth
Ag GDP growth
Agricultural growth in Ethiopia is based on expansion of area...
3. Potentials of Water Resources

- Water resources
  - 1,700 m³/year per capita; Ethiopia is the “Water Tower” of Africa
  - Many of Ethiopia’s rivers are transboundary
  - Highly seasonal water availability: 70% of the total annual runoff is obtained during the period June-September
  - Little storage
Africa's infrastructure gap: Water Storage Per Person (m3)

- Ethiopia: 160 m³
- South Africa: 746 m³
- Thailand: 1,287 m³
- Laos: 1,406 m³
- China: 2,486 m³
- Brazil: 3,255 m³
- Australia: 4,729 m³
- North America: 6,150 m³
3. Potentials of Water Resource

3.1 Ethiopia’s water resources
- is estimated at 123 and 2.6 billion m³, respectively, of renewable surface and ground freshwater per annum.
- Of the ten river basins in the country, four basins, i.e. Baro-Akobo, Abbay, Tekeze and Omo-Ghibe account for 80–90% of the country's water resource.

3.2 Yet the country is affected by recurring drought
- due its reliance on rainfed agriculture and the associated seasonal fluctuation and uneven distribution of rain water.

3.3 The country irrigation potential
- about 3.6 million hectares, of which currently only about 8% has been developed.
## Surface Water Resource & Irrigation Potentials

<table>
<thead>
<tr>
<th>No.</th>
<th>River basin</th>
<th>Catchments area (km²)</th>
<th>Annual run off (m³ × 10⁹)</th>
<th>Specific discharge (litres/km²)</th>
<th>Irrigation potential (10³ ha)</th>
<th>Percentage Developed (Large &amp; Small Scale)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Abbay</td>
<td>199,812</td>
<td>52.60</td>
<td>7.8</td>
<td>711</td>
<td>4.38</td>
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<tr>
<td>2</td>
<td>Awash</td>
<td>112,700</td>
<td>4.60</td>
<td>1.4</td>
<td>206</td>
<td>34.0</td>
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<tr>
<td>3</td>
<td>Baro-Akobo</td>
<td>74,100</td>
<td><strong>23.60</strong></td>
<td>9.7</td>
<td>483</td>
<td>0.06</td>
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<td>4</td>
<td>Genale-Dawa</td>
<td>171,050</td>
<td>5.88</td>
<td>1.2</td>
<td>326</td>
<td>1.10</td>
</tr>
<tr>
<td>5</td>
<td>Mereb</td>
<td>5,900</td>
<td>0.26</td>
<td>3.2</td>
<td>38</td>
<td>1.32</td>
</tr>
<tr>
<td>6</td>
<td>Omo-Ghibe</td>
<td>78,200</td>
<td>17.96</td>
<td>6.7</td>
<td>348</td>
<td>3.42</td>
</tr>
<tr>
<td>7</td>
<td>Rift Valley</td>
<td>52,740</td>
<td>5.64</td>
<td>3.4</td>
<td>46.5</td>
<td>45.75</td>
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<tr>
<td>8</td>
<td>Tekeze</td>
<td>90,000</td>
<td>7.63</td>
<td>3.2</td>
<td>302</td>
<td>2.24</td>
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<tr>
<td>9</td>
<td>Wabi-Shebele</td>
<td>200,214</td>
<td>3.16</td>
<td>0.5</td>
<td>122</td>
<td>1.27</td>
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<tr>
<td>10</td>
<td>Danakil</td>
<td>62,882</td>
<td>0.86</td>
<td>0.0</td>
<td>-</td>
<td>-</td>
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<tr>
<td></td>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td>2582.5</td>
<td>6.24</td>
</tr>
</tbody>
</table>
4. Policy and Strategy


- aims to support increased shift to diversification and commercialization of agriculture.
- The private sector push, especially on exports, is expected to create more jobs and reduce foreign exchange constraints.
- PASDEP will strengthen its support towards increased agricultural productivity, output diversification, and greater market orientation in order to help farmers to move beyond subsistence farming to small-scale market oriented agriculture.
The Government's policy towards irrigation management and development has been outlined in a number of recent documents.

4.2 Ethiopia’s water policy
- Conservation and management of water resources has been identified as a key policy direction for the Ministry of Water Resources (MoWR, 1999).

4.3 Legislation
- Legislation on water resources utilization and management has been enacted. A water code that regulates licensing, fees establishment, charges for urban and irrigation water supply and pollution control has been prepared.
4. Policy Strategy and Development Program


- to translate the Water Resources Management Policy into action by defining a set of medium to long-term measures or action plans in the field of general water resources, hydropower development, water supply and sanitation and irrigation development

- The Water Resources Development Strategy (2002-2016) envisages the development of over 260,000 ha of irrigation in small-, medium- and large-scale schemes.
- Irrigated area, as a result, is expected to reach 471,000 ha by 2016.
5. Current initiative

- The recently completed PASDEP proposes carrying out pre-feasibility studies on 177,998 ha of medium and large scale irrigation. It also proposes feasibility and design on 464,051 ha and carrying out construction in 430,061 ha at an estimated investment cost of Birr 20,755 million (USD 2.3 billion).

- The on-going I&D projects are parts of the efforts to meet GoE’s ambitious irrigation development targets, as indicated in PASDEP.
<table>
<thead>
<tr>
<th>No.</th>
<th>River basin</th>
<th>Projects</th>
<th>Schemes</th>
<th>Command Area (ha)</th>
<th>Status</th>
<th>Financer</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Abay</td>
<td>Ethiopian Nile I &amp; D</td>
<td>Megech</td>
<td>5254</td>
<td>Under Preparation</td>
<td>World Bank</td>
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<td>2</td>
<td>&quot;</td>
<td>Ribb</td>
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<td>14460</td>
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<td>3</td>
<td>&quot;</td>
<td>Anger</td>
<td></td>
<td>5000</td>
<td>Under Preparation</td>
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<tr>
<td>4</td>
<td>&quot;</td>
<td>Lake Tana sub-basin (7 Schemes)</td>
<td></td>
<td>78,000</td>
<td>Under Preparation</td>
<td>Government of Ethiopia</td>
</tr>
<tr>
<td>5</td>
<td>&quot;</td>
<td>Arjo - Deddesa</td>
<td>Arjo - Deddesa</td>
<td>16,800</td>
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</tr>
<tr>
<td>6</td>
<td>Tekeze</td>
<td>Humera</td>
<td>Humera</td>
<td>60,000</td>
<td>Under Preparation</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Tekeze</td>
<td>Wolkaite</td>
<td>Wolkaite</td>
<td>25,000</td>
<td>Under Preparation</td>
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<td>8</td>
<td>Rift Valley</td>
<td>Zuwai</td>
<td>Zuwai</td>
<td>15,500</td>
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<td>9</td>
<td>Rift Valley</td>
<td>Abaya sub-basin</td>
<td>Abaya</td>
<td>17,900</td>
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<td>10</td>
<td>Wabi Shebele</td>
<td>Wabi Shebele Basin</td>
<td>Wabi Shebele Basin</td>
<td>11,920</td>
<td>Under Preparation</td>
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<tr>
<td></td>
<td>Total</td>
<td></td>
<td></td>
<td>249,834</td>
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</table>
## Medium and Large Scale Irrigation Projects under construction

<table>
<thead>
<tr>
<th>No.</th>
<th>River Basin</th>
<th>Projects</th>
<th>Area to be developed</th>
<th>Status</th>
<th>Financer</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Abbay</td>
<td>1. Koga Irrigation &amp; Watershed Project</td>
<td>7,200ha</td>
<td>Dam and I&amp;D Infrastructure under construction</td>
<td>African Development Bank</td>
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<tr>
<td></td>
<td></td>
<td>2. Ribb Dam &amp; Irrigation</td>
<td>19,500ha</td>
<td>Dam under construction</td>
<td>Government of Ethiopia</td>
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<tr>
<td></td>
<td></td>
<td>3. Megech Dam &amp; Irrigation</td>
<td>16,660ha</td>
<td>Dam under construction</td>
<td>Government of Ethiopia</td>
</tr>
<tr>
<td>2</td>
<td>Awash</td>
<td>1. Kessem Dam &amp; Irrigation</td>
<td>30,000ha</td>
<td>Under Construction</td>
<td>Government of Ethiopia</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Tendaho Dam &amp; Irrigation</td>
<td>60,000ha</td>
<td>Under Construction</td>
<td>Government of Ethiopia</td>
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<tr>
<td></td>
<td></td>
<td>Fentale Irrigation</td>
<td>18,000ha</td>
<td>Under Construction</td>
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<td>3</td>
<td>Wabishebele</td>
<td>Gode Irrigation</td>
<td>2,400ha</td>
<td>Under Construction</td>
<td>Government of Ethiopia</td>
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<tr>
<td>4</td>
<td>Baro-Akobo</td>
<td>Alwerro Irrigation Project</td>
<td>10,000ha</td>
<td>Under Construction</td>
<td>Government of Ethiopia</td>
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<tr>
<td></td>
<td></td>
<td><strong>TOTAL</strong></td>
<td><strong>163,760ha</strong></td>
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</tbody>
</table>
Small scale irrigation

- Small-scale irrigation schemes in Ethiopia are understood to include traditional small-scale up to 100 ha and modern communal schemes up to 200 ha (MoWR 2002).
- Traditionally, farmers have built small-scale schemes on their own initiative, sometimes with government technical and material support.
- They manage them through their own users' association or committees (MoWR 2002).
- The farm size varies between 0.25 ha and 0.5 ha. Water users' associations have long existed to manage traditional schemes. They are generally well organised and effectively operated by farmers who know each other and are committed to co-operate closely to achieve common goals.
- Typical associations comprise up to 200 users who share a main canal or a branch canal. They may be grouped into several teams of 20 to 30 farmers each. Such associations handle construction, water allocation, operation and maintenance functions.
Small scale irrigation Challenges

Main knowledge gaps

- Inadequate design
- Lack of knowledge on use of modern irrigation technology
- Poor water and land management
- Poor input utilization
- Lack of post-harvest technology and management.
- Lack of market information and market access
5. Issues for irrigation investment

5.1 Sustainability
- Many schemes require rehabilitation soon after completion
- Low involvement of farmers in design and implementation

5.2 Production and productivity
- Many schemes have low yields, cropping intensity, low value crops
- Low input use, even with a more reliable access to markets

5.3 High costs of irrigation development
- Alternative resource allocation for poverty reduction

5.4 Impacts on health and environment
- Salinization, water borne diseases
- High water abstraction and significant impact on downstream uses
Measures Being Taken to Promote Irrigation Development

- New generation of innovative irrigation projects:
  - Integrated approach to irrigation development
  - Stakeholder involvement from project start, including women
  - Private sector involvement (PPP)
  - Focus on demand-driven delivery of agricultural services by private sector
  - Focus on environment and health
  - Reduce development costs by promoting appropriate technologies and multi-purpose use
  - Capacity strengthening at all levels