Application of SWAT in Developing Countries using Readily Available Data

J.H. Jacobs & R. Srinivasan
The Tana River Basin

- Poor Land Management
  - Disruption of wildlife habitat
  - Increased soil erosion
  - Disruption of hydrological cycles
  - Lack of forest products
  - Destabilization of local and global climate patterns

Inadequate water for domestic use and irrigation
  - Nairobi Water supply
  - Horticulture and irrigation schemes

Siltation and water levels in the Masinga Dam
  - Storage water reservoir effects
  - Effect on power generation
  - High fluctuation of shorelines
Study Objective

Explore the hydrologic impacts on the Masinga reservoir in response to land use interventions in the Upper Tana River catchment with a focus on varying levels of reforestation.
Study Area
Average Annual Rainfall
3-D elevation graphic derived from 100-m DEM for the upper Tana River Basin.
Climate Data Sources and Locations
Gauge Locations for Model Simulation
DRSRS Land Use Survey Point Locations
Land Use Model Input
Kenya Soil and Terrain Database
SWAT Subbasin Delineation
Reforestation Scenarios

- Reforestation scenarios were implemented as full replacement of land by forest above a certain elevation.
- The GIS was used to build a conditional replacement model using the land use grid and the DEM. This allowed spatial representation of the scenarios.
- For the base scenario, the areas designated as forest were left intact as were all other land uses.
Graded reforestation scenarios of 2000, 1950, 1900 and 1850m elevation zones
Reforestation Results:
Average Annual Sediment Yield for Entire Basin

<table>
<thead>
<tr>
<th>Year</th>
<th>Sediment Yield (Million Tons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>3.31</td>
</tr>
<tr>
<td>1950</td>
<td>3.33</td>
</tr>
<tr>
<td>1900</td>
<td>3.24</td>
</tr>
<tr>
<td>1850</td>
<td>3.18</td>
</tr>
</tbody>
</table>

Baseline: 3.43
SPATIAL SCIENCES LABORATORY
TEXAS A&M UNIVERSITY

Integrating information technology and natural resource management

www-ssl.tamu.edu