SURFACE WATER DIVISION

QUALITY RESEARCH ON GHANA’S WATER RESOURCES FOR POSTERITY

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HEAD OF DIVISION
Surface water and Groundwater is a single resource, affected by anthropogenic and geological activities. Water Quality & Quantity (Physico-chemical & Biological) leads to Water suitable for?

Surface Water

= Water Phenomena in the Atmosphere, Rivers, Lakes, Reservoirs, Ponds & Soil

Hydrological Cycle
Assess the surface hydrology and water resources of Ghana for water supply, food and agriculture, fisheries, and manufacturing and mining industries.

Model impacts of climate change on water resources and develop appropriate adaptation strategies and conservation measures for the country.

Assess the sediment transport of rivers and discharges into reservoirs for planning and management of water resources systems (dams).

Develop and adapt water supply technologies (such as rainwater harvesting) for domestic, agricultural and industrial uses.

Sustainable Water Supply
Assessment of Surface Water Resources

(1/2)

- Current Meter
- Q-Liner
- ADCP (Acoustic Doppler Current Profiler)
- Staff Gauge
- V-notch weir
- Current Meter
Assessment of Surface Water Resources (2/3)

Data Collection of Synoptic Meteorological Data at office (since 1976)

- Rainfall, Evaporation,
- Air Temperature
- Relative Humidity, Wind speed,
- Sunshine Duration
- Wind Direction
- Radiation
- Soil Moisture
- Soil Temperature

Manual Climate station

Automatic Climate station installation
**WRI Meteo Station Data Analysis**

**Rainy days**

<table>
<thead>
<tr>
<th>Month</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Feb</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Mar</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Apr</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>May</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Jun</td>
<td>11</td>
<td>13</td>
</tr>
</tbody>
</table>

**Total monthly rainfall (mm)**

<table>
<thead>
<tr>
<th>Month</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan</td>
<td>90</td>
<td>7.8</td>
</tr>
<tr>
<td>Feb</td>
<td>49.7</td>
<td>31.5</td>
</tr>
<tr>
<td>Mar</td>
<td>68.8</td>
<td>163.9</td>
</tr>
<tr>
<td>Apr</td>
<td>83.6</td>
<td>58.2</td>
</tr>
<tr>
<td>May</td>
<td>119.2</td>
<td>140.3</td>
</tr>
<tr>
<td>Jun</td>
<td>174.8</td>
<td>385.2</td>
</tr>
</tbody>
</table>

**Jan – June total rainfall (mm)**

<table>
<thead>
<tr>
<th>Year</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>586.1</td>
</tr>
<tr>
<td>2015</td>
<td>786.9</td>
</tr>
</tbody>
</table>

**Daily rainfall (mm)**

- **3/6/2015:** 244.1 mm
- **5/6/2014:** 66.8 mm
Assessment of Surface Water Resources (3/3)

- Characterization of Stream Flow of Major Rivers and Lakes
- Water Resources Planning
- Hydrological Database Management
Assessing Sediment Transport of rivers

Integrated Sediment Sampling and Laboratory Analysis on
- Particle size distribution
- Moisture Content
- Bulk Density
- Organic Carbone
- Porosity
- Specific Gravity
- TDS/TSS
Develop and Adapt Technologies

- Design, Installation and Technology Transfer of Standardized Rainwater Harvesting System
Adapting Technologies

- Irrigation/Agricultural Water Management/Soil & Water Conservation
- Remote Sensing & GIS
Climate change Modeling and appropriate adaptation strategies and conservation measures

Modeling Impact Of Climate Change On Water Resources

- Hydrographic Surveying
Other Activities of SWD (4/4)

- Flood Studies
- Water Governance
- Public Education/Internships
- Resource persons on National/International Committees
**Clients/Beneficiaries**

- **Ministries, Departments and Agencies**
  - Ministry of Water Resources Works & Housing (MWRWH)
  - Ministry of Food & Agriculture/Ministry of Fisheries (MOFA)
  - Water Resources Commission (WRC)
  - Volta River Authority (VRA)/Bui Power Authority (BPA)
  - Ghana Water Company Ltd (GWCL)
  - Ghana Irrigation Development Authority (GIDA)
  - NADMO, EPA, ICOUR, etc

- **Local Governments**
  - Metropolitan/Municipal/District Assemblies

- **Companies/Industries**
- **Communities**
- **Farmers**
- **NGOs**

- **Development Partners**
  - UNESCO
  - FAO
  - EU
  - DANIDA
  - DFID (UK)
  - AFD
  - UNDP

- **Universities**
- **Research Institutions/IWMI**
Major Achievements 1/2

- Establishment of the classification of 3 major river basin systems currently used in Ghana (Volta, South Western and Coastal basins)
- Made significant contribution to the establishment of WRC
- Provided (Still providing) decision support systems to WRC for the management of water resources of the country
- Led the Water Resources Management Study (WARM) of Ghana which was the first comprehensive baseline studies on water resources parameters with projections on climate change
- Pioneered studies of Climate change impacts on hydrology and water resources of Ghana
Major Achievements 2/2

- Assisted with designs and developments of Irrigation water management schemes in Ghana
- Built and enhanced capacity of key stakeholders of the water-energy-environment sectors regarding analysis and modeling of climate change, climate change impacts on hydrology and water resources
- Economic valuation of ecosystem services
- Stakeholder engagements through social approaches such as participatory scenario developments or foresighting
- Promoting cross disciplinary research
- Built capacity in the design and construction and management of Rain water harvesting schemes
- Undertaken consultancy works for many clients
Current Research Projects

- Modernizing Agriculture in Ghana – *(Water Harvesting techniques; Water Management Techniques and audio documentaries on practical methods of water harvesting)*

- Design and Assessment of Resilient and Sustainable Interventions in water-energy-food-environment Mega-Systems (FUTUREDAMS2)

- Driving eco-innovation in Africa: Capacity-Building for a Safe Circular Water Economy (RECIRCULATE)

- Multi-scale Flood Monitoring and Assessment Services for West Africa (MiFMASS)

- Analysis of historical climate trends and future climate change projections for the White, Black and Oti river basins (ADAPT)
Way Forward

• Obtaining the best available regional and international datasets, including satellite and remotely sensed data to compliment locally generated data

• Acquire and apply state-of-the-art tools, software, and methods for analysis in project delivery

• Adding key competencies to current expertise to enhance delivery
A mix of
- Soil & Water Engineers
- Water Resources Engineers,
- Civil Engineers
- Irrigation Engineers
  with concentrations in hydrology, irrigation and climate sciences and Water sociologist
CSIR-WRI RWH SYSTEM

Underground tank
Overhead Tank
Filtration System
Down pipe
First Flush

THANK YOU