

# WATER RESOURCES COMMISSION



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## ANNUAL REPORT 2011

## **FOREWORD**

This 13<sup>th</sup> Annual Report of the Water Resources Commission (WRC) presents a growing picture of the Commission in terms of the coverage of its activities and relations outside Ghana.

The Integrated Water Resources Management (IWRM) programme has been carried further to other river basins. In addition to the Densu Basin, the White Volta, and Ankobra Basins the Pra and Tano basins have come on stream in terms of introducing practical local level IWRM interventions and establishing WRC's physical presence.

WRC's introduction of climate change adaptation interventions and flood early warning systems in the northern regions can only be said to be timely, notwithstanding that national growth and development strategies including medium term development plans have had no place for climate change and variability and flooding as development challenges. The WRC is enjoined to stay focused and develop concrete actions that would address these issues.

On behalf of my colleagues and the staff of the Secretariat, I would like to extend my sincere thanks and appreciation to the Government, through the Minister of Water Resources Works and Housing, for the sustained support to WRC in particular. We also thank our development partners for and internal collaborative institutions for their continued support and encouragement to the Commission in carrying out its mandate.

**Mr. Paul Derigubaa**  
**Chairman, Water Resources Commission**

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## ACRONYMS

ABB	-	Ankobra Basin Board
BPA	-	Bui Power Authority
CBO	-	Community Based Organisation
CIDA	-	Canadian International Development Agency
CONIWAS	-	Coalition of NGOs in the Water and Sanitation Sector
DA		District Assembly
DANIDA	-	Danish International Development Agency
DBB	-	Densu Basin Board
DGRE		Directorate General for Water Resources (Burkina Faso)
ECOWAS	-	Economic Community of West African States
EU	-	European Union
FEWS	-	Flood Early Warning System
GEF	-	Global Environmental Facility
GMet	-	Ghana Meteorological Agency
GOFA	-	Global Organisation for Fundamental Aid
GoG		Government of Ghana
GWCL	-	Ghana Water Company Limited
HAP		Hydrogeological Assessment Program
HSD	-	Hydrological Services Department
IGF	-	Internally Generated Funds
IUCN	-	International Union for the Conservation of Nature
IWMI	-	International Water Management Institute
IWRM	-	Integrated Water Resources Management
JTC	-	Joint Technical Committee
LI	-	Legislative Instrument
MOFA	-	Ministry of Food and Agriculture
MWRWH	-	Ministry of Water Resources, Works and Housing
NDSU	-	National Dam Safety Unit
NGO	-	Non-Governmental Organisation
NORAD	-	Norwegian Agency for Development Cooperation
ORASECOM	-	Orange-Senqu River Basin Commission
PAGEV	-	Project on Improving Water Governance in the Volta Basin
PFCM	-	Permanent Framework for Coordination and Monitoring
PBB	-	Pra Basin Board

SEA	-	Strategic Environmental Assessment
TAC	-	Technical Advisory Committee
TBB	-	Tano Basin Board
TDA	-	Transboundary Diagnostics Study
UNEP	-	United Nations Environmental Program
VBA	-	Volta Basin Authority
VRA	-	Volta River Authority
WEAP	-	Water Evaluation and Planning System
WHO	-	World Health Organisation
WLPA	-	Weija Lake Protection Association
WQI	-	Water Quality Index
WRC	-	Water Resources Commission
WRCC	-	Water Resources Coordination Centre
WRI	-	Water Research Institute
WVBB	-	White Volta Basin Board

## **EXECUTIVE SUMMARY**

### **INTRODUCTION**

The Water Resources Commission (WRC) was established by Act 522 of 1996 with a mandate to regulate and manage Ghana's water resources and to coordinate any policy in relation to them. The 3<sup>rd</sup> Commission has been in office since July 2010.

This is the 13<sup>th</sup> Annual Report of the WRC. The Report highlights the regulatory and water resources assessment and management activities, administrative matters, manpower, technical assistance, and financial status of the Commission during the year 2011.

### **ADMINISTRATION OF REGULATIONS**

#### **Administration of Water Use Regulations**

The Commission continued with the processing and approval of water rights under the Water Use Regulations, Legislative Instrument (LI) 1692 of 2001. Thirty-three (33) new and renewed water use permits were issued bringing the total water use permits issued to one hundred and seventy-one (171).

The 6<sup>th</sup> Water Use Register was published at the end of 2011. Analysis of the registered water users shows that 63.7% of the total number of 171 major water users was engaged in domestic and/or municipal water supply, whereas 0.6% each were engaged in power generation, construction, underwater wood harvesting, and navigation. Raw water uses for industrial (food processing), irrigation, and mining purposes accounted for 4.7%, 2.3% and 21.1% respectively.

In relation to water use compliance, twenty-six (26) permit holders representing 15.2% of the total one hundred and seventy (171) permit holders complied with their permits conditions. The permit holders are made up of ten (10) companies, some of which have multiple permits for different water use activities. A checklist of water quality parameters has been developed to serve as a guide for monitoring water quality compliance.

#### **Drilling Licence and Groundwater Development Regulations**

The administration of the Drilling Licence and Groundwater Development Regulations LI 1827 of 2006 also continued. At the end of the year forty-one (41) well drilling licenses were issued bringing the total to one hundred and two (102) as compared to fifty-seven (57) in 2010.

### **MANAGEMENT OF PRIORITY RIVER BASINS**

The focus was on the Densu, White Volta and Ankobra Basins towards ensuring functionality of basin secretariats and their boards in managing the water resources of respective basins. In addition, the establishment of three (3) new basin secretariats were initiated for the Tano, Pra, and Dayi river basins to further enhance the decentralisation process.

#### **Densu Basin**

The Densu Basin Board (DBB) was reconstituted in June 2011. In terms of awareness creation, education and training five (5) radio and three (3) television programmes were carried out, while 2 CBOs and 9 Junior and Senior High schools were engaged for the World Water Monitoring Day activities.

Collaborative and coordination activities were organised with the Global Organization for Fundamental Aid (GOFA), the Greater Accra Regional Coordination Council, GWCL, Ga South Municipal Assembly, the Military and the Police to deal with persisting environmental issues such as encroachment of settlements, inappropriate fishing practices, stone quarry and sand winning.



The Densu Basin Board also undertook two (2) ecological monitoring programmes to update the entire members on current ecological trends within and around the Basin. Furthermore, actions and measures in the developed Densu IWRM Plan such as public awareness creation and education were taken on as part of routine programs/activities.

#### **White Volta Basin**

Most activities within the basin were undertaken in collaboration with the PAGEV and Climate Change Adaptation projects. However, the actions and measures in the White Volta IWRM Plan such as institutional collaboration were taken on as part of routine programs/activities.

#### **Ankobra Basin**

The Ankobra Basin Board was reconstituted in March and inaugurated in July 2011. The Secretariat facilitated the process of processing and granting water use permits to twelve (12) water users.

The ABB undertook one ecological monitoring to introduce members on the ecological trends within and around the Basin. Further to that the Board proposed strategies and actions to stem the level of devastation of the Ankobra River and its tributaries by illegal miners, especially the dredgers, which were initiated before the end of the year.

#### **Pra Basin**

The Pra Basin Board was inaugurated on June 21 2011. Two ecological monitoring exercises were organized for the Pra (Offin) Basin Board on the Offin river and five (5) tributaries of the Offin namely Subin, Abankoro, Anyinasu, Ode (Abofour), and Mfensi. The monitoring exercise enabled members of the PBB to observe and make recommendations towards improving the status of the ecosystem of the basin.

The secretariat facilitated the World Water Monitoring Day program in collaboration with two NGOs - Rural Education and Agriculture International (READI) and A Rocha Ghana - by engaging students to conduct basic monitoring of the Offin River at Adiembra.

### **PUBLIC AWARENESS AND EDUCATION**

After 5 years of implementation the Commission deemed it necessary to review the 2004 Communication Strategy and its Action Plan considering the extent of implementation and the dynamics of the communication interventions. The review was near completion with the production of draft Communication Strategy and Action Plan 2012-2016.

Training workshops were held for 112 police prosecutors in six regions. The sensitization of police prosecutors is a paradigm shift to lay the foundation for ensuring the enforcement of water laws in the management of the country's water resources.

As part of promoting and increasing awareness on IWRM promotional and publicity materials were produced to aid in the sensitization of IWRM nationwide. Three (3) different documentaries were screened to sensitize stakeholders including chiefs, school children and the wider public on the need to protect and conserve water.

The World Water Day was celebrated in Kumasi in the Ashanti Region under the theme 'Water for Cities: Responding to the Urban Challenge'. Activities to mark the Day included debates, quiz competition, radio talk shows; and a public forum and flag-hoisting ceremony.

### **WATER GOVERNANCE ACTIVITIES**

The policy development initiative by the WRC is the harmonized Buffer Zone Policy. The Buffer Zone Policy is to ensure that land strips/areas along open water bodies are designated and managed as conservation areas to restore, conserve and maintain the ecological integrity and to provide optimal

socio-economic benefits of such designated areas. The Buffer Zone Policy document was finalised and submitted to the Ministry of Water Resources Works and Housing for onward submission to Cabinet for adoption and implementation.

The Commission is developing a Dam Safety Regulations to regulate all relevant activities related to dam design, construction, operations, maintenance, and decommissioning to ensure uniform and adequate level of safety for all dams in Ghana. Drafting of the Regulations started towards the end of the year.

WRC also initiated the review of WRC (1996) Act 522 and the Water Use Regulation LI 1692 and to propose amendments. The aim was to address some practical difficulties regarding the operations/implementation of these legal enactments. The key issues that had been identified were agreed on and being compiled for submission to the Attorney General and Minister of Justice.

Set up of the Tano Basin office was initiated with the completion of identification key stakeholders and physical survey of the Tano basin. Institutional membership for its Basin Board was also determined, but the nomination of representatives of the institutions was still being garnered. The Birim and Black Volta River Basins were identified as new priority basins that required decentralised secretariats and Basin Boards to assist in the management of the water resources.

The National Dam Safety Unit (NDSU) is envisaged to be the centralised body responsible for administering regulations and coordinating dam safety activities. During 2011, WRC provided the initial secretarial and technical backup to the formal establishment of the NDSU.

## **WATER RESOURCES ASSESSMENT AND PLANNING PROGRAMS**

### **Water Quality Assessment**

The water quality-monitoring program covered 40 monitoring stations over the whole country. In all, thirty-one (31) river stations and nine (9) reservoir/lakes stations were monitored, analysed and classified according to the Water Quality Index (WQI), which is the general water quality indices type in which various physical, chemical and microbiological variables are aggregated to produce an overall index of water quality, describing the state of water quality of the water bodies. The quality of the waters deteriorated with only 55 % of waters found in Class II (fairly good water quality). Overall some 10 river stations improved in water quality while the other 30 stations deteriorated.

### **Hydrogeological Assessment**

Most of the hydrogeological assessment activities were on the improving the knowledge base and comprehension of the hydro-geological make-up of the three (3) regions in Northern Ghana. Data from six electronic databases were validated and consolidated in one database to serve as a basis for future hydrogeological projects. Field data were collected through 37 monitoring wells. Results to date include a hydro-stratigraphical conceptual model and an evaluation of groundwater recharge through soil moisture balance and chloride mass balance.

A Gender and Water Resources Management strategy as well as a Ground Water Management Strategy that defines groundwater monitoring and assessment activities were published at the end of 2011.

### **National and River Basin IWRM Plans**

The preparation of river basin IWRM plans incorporated various “streams” of activities, i.e. elaborating a baseline description, developing water demand projections, carrying out water balance and water availability analyses, and facilitating a Strategic Environmental Assessment (SEA) guided consultative process leading to identification of a prioritised action programme as perceived from the local basin-based perspective. WRC prepared IWRM Plans for the Pra and Tano River basins and by the end of the year draft IWRM plans for the two basins were under review.

The Pra and Tano river basin IWRM plans together with the existing three plans for the Densu, White Volta and Ankobra River Basins have provided vital inputs towards the development of a National IWRM plan. Baseline information was collated and all the participatory and consultative workshops were completed for the development of the National IWRM plan.

### **Climate Variability and Change Initiatives**

The key climate variability and change initiative was the program designed to introduce adaptation measures in water resources management to improve livelihoods of the vulnerable in the three northern regions.

The project was completed with various interventions in the beneficiary communities. These included the provision of climate safe and minimum evaporative community owned dug-outs and wells, and community nurseries for tree planting around water storage facilities in twelve (12) selected communities; provision of designed climate safe subsurface water storage facility/reservoirs to minimise the impact of floodwaters in twelve (12) other communities; a water conservation, flood risk reduction and irrigation strategy document developed for Northern Ghana; and the establishment of an innovative Adaptation Learning Centre as a major reference point in the White Volta Basin office (Bolgatanga) to sustain project activities.

In terms of the way forward, the potential to replicate has been established. WRC and Danida signed an agreement to up scale the project for another two years starting from 2012

### **Flood Hazard Assessment - White Volta Basin**

A World Bank supported project was initiated in 2011 to perform a Flood Hazard Assessment study for the White Volta River. The study was to investigate the scale and severity of flood hazards and assess the effectiveness of structural and non-structural measures to reduce or eliminate flood damages in the future. Furthermore, a Flood Early Warning System (FEWS) will be developed and implemented on flood forecasting, flood warning and flood crisis management.

By the end of the year, the Inception phase had ended successfully and substantial data had been collected to feed into the GIS database, Hydrological database and the Hydrological/hydraulic model. A river cross sections survey was also initiated along the White Volta River in Ghana between Yarugu and Lake Volta, a river reach length of about 570 km. Lastly, the training of key staff of the participating institutions started on issues relevant for the pre-development of the FEWS.

## **TRANSBOUNDARY WATER MANAGEMENT**

The WRC continued facilitating collaboration and cooperation at the international level to encourage the effective and resourceful exploitation and management of transboundary water resources.

### **The Volta Basin Authority**

The Volta Basin Authority (VBA) seeks to ensure international cooperation for the rational and sustainable management of the water resources of the Volta basin shared by six (6) countries. During the year 2011, the VBA undertook the following:

- Baseline studies on environmental and socio-economic conditions and the establishment of communication, information and decision-making tools.
- Regional meetings were held with experts from the Member States in the areas of Cartography, Agricultural Water, and Water-related Diseases.
- A study on 'Inventory of the Hydro-meteorological Situation in the Volta Basin' was undertaken. From the study, a metadata base on the Hydrometeorological Networks and an Atlas of Thematic Maps on the Volta basin have been developed.

- A 7-member delegation undertook a study and exchange visit to the Orange-Senqu River Commission (ORASECOM) in South Africa from 30 January to 05 February 2011. The delegation learnt at first hand the operations of ORASECOM and used the opportunity to agree on some future collaborative areas between ORASECOM and VBA.

### **Project on Improving Water Governance in the Volta Basin (PAGEV)**

The 2nd phase of PAGEV terminated at the end of 2011. Some of the accomplishments during the year 2011 included:

- Community durbars on Behaviour Change Communication (BCC), HIV prevention, stigma and voluntary counselling and testing were undertaken in 4 communities and 4 basic schools. A total of 1,575 (627male and 948 female) community members including the pupils were reached.
- Communities such as Kobore, Mognori and Bazua were able to raise seedlings. In all, 28,500 seedlings were provided and purchased.
- Bazua and Nafkulga communities in Bawku Municipality and Kobore in Bawku West District were supported with 13 water pumps to strengthen household food security in the dry season towards sustainable water resources management in the basin.
- Ministry of Food and Agriculture provided extension services to six (6) communities in terms of seed and fertilizer support for both rainfed and dry season crop production.

### **Ghana/Burkina Faso Joint-Technical Committee on IWRM**

The Ghana-Burkina Faso Joint Technical Committee on IWRM (JTC-IWRM), which seeks to strengthen the consultation mechanism for joint management of the natural resources of the Volta Basin and to advise the Ministers in charge of water of the two countries, held its 7<sup>th</sup> meeting at Tamale, Ghana.

The 2<sup>nd</sup> workshop on information dissemination and sensitization of the media in Burkina Faso and Ghana on water resources management was organised as a side event to the JTC-IWRM meeting. The workshop ended with the formation of a joint Ghana-Burkina media network for sharing information and promoting cooperation in transboundary water resources management.

### **ECOWAS Water Resources Coordination Centre**

The ECOWAS Water Resources Coordination Centre (WRCC) is one of the four organs of the Permanent Framework for Coordination and Monitoring (PFCM) of IWRM in West Africa. The major activity that WRC participated in was the 7<sup>th</sup> Meeting of the Technical Advisory Committee of the WRCC.

### **Transboundary UNEP/GEF Volta Project**

The 4-year UNEP/GEF Volta project is a regional imitative of the six riparian countries and is designed to promote a more sectorally-coordinated management approach, based on the principles of IWRM, at the national and regional levels. In 2011 the Demonstration 3 project in the Black Volta Basin implemented the following:

- Community entry and initial mobilization were completed with over 30 chiefs, elders, and opinion leaders in 5 communities well sensitized on the project.
- Over 400 community members (about 60% were women) were educated on the project through community forums. Participation in the project interventions was very high.

- About 50 project implementation committee members were identified and trained on their roles and responsibilities. They have assisted in the local running of the project.
- About 80 charcoal producers were trained and about 8 persons from the partner organizations benefitted from the Training of Trainers program.
- A new technology called the Kiln method of charcoal production has successfully been introduced to the communities.
- Plantations have been established at different hot spots. A 6 hectare plantation of Cacia established at the Gbongbong river site at Senyeri; 4 hectare Cacia plantation at the Doli river site at Bale; and 2 hectare Cacia plantation at the bank of the Black Volta river at Chache

## **ADMINISTRATIVE AND HUMAN RESOURCES**

During the course of the year, the Commission organised internal and external workshops, meetings and conferences. Targeted staff training programs were undertaken both at the national and international levels with the main focus on competency based training including water resources management, surface water modelling, financial management, and database management.

During the year 2011, the Commission had 29 staff members (18 male and 11 female) at post. The number of senior staff was 17 with the remaining 12 as junior staff. Three (3) staff left the Commission through resignation.

## **TECHNICAL ASSISTANCE**

**Danish International Development Assistance:** A 2-year Danida support program was initiated in 2009 and ended in June 2011. The program was designed to address climate variability and change by introducing adaptation measures in water resources management to improve livelihoods of the vulnerable in the three northern regions.

**Canadian Development International Agency:** The Hydrogeological Assessment Project (HAP) supported by the Canadian International Development Agency (CIDA) ended in December 2011. The project sought to improve the knowledge base and comprehension of the hydro-geological make-up of the three (3) regions in Northern Ghana.

**Norwegian Agency for Development Cooperation:** The Norwegian Agency for Development Cooperation (NORAD) is providing a 3-year assistance for the establishment of a National Dam Safety Unit and the development of Dam Safety Regulations.

**European Union (EU) - Water Facility:** The 3-year EU-Water Facility was designed to strengthen and enhance the capacity of WRC towards the general aim of introducing integrated water resources management (IWRM) at all appropriate levels of society, through the process of preparing the Tano and Pra river basin and national IWRM plans.

**Africa Water Facility (AWF):** WRC has signed two grant agreements with the Africa Water Facility (AWF), a Fund under the Africa Development Bank (AfDB), for implementation of two projects:

Re-optimization of Operations of Akosombo and Kpong Dams on the Volta River Project - to explore how the two dams could be reoperated to achieve simultaneous outcomes of restoring downstream ecosystems and human livelihoods, increasing the total electric power output; and reducing the incidence of water borne disease vectors.

Design For Reuse – Harvesting the Value of Effluent and Nutrients for Sustaining the Operation of Sanitation Facilities Project aimed at improving the public health and environmental integrity in

urban and peri-urban Ghana through the provision of reliable and complete sanitation by increasing the reuse of treated effluent and nutrients.

#### **FINANCIAL STATUS**

The audited financial statements indicate that total income for 2011 was GH¢1,963,995. On the other hand, details of expenditure show that general administrative expenditure for the period amounted to GH¢2,313,643 showing a net loss of GH¢349,648. However, the balance as at 1 January 2011 was GH¢1,643,734 hence the recorded balance as at 31 December 2011 was GH¢1,294,086.

## CHAPTER 1 – INTRODUCTION

### 1.1 The Commission

The Commission represents a forum for the integration, cooperation and coordination of diverse interests and comprises the major stakeholders in the water sector. It consists of 15 members including the Chairman, the Executive Secretary, and a representative each for women and NGOs in the water sector. The major stakeholder institutions represented on the Commission include Hydrological Services Department, Ghana Meteorological Agency, Water Research Institute, Ghana Water Company Limited, Irrigation Development Authority, Volta River Authority, Environmental Protection Agency, Forestry Commission, Minerals Commission, and a Traditional Ruler (Chief).

The list of members of the 3<sup>rd</sup> Commission is presented in Appendix 1 of this Report. During 2011, the Commission met and deliberated on 5 occasions.

### 1.2 Mandate

The WRC was established by an Act of Parliament (ACT 522 of 1996) as the institution generally responsible for the management of Ghana's fresh water resources. It is specifically mandated to regulate and manage the water resources and to co-ordinate related government policies.

### 1.3 Vision

The vision of the WRC is "Sustainable water management by all for all".

### 1.4 Mission Statement

WRC has the mission to 'regulate and manage the sustainable utilization of water resources and to coordinate related policies by combining our core competencies and hard work through effective participation, monitoring and awareness creation for socio-economic development of Ghana'.

### 1.5 Focus Areas and Activities

The Commission's activities in 2011 focused on the following:

1. The core function of regulating fresh water resources including the granting of water rights and drillers' licenses;
2. Meeting objectives of on-going support projects/programs targeted at the management of fresh water resources.

This 13<sup>th</sup> Annual Report of the WRC underscores the following for the year 2011:

- Administration of Regulations;
- Management of priority River Basins;
- Public awareness and education;
- Water governance initiatives
- Water resources assessment and planning programs;
- Transboundary water management initiatives;
- Administration and human resources; and
- Financial status of the Commission.

## CHAPTER 2 – ADMINISTRATION OF REGULATIONS

### 2.1 Administration of Water Use Regulations

Administration of the Water Use Regulations, Legislative Instrument (LI) 1692 of 2001 continued with the processing and issuance of water use permits. Thirty-three (33) new and renewed water use permits were issued bringing the total water use permits issued to one hundred and seventy-one (171) by the end of December 2011. Of the new and renewed permits, five (5) were for domestic water supply, seven (7) for industrial purposes, fifteen (15) for mining, aquaculture had three (3), one (1) was for irrigation, one (1) for under water wood harvesting, and one (1) for diversion purposes.

### 2.2 Water Use Register

The WRC, in fulfilment of the provisions of section 11 (5) of the Water Use Regulations 1692 of 2001, published the 6<sup>th</sup> Water Use Register at the end of 2011. A summary of the water use register is presented in Appendix 2.

The total water use permits (171) in the year 2011 was the same as that of 2010, because water use permits that have either expired or were out of operation were excluded. Analysis of the registered water users shows that 63.7% of the total number of 171 major water users was engaged in domestic and/or municipal water supply, whereas 0.6% each were engaged in power generation, construction, underwater wood harvesting, and navigation. Raw water uses for industrial (food processing), irrigation, and mining purposes accounted for 4.7%, 2.3% and 21.1% respectively. The Ghana Water Company Limited (GWCL) represents 91.7% of the 109 water users engaged in the domestic/municipal water supply category.

### 2.3 Compliance Monitoring

Compliance was basically through routine monitoring carried out through review of reports from permit holders in compliance with their permit conditions. Targeted field monitoring exercises were also undertaken to verify accuracy of records submitted by some permit holders.

The submitted quarterly environmental reports contained data on the following, amongst others:

- Monthly records of water quality monitoring of surface and ground water sources
- Monthly ground and surface water abstraction volumes
- Monthly effluent discharge volumes into the environment
- Monthly groundwater levels
- Monthly rainfall measurements and volumes of rainwater harvested

Twenty six (26) permit holders representing 15.2% of the total one hundred and seventy (171) permit holders, complied with their permits conditions. The permit holders are made up of ten (10) companies, some of which have multiple permits for different water use activities. The compliant companies and their number of permits are presented in Table 1.



**Table 1: Compliant Permit Holders in 2011**

No.	Water User	No. of Permits	Location of Use	Water Use Activity
1	Adamus Resources Limited	1	Nzema Gold Plant	Abstraction
2	Anglogold Ashanti	3	Akrofuom, Obuasi	Abstraction
			Iduapriem	Abstraction
			Obuasi	Diversion
3	Akosombo Textiles Limited	1	Akosombo	Abstraction
4	Central African Gold Limited	2	Bibiani Mine Site	Abstraction
			Mpasatia	Abstraction
5	Central Ashanti Gold Limited	3	Ayanfuri	Abstraction
			Ayanfuri	Dewatering
			Asuafo	Abstraction
6	Chirano Gold Mines Limited	1	Bibiani-Anhwiaso	Abstraction
7	Clark Sustainable Resource Development Limited	2	Afram Arm	Underwater wood harvesting
			Sedorm	Abstraction
8	Golden Star Limited	6	Prestea	Abstraction
			Bogoso/Prestea	Harvesting
			Benso	Abstraction
			Benso	Abstraction
			Mpohor	Abstraction
			Akyempim	Abstraction
9	Newmont Ghana Gold Limited	6	Kenyase /Ntotoroso	Abstraction
			Kenyasi-Subri	Abstraction
			Subika Pit	Abstraction
			Subika and Kenyasi	Abstraction
			Kenyasi (Ahafo Project)	Abstraction
			Kenyasi (Ahafo Project)	Abstraction
10	Owere Mines	1	Obenmase	Abstraction
11	Total	26		

In response to water users consistent requests for guidance on which parameters to monitor, a checklist of water quality parameters was developed to serve as a guide for monitoring water quality compliance. The checklist contains the various water user activities and their corresponding monitoring parameters. Water users will refer to the list to identify which parameters they are to monitor and report on.

#### 2.4 Administration of Drillers Licence and Groundwater Development Regulations

A total of forty-one (41) well drilling licenses were issued in the following categories:

- a) Category B: Companies with at least 2 water well drilling rigs - 6 licenses; and
- b) Category C: Companies with leased or 1 water well drilling equipment - 35 licences.

The WRC also published the 3<sup>rd</sup> Drilling Licence Register at the end of 2011. The total drilling licences issued and registered at the end of 2011 was 102 as against 57 registered in 2010.

Table 2 gives a summary of the licences issued, while details of the Drillers' Licence register are presented in Appendix 3.

**Table 2: Summary of New Drilling Licenses issued in 2011**

No	Organisation	Category	Licence No.
1.	Trust Water Works Ltd.	C	WRC/WDL/011/11
2.	JCR Drilling Ltd.	C	WRC/WDL/063/11
3.	Electro Aqua Gh. Ltd.	C	WRC/WDL/064/11
4.	Time Heals Ent. Ltd.	C	WRC/WDL/065/11
5.	Elex inmesh Ltd.	C	WRC/WDL/066/11
6.	Natalex Co. Ltd	C	WRC/WDL/067/11
7.	Ebekae Ltd.	C	WRC/WDL/068/11
8.	Geosystems Consulting Ltd.	C	WRC/WDL/069/11
9.	Aqua Works Ltd.	C	WRC/WDL/070/11
10.	Pekwapong Co. Ltd.	B	WRC/WDL/071/11
11.	Meridian Waterwell Drilling Ltd	B	WRC/WDL/072/11
12.	Sabailo Limited	C	WRC/WDL/072/11
13.	Brushwell Associates Limited	B	WRC/WDL/073/11
14.	Chucatel Ghana Limited	B	WRC/WDL/074/11
15.	Tech-2 Resources Limited	C	WRC/WDL/075/11
16.	Jamesbury Trading & Construction Ltd	C	WRC/WDL/075/11
17.	Rural Water Development Prog. (Church of Christ)	B	WRC/WDL/08/001
18.	China Zhong Hao (Gh) Ltd	B	WRC/WDL/08/002
19.	Arsmak Energy and Resources	C	WRC/WDL/077/11
20.	Mowakari Trading and Construction Co. Ltd	C	WRC/WDL/078/11
21.	Cephavick Limited	C	WRC/WDL/08/005
22.	Sandimax Company Limited	C	WRC/WDL/079/11
23.	Mikanbros Company Limited	C	WRC/WDL/080/11
24.	7A'S Christian Construction & Development Consult Ltd	C	WRC/WDL/081/11
25.	Prefan Investments Company Limited	C	WRC/WDL/081/11
26.	Leka Interactive Company Limited	C	WRC/WDL/083/11
27.	PRD Rigs Ghana Limited	C	WRC/WDL/084/11
28.	GM Projekts	C	WRC/WDL/085/11
29.	Dextin Company Limited	C	WRC/WDL/086/11
30.	Samjust Engineering Co. Ltd	C	WRC/WDL/087/11
31.	Kinkubi Solutions	C	WRC/WDL/088/11
32.	Savita Services	C	WRC/WDL/089/11
33.	Plumblin Global Services Ltd	C	WRC/WDL/090/11
34.	Both Side Company Limited	C	WRC/WDL/091/11
35.	Sages Consult (Ghana) Ltd	C	WRC/WDL/092/11
36.	Afrihope Missions	C	WRC/WDL/093/11
37.	Aglawu Company Limited	C	WRC/WDL/094/11
38.	G-MARK Environmental Engineering Co. Ltd	C	WRC/WDL/095/11
39.	Geosource Drilling Technologies Limited	C	WRC/WDL/096/11
40.	Darkata Engineering Services Ltd	C	WRC/WDL/097/11
41.	Pamicor Ltd	C	WRC/WDL/098/11

## CHAPTER 3 - MANAGEMENT OF PRIORITY RIVER BASINS

Activities continued in the functional priority river basins of the Densu, White Volta, and Ankobra towards improving the processes of implementing IWRM in Ghana. Actions and measures in the developed Densu, White Volta and Ankobra Basin IWRM Plans such as public awareness creation/raising and education were undertaken as part of routine programs/activities.

### 3.1 Densu Basin

#### 3.1.1 Densu Basin Board

The Densu Basin Board (DBB) was reconstituted in June 2011 and held two meetings. The Board also undertook two (2) ecological monitoring programmes to update the entire members on current ecological trends within and around the Basin.

#### 3.1.2 Regulatory Activities

The Densu Basin Secretariat assisted with the identification of new major and minor water users. During the reporting year, three (3) new users were identified within the basin. These included Boi Water Company Limited at Pantang and two other companies that are abstracting water from boreholes for sale using water tankers at Kwabenya. These users have began the application processes to enable them acquire water use permits.

#### 3.1.3 Awareness Creation, Education and Training

Activities held were generally geared towards enhancing the public's knowledge and appreciation of IWRM-related issues at the basin level.

- Five (5) radio and three (3) television programmes were carried out in connection with the World Water Day and a Stakeholders' Consultative Workshop on Weija.
- 2 CBOs and students from 9 Junior and Senior High schools were engaged for the World Water Monitoring Day in May and November 2011.

#### 3.1.4 Collaborative and Coordinative Activities

A number of collaborative and coordination activities were organised with DAs, the general public and stakeholder organizations to deal with persisting environmental issues such as encroachment of settlements, inappropriate fishing practices, stone quarry and sand winning. The activities included:

- Durbars held in collaboration with Global Organization for Fundamental Aid (GOFA) in 5 communities around Nsawam;
- Collaboration with the Greater Accra Regional Coordination Council, GWCL, Ga South Municipal Assembly, the Military and Police to enforce laws to protect the Weija Dam. Before the close of the year, removal of illegal structures had started;
- Engagement of the Weija Lake Protection Association (WLPA) on six occasions towards mobilizing funding to embark on conservation and preventive activities; and
- Continuous monitoring of the utilization and maintenance of sanitation facilities provided by the Urban Catchment Management Project.

#### 3.1.5 Implementation of the Densu Basin IWRM Plan

The Densu Basin IWRM Plan has a list of prioritised actions and measures, which attempts to address a broad spectrum of water management issues identified for the Densu Basin. The routine actions and measures were undertaken as part of the Secretariat's activities.

## **3.2 White Volta Basin**

### **3.2.1 White Volta Basin Board**

The 17-member White Volta Basin Board (WVBB) did not hold any meetings during the reporting year.

### **3.2.2 Collaborative and Coordinative Activities**

Most activities within the basin were undertaken in collaboration with the PAGEV and Climate Change Adaptation projects. The results are elaborated under the sections on Transboundary Water Management and Water Resources Assessment and Planning Programs respectively.

## **3.3 Ankobra Basin**

### **3.3.1 Ankobra Basin Board**

The Ankobra Basin Board (ABB) was reconstituted in March and inaugurated in July 2011. The ABB met once and undertook one ecological monitoring to introduce members on the ecological trends within and around the Basin.

### **3.3.2 Regulatory Activities**

The Basin Secretariat facilitated the processing and granting of water use permits to twelve (12) water users within the Ankobra Basin. The water users were as follows:

1. Ghana Rubber Estates Ltd,
2. Golden Star (Bogoso/Prestea) Ltd,
3. Adamus Resources Ltd,
4. Ms Elizabeth Otoo,
5. Aboso Gold Fields Ltd,
6. Ghana Bauxite Company Ltd,
7. Liebherr Mining (GH) Ltd,
8. Gold Fields (GH),
9. Golden Star (Wassa) Ltd,
10. AngloGold Ashanti Iduapriem Mine,
11. Shell (GH) Ltd; and
12. Norpalm (Gh) Ltd

The Secretariat also assisted in monitoring the water users to ensure compliance as well as registering minor water users.

### **3.3.3 Ecological Monitoring**

The Basin Secretariat and the ABB toured selected areas within the Ankobra Basin to obtain information on the ecological trends and challenges facing the basin. The Bonsa sub-catchment, which is strategically important to the Tarkwa Municipality, and a section of the main Ankobra River at Prestea (unofficially known as the headquarters of “Galamsey Operations”) were visited.

Following the visits, the Public Awareness and Education and the Technical Committees met and proposed strategies and actions to stem the level of degradation of the Ankobra River and its tributaries by illegal miners, especially the dredgers. One key proposal was for the Basin Secretariat to liaise and collaborate with the Western Regional Security Council to deal with the illegal miners. The collaboration process started before the end of 2011.

### **3.4 Pra Basin**

#### **3.4.1 Pra Basin Board**

The Pra Basin Board (PBB) was inaugurated on 21 June 2011. The inauguration was followed by a training workshop on the roles and obligations of the Board, and the implementation of IWRM in the basin. The PBB also undertook ecological monitoring to observe the ecological trends within and around the Offin sub-basin.

#### **3.4.2 Ecological Monitoring**

A preliminary ecological monitoring exercise was organized by the Basin Secretariat between May 30 and July 14, 2011 on the Offin river and five (5) tributaries of the Offin namely; Subin, Abankoro, Anyinasu, Ode (Abofour), and Mfensi. The monitoring exercise enabled members of the PBB to observe and assess the status of the terrestrial environment along the water bodies. The Board proposed to strengthen and focus on awareness creation as the key intervention to protect the environment from potential damage and restore the health of the ecosystem.

The PBB undertook its second ecological monitoring exercise on 30 September 2011 in Abofour and Nsuontem and interacted with the communities on IWRM challenges. Follow up actions to address the observed water quality issues and outcomes of the interaction included:

- Contact the Offinso South Municipal Assembly for the Assembly to liaise with the affected communities to address the challenges highlighted by both communities.
- Mobilize stakeholder support to address key issues including the relocation of refuse dump, renovation of boreholes, desilting the river regularly and tree planting along the riverbanks at Abofour.
- Facilitate community sensitization processes through community fora and meetings for sound practices and behavioural change that negatively affect the quality of rivers in the area.
- Adopt the productive roles of traditional knowledge systems as experienced at Nsuontem and replicate in other communities in the basin.

#### **3.4.3 World Water Monitoring Program**

World Water Monitoring Day (WWMD) is an international education and outreach program that builds public awareness and involvement in protecting water resources around the world by engaging citizens to conduct basic monitoring of their local water bodies. The 2011 WWMD was observed in the Pra Basin on 7 October, 2011 and facilitated by the Basin Secretariat in collaboration with Rural Education and Agriculture International (READI) and A Rocha Ghana (an Environmental NGO).

Nyinahin Catholic Senior High School was involved in the program to assess the quality of water of the Offin River at Adiembra. The students were provided with monitoring test kits and monitored the four basic water quality parameters of turbidity (clarity of the water), water temperature, dissolved oxygen (low or fluctuating levels can harm aquatic life), and pH (a measure of whether the water is acidic, neutral or alkaline).

#### **3.4.4 Awareness Creation, Education and Training**

The Basin Secretariat facilitated a capacity building training workshop for thirty-one (31) Police prosecutors from the Ashanti and Brong Ahafo Regions and also supported the 2011 World Water Day celebrations.



Figure 1: Participants at the Inauguration of the Pra Basin Board



Figure 2: Compliance Monitoring at GoldFields (Gh) Ltd, Tarkwa



Figure 3: World Water Monitoring Day with Students at Weija Dam Site



Figure 4: Students from Nyinahin Catholic Senior High School testing water temperature of River Offin at Adiembra near Nyinahin



Figure 5: Community sensitization durbar in White Volta Basin



Figure 6: Ecological Monitoring - Tour of the Nsawam Prison Aquatic Environment

## **CHAPTER 4 - PUBLIC AWARENESS AND EDUCATION**

### **4.1 Review of Communication Strategy**

The WRC in 2004 prepared a Communication Strategy and Action Plan as a 'guideline' that set the stage for properly structured and professionally delivered 'communication interventions' to facilitate a wider reach to the intended targets.

After 5 years of implementation the Commission initiated a review of the Communication Strategy and its Action Plan considering the extent of implementation and the dynamics of the interventions. At the end of 2011, the review was near completion with the production of a draft Communication Strategy and Action Plan 2012-2016 document.

### **4.2 Public Awareness Creation In IWRM**

Awareness creation and education workshops were organized for target groups to promote and facilitate IWRM awareness at all levels. In particular, training workshops were held between February and March 2011 for 112 police prosecutors in the Greater Accra, Eastern, Western, Central, Ashanti, and Brong Ahafo Regions. The sensitization of police prosecutors is a paradigm shift to lay the foundation for the enforcement of water laws, and further strengthen the capacity of law enforcement agencies in the management of water resources.

### **4.3 Educational Materials and Publications**

As part of promoting and increasing awareness on IWRM, promotional and publicity materials including 6000 poster stickers, 1200 flyers, and 1,000 pieces each of wrist bangles and a 16-month calendar were printed in February 2011 distributed nationwide. About 2,500 branded Tee shirts were also printed and distributed, while three (3) different documentaries were screened to sensitize stakeholders including chiefs, school children, and the wider public on the need to protect and conserve water.

The three (3) documentaries, which focus on water resources problems and management in the country, the Pra Basin and the Tano Basin were aired 30 times on GTV, TV3, TV Africa, and Metro TV networks. The documentaries were also shown at all WRC workshops and functions such as the training of police prosecutors.

Furthermore, two (2) billboards with messages on the Pra and Tano Basins were mounted in Ejisu and Abesim respectively.

### **4.4 World Water Day**

The essence of celebrating the World Water Day was to further enlighten people including decision-makers about the importance of water to life and draw attention to pressing issues related to the utilization and management of raw water resources in Ghana.

The day, which fell on March 22<sup>nd</sup> 2011, was celebrated in Kumasi in the Ashanti Region under the theme 'Water for Cities: Responding to the Urban Challenge'. Activities to mark the day included:

- a) Debate among Junior High Schools in the Kumasi Metropolitan Area;
- b) Quiz competition for Senior High Schools;
- c) Radio Talk Shows; and
- d) Public forum and flag-hoisting ceremony at the forecourt of the Prempeh Assembly Hall. The event attracted about seven hundred (700) people from a cross section of stakeholders including community members, security services, students, traditional leaders, assemblymen and women, private companies, and allied governmental agencies.



Figure 7: Police Prosecutors and Facilitators of the training program in Kumasi



Figure 8: Section of police prosecutors and facilitator in training workshop in Takoradi

QuickTime™ and a decompressor are needed to see this picture.

Figure 9: Police prosecutors in training workshop in Accra



Figure 10: Group work session - police prosecutors training workshop in Accra



## CHAPTER 5 – WATER GOVERNANCE ACTIVITIES

### 5.1 Policy Development

The main policy initiated by the WRC is the harmonized Buffer Zone Policy. The Buffer Zone Policy is to ensure that land strips/areas along open water bodies (rivers, streams, lakes) are designated and managed as conservation areas. The policy measures and actions would guarantee sustainably managed vegetation in order to restore, conserve and maintain the ecological integrity and provide optimal socio-economic benefits of such designated areas.

The Buffer Zone Policy document was finalised after series of broad-based nationwide stakeholder consultations. The document has been submitted to the Ministry of Water Resources, Works and Housing (MWRWH) for onward submission to Cabinet for adoption and implementation.

### 5.2 Development and Review of Legislative Instruments

The Commission is developing the third Regulations, which is on dam safety. The aim is to regulate all relevant activities related to dam design, construction, operations, maintenance, and decommissioning to ensure uniform and adequate level of safety for all dams in Ghana.

A Legal Committee is facilitating the development of the regulations. Three workshops were organised towards the development of the Dam Safety Regulations. The 1<sup>st</sup> workshop focused on the need to identify responsibilities for dam management in Ghana. The 2<sup>nd</sup> workshop examined the inputs from the Technical Committee on Dams into the regulations, while the 3<sup>rd</sup> workshop initiated the drafting of the dam safety regulations.

In the meantime, WRC initiated a process involving key water users and stakeholders to review the WRC (1996) Act 522 and the Water Use Regulation LI 1692 and to propose amendments. The aim was to address some practical difficulties regarding the operations/implementation of these legal enactments. The key issues that emerged for consideration are related to the following:

- a. Membership of the Commission - Section 3 of Act 522;
- b. Grant of Water right - Section 16(3) of Act 522;
- c. Parliamentary Ratification - Section 16 (8)(9) of Act 522;
- d. Penalty for Offences - Sections 24 and 34 of Act 522; and
- e. Water uses exempted from permit but to be registered (Water Use Regulations L.I. 1692 (2001) - 10 (1a).

Most of the issues for amendment were agreed on and being compiled for submission to the Attorney General and Minister of Justice.

### 5.3 Establishment of Water Governance Institutions

WRC continued with the process of establishing new governance institutions in the form of river basin secretariats and their functional Boards as well as a dam safety unit.

- (i) **Tano Basin Office:** the set up of the Tano Basin office was initiated with the completion of key stakeholders identification and physical survey of the Tano basin. Office space was finally acquired in Sunyani with the assistance of the Brong Ahafo Regional Coordinating Council. Institutional membership for Tano Basin Board (TBB) was also determined, but the nomination of institutional representatives was still being garnered.

**(ii) Birim and Black Volta Basin Offices:** The Birim and Black Volta River Basins were identified as new priority basins that required decentralised secretariats and Basin Boards to assist in the management of the water resources. Consultations with selected stakeholders in the two basins started, but practical actions would commence in 2012.

**(iii) National Dam Safety Unit (NDSU):** the NDSU is envisaged to be the centralised body responsible for administering regulations and coordinating the activities on dams to ensure that an adequate and uniform level of dam safety is maintained with respect to the failure consequences the dam imposes.

During 2011, WRC provided the initial secretarial and technical backup to the formal establishment of the NDSU. Specifically, one temporary staff member was recruited to assist with practical management of activities; office space was allocated and equipped; and the structure and staffing of the NDSU were defined.

## CHAPTER 6 - WATER RESOURCES ASSESSMENT AND PLANNING PROGRAMS

### 6.1 Water Quality Assessment

The water quality monitoring program covered 40 monitoring stations over the whole country. In all, thirty-one (31) river stations and nine (9) reservoir/lakes stations were monitored during the year. The break-down of monitoring stations is as follows:

- South-western System - 19 stations;
- Coastal System - 8 stations;
- Volta System - 13 stations.

Sampling of the rivers and lakes was undertaken in the months of March, July and October 2011. Assessments were carried out on physico-chemical water quality parameters including Temperature; pH; Conductivity; Total Suspended Solids; Transparency; Nutrients; Major Ions; Micro-Organic Pollutants; Trace metals in water and fish; and sediment analysis.

Fish analysed were *Tilapia sp.* The metal concentrations found in the fish were within the WHO guidelines and therefore will not have any implications on health. Bacteriological qualities of the waters were poor. For instance, coliform bacteria was high in all the rivers analysed making the rivers possible sources of gastro-intestinal disease infection if not treated before use for domestic purposes. The detection of certain phytoplankton such as *Euglena*, *Phacus* and *Trachelomonas* is an indication of organic pollution and high human waste. Other potential toxic species were also found.

Most of the river waters were classified in Class II (*fairly good water quality*), with few exceptions in Class III (*poor water quality*). The quality of the waters deteriorated in October 2011, with only 55 % of waters found in Class II. Overall some 10 river stations improved in water quality while the other 30 stations deteriorated. The following rivers scored below 50 (*poor water quality*) in the Water Quality Index (WQI):

1. Lake Bosomtwe
2. Twifo-Praso - R. Pra
3. Dunkwa-On-Offin -R. Offin
4. Ampansie

Table 3 presents the water bodies that either improved or deteriorated in quality from Class II to Class III between 2010 and 2011, while Annex 4 shows the overall Water Quality Indices of Rivers in 2011.

**Table 3: River Stations Water Quality Index for River System**

Station	Mean-2010	Class	Mean-2011	Class	Improvement Ranking
Aframso - R. Afram	55.8	II	63.5	II	1
Pwalugu -White Volta	55.8	II	59.9	II	2
Buipe - Black Volta	63.8	II	67.4	II	3
Mankesim-R.Ochi-Amisa	60.4	II	62.7	II	4
Dominase - R. Ankobra	55.2	II	57.2	II	5
Damanko - Oti	61.5	II	63.1	II	6
Lake Brimso-R. Kakum	59.7	II	60.7	II	7
Mankrong J-R.Ayensu	58.9	II	59.5	II	8
Sefwi-Wiawso - R. Tano	59.2	II	59.5	II	9
Daboya - White Volta	61.5	II	61.8	II	10
Lake Bosomtwe	56.3	II	49.8	III	30

Dunkwa-On-Offin-R. Offin	57.8	II	49.0	III	34
Twifo-Praso - R. Pra	58.9	II	49.4	III	36
Ampansie	59.6	II	48.5	III	37

#### Key

	Rivers that improved in quality
	Rivers that deteriorated from class II to III

## 6.2 Hydrogeological Assessment

Most of the hydrogeological assessment activities were on improving the knowledge base and comprehension of the hydro-geological make-up of the three (3) regions in Northern Ghana.

The assessment was carried out under the CIDA Supported Hydrogeological Assessment Programme (HAP) through inventorying, collection, validation and synthesis of existing hydrogeological information. Data from six electronic databases were validated and consolidated in one database to serve as a basis for future hydrogeological projects. Field data were collected through 37 monitoring wells. Results include a hydro-stratigraphical conceptual model and an evaluation of groundwater recharge through soil moisture balance and chloride mass balance.

Some major accomplishments are as follows:

- The perceived hopelessness situation regarding probability of striking successful groundwater source points e.g. boreholes is giving way for some optimism regarding borehole drilling success rate; i.e. success rate stands at 80% according to field data generated;
- Field data analysed indicates drilling depths should be extended to depths ranging between 100 and 150 meters if water does not show up at depths up to 60 meters and formation penetration rate does not indicate refusal;
- Borehole yields have shown some improvement contrary to existing knowledge that boreholes yields in the north are marginal in nature and only sufficient to support handpump operations; boreholes yields fall in the range from 100litres/min to 600litres/min from data generated under the project;
- The base of a national hydrogeological database has been established. With needed resources this could be up-scaled to cover the entire country;
- Groundwater monitoring infrastructure has been established - 37 monitoring stations fitted with field recording equipment to monitor groundwater levels and quality in the north;
- Estimated recharge over the northern regions for the period 2000-2005 falls in the range of 2 – 16% of average annual rainfall;
- Annual recharge estimated indicates that less than 2% of recharge from rainfall is being abstracted annually; though incidence of over-abstraction may occur in some localized areas;
- Natural groundwater is generally of good quality (microbiological and physico-chemical);
- Certain natural chemical components particularly Fe, Mn, F, and Cl do not meet WHO quality standards in some locations;
- Quality deterioration due to human activities in certain locations resulted in high NO<sub>2</sub> and NO<sub>3</sub>.

Other interventions included capacity building of WRC staff and partner institutions in the technical and institutional facets of groundwater planning and development. Specifically, a Gender and Water Resources Management strategy was completed and published. A Ground Water Management Strategy that defines groundwater monitoring and assessment activities was also published.

### **6.3 National and River Basin IWRM Plans**

River Basin IWRM Plans serve as a “blue print” for further water resource management activities in river basins. WRC continued with the preparation of IWRM Plans for the Pra and Tano River basins and by the end of the year, draft IWRM plans for the two basins had been developed and were under review.

The preparation of the river basin IWRM plans incorporated various “streams” of activities, i.e. elaborating a baseline description, developing water demand projections, carrying out water balance and water availability analyses, and facilitating a Strategic Environmental Assessment (SEA) guided consultative process leading to identification of a prioritised action programme as perceived from the local basin-based perspective.

The Pra and Tano River basin IWRM plans together with the existing three plans for the Densu, White Volta and Ankobra River basins have provided vital inputs towards the development of a National IWRM plan. The national plan is to set out the direction and implementation framework for the legal and institutional development to achieve the overall goal of the water resources management part of the National Water Policy.

Collation of baseline information was completed and all the participatory and consultative workshops were completed for the development of the National IWRM plan at the end of the year.

### **6.4 Climate Variability and Change Initiatives**

The key climate variability and change initiative was the continuation of the 2-year Danida support program designed to introduce adaptation measures in water resources management to improve livelihoods of the vulnerable in the three northern regions. During the year, the project was completed with various interventions in the beneficiary communities.

Some key outputs include:

- Construction of climate safe and minimum evaporative community owned dug-outs and wells, and community nurseries towards tree planting around water storage facilities in twelve (12) selected communities.
- Provision of designed climate safe subsurface water storage facility/reservoirs to minimise the impact of floodwaters in twelve (12) other communities.
- A water conservation, flood risk reduction and irrigation strategy document developed for Northern Ghana
- Establishment of an innovative Adaptation Learning Centre in the White Volta Basin office (Bolgatanga) as a major reference point to sustain project activities.

In terms of the way forward, the potential to replicate was established. For instance little financial investment is required and most of the activities are now seen as cross-cultural in the context of adaptation to climate change. Secondly, there are options for sustainability and up scaling. The local communities are determined in their own little ways to emulate what have been achieved in other communities. Finally, WRC and Danida signed an agreement to up scale the project for another two years starting from 2012.

## 6.5 Flood Hazard Assessment - White Volta Basin

A World Bank supported project was initiated in 2011 to perform a Flood Hazard Assessment study for the White Volta River. The study was to investigate the scale and severity of flood hazards and assess the effectiveness of structural and non-structural measures to reduce or eliminate flood damages in the future. Furthermore, a Flood Early Warning System (FEWS) was to be developed and implemented on flood forecasting, flood warning and flood crisis management.

By the end of the year, the Inception phase had ended successfully with the areas defined for study to include the following:

- a. Flood hazard modeling for the White Volta from the Ghana-Burkina Faso border to Lake Volta, including vulnerable reaches of the main tributaries;
- b. Flood risk assessment by combining the flood hazard with the vulnerability of the communities and land use in the flood prone areas;
- c. Assessment of the effectiveness of structural and non-structural flood management/protection measures;
- d. Flood forecasting and input for a Flood Early Warning System (FEWS);
- e. Provision of basic input to the development of the Emergency Preparedness Plan, and
- f. Training of staff of the partner institutions in the development, application and operation of the modeling tools to be prepared and the use of the modeling results.

Substantial data has been collected to feed into the GIS database, hydrological database and the hydrological/hydraulic model. A river cross sections survey was also initiated along the White Volta River in Ghana between Yarugu and Lake Volta, a river reach length of about 570 km. Along this reach cross sections of the White Volta tributaries Kulpawn/ Sissili, Nasia and Nabogo were to be surveyed from the confluence with White Volta up to the first gauging station as well, over an additional total length of about 140 km. The cross sections of the Volta River and tributaries would be used to develop a one-dimensional flow model.

Lastly, the training of key staff of the participating institutions including WRC, VRA, HSD, and GMet started on issues relevant for the pre-development of the FEWS.

## CHAPTER 7 – TRANSBOUNDARY WATER MANAGEMENT

The WRC maintained and continued with its role as the national focal institution charged with coordinating international cooperation and initiatives to improve water governance at the transboundary level.

### 7.1 The Volta Basin Authority

The Volta Basin Authority (VBA), which was formally established in August 2009, seeks to ensure international cooperation for the rational and sustainable management of the water resources of the Volta basin shared by six (6) countries: Burkina Faso (42.95%), Ghana (41.63%), Togo (6.41%), Benin (3.42%), Mali (3.12%), and Ivory Coast (2.48%).

During the year 2011, VBA undertook activities towards the following strategic outcomes:

#### 1. Establishing data management and sharing mechanisms

- Baseline studies on environmental and socio-economic conditions and the establishment of communication, information and decision-making tools.
- Regional meetings were held with experts from the Member States in the areas of Cartography, Agricultural Water, and Water-related Diseases.
- Volta HYCOS activities continued with the view to improving hydrometric networks and support national activities.

#### 2. Knowing the state of water and environmental resources

- A study on 'Inventory of the Hydro-meteorological Situation in the Volta Basin' was undertaken. From the study, a metadata base on the 'Hydrometeorological Networks' and an 'Atlas of Thematic Maps on the Volta basin' have been developed.

#### 3. Strengthening the capacity of VBA

- A 7-member delegation undertook a study and exchange visit to the Orange-Senqu River Commission (ORASECOM) with its headquarters in South Africa from 30 January to 05 February 2011. The delegation learnt at first hand the operations of ORASECOM and also used the opportunity to agree on possible future collaboration between ORASECOM and VBA.

### 7.2 Project on Improving Water Governance in the Volta Basin (PAGEV)

The 2<sup>nd</sup> phase of PAGEV, which was implemented by the International Union for Conservation of Nature (IUCN) in collaboration with the Directorate General for Water Resources (DGRE) of Burkina Faso and Water Resources Commission (WRC) of Ghana, terminated at the end of 2011.

Some of the accomplishments during the year 2011 included the following:

- Community durbars on Behaviour Change Communication (BCC), HIV prevention, stigma and voluntary counselling and testing were carried out in 4 communities (Mognori, Nafkolga, Bazua and Kugrashia) and 4 basic schools within the project area. A total of 1,575 (627male and 948 female) community members including pupils were reached.
- Communities such as Kobore, Mognori and Bazua were able to raise seedlings. In addition, there was the supply of panar (improved maize variety) seed to flood victims in the Kugrasia community and provision of 200 tree seedlings to be planted on the river site. In all, 28,500 seedlings were provided and purchased.

- Bazua and Nafkulga communities in Bawku Municipality and Kobore in Bawku West District were supported with 13 water pumps to strengthen household food security in the dry season towards managing water resources in the basin, and to galvanise action for ecosystem restoration.
- Ministry of Food and Agriculture (MOFA) provided extension services for both rainfed and dry season crop production. Six (6) communities benefited from seed (mainly maize and onions) and fertilizer support.

### **7.3 Ghana/Burkina Faso Joint-Technical Committee on IWRM**

A Ghana-Burkina Faso Joint Technical Committee on IWRM (JTC-IWRM) was set up in 2005 to strengthen the consultation mechanism for the joint management of the natural resources of the Volta Basin and to advise the Ministers in charge of water of the two countries. The WRC is the focal institution for Ghana while the DGRE acts for and on behalf of Burkina Faso.

In the course of the year, the JTC-IWRM held its 7<sup>th</sup> meeting at Tamale, Ghana, which was attended by officials and experts in charge of water resources of the two countries, the VBA, and for the first time a delegation from Togo as observers. The meeting made the following recommendations:

- Involve the meteorological services of the two countries in the meetings and activities of the JTC-IWRM;
- Ensure that the two countries raise the funds needed to hold regular statutory meetings as stipulated in the agreement signed by the two Ministers in charge of water;
- Ensure the exchange of meteorological, hydrological, and hydraulic information between the two countries; and
- Pursue the sensitization of the local populations of the two countries on the achievements and activities of the JTC-IWRM.

The 2<sup>nd</sup> workshop on information dissemination and sensitization of the media in Burkina Faso and Ghana on water resources management was organised as a side event to the JTC-IWRM meeting. The workshop ended with the formation of a joint Ghana-Burkina media network for sharing information and promoting cooperation in transboundary water resources management.

### **7.4 ECOWAS Water Resources Coordination Centre**

The ECOWAS Water Resources Coordination Centre (WRCC) is one of the four organs of the Permanent Framework for Coordination and Monitoring (PFCM) of IWRM in West Africa. ECOWAS Heads of State and Government established the WRCC in December 2001 to promote, co-ordinate, and implement IWRM in West Africa in compliance with ECOWAS mission and policies.

The major activity that WRC participated in was the 7<sup>th</sup> Meeting of the Technical Advisory Committee (TAC) of the WRCC. The meeting agreed to advance the following:

- The dialogue on large water sector infrastructure projects through adopting the prepared guidelines for the sustainable development of water infrastructure in West Africa;
- The establishment of three new basin organizations namely Mono Basin (Bénin-Togo), Cavally-Cestos-Sassandra Basin (Cote d'Ivoire-Guinea-Liberia) and Comoé-Bia-Tanoé Basin (Burkina, Cote d'Ivoire-Ghana-Mali);
- The action plan for implementation of Water Resource Policy in West Africa; and
- The establishment of a regional water observatory



## **7.5 Transboundary UNEP/GEF Volta Project**

The 4-year UNEP/GEF Volta project commenced in January 2008. The Project is a regional initiative of the six riparian countries sharing the Volta basin and is designed to promote a more sectorally-coordinated management approach, based on the principles of IWRM, at the national and regional levels. The project intends to integrate environmental concerns into development plans of the basin and reduce human activities that lead to water scarcity.

In 2011 activities were carried out at two levels namely coordination of activities at the national level and implementation of the Demonstration 3 project in the Black Volta basin.

### ***Coordination of National Level Activities:***

Activities focused mainly on facilitating and supervising implementation of Demonstration 3 project field activities:

1. Reviewed work plans of the implementing partners and prepared inception report;
2. Undertook monitoring mission to project area and sites to assess and review progress of project implementation, discuss implementation challenges with project partners and make recommendations; and
3. Organized the 1<sup>st</sup> Project Steering Committee meeting in December 2011, to assess progress of project implementation and address challenges.

### ***Implementation of the Demonstration 3 Project:***

1. Community entry and initial mobilization were completed with over 30 chiefs, elders, and opinion leaders in 5 communities well sensitized on the project.
2. Over 400 community members (about 60% were women) were educated on the project through community forums. Participation in the project interventions was very high.
3. About 50 project implementation committee members were identified and trained on their roles and responsibilities in the project implementation. They have greatly assisted in the local running of the project.
4. About 80 charcoal producers were trained and about 8 persons from the partner organizations benefitted from the Training of Trainers program. These local trainers served as trainers of other communities.
5. A new technology called the Kiln method of charcoal production has successfully been introduced to the communities. The charcoal producers have accepted the technology because they produce more charcoal, but they are seeking assistance to purchase some of the Kiln.
6. Plantations have been established at different hot spots identified along the selected tributaries of the Black Volta River namely the Gbongbong and Doli Rivers as well as the degraded banks of the main Black Volta. Specifically:
  - a. A 6 hectare plantation of Cacia established at the Gbongbong river site at Senyeri
  - b. 4 hectare Cacia plantation established at the Doli river site at Bale
  - c. 2 hectare Cacia plantation has been established at the bank of the Black Volta river at Chache



Figure 11: Tree planting at Bale



Figure 12: Kiln charcoal production



Figure 13: Tree planting at Senyeri



Figure 14: Community forum at Cheche

## CHAPTER 8 - ADMINISTRATIVE AND HUMAN RESOURCES

### 8.1 Training Courses

The commitment to the implementation of an organisational development plan resulted in the update of staff needs assessment/capacity development plan. Targeted staff training programs were undertaken both at the national and international levels.

The main focus was on competency-based training where a number of staff had the opportunity and underwent specialised training including water resources management, dam safety, financial management, and database management.

Staff of the Commission benefited from the following training programmes and courses:

1. International Centre of Hydropower (ICH) course for Dam Safety Inspection. Six participants attended with two from WRC/NDSU and one each from VRA, GWCL, BPA and GIDA; Trondheim, Norway, June
2. Regional training on Agricultural Water Management in West Africa; Ouagadougou, Burkina Faso, 10-13 October
3. Training course in web services organised by VBA/IUCN; Ouagadougou, Burkina Faso, October 3-6
4. Training workshop for Administrative staff of the Water Resources Commission, Accra
5. WEAP Regional Workshop organized by IUCN (PAGEV)/VBA; Ouagadougou, Burkina Faso

### 8.2 Academic Courses

Six (6) staff members continued their academic degree programs in 2011

1. Edwin Afosa Anim and Eric Muala: Msc in Water Management; UNESCO-IHE, Institute for Water Education, Netherlands
2. Adwoa Dako: M.A. Communication Studies; University of Ghana
3. Florence Akpabli: BSc. Administration; Datalink University
4. Nicholas Owusu: BSc. Administration; IPS
5. Abigail Aziakpor: BSc. Administration; Methodist University

### 8.3 Workshops, Meetings and Conferences

During the course of 2011, WRC organized or was represented at the following meetings, workshops, and conferences:

1. 1<sup>st</sup> meeting of the Man & the Biosphere Committee of Ghana, Ada, May 6
2. 2<sup>nd</sup> Steering Committee meeting of WASH sector Resource Centre Network (RCN), Accra, November 8.
3. 5<sup>th</sup> URAdapt Research into Strategic Action Platform (Re-SAP) meeting, Accra, August 29
4. 11<sup>th</sup> PAGEV Project Steering Committee meeting, Ouagadougou, Burkina Faso, February 28
5. 18<sup>th</sup> Natural Resources Technical Review Committee meeting, Accra, December 1
6. Consultative workshop on capacity building for the assessment and monitoring of the costs of environmental degradation, Accra, December 6

7. Launch of situation Analysis of Women and Children in Ghana, by UNICEF, Accra, November 16.
8. Launching of a report "Human health risk assessment and epidemiological studies from exposure to toxic chemicals from mining operations in Tarkwa Nsuaem Municipality, Prestea Huni Valley District and Cape Coast Metropolis"; Accra, October 25
9. Mole XXII Conference organised by Coalition of NGOs in Water and Sanitation, CONIWAS. Presented paper on the topic "Oil and Gas and Mining its Implication in the WASH Sector"; Busua, July
10. Planning committee of the 3<sup>rd</sup> Ghana Water Forum held in September, Accra
11. Preparation of Ghana's 3<sup>rd</sup> National Communication on the UNFCCC, Accra, November 1.
12. Publicity Sub-Committee of the 3<sup>rd</sup> Ghana Water Forum; Accra
13. Rainwater Harvesting Strategy validation workshop, Accra, December 15.
14. Stakeholders meeting on "Facilitating Implementation and Readiness for Mitigation In Ghana"; Accra, October 26
15. Stakeholders' workshop for the development of Rainwater Harvesting Strategy; Accra. October 20.
16. Validation workshop on "Best Practices for the Development of Sustainable Water Infrastructure in West Africa, Ouagadougou, Burkina Faso, January 11
17. 18<sup>th</sup> National Learning Alliance platform, Accra, 28 July.
18. 3<sup>rd</sup> URAdapt Consultative Group meeting, Accra, August 26
19. Environmental indicators and statistics, Accra, October 12
20. Stockholm World Water Week, Stockholm, Sweden, August 21-27

#### **8.4 Human Resources**

The Commission had 29 staff members (18 male and 11 female) at post. The number of senior staff was 17 with the remaining 12 as junior staff. Three (3) staff left the Commission through resignation. The following staff members were at post as at the end of the year:

##### ***Non-Contract Appointments***

- |                                |                                          |
|--------------------------------|------------------------------------------|
| 1. Ben Y. Ampomah <sup>1</sup> | Ag. Executive Secretary (Economist)      |
| 2. Dorcas A. Paintsil          | Water Quality Specialist                 |
| 3. Francis Kwadade- Cudjoe     | Information Technology Specialist        |
| 4. Enoch B. Asare              | Ground Water Specialist                  |
| 5. Bob Alfa                    | Surface Water Resources Engineer         |
| 6. Bernadette Adjei            | Lawyer                                   |
| 7. Esi E. Biney                | Ecologist                                |
| 8. Linda G. Ennison            | Ag. Admin. Officer                       |
| 9. Adwoa M. Dako               | Public Relations Officer                 |
| 10. Stephen A. Boateng         | Accountant                               |
| 11. Aaron Bundi Aduna          | Basin Officer, White Volta Basin         |
| 12. Mawuli Lumor               | Basin Officer, Ankobra Basin             |
| 13. Ronald Abrahams            | Basin Officer, Densu Basin               |
| 14. Christine Young            | Assistant Officer (Legal and Monitoring) |

15. Edwin Afosah-Anim <sup>2</sup>	Assistant Officer (W.R. Planning)
16. Eric Muala <sup>3</sup>	Assistant Officer (Legal & Monitoring)
17. Joachim Ayiwe Abungba	Assistant Officer (White Volta Basin)
18. Edward A. Gyasi	Accounts Clerk
19. Dorcas Abban	Administrative Assistant, Densu Basin
20. Florence Akpabli	Secretary/Receptionist, Head Office, Accra
21. Nicholas Sakyi Owusu	Accounts Clerk II, Head Office, Accra
22. Laiza Sulley	Secretary, White Volta Basin, Bolgatanga
23. Emmanuel Mensah	Office Assistant, Head Office, Accra
24. Edward Toah	Driver Head Office, Accra
25. Samuel Quaye	Driver, Head Office, Accra
26. Daniel Botwe	Driver, Head Office, Accra
27. Abigail Aziakpor	Secretary/Receptionist, Head Office, Accra
28. Paapa Salifu	Cleaner/Gardener Head Office, Accra
29. Grace Quarcoe	Assistant Administrative Officer

#### ***Contract Appointments***

1. Dufie Adu Pako	Assistant Officer, Pra Basin
2. Brenda Ampomah	Assistant Officer, Densu Basin
3. Kwadwo Twum Karikari	Accounts Clerk
4. Joyce Annor	Cleaner

#### ***National Service***

1. Aminatu Mohammed	Head Office, Accra
2. Fredrick Owiredu Bremang	Head Office, Accra
3. Maclean Ayarik Akanlu	Ankobra Basin Office

#### ***Resignation***

1. Ransford Sowah Adjei	Assistant Officer (Information and Education)
2. Benjamin Opoku	Basin Officer, Tano Basin
3. Samuel Sey	Basin Officer, Pra Basin

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<sup>1</sup> Dr. Charles A. Biney, the substantive Executive Secretary retired in August 2010

<sup>2,3</sup> On study leave since 2010

## CHAPTER 9 - TECHNICAL ASSISTANCE

### 9.1 Danish International Development Assistance

A 2-year Danida support program was initiated in 2009 and ended in June 2011. The program was designed to address climate variability and change by introducing adaptation measures in water resources management to improve livelihoods of the vulnerable in the three northern regions (Refer to section 6.4).

### 9.2 Canadian Development International Agency

The Hydrogeological Assessment Project (HAP) supported by the Canadian International Development Agency (CIDA) ended in December 2011. The project sought to improve the knowledge base and comprehension of the hydro-geological make-up of the three (3) regions in Northern Ghana. It also contributed to capacity building of WRC staff and partner institutions in the technical and institutional facets of groundwater planning and development (Refer to section 6.2).

### 9.3 Norwegian Agency for Development Cooperation

The Norwegian Agency for Development Cooperation (NORAD) is providing a 3-year assistance for the establishment of a National Dam Safety Unit and the development of Dam Safety Regulations. The project formally started in 2010 and is to end in 2012 (Refer to sections 5.2 and 5.3).

### 9.4 European Union (EU) - Water Facility

The EU-Water Facility is a 3-year project (2009-2011) designed to strengthen and enhance the capacity of WRC towards the general aim of introducing integrated water resources management (IWRM) at all appropriate levels of society, through the process of preparing river basin and national IWRM plans. Most of the activities carried out under the EU support program relate to the development of the Tano and Pra river basins and the national IWRM plans (Refer to section 6.3).

### 9.5 Africa Water Facility (AWF)

WRC has signed two grant agreements with the Africa Water Facility (AWF), a Fund under the Africa Development Bank (AfDB), for implementation of two projects:

- Re-optimization of Operations of Akosombo and Kpong Dams on the Volta River Project: seeks to explore how the two dams could be reoperated to achieve among others the simultaneous outcomes of restoring downstream ecosystems and human livelihoods; increasing the total electric power output; increasing the reliability of water supply for hydropower generation; and reducing the incidence of water borne disease vectors. It is being implemented with other local and external partners (Volta River Authority, Water Research Institute, Institute of Environment and Sanitation, Centre for African Wetlands, International Water Management Institute (IWMI), and National Heritage Institute of California).
- Design For Reuse – Harvesting the Value of Effluent and Nutrients for Sustaining the Operation of Sanitation Facilities Project. The project aims at improving the public health and environmental integrity in urban and peri-urban Ghana through the provision of reliable and complete sanitation by increasing the reuse of treated effluent and nutrients. IWMI is the main implementing partner.

## CHAPTER 10 - FINANCIAL STATUS

### 10.1 Audited Financial Statements

The audited financial statements indicate that total income for 2011 was GH¢1,963,995. On the other hand, details of expenditure show that general administrative expenditure for the period amounted to GH¢2,313,643 showing a net loss of GH¢349,648. However, the balance as at 1 January 2011 was GH¢1,643,734 hence the recorded balance as at 31 December 2011 was GH¢1,294,086.

Details of key components of the audited financial statements comprising the Income and Expenditure Account and Balance Sheet for the year ended 31st December 2011 are presented below.

#### INCOME STATEMENT FOR THE YEAR ENDED 31 DECEMBER 2011

		2011	2010
	NOTE	GHC	GHC
Income (IGF)	2	518,882	429,553
Other Income	3	<u>1,445,113</u>	<u>1,860,935</u>
<b>Total Income</b>		<b>1,963,995</b>	<b>2,290,488</b>
General administration expenses	4	(2,313,643)	(1,515,804)
<b>Net income/ (loss) for the year</b>		<b><u>(349,648)</u></b>	<b><u>(774,684)</u></b>

**BALANCE SHEET AS AT 31 DECEMBER 31, 2011**

**ASSETS**

2011  
GH¢

2010  
GH¢



**Non-current Assets**

Property, Plant & Equipment	651,042	447,502
White Volta Capital Expenditure	21,869	18,506
Pra capital expenditure	30,285	16,465
Tano Capital expenditure	72,499	
	<u>775,695</u>	<u>482,473</u>

**Current Assets**

Accounts Receivables	254,803	278,044
Deferred expenditure	5,761	8,642
Prepayment for Residence	-	42,949
Cash & cash equivalents	326,881	871,240
	<u>587,445</u>	<u>1,200,875</u>
<b>Total Assets</b>	<u><b>1,363,140</b></u>	<u><b>1,683,348</b></u>

**EQUITIES AND LIABILITIES****Equity**

Accumulated Fund	1,234,241	1,583,889
Development Fund	59,845	59,845
	<u>1,643,734</u>	<u>1,294,086</u>

## Current Liabilities

Account Payables	69,054	39,614
	<u>69,054</u>	<u>39,614</u>
<b>Total Equity &amp; Liabilities</b>	<u><b>1,363,140</b></u>	<u><b>1,683,348</b></u>

## **Appendix 1 Members of the Water Resources Commission**

At the end of the year 2011, membership of the Commission was as follows:

1. Mr. Paul Derigubaa - Chairman
2. Dr. Kwabena Kankam-Yeboah - Water Research Institute
3. Mr. Julius Wellens-Mensah - Hydrological Services Department
4. Mr. Zinedeme Minia - Ghana Meteorological Agency
5. Mr. Daniel S. Amlalo - Environmental Protection Agency
6. Mr. Raphael Yeboah - Forestry Commission
7. Mr. Jonathan Ahenkorah - Minerals Commission
8. Mr. Charles K. O. Addo - Volta River Authority
9. Mr. Clement Bugase - Community Water and Sanitation Agency
10. Ms. Victoria Daaku - CONIWAS (NGO Representative)
11. Mrs. Clare Banoeng-Yakubo - Women's Representative
12. Pe Oscar Batabi Tiyaamu II (Kayoro-Pio) - Representative, Traditional Authorities
13. Mr. Ben Ampomah - Acting Executive Secretary, WRC
14. Mr. Zachary Gbireh - Irrigation Development Authority
15. Mr. Ebenezer Garbrah - Ghana Water Company Limited

**Appendix 2: Water Use Register for 2011**

<b>No</b>	<b>User Name</b>	<b>Municipal/District</b>	<b>Point of Use</b>	<b>Type of Source</b>	<b>Water Use Activity</b>	<b>Primary Purpose</b>	<b>Expiry Date</b>
1.	Abosso Goldfields Limited	Prestea-Huni Valley	Damang	River / Groundwater	Diversion	Industrial/Mining	1-Jan-13
2.	Adamus Resources Limited	Ellebelle	Nzema Gold Plant	River Ankobra	Pump Abstraction	Industrial/Mining	1-Oct-13
3.	Agricomah Enterprise	North Tongu	Mepe	Lower Volta	Fish Cage	Aquaculture	1-Jan-12
4.	Akosombo Continental Hotel Ltd	Asuogyaman	Atimpoku	Volta Lake	Pump Abstraction	Navigation	1-Jan-11
5.	Akosombo Textiles Limited	Asuogyaman	Akosombo	Volta River	Pump Abstraction	Industrial	1-Jan-11
6.	Alpha Para Enterprise	Ga East	Ashongman	Onyasia stream	Pump Abstraction	Domestic/Municipal	1-Jan-11
7.	Amoro Puse - Bosi	Jomoro	Elubo	Groundwater	Pump Abstraction	Domestic/Municipal	1-Jan-11
8.	AngloGold Ashanti	Wassa West	Iduapriem	Groundwater	Damming	Industrial/Mining	1-Jan-13
9.	AngloGold Ashanti	Adanse East	Akrofuom, Obuasi	Jimi River	Pump Abstraction	Industrial/Mining	1-Jan-14
10.	AngloGold Ashanti(Gh) - Stratsys Investment Ltd	Upper Denkyira	Ayanfuri	Offin River	Diversion	Industrial/Mining	-
11.	Aquaprima Ghana Limited	North Tongu	Leftbank Kpong Irrigation	Lake Volta	Aquaculture (Fish cage)	Aquaculture	1-Jan-11
12.	Benso Oil Palm Plantation Limited	Mpohor Wassa East	BOPP Estate	River, Groundwater	Pump Abstraction	Industrial	1-Jan-13
13.	Blue Sky Products (Gh) Limited	Akwapim South	Dobro	Groundwater	Pump Abstraction	Industrial	1-Jan-12
14.	Cargill Ghana Ltd	Tema Municipal	Tema Export Processing	Groundwater	Abstraction	Industrial/Domestic	1-Jan-14
15.	Central African Gold Limited	Bibiani-Anhwiaso-Bekwai	Bibiani Mine Site	Amponsah, Mpokwamp, Mempeasemati Streams	Abstraction	Industrial/Mining	1-Apr-13
16.	Central Ashanti Gold Limited	Upper Denkyira West	Ayanfuri	Abnabna, Fobinso, Abnanbna-AF Gap, Fetish, Esujah Pits	Dewatering	Industrial/Mining	1-Jan-13
17.	Central Ashanti Gold Limited	Upper Denkyira West	Ayanfuri	Groundwater	Abstraction	Industrial/Mining	1-Jan-13
18.	Central Ashanti Gold Limited	Upper Denkyira West		Asuafo stream	Diversion	Mining	-
19.	Chirano Gold Mines Ltd	Bibiani-Anhwiaso-Bekwai	Bibiani-Anhwiaso-Bekwai	Groundwater, River Suraw	Abstraction	Domestic/Mining	10-Jan-14
20.	Christ The King Water Works	Prestea Huni Valley	Bogoso Area	Groundwater	Abstraction	Domestic/Municipal	1-Jan-15
21.	Clark Sustainable Resource Development Ghana Ltd	Asuogyaman	Afram Arm	Volta Lake	Underwater wood harvesting	Industrial	1-Sep-13

22.	Clark Sustainable Resource Development Ghana Ltd	Asuogyaman	Sedorm	Groundwater, Volta Lake	Abstraction	Domestic/Industrial	1-Sep-13
23.	Crystal Lake Fish Ltd	Asuogyaman	Dodi-Asantekrom	Volta Lake	Aquaculture (Fish cage), Abstraction	Aquaculture	1-Jan-12
24.	DMFS Ventures	Ga East	Legon	Groundwater	Abstraction	Domestic/Municipal	1-Aug-12
25.	Ghana Bauxite Company Limited	Bibiani-Anhwiaso-Bekwai	Afoa Hills	River Awa & Atronsu/Groundwater	Abstraction	Industrial/Mining	1-Jan-13
26.	Ghana Manganese Company Ltd	Wassa-West	Nsuta	Kawere River	Abstraction	Mining	1-Jan-13
27.	Ghana Oil Palm Development Company Limited	Kwaebibirim	Kwae Estate	Groundwater	Abstraction	Irrigation	18-Jan-13
28.	Ghana Rubber Estates Limited	Ahanta West	Apimenim & Abura	River Suoni & Tsibu/Groundwater	Abstraction	Irrigation, Industrial/ Domestic	1-Jan-14
29.	Ghana Water Company Ltd	Obuasi Municipality	Obuasi	River Oda	Abstraction	Domestic/Municipal	1-Jan-12
30.	Ghana Water Company Ltd	Akwapim South	Nsawam	River Densu	Abstraction	Domestic/Municipal	1-Jan-12
31.	Ghana Water Company Ltd	Kwahu-South	Kwahu Tafo	River Afram	Abstraction	Domestic/Municipal	1-Jan-12
32.	Ghana Water Company Ltd	New Juaben Municipality	Koforidua	River Densu	Abstraction	Domestic/Municipal	1-Jan-12
33.	Ghana Water Company Ltd	East Akim	Bunso	River Birim	Abstraction	Domestic/Municipal	1-Jan-12
34.	Ghana Water Company Ltd	Obuasi Municipality	Hweaseambo (Obuasi)	River Jimi	Abstraction	Domestic/Municipal	1-Jan-12
35.	Ghana Water Company Ltd	East Akim	New Tafo	River Bayira	Abstraction	Domestic/Municipal	1-Jan-12
36.	Ghana Water Company Ltd	Obuasi Municipality	Obuasi	Groundwater	Abstraction	Domestic/Municipal	1-Jan-12
37.	Ghana Water Company Ltd	Asuogyaman	Kpong	River Volta	Abstraction	Domestic/Municipal	1-Jan-12
38.	Ghana Water Company Ltd	Atwima Nwabiagya	Owabi	River Owabi	Abstraction	Domestic/Municipal	1-Jan-12
39.	Ghana Water Company Ltd	Nzema East	Nsein	River Denkyezule	Abstraction	Domestic/Municipal	1-Jan-12
40.	Ghana Water Company Ltd	Asikuma-Odoben-Brakwa	Breman-Asikuma (Weir)	Ochi-Nakwa	Abstraction	Domestic/Municipal	1-Jan-12
41.	Ghana Water Company Ltd	Upper Denkyira East	Dunkwa-on-Offin	Groundwater	Abstraction	Domestic/Municipal	1-Jan-12
42.	Ghana Water Company Ltd	Wassa West	Bonsaso	River Bonsa	Abstraction	Domestic/Municipal	1-Jan-12
43.	Ghana Water Company Ltd	Efutu-Awutu-Senya	Winneba - Weir	Ayensu River	Abstraction	Domestic/Municipal	1-Jan-12
44.	Ghana Water Company Ltd	Hohoe	Hohoe	River Dayi	Abstraction	Domestic/Municipal	1-Jan-12
45.	Ghana Water Company Ltd	Shama Ahanta East Metro.	Inchaban	River Anankwari	Abstraction	Domestic/Municipal	1-Jan-12

46.	Ghana Water Company Ltd	Mpohor Wassa East	Daboase/Bosomase	River Pra	Abstraction	Domestic/Municipal	1-Jan-12
47.	Ghana Water Company Ltd	Ga West	Weija	River Densu	Abstraction	Domestic/Municipal	1-Jan-12
48.	Ghana Water Company Ltd	Asuogyaman	Anum Boso	Volta Lake	Abstraction	Domestic/Municipal	1-Jan-12
49.	Ghana Water Company Ltd	Fanteakwa	Begoro	River Akrum	Abstraction	Domestic/Municipal	1-Jan-12
50.	Ghana Water Company Ltd	East Akim	Apedwa-Asafo	River Densu	Abstraction	Domestic/Municipal	1-Jan-12
51.	Ghana Water Company Ltd	Atiwa	Kwabeng	River Awusu	Abstraction	Domestic/Municipal	1-Jan-12
52.	Ghana Water Company Ltd	Atiwa	Abomосу	River Birim	Abstraction	Domestic/Municipal	1-Jan-12
53.	Ghana Water Company Ltd	Atiwa	Anyinam	River Birim	Abstraction	Domestic/Municipal	1-Jan-12
54.	Ghana Water Company Ltd	East Akim	Kibi	River Birim	Abstraction	Domestic/Municipal	1-Jan-12
55.	Ghana Water Company Ltd	Kwaebibirim	Kusi	River Birim	Abstraction	Domestic/Municipal	1-Jan-12
56.	Ghana Water Company Ltd	Fanteakwa	Osino	River Birim	Abstraction	Domestic/Municipal	1-Jan-12
57.	Ghana Water Company Ltd	New Juaben Municipality	Akwadum	River Densu	Abstraction	Domestic/Municipal	1-Jan-12
58.	Ghana Water Company Ltd	Manya Krobo	Asewewa	Groundwater	Abstraction	Domestic/Municipal	1-Jan-12
59.	Ghana Water Company Ltd	Sekyere-West	Mampong Weir	River Kyeremfa	Abstraction	Domestic/Municipal	1-Jan-12
60.	Ghana Water Company Ltd	Birim South	Osenase	River Supong	Abstraction	Domestic/Municipal	1-Jan-12
61.	Ghana Water Company Ltd	Yendi	Yendi	River Daka	Abstraction	Domestic/Municipal	1-Jan-12
62.	Ghana Water Company Ltd	Fanteakwa	Bosuso	River Yaya	Abstraction	Domestic/Municipal	1-Jan-12
63.	Ghana Water Company Ltd	Sunyani Municipality	Abesim	River Tano	Abstraction	Domestic/Municipal	1-Jan-12
64.	Ghana Water Company Ltd	Techiman Municipality	Tanoso	River Tano	Abstraction	Domestic/Municipal	1-Jan-12
65.	Ghana Water Company Ltd	Asutifi	Acherensua	River Tano	Abstraction	Domestic/Municipal	1-Jan-12
66.	Ghana Water Company Ltd	Tano North	Dwomo	River Moku	Abstraction	Domestic/Municipal	1-Jan-12
67.	Ghana Water Company Ltd	Berekum	Berekum	Groundwater	Abstraction	Domestic/Municipal	1-Jan-12
68.	Ghana Water Company Ltd	Wenchi East	Wenchi	Groundwater	Abstraction	Domestic/Municipal	1-Jan-12
69.	Ghana Water Company Ltd	Asutifi	Biaso	River Bia	Abstraction	Domestic/Municipal	1-Jan-12
70.	Ghana Water Company Ltd	Asunafo North	Goaso	River Goa	Abstraction	Domestic/Municipal	1-Jan-12
71.	Ghana Water Company Ltd	Atwima Nwabiagya	Barekese	River Offin	Abstraction	Domestic/Municipal	1-Jan-12
72.	Ghana Water Company Ltd	Ashanti-Akim North	Nubuom (Konongo-Odumasi)	River Anum	Abstraction	Domestic/Municipal	1-Jan-12

73.	Ghana Water Company Ltd	Birim North	Ofoase-Akim	River Pra	Abstraction	Domestic/Municipal	1-Jan-12
74.	Ghana Water Company Ltd	Keta	Keta	Groundwater	Abstraction	Domestic/Municipal	1-Jan-12
75.	Ghana Water Company Ltd	Kwaebibirim	Asuom	Groundwater	Abstraction	Domestic/Municipal	1-Jan-12
76.	Ghana Water Company Ltd	Birim South	Asene	Groundwater	Abstraction	Domestic/Municipal	1-Jan-12
77.	Ghana Water Company Ltd	Twifo Hemang Lower Denkyira	Twifo Praso	River Pra	Abstraction	Domestic/Municipal	1-Jan-12
78.	Ghana Water Company Ltd	Nzema East	Axim	River Denkyemzule	Abstraction	Domestic/Municipal	1-Jan-12
79.	Ghana Water Company Ltd	Birim South	Swedru-Akim	Groundwater	Abstraction	Domestic/Municipal	1-Jan-12
80.	Ghana Water Company Ltd	Kpandu	Sovie	Groundwater	Abstraction	Domestic/Municipal	1-Jan-12
81.	Ghana Water Company Ltd	Ga West	Weija Adam Clar	River Densu	Abstraction	Domestic/Municipal	1-Jan-12
82.	Ghana Water Company Ltd	Akatsi	Abor	Groundwater	Abstraction	Domestic/Municipal	1-Jan-12
83.	Ghana Water Company Ltd	Ga West	Weija Candy	Densu River	Abstraction	Domestic/Municipal	1-Jan-12
84.	Ghana Water Company Ltd	Asuogyaman	Kpong	Volta	Abstraction	Domestic/Municipal	1-Jan-12
85.	Ghana Water Company Ltd	Tamale Metro.	Tamale	White Volta	Abstraction	Domestic/Municipal	1-Jan-12
86.	Ghana Water Company Ltd	Kpandu	Nkonya-Ahenkro	Groundwater	Abstraction	Domestic/Municipal	1-Jan-12
87.	Ghana Water Company Ltd	East Akim	River Pra	River Pra	Abstraction	Domestic/Municipal	1-Jan-12
88.	Ghana Water Company Ltd	Agona	Kwanyako Dam	Ayensu River	Abstraction	Domestic/Municipal	1-Jan-12
89.	Ghana Water Company Ltd	Cape Coast Municipality	Brimsu Treatment Works	River Kakum	Abstraction	Domestic/Municipal	1-Jan-12
90.	Ghana Water Company Ltd	Jasikan	Jasikan	Groundwater	Abstraction	Domestic/Municipal	1-Jan-12
91.	Ghana Water Company Ltd	Keta	Anyako	Groundwater	Abstraction	Domestic/Municipal	1-Jan-12
92.	Ghana Water Company Ltd	Ho	Kpedze	River Tale	Abstraction	Domestic/Municipal	1-Jan-12
93.	Ghana Water Company Ltd	Ketu	Agbozume	Groundwater	Abstraction	Domestic/Municipal	1-Jan-12
94.	Ghana Water Company Ltd	Ketu	Aflao/Denu	Groundwater	Abstraction	Domestic/Municipal	1-Jan-12
95.	Ghana Water Company Ltd	Kpandu	Kpandu	Groundwater	Abstraction	Domestic/Municipal	1-Jan-12
96.	Ghana Water Company Ltd	Sogakope	S/E of V/R- Sega to Keta	River Volta	Abstraction	Domestic/Municipal	1-Jan-12
97.	Ghana Water Company Ltd	Jasikan	Jasikan	Groundwater	Abstraction	Domestic/Municipal	1-Jan-12
98.	Ghana Water Company Ltd	Mfantseman	Mankessim/ Baafikrom	Ochi-Amissa	Abstraction	Domestic/Municipal	1-Jan-12
99.	Ghana Water Company Ltd	Kwaebibirim	Kade	Groundwater	Abstraction	Domestic/Municipal	1-Jan-12

100.	Ghana Water Company Ltd	Kasena-Nankana	Doba/Navrongo Township	Groundwater	Abstraction	Domestic/Municipal	1-Jan-12
101.	Ghana Water Company Ltd	South Dayi	Ho/ Peki	Groundwater	Abstraction	Domestic/Municipal	1-Jan-12
102.	Ghana Water Company Ltd	Bawku-East Municipality	Bawku Township	Groundwater	Abstraction	Domestic/Municipal	1-Jan-12
103.	Ghana Water Company Ltd	Mfantseman	Baifikrom H'dworks	Ayensu River	Abstraction	Domestic/Municipal	1-Jan-12
104.	Ghana Water Company Ltd	Bolgatanga Municipality	Bolgatanga/ Zuarungu/Bongo	River Yaregatanga	Abstraction	Domestic/Municipal	1-Jan-12
105.	Ghana Water Company Ltd	Wa Municipality	Wa	Groundwater	Abstraction	Domestic/Municipal	1-Jan-12
106.	Ghana Water Company Ltd	Ho Municipality	Tsito	River Wuve	Abstraction	Domestic/Municipal	1-Jan-12
107.	Ghana Water Company Ltd	Wassa West	Prestea	Groundwater	Abstraction	Domestic/Municipal	1-Jan-12
108.	Ghana Water Company Ltd	Wassa West	Bogoso	Groundwater	Abstraction	Domestic/Municipal	1-Jan-12
109.	Ghana Water Company Ltd	West Gonja	Damango	River Sorri	Abstraction	Domestic/Municipal	1-Jan-12
110.	Ghana Water Company Ltd	ATMA	River Volta	River Volta	Abstraction	Domestic/Municipal	1-Jan-12
111.	Ghana Water Company Ltd	Jomoro	Elubo	River Tano	Abstraction	Domestic/Municipal	1-Jan-12
112.	Ghana Water Company Ltd	Kwahu West	Nkawkaw	Groundwater	Abstraction	Domestic/Municipal	1-Jan-12
113.	Ghana Water Company Ltd	Suhum Kraboa-Coaltar	Suhum	Groundwater	Abstraction	Domestic/Municipal	1-Jan-12
114.	Ghana Water Company Ltd	South Dayi	Kpeve	River Volta	Abstraction	Domestic/Municipal	1-Jan-12
115.	Ghana Water Company Ltd	Adansi	New Edubiase	Groundwater	Abstraction	Domestic/Municipal	1-Jan-12
116.	Ghana Water Company Ltd	Obuasi	Odaso	River Oda	Abstraction	Domestic/Municipal	1-Jan-12
117.	Ghana Water Company Ltd	Wassa West	Aboso	Groundwater	Abstraction	Domestic/Municipal	1-Jan-12
118.	Ghana Water Company Ltd	Ahafo Ano North	Tepa	Katabo River	Abstraction	Domestic/Municipal	1-Jan-12
119.	Ghana Water Company Ltd	West Akyem	Aboabo	Groundwater	Abstraction	Domestic/Municipal	1-Jan-12
120.	Ghana Water Company Ltd	Kpandu	Anfoega	Groundwater	Abstraction	Domestic/Municipal	1-Jan-12
121.	Ghana Water Company Ltd	Kadjebi	Kadjebi	Groundwater	Abstraction	Domestic/Municipal	1-Jan-12
122.	Ghana Water Company Ltd	Akatsi	Avenorpeme	Groundwater	Abstraction	Domestic/Municipal	1-Jan-12
123.	Ghana Water Company Ltd	West Akim	Asamankese	River Abuchen	Abstraction	Domestic/Municipal	1-Jan-12
124.	Ghana Water Company Ltd	Sekyere East	Effiduase	Borehole	Abstraction	Domestic/Municipal	1-Jan-12
125.	Golden Star (Bogoso/Prestea) Ltd	Wassa West	Prestea	Asuo Kofi	Abstraction	Industrial/Mining	1-Jan-11

126.	Golden Star (Bogoso/Pretea) Limited	Wassa West	Bogoso/Pretea	Rainwater harvesting/dewatering/ Groundwater	Abstract/Store	Mining/Domestic	1-Jan-14
127.	Golden Star (Wassa) Limited	Tarkwa Nsuaem	Benso	Groundwater, Toi, Ametano, Subri Streams	Abstraction	Mining	1-Jan-14
128.	Golden Star (Wassa) Limited	Tarkwa Nsuaem	Benso	Groundwater	Abstraction	Mining	1-Jun-11
129.	Golden Star (Wassa) Limited	Mporhor Wassa East	Mpohor	Adaekrom pit, Obraeybona Stream	Abstraction, Dewatering	Mining	1-Jul-13
130.	Golden Star (Wassa) Limited	Mpohor Wassa East	Akyempim	Groundwater	Abstraction, Dewatering	Mining	1-Jan-13
131.	Goldfields Ghana Limited (Tarkwa Gold Mines)	Wassa West	Tarkwa Gold Mine	Huni & Bonsa streams (groundwater & river)	Abstraction	Industrial/Mining	1-Jan-11
132.	Goldfields Ghana Limited (Tarkwa Gold Mines)	Tarkwa Nsuaem	Tarkwa Gold Mine	(groundwater & ponds)	Abstraction	Industrial/Mining	1-Jan-14
133.	Jakdom Agricultural services Limited	Asuogyaman	Mpakadan	Volta Lake	Aquaculture (Fish Cage)	Aquaculture	1-Jan-12
134.	Kibi Goldfields Ltd	Fanteakwa	Saamang	Akusu, Anoma Rivers	Diversion	Construction	
135.	Kibi Goldfields Ltd	Fanteakwa	Saamang	Freshwater Dam	Abstraction	Industrial/Mining	1-Jan-14
136.	Kibi Goldfields Ltd	Fanteakwa	Saamang	Anoma River	Abstraction	Industrial/Mining	1-Jan-14
137.	Kibi Goldfields Ltd	Fanteakwa	Saamang	Groundwater	Abstraction	Domestic	1-Jan-14
138.	Kibi Goldfields Ltd	Fanteakwa	Saamang		Damming	Construction	
139.	Lee's Farm Ghana Limited	Asuogyaman	Adjena	Volta Lake	Aquaculture (Fish Cage)	Aquaculture	1-Jan-13
140.	Mairene Ventures	Ga – East	Kwabanya	Groundwater	Abstraction	Domestic/Municipal	1-Jan-13
141.	Mama Afrika Water Supply	Ga – West	Amasaman	Groundwater	Abstraction	Domestic/Municipal	1-Jan-11
142.	Ministry of Energy (Mini Hydro Power Plant)	Hohoe	Tsatsadu	Tsatsadu River	Diversion, Construction	Power Generation	1-Jan-13
143.	Newmont Ghana Gold Ltd	Asutifi	Kenyasi (Ahafo Project)	Groundwater	Abstraction	Industrial/Mining	1-Dec-12
144.	Newmont Ghana Gold Ltd	Asutifi	Kenyasi-Subri	Subri River	Abstraction/Storage	Industrial/Mining	1-Jan-11
145.	Newmont Ghana Gold Ltd	Asutifi	Subika Pit	Groundwater	Dewatering	Industrial/Mining	1-Feb-13
146.	Newmont Ghana Gold Ltd	Ahafo	Kenyasi (Ahafo Project)	Awonsu stream	Construction, Diversion	Mining	-
147..	Newmont Ghana Gold Ltd	Asutifi	Subika, Kenyasi	Groundwater	Abstraction	Mining/Domestic	1-Jan-12
148.	Newmont Golden Ridge Ltd	Abirem North	New Abirem (Akyem Project)	Groundwater	Abstraction	Mining/Domestic	1-Jan-14
149.	Newmont Golden Ridge Ltd	Birim North	Hweakwae	Groundwater	Abstraction	Industrial/Mining	1-Jan-14



150.	Newmont Golden Ridge Ltd	Birim North	Hweakwae	Natural Water Course	Damming	Industrial/Mining	-
151.	Norpalm Ghana Ltd	Ahanta West	Ewusiejoe	R. Butre/ Groundwater	Abstraction	Industrial/Domestic	1-Jan-14
152.	Owere Mines Limited	Asante Akim	Obenmase	Groundwater	Abstraction	Industrial/Mining	1-Jan-14
153.	Peelco Limited	Awutu Senya	Bawjiase/Obembo	Groundwater	Abstraction	Industrial	1-Jan-13
154.	Prestea Sankofa Gold Limited	Prestea Huni Valley	Bondaye, Prestea	Bondaye pit, Essuo Kofi stream, groundwater	Abstraction	Mining/Domestic	1-Sep-13
155.	Regional Building & Contracting Company Ltd	Dangme West	Akuse/Asutsare	Lower Volta River	Dredging (Sand winning)	Industrial/Mining	1-Jul-13
156.	Samuel Opoku & Sons Limited	Gomoa	Adjumako	Rain water	Abstraction	Industrial/Mining	1-Jan-12
157.	Samuel Opoku & Sons Limited	Gomoa	Ajumako	Rain water	Damming	Construction	-
158.	Sithe Global Sustainable Oils Ghana Limited	Nkwanta South	Nkwanta South	Asukokoo River	Abstraction	Irrigation	1-Jan-13
159.	Sun Woo Culturing System Ltd	Asuogyaman	Volta River Basin	Volta Lake	Aquaculture (Fish cage)	Aquaculture	1-Mar-14
160.	The Pure Company Limited	N. Kintampo	Benkrom	Black Volta River / Groundwater	Abstraction	Industrial/Domestic	1-Jun-11
161.	Triton Aquaculture Africa Ltd	Asuogyaman	Dodi-Asantekrom	Volta Lake	Abstraction	Aquaculture	1-Dec-11
162.	Triton Aquaculture Africa Ltd	Asuogyaman	Dodi-Asantekrom	Volta Lake	Aquaculture (Fish cage)	Aquaculture	1-Jun-14
163.	Tropigha Farms Limited	Kpandu	Gbefi	River Dayi	Abstraction	Irrigation	1-Jan-11
164.	Tropo Farms Ltd	Dangme West	Asutsuare (K.I.P.)	Kpong Irrigation Project Canal	Abstraction	Aquaculture	1-Jan-11
165.	Twifo Oil Palm Plantations Limited	Twifo Hemang Lower Denkyira	TOPP Estate	Obuo (Surface water) and Groundwater	Pump Abstraction	Domestic/Industrial	1-Jul-13
166.	Volta River Estates Limited	Asuogyaman, Dangbe West	South Senchi, Powmu, Akwamufie, Akwadum, Natriku	Volta Lake, River Volta	Pump Abstraction	Irrigation	1-Jan-11
167.	Voltic (Gh) Limited	Ga West	Medie	Groundwater	Abstraction	Industrial	1-Jan-11
168.	Voltic (Gh) Limited	Bosomtwi	Nyameani	Groundwater	Pump Abstraction	Industrial	1-Jan-13
169.	Waterhealth Ghana Ltd	Ga West, Akwapim South	Manhean, Afuaman, Nsakina, Pakro	Densu, Nsaki, Ntiribo Rivers	Abstraction	Domestic/Municipal	1-Jan-14
170.	West African Fish Limited	Asuogyaman	Domiabra	Volta Lake	Aquaculture (Fish cage)	Aquaculture	1-Jun-11
171.	X'tra Gold Mining Limited	Atiwa	Kwabeng	Abodosu Stream	Diversion/ Abstract /Store	Industrial/Mining	1-Jan-11

**Appendix 3: Well Drilling License Register - 2011**

<b>No.</b>	<b>Permit Holder</b>	<b>Address</b>	<b>Company Registration No.</b>	<b>License No.</b>	<b>Category</b>	<b>Expiry Date</b>
1.	7 A's Christian Construction & Dev. Consul Ltd	P.O. BOX AN 5038, Accra-North	CA 74,771	WRC/WDL/081/11	C	26-Jun-14
2.	Abdelco Limited	Box 9484, KIA, Airport-Accra	30,732	WRC/WDL/038/09	B	10-Dec-12
3.	Admeds Enterprise	P. O. Box 4745 Kumasi	BN-48, 368B	WRC/WDL/034/09	C	19-Nov-12
4.	Aglawu Company Limited	P. O. Box S K 332, Tema	CA-56,869	WRC/WDL/094/11	C	12-Oct-14
5.	Agricultural Materials Limited	P. O. Box 15097, Accra-North	44,142	WRC/WDL/09/008	C	15-Feb-12
6.	Afrihope Missions	P. O. Box 529 Berekum, Brong Ahafo	G-20,731	WRC/WDL/093/11	C	10-Oct-14
7.	Aqua Galaxy Limited	P. O. Box GP 21493, Accra	CA-45,123	WRC/WDL/026/09	C	20-Oct-12
8.	Aqua Works Limited	P. O. Box 346, Teshie, Accra	CA-14, 690	WRC/WDL/070/11	C	07-Mar-14
9.	Araco Construction Ltd.	P. O. Box 123, Bolgatanga, Upper East Region	CA-3,322	WRC/WDL/020/09	B	11-Oct-12
10.	Arsmak Energy and Resources	P. O. BOX KN 314 Kaneshie, Accra	CA-29,792	WRC/WDL/077/11	C	23-Jun-14
11.	Bauer Resources Ghana Limited	Box MB 615, Ministries, Teshie - Nungua, Accra	CA - 72,956	WRC/WDL/050/10	C	15-Aug-13
12.	Bed-Rock Construction & Drilling Co. Ltd.	P. O. Box OF 446, Ofankor-Accra	CA-33,969	WRC/WDL/019/09	C	19-Oct-12
13.	Bizgeo Company Limited	PMB MD 127, Madina-Accra	CA-22,859	WRC/WDL/057/10	C	16-Aug-13
14.	Both Side Company Limited	P. O. Box 356 Bolgatanga, Upper East Region	CA-63,452	WRC/WDL/091/11	C	04-Oct-14
15.	Bremsbouna Company Ltd	P. O. Box DS 653 Dansoman Estate, Accra	C-82,397	WRC/WDL/024/09	C	09-Nov-12
16.	Brushwell Associates Limited	P. O. Box DC 439 Dansoman, Accra	CA-28,586	WRC/WDL/073/11	B	25-Apr-14
17.	Caspian Energy Ghana Ltd	P. O. Box OS 726, Osu-Accra	CA-65,594	WRC/WDL/041/10	B	25-Feb-13
18.	Cephavick Limited	P. O. Box TL 2571 Tamale; P.O. Box MB 359 Mambrobi-Accra	CA-17,548	WRC/WDL/08/005	C	24-Jun-14
19.	Champion Man Company Limited	Box KW 302, Kwadaso – Kumasi	CA-60,706	WRC/WDL/052/10	C	15-Aug-13

20.	China Geo-Engineering Corporation (Gh) Ltd	Box CT 3477, Cantonments-Accra	76,967	WRC/WDL/055/10	B	16-Aug-13
21.	China Henan Geo-Construction Co. Ltd	P. O. Box KS 12198, Kumasi	C-89,839	WRC/WDL/08/003	B	18-May-11
22.	China Zhong Hao (Gh) Limited	P. O. Box 649 OF, Accra (Plot No. 39, Dome-Accra)	CA-4,096	WRC/WDL/08/002	B	08-Jun-14
23.	Chucatel Ghana Limited	P. O. Box TN 962, Teshie Nungua, Accra	CA-79,368	WRC/WDL/074/11	B	25-Apr-14
24.	Darkata Engineering Services	P. O. Box 62 Trade Fair, Accra	71,666	WRC/WDL/097/11	C	03-Nov-14
25.	Dextin Company Limited	P. O. Box CT 4329, Accra-North	CA-51,527	WRC/WDL/086/11	C	19-Jul-14
26.	Doayin Services Limited	P. O. Box 650, Bolgatanga	C-81,059	WRC/WDL/030/09	C	20-Oct-12
27.	E E & E Company	P. O. Box AE 1163, Accra	CA-18,392	WRC/WDL/014/09	C	06-Oct-12
28.	Ebekae Limited	P. O. BOX SE 1188.Suame-Kumasi	CA-41,887	WRC/WDL/068/11	C	07-Feb-14
29.	Electro Aquah Services	P.O.BOX 518, Fante New Town-Kumasi	C-73-552	WRC/WDL/064/11	C	18-Jan-14
30.	Elex Investments Ghana Limited	P. O. BOX TL. 2299, Tamale	CA-70,832	WRC/WDL/066/11	C	18-Jan-14
31.	Enacent Agency Limited	P. O. Box MD 438, Madina-Accra	75,913	WRC/WDL/054/10	C	16-Aug-13
32.	Espan Company Limited	P. O. Box MS 678, New Achimota, Accra	CA-3,802	WRC/WDL/013/09	B	06-Oct-12
33.	F & F Maida Limited	P. O. Box 1510, Tamale	CA-63,485	WRC/WDL/015/09	C	06-Oct-12
34.	Fadl Rahaman Enterprise Ltd	Box AX 1651, Takoradi	CA-61,417	WRC/WDL/039/10	C	12-Jan-13
35.	FBB Drilling & Construction Ltd.	BC 169, Burma Camp, Accra	C-85,647	WRC/WDL/051/10	C	15-Aug-13
36.	For Go Enterprise Limited	P. O. Box DK 80 Darkuman, Accra	CA-33,549	WRC/WDL/060/11	C	11-Oct-13
37.	Galaxy Borehole Drilling (Gh) Ltd	P. O. Box GP 3375, Accra, Ghana	CA-31,425	WRC/WDL/031/09	B	22-Oct-12
38.	Geohydraulics Limited	P. O. Box LG 924, Legon	CA-42,603	WRC/WDL/08/007	C	05-Oct-11
39.	Geosource Drilling Technologies Limited	No.24 Opp. ABC (Guinness Ghana) Achimota, Accra	CA-22,285	WRC/WDL/096/11	C	1-Nov-14
40.	Geosystems Consulting Limited	P. O. BOX 28 Abuakwa-Kumasi	CA-40,567	WRC/WDL/069/11	C	07-Feb-14
41.	Global Almas Limited	P. O. Box LG 825, Legon	CA-6,125	WRC/WDL/059/10	C	16-Aug-13
42.	G-Mark Environmental Engineering Company Ltd	c/o Trustees Services Ltd, P. O. Box GP 1632, Accra	CA-91,243	WRC/WDL/095/11	C	01-Nov-14
43.	GM Projekts	P. O. Box 16157, K.I.A, Accra	CA-73,401	WRC/WDL/085/11	C	18-Jul-14
44.	Hitesh Impex Limited	P. O. Box 4610-CT, Cantonment Accra, Ghana	CA-88,981	WRC/WDL/022/09	B	21-Oct-12

45.	Huchang Infrastructure Eng. Co (Gh) Ltd.	Box 1470, Madina-Accra	CA-8,136	WRC/WDL/056/10	B	16-Aug-13
46.	Hydrocom Limited	P. O. Box CE 12062, Tema	CA-69,655	WRC/WDL/028/09	C	20-Oct-12
47.	Indo-Ghana Borehole Services Ltd.	P. O. Box GP 4711, Accra-Ghana	CA-1,830	WRC/WDL/016/09	B	18-Oct-12
48.	J. Adom Limited	Box KD 429, Kanda, Accra	C – 87,66	WRC/WDL/061/10	C	14-Oct-13
49.	Jamesbury Trading and Construction Ltd.	P. O. Box 6397, Accra -North	CA-10,562	WRC/WDL.076/11	C	15-May-14
50.	JCR Drilling Ghana Limited	P. O. Box KB 792, Korle Bu, Accra	CA-50,988	WRC/WDL/063/11	C	18-Jan-14
51.	Jiangsu Geology & Engineering Company Ltd.	Box 282 Education Ridge, Tamale, Northern Region	CA-78,734	WRC/WDL/048/10	B	26-May-13
52.	Jil and Jic Limited	P. O. Box DS 1920, Accra	CA-13,425	WRC/WDL/023/09	C	21-Oct-12
53.	Joissam Construction Ltd.	Box AD 1188 Adabraka- Accra	CA-16,243	WRC/WDL/049/10	B	15-Aug-13
54.	Jokumaks Limited	P. O. Box 291, Sunyani	C-27,545	WRC/WDL/025/09	C	09-Nov-12
55.	Kingaka Construction Ltd.	P. O. Box TN 385, Accra	61,309	WRC/WDL/058/10	B	16-Aug-13
56.	Kinkubi Solutions	P. O. Box SN 366 Santasi, Kumasi	BN-29,924D	WRC/WDL/088/11	C	16-Aug-14
57.	Kwik Silver Ghana Limited	PMB C11, May's Plaza, Comm 8, Tema	C-69,898	WRC/WDL/053/10	C	16-Aug-13
58.	Lardwin Company Limited	P. O. Box DC 94 Dansoman, Accra	CA-43,322	WRC/WDL/033/09	C	10-Nov-12
59.	Leka Interactive Company Ltd	P. O. Box 474, Teshie-Nungua	CA-83,361	WRC/WDL/083/11	C	03-Jul-14
60.	Lovemak Ventures Ltd	P. O. Box MA 188, Ho	CA-21,825	WRC/WDL/035/09	C	19-Nov-12
61.	Marknoc Enterprise	P. O. Box TKW 413 Tarkwa W/R	BN-50,730C	WRC/WDL/099/11	C	13-Nov-14
62.	Meridian Water Well Drilling Ltd	P. O. Box CT 5632, Accra	CA-74,412	WRC/WDL/072/11	B	04-Apr-14
63.	Methodist Development & Relief Services	Wesley House, P.O. Box 403, Accra	G-16,661	WRC/WDL/08/006	C	21-Sep-11
64.	Mikanbros Company Ltd	MB 687, Ministries-Accra	CA-77,893	WRC/WDL/080/11	C	26-Jun-14
65.	Mowakari Trading and Construction Company Ltd.	P. O. Box 468 Obuasi	CA-78,411	WRC/WDL/078/11	C	09-Jun-14
66.	Multi-Hydro Technique Limited	P. O. Box TA 312, Taifa, Accra	95,844	WRC/WDL/10/09	C	27-May-12
67.	Natalex Company Limited	P. O. Box.LD 151, Legon -Accra	CA-22,038	WRC/WDL/067/11	C	07-Feb-11
68.	Oti Yeboah Complex Ltd.	P. O. Box 244 Sunyani, Brong Ahafo	30,777	WRC/WDL/040/10	C	12-Jan-13
69.	Pamicor	P. O. Box DTD P11 Coastal Estates, DFF Spintex Rd. Baatsona, Accra	CA-30,525	WRC/WDL/098/11	C	07-Nov-14

70.	Pekwapong Company Ltd	P. O. Box P531, Kumasi	CA-69,855	WRC/WDL/071/11	B	17-Mar-14
71.	Plumblin Global Services Ltd	P. O. Box LG 1069 Legon, Accra	CA-62,100	WRC/WDL/090/11	C	21-Sept-14
72.	Posen Enterprise Limited	P. O. Box MP 1697, Mamprobi-Accra	CA-56,784	WRC/WDL/042/10	C	17-Mar-13
73.	PRD Rigs Ghana Ltd	CT 5285, Cantonments-Accra	CA-46,471	WRC/WRL/084/11	C	05-Jul-14
74.	Prefan Investments Company Ltd	P. O. Box 1694, Kumasi	CA-81,470	WRC/WDL/082/11	C	26-Jun-14
75.	Quay Hydro Consult Limited	Box OD 293, Odorkor, Accra	CA - 71,027	WRC/WDL/062/10	C	14-Oct-13
76.	Rahmex Enterprise Ltd.	P. O. Box 410, Wa	81,479	WRC/WDL/045/10	C	22-Mar-13
77.	Rays Boat Company Ltd.	P. O. Box 3308, Kumasi	CA-61,834	WRC/WDL/027/09	C	10-Nov-12
78.	Rural Water Development Programme of Church of Christ	P. O. Box AN 6017, Accra-North	G.3.785,D.S.W/59	WRC/WDL/08/001	B	08-Jun-14
79.	Sabailo Limited	P. O. Box 93, Bolgatanga	CA-21,576	WRC/WDL/072/11	C	10-Apr-14
80.	Sabfex Enterprise	P. O. Box 77 Wassa Nsuta, Tarkwa	TIN-1240023975	WRC/WDL/060/11	C	08-Dec-14
81.	Sages Consult (Ghana) Limited	P. O. Box 1231 Sunyani, Brong Ahafo	CA-42,341	WRC/WDL/092/11	C	09-Oct-14
82.	Samjust Engineering Co. Ltd	P. O. Box 837 Kenen Techiman, B/A	CA-8,158	WRC/WDL/087/11	C	01-Aug-14
83.	Sandimax Company Ltd	P. O. Box NG 59, Nungua-Accra	CA-18,692	WRC/WDL/079/11	C	23-Jun-14
84.	Savana Construction Company Ltd.	P. O. Box 276, Tamale	CA-20,114	WRC/WDL/032/09	C	22-Oct-12
85.	Savanstar Limited	P. O. Box CT 5100, Cantonment, Accra	CA-35,347	WRC/WDL/017/09	C	11-Oct-12
86.	Savita Services	P. O. Box LG 893 Legon, Accra	BN-70,189C	WRC/WDL/089/11	C	16-Aug-14
87.	Stanton Limited	KS 6613 Kumasi-Ghana	C-46,734	WRC/WDL/047/10	C	26-May-13
88.	Starco Ventures Limited	Box 1235, Koforidua	CA-17,860	WRC/WDL/044/10	B	17-Mar-13
89.	Sustain Ghana Limited	P. O. Box 281, Madina-Accra; P. O. Box AY 216 Kumasi	CA-22,894	WRC/WDL/08/004	C	16-Jun-11
90.	TBL Resources Limited	P. O. Box CT 6109, Cantonments-Accra (H/No. 4, 2nd Soula St., North La Bone)	CA-9,686	WRC/WDL/09/009	B	23-Mar-12
91.	Tech- 2 Resources Limited	P. O. Box 882, Tamale	CA-39,729	WRC/WDL/075/11	C	02-May-14
92.	Tedson Drilling & Construction Limited	P. O. Box HP 582, Ho, Volta Region	C-90,609	WRC/WDL/018/09	C	15-Oct-12
93.	Time Heals Enterprise Limited	P. O. Box 261, Bawku	CA-7008	WRC/WDL/065/11	C	18-Jan-14
94.	To-Time Ghana Limited	P. O. Box SN 501, Santasi-Kumasi	CA-41,409	WRC/WDL/012/09	C	06-Oct-12

95.	Trust Water Works Limited	P. O. Box 01852, Osu-Accra	CA-12,033	WRC/WDL/011/11	C	18-Jan-14
96.	Waale Construction Works Limited	P. O. Box 250, Bolgatanga	CA-19,730	WRC/WDL/046/10	C	22-Mar-13
97.	Waterside Company Limited	P. O. Box 1099 Madina-Accra	CA-9509	WRC/WDL/11/09	C	27-May-12
98.	Waterside Ghana Limited	P. O. Box 1099 Madina-Accra	CA-61,583	WRC/WDL/021/09	C	19-Oct-12
99.	Water Vision Technology Limited	P. O. Box 621, Bolgatanga	CA-90,741	WRC/WDL/029/09	C	20-Oct-12
100.	Weddi Africa Ltd.	P. O. Box CT 6401, Accra	C-17,581	WRC/WDL/037/09	C	01-Dec-12
101.	Western Water Works Limited	P. O. Box 181, Sekondi -Western Region	CA - 8,272	WRC/WDL/036/09	B	19-Nov-12
102.	Zegor Limited	P. O. Box LG 629 Legon Accra	CA-21,945	WRC/WDL/043/10	C	17-Mar-13

**Appendix 4: Water Quality Indices for Rivers in Ghana (2010 – 2011)**

<b>Station</b>	<b>Mean-2010</b>	<b>Class</b>	<b>Mean-2011</b>	<b>Class</b>
Weija Lake	61.5	II	53.2	II
Potroase - R. Densu	76.0	II	62.2	II
Mangoase - R. Densu	57.3	II	52.3	II
Nsawam - R. Densu	53.9	II	52.4	II
Mankrong J-R.Ayensu	58.9	II	59.5	II
Osino - R. Birim	56.8	II	51.2	II
Akim Oda-R Birim	58.3	II	53.5	II
A Brenase-R.Pra	64.2	II	57.1	II
Twifo-Praso - R. Pra	58.9	II	49.4	III
Daboase - R. Pra	56.8	II	55.3	II
Dunkwa-On-Offin -R. Offin	57.8	II	49.0	III
Adiembra - R. Offin	61.4	II	55.3	II
Lake Barekese - R. Offin	59.6	II	57.1	II
Lake Bosomtwe	56.3	II	49.8	III
E Ekosi-R.Ochi-Nakwa	59.0	II	57.3	II
Mankesim-R.Ochi-Amisa	60.4	II	62.7	II
Baafikrom Reservoir	71.2	II	67.8	II
Lake Brimso-R. Kakum	59.7	II	60.7	II
Ewusijo-R. Butre	71.3	II	67.3	II
Bonsaso - R. Bonsa	65.7	II	58.3	II
Amfansie	59.6	II	48.5	III
Dominase - R. Ankobra	55.2	II	57.2	II
Prestea - R. Ankobra	63.5	II	54.3	II
Elubo - R. Tano	64.3	II	61.0	II
Sefwi-Wiawso - R. Tano	59.2	II	59.5	II
Tanoso - R. Tano	63.4	II	61.0	II
Dadieso R. Bia	60.8	II	59.9	II
Aframso - R. Afram	55.8	II	63.5	II
Hohoe - R. Dayi	74.0	II	57.3	II
Damanko - Oti	61.5	II	63.1	II
Sabari - R. Oti	65.7	II	61.9	II
Saboba -R. Oti	64.0	II	58.1	II
Pwalugu -White Volta	55.8	II	59.9	II
Nabogo - White Volta	61.9	II	60.4	II
Daboya - White Volta	61.5	II	61.8	II
Buipe - Black Volta	63.8	II	67.4	II
Bamboi - Black Volta	68.5	II	64.4	II
Ajena - Main Volta	73.0	II	69.3	II
Kpong - Main Volta	70.6	II	68.5	II
Sogakope - Lower Volta	67.8	II	55.8	II

**Water Quality Classification System**

- >80: Class I - Good water quality*
- 50 – 80: Class II - Fairly good water*
- 25 – 50: Class III - Poor water quality*
- < 25: Class IV- Grossly polluted water*

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