



High-Level Conference on:

Water for Agriculture and Energy in Africa: the Challenges of Climate Change

Sirte, Libyan Arab Jamahiriya, 15-17 December 2008

National Investment Brief

GHANA

EXECUTIVE SUMMARY

Ghana's priority for investment areas is based upon its needs to ensure food security for the vulnerable rural population in poverty, the opportunities and the comparative advantage it has for agricultural and allied activities both within the economy and in the regional context, and the constraints it would like to remove or minimize so that regionally balanced and accelerated agricultural development can take place within a medium-term framework. Such investments would also have the perspective of substantially reducing poverty, both in proportion and severity, by 2015.

Ghana is not self-sufficient in food production, and it has been difficult to ensure food availability in sufficient quantities all year round. There was about 35% undernourishment in 1990-1992 and in 1999-2001, this figure dropped to just over 10%.

Agriculture is the main economic sector in Ghana, accounting for about 40 percent of GDP. It is predominantly practiced on smallholder, family-operated farms using rudimentary technology to produce about 80% of Ghana's total agricultural input.

Even though it has been realized that irrigation holds the key to ensuring sustained food availability in the face of climate change, irrigation development has lagged investment at appropriated level. Out of the known 1.9 million ha of irrigation potential, less than 2 percent has been developed and in use.

Ghana shares hydropower created at Akosombo and Kpong with Togo, Benin and Cote d'Ivoire. The current hydropower capacity is 1.2 GW. The Bui hydropower project which will add 400 MW to current capacity is under construction, it is expected to come on stream in 2012. Other proposed projects expected to add to the capacity of the power system include the Hemang, Awisam, Tano, Juale and Pwalugu hydroelectric power projects with a total installed capacity of 340 MW.

The financial envelope for the short, medium and long term investment projects is estimated to be US\$317 Million, US\$100 Million and US\$2506 Million respectively. The Government can only realize the benefits and hence substantially reduce rural poverty only if its development partners continue to assist the funding of these projects.

1. CONTEXT

1.1 AGRICULTURE AND FOOD SECURITY

Agriculture

Agriculture is the main economic sector in Ghana, accounting for about 36 percent of GDP. The agriculture sector is also the main source of employment and income for 56 percent of the total economically active population and is the largest foreign exchange earner. The share of women in agricultural labour force in 2005 stood at 45 percent. In addition, this sector contributes an average of 12 percent and 8 percent to tax revenue and total revenue. The sector consists of the cocoa sub-sector (incl.; coffee, and shea nuts), 13%; other crops, 64%; livestock (incl. poultry), 7%; fisheries (marine, freshwater), 5%; and forestry and logging, 11%. The major role played by agriculture in the improvement of Ghana's economy presently has been dominated by the cocoa sub-sector. Ghana can therefore not achieve economic growth and poverty reduction without significant improvement in the agriculture sector.

Agriculture is predominantly practiced on smallholder, family-operated farms using rudimentary technology to produce about 80% of Ghana's total agricultural input. It is estimated that about 2.74 million households operate a farm or keep livestock. About 90 percent of farm holdings are less than 2 hectares in size.

Although production levels of the major staple food crops in Ghana in a normal-rainfall year are adequate, with estimated self-sufficiency ratios of 100 percent for roots and tubers, fruits and vegetables, fats and oils, and 90 percent for cereals (excluding rice), seasonal food insecurity is wide-spread. This is due to almost total dependence on rain-fed agriculture thereby making the fortunes of the sector follow the rainfall patterns, minimal use of fertilizer among farmers culminating generally in low productivity (avg. yields 30%-50% of achievable yields), insufficient purchasing power of a large proportion of the population and inadequate storage, marketing and processing structures in most rural areas. With the population growth rate estimated at 1.7 percent (2004) and the growing demand for more improved crops for local industries and for export, irrigated agriculture is an important factor in promoting agricultural growth.

Irrigation and Water Control

The potential for irrigation schemes in Ghana is very good although the experience in irrigated agriculture is relatively limited. Ghana's irrigation potential is estimated at 1.9 million ha. Valley bottoms potential and flood plains could add another 1.0 million ha that could be cultivated mostly to rice by employing water management technologies such as bunding, leveling and puddling. It is believed that overall about 27,900 ha of the total of 30,900 ha equipped, or 90 percent, were actually irrigated in 2000, while in the 22 public irrigation schemes, only 5,600 ha of the 8,587 ha equipped, or 65 percent, were actually irrigated. This is due to deterioration of the infrastructure because of lack of sufficient funds for maintenance.

The main crops produced under the limited irrigation agriculture include cereals, i.e. corn, rice, sorghum and millet; vegetables such as tomatoes, okra, peanuts, chillies and pepper as well as exotic vegetables such as cabbage and spring onions (eg. grain harvest in 1999 included corn, 1,014,000 tons; paddy rice, 210,000 tons; sorghum, 302,000 tons; and millet, 160,000 tons). Rice area under formal irrigation is about 40% of the total area, with vegetables making up the rest. Peri-urban irrigation is all to exotic vegetables. Drip irrigation of 1,400 ha bananas for export by two foreign companies has been going on for the last 5 years.

Food Security

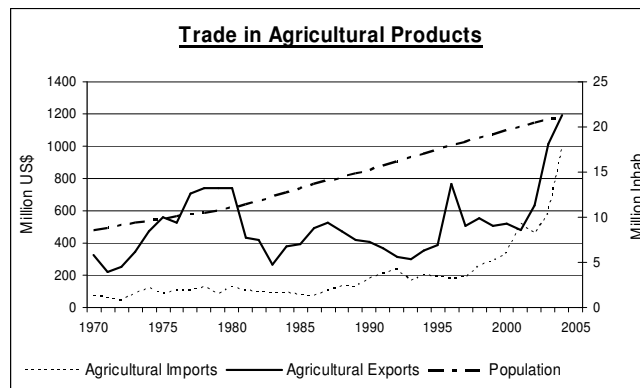
Ghana is not self-sufficient in food production, and it has been difficult to ensure food availability in sufficient quantities all year round. During periods of good rains, food abounds, but inadequate storage facilities result in losses of perishable crops. Inadequate agro-processing facilities are adding to food insecurities in the country.

There are also significant differences in the spatial distribution of poverty. Poverty levels in 1998/99 were highest in the three northern savannah regions, namely the Upper East, Upper West and Northern Regions with 88 percent, 84 percent and 69 percent respectively. In contrast, poverty levels were lowest in the Greater Accra and Ashanti Regions with 5 percent and 28 percent respectively.

There was about 35% undernourishment in 1990-1992 in Ghana. In 1999-2001, this figure dropped to just over 10%. In numerical terms, this gives about 5.5 million undernourished people in 1990-1992 and 2.4 million in 1999-2001. Therefore, Ghana was among the first countries in sub-Saharan Africa to have reached the first Millennium Development Goal 1(MDG) of halving hunger by 2015, in terms of level of undernourishment.

Food and agriculture trade and import balance

The food import bill has seen a very steep upward change starting from 1995 as the figure below illustrates. The major food commodities imported are cereals, sugar, and fish. With the world food crisis compounded by the astronomical fuel price hikes in recent months, the pressure on the country's foreign earnings has put Government's planned development out of joint, as it seeks to feed the growing population that has passed the 21.0 million mark and also to make fuel available.



As of 2008, data is not yet available but for the period to 2004 as shown on the figure already referred to, the food import bill, made up mostly of cereals such as rice and wheat imports. There is a jump from about US\$200.0 million between 1995 and 2000, to nearly US\$1,000 million in 2004. The 2008 import bill may well double this figure when released by early 2009. Although most of the year-to-year trends are attributable to weather patterns, the longer term improvement in performance can be attributed to public policy changes such as changing the exchange rate, altering controls on interest rates, and adjusting the money supply. Livestock farming is restricted to the Northern region and the Accra plains. Production of meat is, therefore, insufficient to meet local annual demand of about 200,000 tons (2001). The shortfall has been met by imports of livestock from neighbouring countries.

1.2. WATER RESOURCES AND HYDROPOWER

Both surface and groundwater sources constitute Ghana's water resources potential. Surface water resources are made up of an extensive network of rivers and streams classified into three river systems, namely; the Volta, South Western and Coastal river systems. These river systems make up 70%, 22%, and 8% respectively of the total land area of about 240,000 km². Lake Bosomtwe is the only significant natural freshwater lake located in the forest zone with a surface area of 50 km² and a maximum depth of 78m. Generally, rainfall decreases from the south-west (2000 mm p. a.) towards the north (950 mm p. a.) and the south-east (800 mm p. a.). Total annual runoff is 56.4 billion m³ with the Volta system accounting for 41.6 billion m³. The mean annual runoff from within country is about 40 billion m³ with the Volta contributing 65%, South-Western, 29% and Coastal 6%. Runoffs are however, characterized by wide disparities between wet season and dry season flows.

Uses of water in Ghana are both consumptive and non-consumptive. The main consumptive uses are domestic water supply, irrigation and livestock watering. Impoundments and reservoirs have been constructed for hydropower generation, potable water supply and irrigation schemes. Assuming total dependence on surface water resources the consumptive water demand for 2020 has been projected to be 5 billion m³, which is equivalent to only 12% of the total surface water

resources. Nevertheless, urban water supply coverage is estimated at 55%, rural and small town supply coverage is 52% (2006).

Major non-consumptive uses include fisheries, navigation and hydropower generation. Ghana shares its current hydroelectric capacity of 1.2 GW located at Akosombo (912 MW) and Kpong (160 MW) with Togo, Benin and Cote d'Ivoire. The Akosombo dam was completed in the mid 1965 and the Kpong dam in 1981. Both dams impound the Volta River, with the former creating one of the largest artificial lakes. In 2005, the turbines of the Akosombo generation station underwent retrofitting to increase its installed capacity by about 108 MW. Current water use for hydropower generation (at Akosombo) which is non-consumptive water use is 37 843 km³/year.

The capacity of the existing power system will not be able to meet demand which is expected to have an annual percentage growth of 5.93 percent over the coming years. In the area of hydropower currently, the Bui hydropower project, estimated at US\$ 700 million, which will add 400 MW to current capacity is under construction and expected to come on stream in 2012. Other proposed hydropower projects expected to add to the capacity of the power system include the Heman, Awisam, Tano, Juale (operational by 2012) and the Pwalugu (operational by 2020) hydroelectric power projects with a total installed capacity of 340 MW.

Ghana shares 3 international rivers:

- The Volta River is shared by 6 countries: Ghana, Cote d'Ivoire, Togo, Burkina Faso, Benin and Mali. There is no mechanism to develop the Volta River together, but a permanent joint commission has been set up to discuss ways of sharing benefits and increasing cooperation for better management of the Volta River basin. The Volta River system consists of the Oti and Daka Rivers, the Red, White and Black Volta Rivers and the Pru and Afram Rivers. The basin covers 70% of the country area.
- The Bia River originates in the Ashanti Uplands and flows into Cote d'Ivoire.
- The Pra River flowing parallel with the Bia River to the southeast of the latter also has its headwaters in the Ashanti Uplands and enters the Atlantic Ocean through the Tano lagoon located in Cote d'Ivoire.

1.3. CLIMATE CHANGE

Estimated levels of greenhouse gas emissions from 1990 to 1996 indicate that Ghana is a net greenhouse gas sink. However, observing the trend of emissions from 1990 to 1996 indicate that Ghana may become a net emitter if the necessary sustainable policies and measures geared towards systematic reductions of greenhouse gas emissions from key sectors such as energy, industry and forestry are not embarked upon. Mitigation efforts including energy, agriculture, forestry, waste and Clean Development Mechanism have been proposed and are being integrated into national development planning.

Ghana is particularly vulnerable to Climate Change due to lack of capacity to undertake adaptive measures to address environmental problems and socio-economic costs. These include climate change associated with health systems, flooding, which has already began taking its toll in the coastal areas, water supply and hydropower generation and agriculture.

The climate change impacts to be experienced under socio-economic conditions are second order impacts, the first order impacts being on the supply and demand of the water resource. Regarding agriculture, it is expected a percentage decrease in the maize yield ranged from 0.5 percent in the year 2000 to 6.9 percent in the year 2020. The projected reduction in hydropower generation by 2020 could reach 60 percent. Adaptation options are in general for water conservation and efficient use of water for projected reduction in water resources. The energy sector is currently the largest emitter of green house gases (GHG). The emissions from the energy sector grew by 6.6 percent during the period 1991-1996.

2. NATIONAL STRATEGIES FOR WATER, AGRICULTURE AND ENERGY

2.1. POLICY CONTEXT

The main Government objective is to make Ghana a leading agro-industrial country by the year 2010 through modernization of agriculture-based rural development. This strategy has been mainstreamed into the Millennium Development Goals (MDGs) and **Ghana Poverty reduction Strategy (GPRS)** inspired budgets for the years 2003-2005. The Ghana Poverty Reduction Strategy 2003-2005 (GPRS) is predicated inter alia on a key role for irrigation in achieving national food security, alleviating rural poverty and equitable economic development. The overall objective of GPRS is to reduce the incidence of poverty from 40 percent in 2002 to 32 percent in 2004. The Government of Ghana has consciously made some recent efforts to stimulate growth and development of the agriculture sector through appropriate policy framework and sectoral development programmes.

Ghana's first agricultural policy, as captured in the **Food and Agricultural Sector Development Policy (FASDEP I)** document was formulated in 2002. It was meant to provide a framework of modernizing the agricultural sector and making it a catalyst for rural transformation in line with the goal set for the sector in the GPRS I. In 2007 **FASDEP II** was subsequently, formulated to address shortcomings of FASDEP I identified by a poverty and social impact analysis (PSIA). The policy is consistent with the national development objectives as specified in GPRS II, and the Comprehensive Africa Agriculture Development Programme (CAADP) of NEPAD and seeks to enhance the environment for all categories of farmers, while targeting poor and risk prone and risk-averse producers. The policy objectives focus on key issues such as food security, growth in incomes, and sustainable management of land and environment among others. Appropriate strategies will be adopted to achieve these objectives while programmes of implementation will be guided by broad policy principles well documented in the FASDEP II document.

The government with the assistance of FAO, is presently updating the **Food Security and Agriculture Development Horizon 2015 National Strategy** document, aimed at ensuring sustained development and accelerated real food and agricultural GDP growth in the long term. Though the document is still in the draft form, the identified strategic priorities and targets are within the holistic framework of FASDEP, and correspond to the objectives of CAADP. The resource implications to 2015 will be determined on the basis of the government's strategic Plan as well as the National Medium-Term Investment Programmes.

The promotion of irrigation farming is strategically important for Ghana if it is to satisfy the increase in food demand and alleviate the poverty which otherwise could become very serious in the future due to the rapid population growth of about 1.7 percent. If this rate continues Ghana's population will almost double within 25 years from its current 20 million to almost 42 million. With the support of FAO, the Government has prepared a **policy document to guide irrigation development**. The specific problems addressed by the policy are i) Low agricultural productivity and slow rates of growth ii) constrained socio-economic engagement with land and water resources; iii) Environmental degradation associated with irrigation production and iv) lack of irrigation support services. The document is presently before legislators for passage. Autonomous adaptation options which could be embarked upon by stakeholders in the face of stream flow reduction under climate change involve the use of groundwater resources from shallow and hand-dug wells to supplement the shortfalls. Water conservation practices such as rain water harvesting at domestic level may be increased. There may also be a natural migration of people from water stressed areas with relatively good amounts of water supply.

The water development policy has been well documented in the country's **National Water Policy** document launched in June 2007. The policy's formulation process has been guided by Ghana's **Water Vision for 2025** whose main objective is to promote an efficient and effective management system and environmentally sound development of all water resources in Ghana. The Integrated Water Resources Management (IWRM) has since been adopted with the view to enhancing sustainable management of water resources and provide appropriate decision support systems for valuating competing uses for water while dealing with challenges including:

- Balancing needs for improving food supplies, demands from human settlements and farmlands with that of hydroelectric power generation and other in-stream uses as well as preserving water courses and wetlands for fish and wildlife habitat,
- Forecasting amounts of groundwater and surface water that should be withdrawn to meet both current and future needs, and
- Carrying out studies on how much beneficiaries can afford to pay for sustaining water services.

Implementation programmes being pursued in the medium term follow the broad framework of GPRS II which recognizes the critical and cross-cutting role of water in meeting basic human needs, promoting accelerated growth and good governance.

Ghana's energy policy seeks to respond to the country's energy vision with ten broad objectives. Appropriate strategies have thus been put in place towards achieving each of these broad objectives. A **Strategic National Energy Plan (SNEP)** spanning a twenty year period has consequently been formulated to this effect. SNEP, among others will (a) establish an optimal blend of increasing demand, investment in generation and transmission, and energy efficiency; (b) optimize the conjunctive use of commercial grid electricity and imported fossil fuel and renewable energy such as wood fuels which constitute over 60% of Ghana's energy utilization; and (c) broaden the sources and types of energy supply and integrating them into high quality utility service for the total growth of the economy.

The policy framework has also been formulated within the existing socio-economic and environmental policies, the linkages of the energy sector with other sectors, and international linkage of the sector in relation to energy trends in the area of energy investments and donor support, pricing and global impacts. (Source: SNEP 2006-2020, Energy Commission, Ghana, June 2006).

2.2. INVESTMENT ENVELOPE

The investment envelope for the short, medium and long term is presented in the Table below and expressed in million US\$. These figures are based on CAADP investment projections and information on up-coming projects by the Ministry of Energy and by GIDA for which feasibility updates will be initiated shortly.

The projects listed in Section 3 have substantially modified the Investment Envelope. In the area of hydro-power projects classified as large scale hydraulic projects, the Bui dam, Pra and Tano rivers projects costs, all short term projects, have raised the estimates in that sector. Also floods in 2007 increased the irrigation infrastructure rehabilitation. A phased development of the Accra plains irrigation project for which feasibility study is on-going, is the only long term investment for which data was estimated and reflected in the investment envelope.

Time scale	Type of investment (million US\$)			
	Small scale water control	Rehabilitation of irrigation	Large scale Hydraulic project	Total
Short-term	163	93.23	1513.57	1769.80
Medium-term	103	6	32.7	141.70
Long-term	51	1	960	1012.0
Total	317	100.23	2506.27	2923.5

2.3. PROJECTS PORTFOLIO

Section 3 presents recently achieved, active and pipeline projects related to the above investment-envelope. Currently, there are twelve project profiles already implemented or on-going with costs ranging from US\$0.47M for small scale irrigation works to US\$103 M for the Northern Rural Growth Programme. There is also one Bankable Investment Project Profile for a total of US\$ 63.3 million, among other 13 pipeline projects.

3. PROJECT PROFILES (ON-GOING AND PROJECTED)

Project title	Funding Partners	Time Scale	Total Budget	Description
I. PROJECTS RECENTLY IMPLEMENTED				
Rehabilitation of Ashaiman and Okyereko irrigation projects	GOG/JICA	1997-2000	\$0.47M	Small scale irrigation works, extension support, institutional development and crop improvement for 136 ha on the 2 schemes
Rehabilitation of 9 Public Irrigation Schemes	GOG/WB	2004-Sept 2006	\$0.622 M	Main and lateral canals rehabilitated. Sprinkler systems replaced. Flow measuring weirs installed for a total of 750 hectares on the 9 schemes.
Land Conservation and Smallholder Rehabilitation Project (LACOSREP II)	IFAD/GOG	2003-2007	\$15.04M	Small dams construction/Rehabilitation for communities in the Upper East Region
Upper West Agricultural Development Project (UWADEP)	IFAD/GOG	2002-2006	\$10.81M	Small dams and irrigation systems construction and rehabilitation for communities in the Upper West Region
II ON-GOING PROJECTS				
Rehabilitation of Tono Irrigation Project	GOG/CIDA	2007- Dec 2008	\$7.504 M	Gravity canals system lining and other infrastructure rehabilitation for 1800 ha.
Small Farms Irrigation Project Phase II	BADEA/GO G	June 2003- Dec 2008	\$11.88 M	485 ha of community based irrigation works in 8 communities out of a projected 840 ha.
Accra Plains Irrigation Project - Feasibility Study up-date	Kuwaiti Fund /GOG	2007-2009	\$1.40 M	Feasibility study up-date of the 160,000 ha irrigation project downstream of the Kpong hydro-power dam.
Small Scale Irrigation Development Project (SSIDP)	ADB/GOG	DEC 2002 - Mar 2009	\$32.48 M	2,170 ha of Community based irrigation works in 26 communities in 9 regions.
Northern Region Poverty-Reduction Programme	IFAD, Government Beneficiaries	2004 - 2010	\$59.6M	Programme components include two broad lines of support: (i) operational support and capacity building to ensure that processes, services and resource flows function effectively; and (ii) a Community Development Fund to finance, among others, the development or upgrading of safe water supply systems, environmental sanitation, water for livestock, irrigation, health and education facilities, etc.
Afram Agricultural Development Project (Afram Plains)	ADF/GOG/Beneficiaries	2006-2011	\$36.14 Million	Agriculture production development, through rainwater management, improvement to existing community based irrigation activities etc
National Programme for Food Security	AfDB, FAO	2006 - 2015	\$250M	Stimulating food production by directly targeting the participation of large number of poor households; promoting social development and equity through improvement in social services addressing the needs of the most chronically food insecure populations; facilitating the establishment of an enabling long term food security policy and institutional capacity for early warning, disaster management and monitoring progress on food security
Northern Rural Growth Programme	IFAD, AfDB, Financial Institutions, Private Investors, Government Beneficiaries	2007	\$103.5M	The programme has four components: (i) commodity chain development; (ii) rural infrastructure including small-scale irrigation development, inland valley bottom/flood recession schemes, improving rainwater productivity, rural roads and market facilities; (iii) improved access to rural financial services; and (iv) programme coordination, management, monitoring and evaluation.
Implementation Accra Plains Irrigation feasibility study	LIBYA/GoG	2012		Implementation of the Accra Plains feasibility study which is currently on -going and will be completed in 2009
III PIPELINE PROJECTS				
Rehabilitation of Veia Irrigation Project	CIDA/GOG	Dec 2008 - 2009	\$5.175 M	Infrastructure of the gravity irrigated system will be rehabilitated to improve the operation of this 800 ha project.
Rehabilitation of 73 Flood Disaster Dams and Irrigation System	WB/GOG	Dec 2008 - Dec2009	\$15.0M	Rehabilitation of Dams and irrigation infrastructure destroyed by floods in Northern, Upper East and Upper West Regions
Hemang Hydro-electric Power Project	IPP	2009-2012	\$270 M	90 MW of electricity to be produced from the project on the River Pra by an

				independent Power Producer (IPP)
Awisam (Pra River) Hydro-electric Power Project	IPP	2009-2012	\$290M	50 MW to be produced from the project by an Independent Power Producer (IPP)
Tano Hydro-electric Power Project	IPP	2009-2012	\$300M	65 MW to be produced. There is a resettlement component.
Programme for the Procurement of Basic Equipment for Maintenance of Irrigation Schemes	AfDB/GoG	2010	\$4.0 M	Procure basic equipment for the maintenance
Bui Hydro-Electric Power Project	China / GOG	Mid 2008-2012	\$622.0M	Construction and commissioning of 400 MW hydro-electric dam on the Black Volta.
Mapping of irrigation potential using GIS	KfW and GOG	2010	\$7.5 M	Identify, collect and compile data on all potential Irrigation and drainage sites in Ghana using GIS.
Bui irrigation project (study and implementation)	GoG	2015	\$60M	Development of irrigation infrastructures downstream Bui hydropower dam
Road culvert diversion weirs for irrigation (study and implementation)	GoG	2010	\$30M	Identify locations during road construction for culvert diversion weirs and provide pipe networks for irrigation
Rehabilitation of Dawhenya Irrigation Project	-	-	\$3.00M	Replacement of pumps and canal lining for the 260 ha project.
Small-scale Surface Water Extraction Irrigation Project	GOG	2010	\$12.8M	Construction of 2500 ha of community based surface water extraction irrigation projects in 4 regions
Energy development and access program; power system reinforcement project in Kumasi	ADF/VRA/ECCG	2009	\$50.83 M	Provision of i) a 161/33 k V substation with a capacity of 132 MVA; ii) Reinforcement of an existing 161/33 k V substation; iii) two 33/11 k V substations each with a capacity of 40 MVA; iv) 43 km of 33 k V lines ; v) 52 km of 11 k v lines ; vi) 731 smaller more efficient networks
Accra plains irrigation project	Libya/GoG	2012-2017	\$75M	Implementation of the Accra Plains feasibility study which is currently on -going and will be completed in 2009
Bankable Investment Project Profile: Small-scale /Micro-scale Irrigation and Drainage Project	FAO, NEPAD	2010	\$63.3M	This project would be aimed at expanding the area under economically viable small-scale and micro-scale irrigation and the rehabilitation of existing irrigation schemes.

ANNEX 1: MAP OF WATER CONTROL IN GHANA:



ANNEX 2: COUNTRY STATISTICS

Country and population								
Area of the country	2008	23854	1000 ha					
Cultivated area as % of the total area of the country	2007	28.94	%					
Total population	2005	22113	1000 inhab					
• of which rural	2005	54	%					
Population economically active in agriculture	2005	6245	1000 inhab					
• as % of total economically active population	2005	56	%					
• female	2005	45	%					
• male	2005	55	%					
Economy and Development								
Gross Domestic Product (GDP) (current US\$)	2007	15246	million US\$/yr					
• value added in agriculture (% of GDP)	2007	36	%					
• GDP per capita	2007	650	US\$/yr					
Access to improved drinking water sources								
Total population	2006	78.1	%					
Urban population	2006	90.7	%					
Rural population	2006	69.1	%					
Water Resources and management								
Average precipitation	2007	283.2	10 ⁹ m ³ /yr					
Total actual renewable water resources	2007	56.4	10 ⁹ m ³ /yr					
Dependency ratio (transboundary rivers)	2007	43.0	%					
Total actual renewable water resources per inhabitant	2007	2406	m ³ /yr					
Total dam capacity	1994	148.5	10 ⁹ m ³					
Total water withdrawal	2000	0.982	10 ⁹ m ³ /yr					
• as % of total actual renewable water resources	2000	1.85	%					
IRRIGATION AND DRAINAGE								
Irrigation potential	2007	1900	1000 ha					
Water Management								
Area equipped for irrigation: full control - total	2007	33.8	1000 ha					
Equipped lowlands	2000	0.0	1000 ha					
Total area equipped for irrigation	2007	33.8	1000 ha					
• Area equipped for irrigation as % of cultivated area	2000	0.5	%					
• Annual increase rate		30.1	%					
• Power irrigated area as % of area equipped for irrigation	2007	63.5	%					
• Area actually irrigated as % of area equipped for irrigation	2000	90.3	%					
Non-equipped cultivated lowlands and flood recession	2007	0.0	1000 ha					
Total agricultural water managed area	2007	33.8	1000 ha					
• Agricultural water managed area: as % of cultivated area	2000	0.5	%					
• Drained cultivated area as % of total cultivated area		-	%					
Typology of irrigation schemes								
Small-scale schemes (<ha)	2007	24.25	1000 ha					
Medium-scale schemes (- ha)	2007	2.65	1000 ha					
Large-scale schemes (>ha)	2007	6.9	1000 ha					
Irrigated crops								
Rice	2007	8.097	1000 ha					
ENERGY INDICATORS								
Energy Production	2005	6,788(Gwh)	Mtoe					
Net Imports	2005	815(Gwh)	Mtoe					
TPES	2005	8.94	Mtoe					
- TPES/Pop	2005	0.40	toe/capita					
- TPES/GDP	2005	1.41	toe/thousand 2000 US\$					
- TPES/GDO (PPP)	2005	0.18	toe/thousand 2000 US\$ PPP					
Electricity Consumption	2005	5.247(Gwh)	TWh					
- EC/Pop	2005	271	kWh/capita					
ENERGY SUPPLY AND CONSUMPTION (2005)*								
	Coal	Gas	Crude oil	Petroleum products	Hydro	Other Renewable & Waste	Others	TOTAL
Production	0	0	0	0	458	5897	0	6355
Imports	0	0	2050	695	0	0	70	2815
Exports	0	0	0	-183	0	-1	-55	-239
International Marine Bunkers	0	0	0	0	0	0	0	0
Stock Changes	0	0	0	6	0	0	0	6
Total Primary Energy Supply (TPES)	0	0	2050	518	458	5896	15	8937

* in thousand tonnes of oil equivalent (ktoe) on a net calorific value basis.

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