



GHANA

**THIRD NATIONAL REPORT TO THE COMMITTEE FOR
THE**

REVIEW OF THE

**THE UNITED NATIONS CONVENTION
TO COMBAT DESERTIFICATION**

MARCH 2005

1.0 EXECUTIVE SUMMARY

The Republic of Ghana is located in south-central West Africa, south of the Sahara and north of the Equator on the Gulf of Guinea. It is bounded on the north and northwest by Burkina Faso, on the west by Cote d'Ivoire, and on the east by Togo, and on the South by the Atlantic Ocean. The country is administratively divided into ten regions and one hundred and ten districts.

Ghana has an area of 238,537 square kilometers and a current 2000 Population figure of about 18.4 million, of which 51.4% live in the relatively dry areas, which are subject to moderate to high levels of desertification. These dry areas are found mostly in the Northern and Upper Regions and also in the coastal savanna zone. It is also now established that the transition zone between the forest and savanna ecological zones and some parts of the forest zones are under threat of desertification. Hence, these areas are being considered under the National Action Programme (NAP) for action to reverse the trend of land degradation. Overall, approximately 30-40% of the total land area of Ghana is subject to desertification.

Current trend in forest destruction in the forest belt through farming, logging, mining, bushfires, firewood and charcoal production, shows that the area could face the wrath of desertification if remedial measures are not put in place. In the savanna zone (covering about 15.6 million hectares), as much as 14.7 million hectares are unreserved and are being destroyed at an estimated rate of 22,000 hectares per annum.

Such is the scenario of land degradation in Ghana that has made the threat of desertification to assume national proportions. Although development and environment issues are inextricably linked, the quest for economic growth has, for a long time, over-shadowed environmental concerns. Consequently, the process of development has often left in its trail, deterioration of productive lands, deforestation, desertification, air and water pollution and poverty.

In line with Ghana's quest for sustainable development and also to fulfill the nation's obligations under the UNCCD, a National Action Programme has now been elaborated and validated at a National Workshop. The Government of Ghana adopted the document in July 2004. Consultations are currently underway with the Global Mechanism of the UNCCD to help implement the NAP. Other activities lined up are the prioritization of proposed projects identified in the NAP and a resource mobilization workshop with the donor community to be held in 2005.

Ghana is a member of the Economic Community of West African States (ECOWAS) and the Africa Union (AU). Though not a member of CILSS Ghana has participated in meetings and programmes organized by it.

Though an NGO national coordinating committee is yet to be formed on Desertification in the country, networks of NGOs have however been formed in the various regions including regions affected by desertification

This report is presented for the Review of the Convention Secretariat in accordance with Article 26 of the Convention to Combat Desertification. The report sets out to upgrade or provide new information on the national report submitted in 2002. It is based on the format provided by the UNCCD which include; strategies and priorities established within the framework of sustainable development plans and policies, the institutional measures taken to implement the Convention, participation and consultative process in support of the preparation of the National Action Programme and partnership agreement with developed country parties, some measures taken to conserve natural resources and to improve the economic environment and knowledge of desertification information on financial allocations from national budgets and other sources and a review of benchmarks and indicators utilized to measure progress and assessment: This report is therefore an update of events (including a country profile) since the second report to the CRIC.

Name of Focal Point	Executive Director
Address including email address	Environmental Protection Agency, Post office Box M 326, Accra, FAX (23321)662690 Email: support@epaghana.org , epaed@africaonline.com.gh
Country specific websites relating to desertification	www.epa.gov.gh

Acronyms

CCD	Convention to Combat Desertification
CCFI	Collaborative Community Forestry Initiative
SADEP	Small Holder Agriculture Fund Development Programme
CSIR	Council for Scientific and Industrial Research
EAP	Environmental Action Plan
EPA	Environmental Protection Agency
ERP	Economic Recovery Programme
FD	Forestry Department
FORIG	Forestry Research Institute of Ghana
FRMP	Forest Resources Management Project
GM	Global Mechanism
GNFS	Ghana National Fire Service
GPRS	Ghana Poverty Reduction Strategy
ICOUR	Irrigation Company of Upper Region
INCD	Intergovernmental Negotiating Committee for the Convention to Combat Desertification
IRNR	Institute of Renewable Natural Resources
LAP	Land Administration project
LUT	Land Utilization Type
MES	Ministry of Environment and Science
MOFA	Ministry of Food and Agriculture
MTADP	Medium-Term Agricultural Development Programme
NAP	National Action Programme
NDF	National Desertification Fund
NGGS	Northern Ghana Guinea Savanna

NGO	Non-Governmental Organisation
NSBCP	Northern Savanna Biodiversity Conservation project
NPACD	National Plan of Action to Combat Desertification
NRMP	Natural Resources Management Project
UWADEP	Upper West Agricultural Development Fund
RIPS	Regional Institute for Population Studies
RSAU	Remote Sensing Application Unit
SARI	Savanna Agricultural Research Institute
SRI	Soil Research Institute
UNDP	United Nations Development Programme
UNSO	United Nations Office to Combat Desertification and Drought
DISCAP	District Capacity Project
WRI	Water Research Institute
NEAP	National Environmental Action Plan
NRMP	Natural Resources Management Programme
SRMP	Savanna Resources Management Programme
COP	Conference of the Parties
PSRP	Poverty Reduction Strategy Paper
NTFPs	Non-Timber Forest Products
VIP	Village Infrastructure Project
FORIG	Forestry Research Institute of Ghana

TABLE OF CONTENT

	Page
1.0 Executive Summary.....	1
2.0 Strategies and priorities established within the framework Of sustainable development plans and/or policies.....	6
3.0 Participatory process in support of preparation and implementation of action programmes particularly processes involving Civil Society, Non-governmental Organisations and Community based organisations.....	11
4.0 Consultative process in support of the preparation and implementation NAPs and partnerships agreements with developed country parties and other interested entities, particularly mobilization and co-ordination of both domestic and international resources.....	18
5.0 Planned measures taken within the frame work of NAP,	19
6.0 Institutional measures taken to implement the convention including	27
legislative and institutional frameworks or arrangements	
7.0 Financial allocations from national budgets in support of implementation as well as financial assistance and technical cooperation including their inflows, processes to identify their regalements area of finding and setting priorities.....	29
8.0 Review of bench marks and indicators utilized to measure progress and an assessment.....	31
9.0 Conclusion.....	32
10.0 Reference.....	33
11.0 Country profile.....	36

2.0 STRATEGIES AND PRIORITIES ESTABLISHED WITHIN THE FRAMEWORK OF SUSTAINABLE DEVELOPMENT PLANS AND/OR POLICIES

Two national reports prepared by Ghana to the Conference of Parties to the UNCCD, elaborated on the existence of a number of enabling policies, strategies, legislations and plans that continue to support the implementation of the Convention to Combat Desertification.

A number of these major policies, plans and legislations were highlighted hence may be mentioned to buttress their relative significance and indicate any amendments or changes that they have undergone since the last report.

The National Environmental Policy for example which seeks to ensure the reconciliation between economic and natural resources conservation also seeks to make a high quality environment a key element supporting the country's economic and social development.

The National Environmental Action Plan (NEAP) had its implementation strategy in the Ghana Environmental Resource Management Project, which ended in 1998. The period for the implementation of NEAP also ended in 2000 hence the need for serious review of the NEAP to incorporate aspects of the NAP implementation and other relevant environmental issues.

Previous reports also highlighted the National Economic Framework and Policy particularly the National Development Policy Framework popularly described as Ghana's Vision 2020.

Two (2) national development strategies that resulted from the Vision 2020 included the "First Step (1996 – 2000) and the Interim Poverty reduction Strategy Paper 2000 – 2002 (1 – PRSP). The implementation of the two strategies met considerable challenges, in part emanating from weak national ownership, unrealistic implementation strategies and inadequate financing.

The preparation of the GPRS (2002 – 2004) attempts to address these and other challenges by constituting a broad-based consensus building among government, civil society private sector and development partners on key issues and programmes for accelerated and sustained poverty reduction.

The Ghana Poverty Reduction Strategy (GPRS) is a comprehensive framework of policies and strategic initiatives aimed at ensuring economic growth and poverty reduction in Ghana over three years (2002 – 2004).

The policies and strategies in the GPRS take into consideration some environmental concerns. The document recognizes that environmental degradation is a contributory cause of poverty. It makes reference to the need to apply appropriate environmental assessment tools to ensure that growth derived from the GPRS is environmentally friendly.

The analysis of the causes of various forms of poverty and the prescribed strategic actions and solutions either do not consider the environmental factors. Consequently, environmental impacts of strategies for delivering growth and poverty reduction are not adequately addressed, for example, the significant contribution of environmental degradation continued with worsening poverty and the natural resources making significant contribution to the national economy and associated risk that continued unsustainable extractive processes pose to future economic growth.

The potential for sustainable management of key resources like land, forest and water for the pro-poor economic growth need further policy analysis hence, the National Development Planning Commission (NDPC) the Environmental Protection Agency (EPA) of the Ministry of Environment and Science (MES) facilitated the conduct of Strategic Environmental Assessment (SEA) of the GPRS at the national and district levels. In the next review of the GPRS, natural resource management issue would be included as a key thematic area.

Other major policies and legislations continue to provide the framework within which programmes and projects are formulated and implemented. These have relevance for the

sustainable management of environmental resources and for combating desertification. The other relevant policies apart from the wider Environmental Policy include:-

The Forest and Wildlife Policy implemented through the Forest Development Master Plan highlighted in the previous report. This is in its second phase (2001 – 2010) and will continue to deal with:

- Sustainable forest and savanna woodland management;
- Propagation of forest-based products;
- Wildlife and protected areas conservation.

The Land Policy which is also now in place has its implementation strategy in a new project called *the Ghana Land Administration Project* of four (4) components :

- Harmonizing Land Policy and regulatory framework for sustainable land administration;
- Institutional reform and development;
- Improving land titling, registration, valuation and information systems;
- Project management, monitoring and evaluation.

Water Policy.

A new water policy is being finalized

The policy outlines the specific role of the Government of Ghana to ensure effective development and management of the country's water resources in particular, it will encourage:-

- Sustainable exploitation, utilization and management of water resources while maintaining bio-diversity and the quality of the environment;
- Participation of all stakeholders including the private sector, local communities particularly women in decision-making on water related issues;

It will among others ensure the availability of water in sufficient quantity and quality, as well as appropriate infrastructure for agriculture to sustain food production and security.

The institution of measures to mitigate the effects of and prevent damages caused by extreme hydrological occurrences (viz floods and droughts). It will also promote and support scientific, technological and socio-economic research, including the development and use of appropriate technologies and practices for sustainable water resources development and international cooperation in the management of shared water resources.

A Water Resources Commission (WRC) made up of 15 members has been set up since 1998 with the wide ranging responsibilities and a primary task related to the allocation of water resources among various competing users.

The focus is to use the principle of Integrated Water Resources Management (IWRM) and adopt a strategy to achieve its vision of developing efficiently and effectively managing a system for the sustainable development of water resources in Ghana to ensure full socio-economic benefit for present and future generations. The Commission was instrumental in the development of the water policy and a medium-term 5-year work plan to guide its operations

2.1 The National Wildfire Policy

Although a number of legislations have been passed over the years, the absence of a policy direction has led to inconsistencies in the implementation and enforcement of wildfire laws. The resultant effect has been the ever-increasing incidence of wildfire over the years.

To conserve, enhance and protect the natural environment and give a clear-cut direction to wildfire management, a comprehensive National Wildfire Policy has been formulated.

The National Wildfire Policy seeks to improve the socio-economic well being of the citizenry through effective management of wildfires for the sustainable management of natural resources and restoration of environmental quality.

The specific objectives are:-

- ❖ To ensure effective prevention and control of wildfires;
- ❖ To introduce alternative resource management systems that will minimize the incidence and effects of wildfires;
- ❖ To institute incentive and reward systems in wildfire management;
- ❖ To promote user focused research on wildfire management.

2.2 Forest and Wildlife Policy

Under the Wildlife Parks Protection and Rehabilitation Component of the Northern Savanna Biodiversity Conservation Project,(NSBCP) the Mole National Park and the Gbelle Resource Reserve are involving fringe communities in the management of Parks through the formation of Wildlife Protected Area Management Committees (WPAMCs) to support development and implementation of collaborative management plans.

Achievements so far include -

- ❖ Sensitization of Committees on objectives of collaborative management ;
- ❖ Wildlife Protected Area Management Committees (WPAMCs) established in all fringe communities;
- ❖ Fringe communities provided with bicycles to facilitate management objectives.

2.3 Pesticides Control And Management Act 528 (1996)

The enactment of the Pesticides Control and Management Act 528 (1996 provides for the control, management and regulation of pesticides in Ghana.

Under the law, pesticides dealers are required to register and obtain licenses to ensure prudent management of pesticides in the country.

3.0 PARTICIPATORY PROCESS IN SUPPORT OF THE PREPARATION AND IMPLEMENTATION OF THE NATIONAL ACTION PROGRAMME

The participatory process for the preparation and implementation of the National Action Programme to Combat Desertification and Drought as outlined by the UNCCD has been

fully complied with. Presently the National Action Programme (NAP) document has been finalized and adopted by Government.

In line with the country's decentralization policy and active community involvement in the implementation of the NAP document, the following participatory activities are being pursued:-

- Mainstreaming environmental issues into sectoral policies and programmes;
- Twenty eight (28) new Districts have been created countrywide and this brings to the fold 138 districts in the country. Ten (10) of such newly created districts are in the three Northern Regions which are more prone to desertification. The thrust of this policy is to promote accelerated development and reduce rural poverty. Desertification control and prevention programmes form a component part of the Poverty Reduction Strategy at district and community levels;
- Gender desks have been established in the District Assemblies in the three northern regions to ensure that gender issues are mainstreamed into the district development plans at the local level. ;
- Steps are underway to create gender desks at the various Ministries.
- Action plans have been developed for 20 pilot communities;

- Fire management Plans have been developed in 20 pilot communities with the active involvement of women and youth groups.

A wide range of training institutions backed by scientific research run training programmes and conduct researches on specific aspects of desertification.

Communities have been trained in water harvesting techniques, establishment and management of tree nurseries in pilot communities, land and water management and the use of mercury retort by small-scale mining operatives, etc.

3.1 Capacity Needs

The implementation of the National Action Programme requires the need to build the capacities of communities and other stakeholders to maintain the mechanism for their active participation in the following areas:

- Institutional strengthening;
- Research;
- Data collection;
- Packaging of information;
- Advocacy skills;
- Proposal writing;
- Provision of Internet facilities, etc.
- Logistics

The Global Environment Facility through a local NGO, *HELPING AND LEARNING HANDS* has over the past two years organized capacity building workshops to build the capacities of local NGOs and CBOs on project proposal writing to source funds for the implementation of sustainable land management programmes.

3.2 Promotion of Indigenous knowledge

Indigenous knowledge and beliefs of environmental management forms an integral part of desertification control activities. Over one hundred sacred groves in the three northern regions are being reinforced through the use of taboos and local rules and regulations. Sixty-two (62) communities have enacted their own rules and regulations, stone lining, an indigenous land and water management strategy is being replicated in the desertification prone regions through the land and water management project. Local and international NGOs have been working in some communities to sustain the local knowledge in water and soil conservation

3.3 Mass education through radio programmes

At least, ninety-six (96) radio programmes are held annually since 2002. Programmes are run in English and twelve (12) local languages in the Northern sector. Various environmental messages including best practices are disseminated.

3.5 Success Stories/ Achievements

3.5.1 The Non-burning Concept

Two hundred (200) communities have adopted the concept of no burning. The concept encourages complete no burning in highly degraded environments. However various mechanisms such as the establishment of green belts, natural regeneration sites and community reserves are encouraged in bushfire prone communities to serve as practical and demonstration sites).

- Provision of local museum for rare medicinal plants;
- Conservation of indigenous tree species;
- Increase of forest cover;
- Regeneration of degraded sites;
- Provision of buffer for wildlife and bird habitat;
- Increase in fodder and forage;
- Protection of headwaters and stabilizing stream flows;
- Improvement in soil fertility, e.g., eight (8) maxi (800 kilogrammes) bags soya beans harvested (at Goziri in the Upper West region) as against three (3) maxi bags of soya beans previously harvested on one acre plot.

Coverage of such no burning communities range between a quarter of a kilometer to 6 km². Community reserves as regeneration sites have plot sizes between 80 and 400 hectares.

To ensure effective consultation, effective information dissemination at the local level, a coalition of opinion leaders is in place. They send out various messages on prudent environmental management. Eminent traditional rulers have their voices recorded on their experiences and pieces of advice on bush fire prevention and management. These messages are disseminated over the Radio FM in the various local languages for the listening public.

3.6 Activities of Non-Governmental Organizations (NGOs) in the affected areas

Activities of locally based NGOs continue to play key roles in natural resource management.

□ Amasachina Self Help Association (Local NGO)

Amasachina Self help Association in collaboration with Tree Aid, a UK based NGO which provides financial support for adopted local and indigenous approaches towards combating desertification in 15 communities in the Yendi, West Dagomba District of the Northern Region with a life span of five years.

Key components of the project include: afforestation, bushfire control and micro credit scheme for women. The project utilized indigenous knowledge for enhancing tree growing and reducing environmental degradation as a way of involving local communities to participate and own the tree growing initiatives.

To achieve its objectives, the communities were empowered through:-

- Training about 650 fire fighting volunteer squads in 15 communities to assist them manage bushfires including public campaigns;
- Production of 105,000 assorted tree seedlings and woodlot of 2 hectares each as demonstration field in 15 communities;
- Assistance to 15 communities to plant fodder that will serve as grazing grounds for animals;
- Organize 32 women's groups to undertake income generation activities with micro credit support from the project.

A total of three (3) nurseries had been created in 3 communities with a capacity of 105,000 seedlings to support communities to grow trees of different species of their choice.

In Tijo, Northern Region, 35,000 species of trees including, teak, cashew and grafted mangoes were raised and planted.

- 24,000 teak for woodlot;
- 8,000 cashew for agro-forestry;
- 3,000 grafted mangoes for household planting.

□ **Diocesan Development office Project**

Upper East Region: The Bongo Agro-Forestry Project during 2003, supported twenty-eight (28) nursery farmers to establish tree nurseries. A total of 12,450 seedlings were nursed and out that number, 9,978 seedlings survived.

□ **TRAX Programme Support- Ghana**

TRAX Programme Support (TRAX-Ghana) is a British NGO registered in Ghana working in Northern Ghana.

Major activities of TRAX are:-

- Tree nursery establishment;
- Anti-bushfire campaign (no burning through education and video shows in communities);
- Low external input and sustainable Agriculture (LEISA) promotion – contour identification and stone bonding to check erosion.

3.7 Lowland Rice Development Programme

The Lowland Rice Development Project is a collaborative project between the Ministry of Food and Agriculture and (*L' Agence Francaise de Development (AFD)*) with a total grant of 2.65 million Euros. from the latter. The project reached completion in 2003 and has achieved remarkable results in quantitative terms.

It aims at increasing the local production of rice both qualitatively and quantitatively that will meet the standards of the market and at competitive prices with imported rice.

- Achievements: Before the inception of the project, yields of rice was generally poor about 0.5 tons to 1.0 tons/ha. The quality of the paddy was poor with lot of stones and other debris. The low humidity and high temperature during harvesting period

cracked the grains and when milled directly from harvest produced 100% broken rice full of stones.

Significant achievements chalked by the project were that yields improved from 0.5 tons/ha – 1.0 tons/ha to 2.6 tons/ha. Even in the year 2001 where drought affected rice yields and yields were poor with zero harvests in some rice fields, yields in the lowland rice project valleys were maintained at 2.6 tons/ha. That is four time the yields of traditional units.

As far as the transformation of and quality of the commercialized rice is concerned (after parboiling), the implementation of the project led to a significant improvement using a mixture of traditional knowledge and modern techniques introduced by the project has resulted in a roughly 15% increase in parboiled rice prices compared to unsorted rice and also in raising the income of the local women using these techniques. In all, about 300 women were trained in these techniques with an adoption rate of 90%.

➤ **Experiences/Lessons Learnt:**

- ❖ Farmers in the project area are now very convinced that they can improve and sustain rice yields if improved water-harvesting techniques are adopted. Hence after the project the old farmers are still using the technology.

➤ **Land and Water Management Programme of M O F A**

The Ministry of Food and Agriculture (MOFA) continued with the programme to address the problem of land degradation on agricultural lands. This was aimed at promoting rural livelihoods through the prevention of land degradation in farming communities achieved by the introduction of improved land and water management practices.

In pursuance of this programme, the capacity within MOFA to be able to plan and implement community based improved land and water management programmes was one of the major achievements of the programme. Nearly hundred (100) field staff was trained in the preparation of Village Land Development Plans. The field staff intends assists communities to develop their plans.

The main problems associated with land degradation in the Northern Regions included: soil infertility loss; soil erosion; deforestation; indiscriminate bush burning. The Village Land Development Plans (VLDP) therefore addressed the following major technologies which were vigorously adopted by farmers:-

- **Soil erosion control:** Contour bunding and contour farming technologies have been promoted.
- **Soil Fertility Improvement:** Cereal/legume rotation system to improve soil fertility status has also been widely promoted and is being adopted by farmers. In this regard the in-cooperation of soyabean into the cropping system has intensified over the years. The use of mecuna as a cover crop is also picking up among farmers.

Composting and the use of farmyard manure are also being encouraged. Dynamic kraaling is also being practiced in some communities where livestock especially cattle is communally kept. Farmers who have over the years adopted the application of farm yard manure to their crops have recorded significant improvement in their yields.

- **Indiscriminate Bush Burning:** Some level of awareness of the hazards of indiscriminate bush burning has been created in communities. Communities that have been successful in the prevention and control of bushfires have sustained their enthusiasm in ensuring that the vegetation surrounding their communities remained protected from wildfires. Shelilaayili in the Gushegu/Karaga District has achieved outstanding results from “no burning” over five (5) years. This level of achievement was arrived at as a result of the active participation of traditional authorities in the campaign against bushfires.

- **Agro-Forestry**

To reduce the spate of deforestation, farmers are vigorously pursuing tree growing alongside crops and fodder on community and individual lands. The preparation of the Village Land Development Plans has laid a solid foundation for the start of a community based improved land and water management programme.

4.0 CONSULTATIVE AND PARTNERSHIP ARRANGEMENTS

4.1 Supports from International Partners for Cooperation

Since the finalization of the National Action Programme, Canada has taken steps to support Ghana in the implementation of the NAP through a partnership agreement which has been signed. Funds have been committed to the National Desertification Fund.

4.2 Consultations with the Global Mechanism (GM) of the UNCCD

The Global Mechanism of the UNCCD with the Environmental Protection Agency (EPA), NFP has held discussions with the Ministry of Environment and Science (MES), DANIDA, The Netherlands Embassy, CIDA Canada, the UNDP and other multilateral and bilateral partners.

The input of the meeting is to solicit the support of multilateral and bilateral organizations in the implementation of the UNCCD objectives. As a result, conclusive agreements have been reached with the GM of the UNCCD with final support to mainstream the NAP into the national development plans.

4.3 Ghana EPA Desertification Capacity Building Project

CIDA – Canada has agreed to assist building the capacity of the Environmental Protection Agency (EPA) the implementation of the NAP. Series of discussions were held during the 2003 culminating in a two-day project design workshop in May 2003 to agree on the components of the project. Final project document have been prepared and approved.

4.4 National Capacity Self-Assessment Project

The National Capacity Self Assessment Project is a Global Environment Facility (GEF) funded project, which was initiated in 2003. The main objective is to assess Ghana's national capacity to manage the global environment and to enable the country formulate strategies and to draw up an action plan to strengthen the weaknesses identified. It is also to synergise the three conventions. The project is also to identify constraints associated within the three Rio Conventions namely; Biodiversity (CBD, Desertification (UNCCD) and Climate Change (UNFCCC).

The project has undertaken six (6) zonal workshops which covers all the ten regions of the country.

5.0 PLANNED MEASURES TAKEN WITHIN THE FRAMEWORK OF NAP

5.1 Northern Savanna Biodiversity Conservation Project (NSBCP)

The six (6) year project (2002 – 2008) which commenced in September 2002 has already made significant progress in relation to capacity building and awareness creation in the following areas:-

- The development and implementation of a biodiversity education strategy and the use of local radio FM to disseminate information on the project in English and the major local languages in the three (3) Northern Regions;
- The training of nineteen (19) communities in seed nursery establishment and management The production of about 5,000 seedlings per nursery per year;
- The training of traditional healers in silviculture and nursery techniques and establishment of three medicinal plant nurseries and demonstration gardens in respect of indigenous crop conservation in each of the three Northern Regions.

Twenty (20) communities sensitized and practicing controlled burning or “no burning” in project communities.

Provision of alternative livelihood to communities in the form of fruit tree (grafted mango) plantation development, bee-keeping and honey production, and low tillage bullock plough and legume cover crop schemes to assist reduce poverty in (19) target communities

The project is relevant to the country because it is developing systems that can be replicated in other communities in the rehabilitation of degraded areas, demonstrating gardens for

medicinal plants and indigenous crops, conservation of wildlife and corridors and forest management in the three Northern Regions mostly affected by desertification.

5.2 Bushfire Management in Northern Ghana (BURN) PROJECT

CARE International – Ghana, in partnership with the University for Development Studies, Tamale and with funding from the Royal Danish Embassy in Accra is implementing a 2-year (June 2003 to July 2005) pilot project known as the Bushfire Management and Rural Livelihoods in Northern Ghana (BURN) project.

The project seeks to combine historical research, action research and development in addressing the management of bushfire in Northern Ghana with participation of all actors or stakeholders and is being piloted in partnership with selected local NGOs, 2 traditional area councils and CBOs in four (4) communities in four (4) Districts in the three Regions of Northern Ghana (Northern, Upper East and Brong-Ahafo regions).

The local partners are PROCESS in the West Mamprusi and PAS – Langbensi in the East Mamprusi district, both in the Northern Region, CECIK in the Bolgatanga Municipality in the Upper East Region and FASCU in the Wenchi District in the Brong-Ahafo Region.

The project aims at:-

- Improving the understanding of academia, NGOs and communities of indigenous knowledge systems with emphasis on bushfire management and development;
- Facilitating selected traditional institutions and communities pilot improved community-based bushfire management and control systems;
- Increasing the awareness and engagement of policy makers at all levels of governance in dialogue on community participation in and ownership of bushfire control and management systems.

The project has adopted a participatory process and rights-based approach to achieving its goal of *improved livelihoods among poor farming communities in Ghana's Northern Savannah Area through improved environmental and natural resource management.*

5.3 Key Achievements

- Three generational gender-sensitive tool for conducting historical research has been developed and tested;
- Community institutional mapping and traditional bushfire management practices and systems documented by pilot communities and used for community dialogue on developing improved systems of community-based bushfire management;
- Pilot communities have developed and implementing improved models ranging from early-burning systems to variants of non-burning models linked to livelihoods enhancement with the involvement of 20 other neighboring communities;
- Two (2) paramountcies and one (1) division, covering more than 80 communities, have begun the process of developing paramountcy-wide bushfire management systems with an improved understanding of the laws and policies regarding bushfire management and the opportunities and possibilities open to them to facilitate more sustainable models which take account of existing laws;

District Assemblies in the four (4) pilot districts have shown more interest in supporting and facilitating community based bushfire management systems;

- Three (3) books published by the University of Development, (U D S :) 'The Chief, the Forester and the Fireman: (Proceedings of the National Bushfire Workshop, February 2004):
- Methodologies for the empowerment of rural people in Northern Ghana,
- The Harmattan Series, Occasional Paper No. 1;

- Supporting the establishment of a post-graduate centre, design and implementation of post-graduate degree programme by UDS with funding and experiences gained from the project.

5.4 Lessons Leant

- Community-based bushfire management systems do work; but to be sustainable, they need to be situated within the context of policies/management strategies at traditional, district, regional and national levels;
- Inter-community learning on sustainable bushfire management is important and has been proven to be an acceptable learning mechanism for communities;
- Not enough dialogue going on between traditional institutions, CBOs, research institutions and governmental agencies. Current dialogue appears to be spasmodic;
- Process approach if adopted results in greater ownership of outcomes by communities;
- Facilitating development in partnerships enables greater synergies and complementarities;
- Engagement with communities starting with a recognition and respect for their knowledge systems enhance the re-vitalization of their knowledge base and their ownership of process and systems;
- Bushfire management systems that are linked to livelihoods and meet the varied needs and interests of community members provide a valued incentive and motivation for sustainable management of bushfire and natural resource

Through the intersectoral workshops, this project has brought together all necessary stakeholders to review the bushfire law (PNDC Law 229) making traditional authorities to take control of bushfires and assist in the enforcement of the law at the local level.

5.5 Savanna Agricultural Research Institute

The mandate area of the Savanna Agricultural Research Institute (SARI) covers about 40% of the total land area of Ghana, which also happens to be the area most affected by desertification. Research efforts at SARI are therefore geared towards soil fertility management strategies that will help combat the threat of advancing desert conditions.

5.5.1 On-Going Research

The following projects that are also aimed at maintaining soil fertility in Northern Ghana and therefore combating desertification are currently under on-station trial and will be recommended to farmers as soon as they are established to be effective:-

- i. Soil fertility improvement with cover such as, *Crotalaria*, *Mucuna*, *Lablab*, *Callopogonium* and *Pueraria* in root and tuber cropping systems. The aim is to increase cassava and yam production by 20% through high nitrogen-fixing non-food leguminous crops;
- ii. Restoration of degraded soils for sorghum production using cover crops and rock phosphate. This project is aimed at increasing sorghum production by 30%;
- iii. Agro-forestry involvement planting of leguminous trees among food crops on the same piece of land.

The cover crops protect the soil after the crops have been harvested, thus minimizing wind erosion and therefore desertification. Within the period under review (2002 – 2004), SARI has developed a number of resistant and high yielding varieties for rice, groundnuts, cowpea, cassava, pearl millet, sorghum and soya bean.

High yielding and early maturing rice namely Digan (IR 12979-24-1) released in 2003 and IRAT 262, IRAT 216 upland varieties which do quite well in drought prone hydromorphic areas are yet to be released.

Also early maturing variety groundnuts JL 24 with low oil content but suitable for soup and confectionery has also been developed yet to be released.

Two (2) varieties of cowpea Marfo-tuya (Sul 518-2) with 70 days maturing with potential grain and hauling yield of 2.5 tons/ha and 4.0 tons/ha respectively Apaagbala (ITxP-148-1) with a maturing period of 65 days and high yielding also released to farmers in 2003.

Three (3) varieties of early maturing cassava with high yielding potential were also released in 2003. These are Nyeri-Kobga (91/02324), Eskamaye (91/02327) and Fil-Ndiakong (92/0067) while 2 varieties of soya beans namely Jenguma (T9X-1448-2E) and Quarshie (TGX-1445-2E) were selected for their shattering resistance, high yielding and early maturing.

In an ecological zone where rainfall is low and erratic these early maturing and drought resistant varieties will improve on farmers chances of getting good yields and hence enhance food security.

5.6 Forestry Research Institute of Ghana (FORIG)

The FORIG Northern Savanna Research Centre has been opened in Bolgatanga in the Upper East Region. Its priority programmes focus on the following areas: rehabilitation of degraded savanna woodland; tree plantation development within settlements, tree improvement and seed technology and water harvesting technology.

Since its inception 5 years ago, the centre has conducted trial plantations of exotic and indigenous tree species including *Khaya Senegalensis* and *Ceiba petandra* in the Bawku District of the Upper East Region.

It is currently undertaking studies into:-

- The production of Gum Arabic in Northern Ghana; and
- The utilization and status of conservation of indigenous fruits in Northern Ghana.

If results prove positive, the introduction of Gum Arabic will bring income to farmers in future while the conservation of the indigenous fruits will prevent their extinction as has happened to many local fruit tree varieties in some areas.

5.7 The CIDA Farmer Project : *Farmer Response Mechanism Extension Research (FARMER)*

The main objective of the FARMER Project (CIDA) supported project) is to strengthen capacities so as to assist to monitor and evaluate existing projects and to implement new projects on food security in the communities. The project aims at addressing food insecurity and rural poverty in Northern Ghana. According to the 2000 Population and Housing Census, the three (3) Northern Regions of Ghana have a population of 3,346,105 of which 2,700,000 (81%) live in rural areas and depend on the farm for their livelihood. Among others reasons for food insecurity in the northern part of Ghana is the environmental and natural resource management issues, including a harsh climate, variable and scant rainfall, poor soils, accelerated environmental degradation, water shortages, deforestation and desertification and loss of biodiversity. The project covers the three northern regions of the country.

5.8 Irrigation Company Upper Regions (ICOUR) Limited, Navrongo

The Irrigation Company of Upper Regions (ICOUR Ltd.) was established by Government of Ghana in 1985 to promote the production of food crops by small-scale farmers within organized and managed irrigation schemes at Tono near Navrongo and Veve near Bolgatanga.

The company continues to provide tree seedlings to support the afforestation programme of the government, for instance during the period 2002 – 2003, ICOUR planted 77,523 seedlings of various tree species including fruit trees such as cashew, guava, pawpaw and grafted mangoes.

5.9 Increased Awareness Creation

Improving Knowledge Of Desertification

i Targeted Workshops, Seminars and Public Awareness

Ghana's effort at providing knowledge among the broad mass of the population has been through a number of workshops, seminars and community/district durbars.

ii The World Day to Combat Desertification and Drought (WCDD)

One event that has made tremendous impact has been the yearly celebration of the World Day to Combat Desertification, which is celebrated on 17th June every year. This event which is coordinated and funded by the Ministry of Environment and Science (MES) and organized by the EPA is preceded by a national broadcast on national radio and television by the Minister of Environment and Science. There are also radio and newspapers commentaries on desertification and drought, which reach a wider Ghanaian public.

The climax of the celebration is organized in a rotational manner among the (Northern, Upper East and West Regions) that are mostly affected by desertification and drought. Each year a different district in the target region is chosen to organize the durbar of chiefs and people including school children, youth groups, women's groups, decentralized departments, environmental committees, NGOs and CBOs.

The aim is to use the occasion to create awareness of the convention and educate the people on actions that cause desertification and drought and positive action to reverse the trend including, reforestation, soil erosion control and bushfires control. Institutional, community and individual efforts to fight land degradation are also recognized and rewarded on this great day.

iii World Environmental Day

On the World Environment Day community programmes are organized around certain global or national themes every year to lay emphasis on key environmental problems and their solutions. Awareness of the general public, schools, communities and identifiable group including women is created on some environmental issues of concern particularly land degradation. This is done through community durbars, school programmes and radio discussions.

6.0 INSTITUTIONAL MEASURES TAKEN TO IMPLEMENT THE CONVENTION INCLUDING LEGISLATIVE AND INSTITUTIONAL FRAMEWORKS OR ARRANGEMENTS

At the national level, the Ministry of Environment and Science (MES) still maintains its mandate of providing policy direction on environmental issues and science in the country.

National Focal Point

The Environmental Protection Agency, an implementing Agency under the Ministry of Environment and Science continue to provide the National Focal Point and as well as the secretariat to the National Desertification Committee. The Ministry, through the EPA continues to provide support for the national and regional celebrations of the World Day to Combat Desertification and World Environment Day annually.

National Desertification Committee

At this level, the National Desertification Committee (NDC) same as the National Coordinating Body (NCB) continues its role of coordination and providing supervisory guidance for the implementation of the Convention to Combat Desertification and Drought.

The Committee, which is multidisciplinary, and multisectoral has its membership drawn from Government institutions, departments, ministries, research institutions, academia, civil society, NGOs, women's organizations and traditional authorities. It is chaired by the Vice Chancellor of the University for Development Studies, Tamale in the Northern Region of Ghana and meets quarterly to deliberate on issues related to desertification and drought. The current constitution of the NDC is significant as it brings experienced and knowledgeable persons from relevant organizations to share information and coordinate the NAP activities.

The NDC was active in the coordination and finalization of the NAP. The Committee and the MES facilitated the forwarding of the NAP document to government for adoption.

6.1 National NGO Focal Point:

The Friends of the Earth (FOE)-Ghana, is accredited to the UNCCD as the Focal Point representing NGOs in the country and continues to interact and coordinate efforts of the Network of NGOs working on Desertification and Drought.

In 2003 to date FOE-Ghana among others carried out a number of activities:-

- * The consolidation of awareness creation and 13 hectares woodlot project in Wulugu in West Mamprusi District;
- * Capacity building in bushfire prevention and control in the Wulugu area;
- * FOE-Ghana also took part in the annual celebration of the World Day to Combat Desertification and Drought in Ghana and provided a press release, which lobbied for the Government and implementation Agencies to conclude and adopt the NAP without delay;
- * Radio programmes on national radio threw more light on the importance of the day and called for wider public participation on the events of desertification and drought.

6.2 Local level implementation arrangements

At the regional level, the Regional Desertification Committees (RDCs) have been formed in each of the three-proned regions of Ghana. The RDCs have similar composition as at the National level with Regional heads of department, House of Chiefs, NGO representatives and some District Assembly representatives. Due to the multi-sectoral nature of the problems of desertification the RDCs are sub-committees of the Regional Environmental Committees so as not to duplicate responsibilities.

At the District level, District Environmental Management Committees (DEMCs) exist with mandate for ensuring that District plans, policies and programmes incorporate actions to combat desertification and drought. These committees are obligated to form Community

Environmental Management Committees (CEMCs) to deal with community programmes and projects to address issues of land degradation.

All these structures were involved in the elaboration of the NAP through the bottom-up approach where information was generated from the community to district, regional and national levels for the preparation of the NAP. The people were also actively involved in taking decisions at the local, district, regional and national consultative fora on the NAP.

They will continue to offer necessary assistance during the implementation stage of the NAP these structures described above move alongside the Government's decentralization policy hence would ease implementation of the NAP and will assist to inform the structure above and feed into it.

6.3 Legal and Institutional Frameworks

The National Environmental Action Plan (NEAP), the National Development Policy Framework (NDPF) – Vision 2020, the Ghana Poverty Reduction Strategy (GPRS), the National Population Policy (NPP), the National Land Policy (NLP), the National Water Policy (NWP) and Government's Decentralization Policy (GDP) among others, have linkages with national efforts towards combating desertification and drought as indicated earlier in the report.

Therefore institutional measures in terms of policies, plans, legislations and programme contained in the above have a bearing on the management of the country's environment and particularly on desertification and drought. They serve to empower relevant Government agencies and NGOs to undertake activities aimed at combating desertification and drought. These policies, plans and programmes need to be harmonized and require holistic approaches for them to be adopted and applied.

Also for the effective implementation of the NAP to combat desertification and drought, the biodiversity conservation and climate change, there is the need to mainstream them in to national development goals and other sectoral action plans.

7.0 FINANCIAL ALLOCATION FROM NATIONAL BUDGETS IN SUPPORT OF IMPLEMENTATION AS WELL AS FINANCIAL ASSISTANCE AND TECHNICAL CO-OPERATION RECEIVED AND NEEDED

Canada has agreed with the Government of Ghana to commit 6 million Canadian dollars for the implementation of the NAP.

The Ghana Government however, provides the office accommodation and meeting place and pays the salaries and emoluments of persons currently coordinating the activities of the NDC. It also provides transport and sitting allowances for members during meetings and field visits.

7.1 *Funds from Central Government*

Various Ministries, Department, and Agencies whose activities relate to combating desertification and mitigating the effect of drought are allocated funds on an annual basis for their operations. The Ministry of Environment and Science for instance, and its agencies namely the Environmental Protection Agency, the Council for Scientific and Industrial Research and its institutes (e.g. Crop Research Institute, Animal Research Institute, Soil Research Institute, Savannah Agricultural Research Institute, Forest Research Institute of Ghana, Water Research Institute,) are playing various roles, which have relevance for desertification control.

For the 2002 financial year for example, the Government of Ghana made an allocation of ₵2,344,207,630 or \$311,227,684 for the overall development expenditure of the Ministry and its agencies to carry out their planned activities including desertification. The budget for the Ministry of Lands and Forestry, which is about equal to the above sum, is also provided by GOG.

The Government also allocates funds annually for the national and regional celebration of World Day to Combat Desertification and Drought and the World Environment Day fall in June every year.

7.2 National Desertification Fund.

This has been duly registered with the Registrar General's Department where a certificate of incorporation has been issued. The Fund now has the legal mandate to operate as an entity. The board of directors will be inaugurated and the fund launched so that resources could be channelled to it for the NAP implementation activities.

Some initial awareness has been created on the Fund and possible sources of raising funds include the District Assembly common fund from Central Government to district DAs, Community contributions, and levies on natural resources, corporate organisations and industrial concerns.

8.0 REVIEW OF BENCHMARKS AND INDICATORS UTILISED TO MEASURE PROGRESS, AND AN ASSESSMENT THERE OF

Ghana still lacks any systematic benchmarks or indicators for assessing the implementation of the convention or the extent of desertification. Most of what is available are compartmentalised in various institutions or organisation for monitoring certain parameters of environmental change. The Ministry of Environment and Science has however developed a set of indicators to monitor sustainable development. These indicators could later be further developed within the context of the UNCCD.

Since change is in relation to some previously existing state the first task for national resource and other environmental monitoring is to ascertain some baseline conditions for monitoring. It may be possible to use existing standards relating to the characteristics and quality of land resources and the environment, or, some desired levels of land and water quality.

Despite the fact that land degradation is a major problem, which affects the agricultural potential of the country not much attention has been directed at the assessment of the various types of degradation. There seem to be no comprehensive plan for monitoring the rate and extent of land degradation even in the few cases where assessment has been carried

out. A monitoring plan is therefore a pre-requisite for the planning of, for example sustainable land use systems. In this case there is urgent need for assessing and monitoring the extent of land degradation in the various agro-ecological zones as a means of planning and implementation of sustainable land-use systems.

During the NAP preparation process it became obvious that benchmarks or indicators could not be set but will require some support as a first step to produce or obtain these indicators from relevant institutions and agencies .

Institutions like the Soil Research, Crop Research, Savannah Agricultural Research Institutes, Universities, the Water Research Institute and EPA could be tasked to continue to produce and make available relevant baseline information, benchmarks and indicators in a comprehensive form for monitoring the implementation of the CCD and the extent of desertification and drought in the country.

In the case of national sustainable development, a national committee has been established to develop benchmarks and indicators that would be used to measure progress in the implementation of the national sustainable agenda. When developed some of these could be applied to measure some desertification activities in relation to socio-economic parameters.

9.0 CONCLUSION

Among the environmental problems facing Ghana is desertification, which is caused by factors such as deforestation, soil erosion, bush burning and inappropriate agricultural practices.

Land degradation (desertification) continues to be the most serious environmental problems facing Ghana. Its causative factors such as deforestation, soil erosion, bush burning inappropriate farming practices occur at alarming rates.

The Government of Ghana recognizes that generally, environmental degradation is a critical issue, which has bearing on the country's development. Measures have therefore been put in place in recent years to stem the tide of environmental degradation. .

In 2002, the EPA initiated a process of mainstreaming the environment into national development plans. The GPRS was subjected to strategic environmental assessment.

In line with its obligations under the convention to combat desertification, Ghana has now elaborated its NAP and has validated it at a national workshop. The Government of Ghana has adopted the final report.

Ghana needs financial and technical support from bilateral and multilateral partners to be able to bring all the on-going activities, and many others yet to be planned, along lines of the U.N. Convention to Combat Desertification.

10.0 REFERENCES

- 1 Report on Workshop on Combating the Effects of Drought and Desertification. 1987
2. Environmental Protection Council (November, 1991), Ghana National Report to NCED.
3. Environmental Protection Council (December, 1991), Report on Workshop for Monitoring Assistants.
4. Environmental Protection Council (1991), Ghana Environmental Action Plan (Volume 1).
5. Environmental Protection Council, Ghana Environmental Action Plan (Volume 2).
6. Environmental Protection Agency (October, 1994), Report on Seminar on Drought and Land Degradation.

7. Interim Secretariat for CCD, United Nations Convention to Combat Desertification in those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa - Text with Annexes.
8. United Nations (10 June, 1997), Draft Decisions for Consideration by the Conference of the Parties (Note by the Secretariat - document No. ICCD/COP (1)/2).
9. MES, Minutes of meeting of the Task Force on National Desertification Fund, Minutes of meetings.
10. Ministry of Agriculture, Ghana Medium – Term Agricultural Development Programme (MTADP): An agenda for Sustained Agricultural Growth and Development (1991-2000); February 1990.
11. CILSS/ECOWAS, Combating Desertification in West Africa: Sub-Regional Action Programme. Orientation framework. September 1999.
12. Government of Ghana, Northern Savanna Biodiversity project (NSBCP), progress report. 2004
13. UNEP, Strengthening of the National Environmental Machinery and Legislative Support, December 1988 (Nairobi).
14. UNCCD Secretariat, UNCCD National Report Help Guide, Oct 2003
15. Government of Ghana, The Annual Estimate for 2000, 2001, 2002 (Vol. Vi): Ministry of Environment Science and Technology.
16. FARMER Project document 2003
17. Integrated Management of the Volta Basin Project Ghana country report

18. Working Papers on National Consultative workshops- Ghana 2001
19. EPA, Environmental Review Report on Ghana 1996/1997,
20. Government of Ghana National Report to the CRIC April 2002
21. Government of Ghana: National Action Programme to Combat Desertification. 2002
22. FAO/IFAD Aide Memoir FAO/FAD Mission To Ghana, March 2002.
23. FOE-GHANA, Report 2004
24. Government of Ghana /MEST; Evaluation of Ghana Capacity 21 Programme /Final Report 1, October 2001.
25. Amasachina Self Help Annual Report 2003
26. TRAX- Ghana Annual report 2003

GHANA COUNTRY PROFILE

United Nations Convention to Combat Desertification (UNCCD) country profile from the Environmental Protection Agency of Ghana.

Focal Point:
Environmental Protection Agency
under the Ministry of Environment and Science.

Date of submission of report:
September 2004.

Mailing address:

**Environmental Protection Agency
Post Office Box M326,
Accra Ghana.
99 Starlets Road**

Telephone:
233-21-664697/8

Email:
support@epaghana.org

Tele fax: (233-21) 662690

Country Location

Ghana is located in West Africa between the Republic of Togo to the east and La Cote d'Ivoire to the west. In the north is Burkina Faso and the Gulf of Guinea to the southern part. It lies between longitudes 3° 15' W and 1° 12' E, and latitude 4° 44' N and 11° 15' N.

The land size of the country is about 238,533 km² with an extra 110,000 km² of the sea as part of its territorial area. The border with Togo is 877 km long, the one with La Cote d'Ivoire is 668 km long and with Burkina Faso is 548 km in length. The coastline, which covers a distance of 550km, starts from Aflao in the east to Elubo in the west.

Biophysical indicators relating to desertification and drought

Climate

The country lies in a moist equatorial climatic zone through the influence of inter tropical convergence zone and the wind system. The southwest monsoon wind carries moisture from the sea to the land from March to July and this brings rainfall. There are two rainy seasons in the southern sector. These are the main rainy season (April-July) and the small rainy season (September - November). The northern sector has only one rainy season from June to October.

The south- western part of the country (Axim) experiences about ten months of rainfall with mean annual rainfall of 2250mm. There is no marked dry season.

Rainfall decreases northwards with about seven months of rainfall in Wenchi (Brong Ahafo Region) and mean annual rainfall of 1,250 mm. The total potential evapo-transpiration is about 1,430 mm, giving 12.6 % annual water deficit and an average annual aridity index of 0.87. Average temperature is 26 °C while the relative humidity is about 75 %.

In Tamale (Northern Region) rainfall lasts for five to six months with mean annual rainfall of 1000mm and about six to seven months of drought. Potential evapo-transpiration amounts to 1720 mm per annum. Evapo-transpiration is therefore in excess of about 66.4 % over rainfall. Relative humidity is about 1033 mm and average temperature is 28.1 °C. Potential evapo-transpiration amounts to 1652 mm per annum, giving an excess of evapo-transpiration over rainfall by about 87 % and an average annual aridity index of 0.54. Average annual effective rainfall is estimated at 685 mm.

Upper East and Upper West regions, which are also desert prone areas of Ghana have about five to six months of rainfall averaging about 885 mm, and a long period of drought of six to seven months in the year. Potential evapo-transpiration amounts to 1652 mm per annum, meaning an excess of evapo-transpiration over rainfall by about 87 % and an average

annual aridity index of 0.54. Average annual effective rainfall is estimated at 685 mm. Average temperatures are around 28.6 °C.

The south-eastern coastal plains (Accra-Keta) has mean annual rainfall of 900mm. There are two rainy seasons which lasts for seven to eight months. There is a five month period of drought from November to early March. There is a total potential evapo-transpiration of about 1,504 mm, giving a 46.1 % annual water deficit and an average annual aridity index of 0.54. Average temperature is 27.1 °C and relative humidity is 81 %, Average annual effective rainfall is estimated at 659 mm.

Relative humidity is higher at the coastal areas and decreases inland. The country is under the influence of harmattan brought on by the north -east trade winds blowing dust and haze from the dry Sahara desert. These last for about four months (November – February) in the northern regions and about two months (December – January) in the southern part of the country.

Sunshine is high through-out the year. The country receives a mean global irradiation ranging between 4 and 6 kWh/m²/day. The solar radiation levels are highest(above 5.0 kWh/m²/day) in Northern, Upper East and Upper West regions. Others are southwestern part of Volta Region and the coastal strip of Central Region. Moderate solar radiation (4.7 and 5.0 kWh/ m²/day) stretch from Brong Ahafo, Eastern and most part of Volta Region. Others are coastal part of Greater Accra through Central and Western Regions. The rest of the country has low solar radiation below 4.7 kWh/ m/day occurring in lower portions of Brong Ahafo and Ashanti regions and the entire Western region.

Solar radiation varies within the year. From January to April, which is the dry season with few cirrus clouds, there is a rise (14%) in global irradiation. During the rainy season lasting from April to August thick black cumulus clouds are common hence there is steady reduction averaging 22%. The clouds prevent solar irradiation from reaching the earth surface. There is a rise of 23% from August to November but decreases between November and January which is the harmattan season with lots of dust particles brought by the dry north-east winds from the Sahara desert. The dust prevents sun rays from reaching the ground.

Vegetation

Ghana is divided into six main ecological zones. These are high rain forest, semi deciduous forest, coastal savanna, guinea savanna and Sudan savanna and mangrove swamp.

The rainforest is evergreen throughout the year and is found in south-western Ghana around Axim. It covers an area of about 7,500km². The vegetation is evergreen with big canopies and tall trees such as *Cynometra-Lophira-Tarrietia*, *Cynometra ananta*, *Lophira alata* and *Tarrietia utilis* as indicator trees. There are also raphia palms and climbers, which weave through the trees.

The semi deciduous forest is green in the rainy season but shed leaves during the dry season and is mainly in the Ashanti and Brong Ahafo regions. It covers a total area of 66,300 km² about 90% of the forest zone. The dominant trees are *Celtic-Triplochiton* , *Antiaris-Chlorophora*, *Celtic milbraedii* , *Triplochiton scleroxylon* , *Antiaris africana* and

Chlorophora excelsa. They contain the main forest reserves and are suitable for cocoa and coffee production.

In between the forest and the savanna there is a transitional vegetation zone which covers northern Brong Ahafo Region to the east to northern Volta Region to the west over a distance of 48 km. It covers almost 8,300 km². It is a mixture of semi deciduous and savanna vegetation. Common tree species are *Daniella Oliveri*, *Terminalia macroptera* and *Borassus aethiopum*. The tall grasses include *Andropogon* and *Pennisetum* spp.

The coastal savanna is located on the Accra – Keta plains through to Cape Coast and covers an area of 4,500 km². The main vegetation is grass and shrubs interspersed with trees. The indicator grasses are *Andropogon gayanus* and *Hyparrhenia dissoluta* in highland areas; *Vetiveria fulbibarbis* and *Brachiaria falcifera* in low areas. Most common trees are *Antiaris africana*, *Ceiba pentandra*, *Albizia zygia*, *Azadirachta indica*, *Baphia nitida*, *Grewia* spp and *Griffonia simplicifolia*.

The Guinea savanna is found in the Northern Region of Ghana adjoining the semi deciduous forest and the transitional zone. It covers approximately 147,900 km². The vegetation is tall grasses which are mostly in tussocks. These are *Andropogon gayanus*, *Hyparrhenia*, *Heteropogon* spp, *Aristida*, *sporobolus*, *Imperata* and *Cymbopogon gigantus*. The common trees are *Lophira lanceolata*, *Anogeissus leiocarpus*, *Azelia africana*, *Parkia filicoidea*, *Butyrospermum parkii* and *Antiaris Africana*.

The Sudan Savanna spreads across Upper East and Upper West regions. It covers an estimated area of 1,900 km². The grasses are short, stocky and sparsely spaced. The indicator grasses are *Andropogon* spp., *Heteropogon* spp; *Hyparrhenia* spp; *Aristida* spp; and *Loudetia* spp. There are very few trees such as *Anogeissus leiocarpus*, *Acacia* spp and *Terminalia microcarpa*.

Mangrove occurs on the narrow strip of coastal dunes in the southwest. It also occurs on filled in lagoon beds, river estuaries, lagoon margins and on the delta of the Volta river. In lagoon areas on the east coast of the country, the mangrove vegetation as determined by low rainfall most heavy salt laden winds and highly saline heavy black clays. Some of the colonizers of the sand above high water marks are *sporobolus virginiasis* and sp saline flats and lagoon shores are dominated by pure strands of *paspalun* sp Swamp forest is dominated by the raphia palm. In moderate damp areas not disturbed by cultivation typical trees are *xylophia* sp. Most of this vegetation has been destroyed through fuel wood collection.

The rest of the vegetation types were modified by bushfires, agricultural and mining activities and unsustainable forest depletion.

Land use (percent of total land)

The general pattern of land use may be agricultural or non-agricultural.

Land Use (General)

Land Use	Area ('000 sq.km)	% of Total
Savanna woodland	71	30
Bush fallow and other uses	60	25
Unimproved pasture	36	15
Forest reserves	26	11
Tree crops	17	7
Annual crops	12	5
Wildlife reserves	12	5
Unreserved forest	5	2
Total	239	100

*Source: Medium Term Agric. Development Programme (MTADP) Document, (1990).
Ministry of Food and Agriculture*

Agricultural Land Use

Agricultural land use includes cultivated annual and tree crops, bush fallow and unimproved pasture. The major annual crops are classified as cereals, root crops, pulses and nuts and vegetables.

The major cereals are maize, millet and sorghum. Maize is grown throughout the country with about 63% of food farmers involved in its cultivation. Millet and sorghum, however are mainly grown in the savanna zone. Rice is a cash crop of importance especially in the Northern, Upper East and Upper West regions. Cassava is grown almost everywhere in Ghana except the Upper East Region. The cultivation of yam is concentrated mainly in the transitional and Guinea Savanna zones. Groundnuts, bambara nut and beans are largely cultivated in the Upper West, Upper East and Northern regions.

Non-agricultural Land Use

The non-agricultural land use includes forest reserves, wildlife reserves, unreserved closed forest, unreserved savanna lands, mining, settlements and institutional uses. About 66.6% of the forest reserves are located in the forest zone constituting about 21% of the total area of the zone. In contrast, 5.6% of the savanna zone is under reserve. However, about 90% of the wildlife reserves are found in the savanna zone.

The Northern and Coastal savannas are the main grazing lands in Ghana. Majority of the cattle herds in Ghana are concentrated in the north where there are ample grazing grounds. Sheep and goats are widely distributed in the country but are largely concentrated in the north eastern section of the country particularly in the Upper East.

Gathering of forest products such as nuts, fruits, medicinal herbs, barks and roots and cutting of fuelwood is practised in all the desertification-prone zones. These contribute significantly to the degradation of forests and woodlands.

Of major relevance to the degradation problems are mining activities and settlements. Poor road construction works, drainage systems and unprotected gravel and soil-excavated sites along the road networks of the country are major contributors to gullying and sedimentation.

Farming Systems

The major farming systems prevailing in the desertification-prone zone are bush fallow, compound and bush farms, specialized horticulture and large scale and mixed farming.

Bush Fallow System

The bush-fallow system is the predominant system of farming. It involves the rotation of fields rather than crops; the use of fire for clearing vegetation; and the use of simple tools (dibble stick, hoe and cutlass for cultivation). Mostly, farm sizes are up to 2 ha and soil fertility is restored by fallow vegetation.

The system works satisfactorily only in situations where enough land is available to ensure fallow periods of about 10 years or more. With the current fallow periods reduced in most cases from 6 to 10 years to 2 to 3 years, the system is becoming an inefficient production system.

The Compound Farming System

It is found in the Northern, Upper East and Upper West regions, from Bolgatanga to Bawku and in the Lawra, Jirapa-Lambussie districts in the Upper West Region.

Farming is done on land around the homestead where the fertility of the soil is maintained by the application of household refuse and livestock droppings. Horticultural crops such as okro, tomato and sweet potato are planted. Sorghum and late millet are also planted. Groundnuts are sometimes planted or interplanted over the whole area except those reserved for horticultural crops. The size of a compound farm may vary from a quarter of a hectare to over 2 hectares slope.

Bush Farms

Farmers establish bush farms to supplement the produce from the compound farms. The bush farms are located at about 4 to 9 km away from the village with sizes averaging one hectare or more. The bulk of the cereal needs of the household is produced from these farms. The usual cropping system is to mix sorghum and late millet or planted singly and often intercropped with groundnuts, bambara nuts or cowpea. The bush farms are characterized by the bush fallow system and nutrient mining. With the current population pressure, there is not enough land to go round every household unit and the yields from the compound farms are hardly sufficient to cater for their dietary needs. This situation creates

annual food shortages causing an annual hunger gap between April and July in the northern savanna zone.

Mixed Farming (Crop-Livestock Integration)

Mixed farming combines the cultivation of crops with livestock rearing. The latter provides power and manure on the farm. More than 30% of the total land area of northern Ghana is ploughed by bullocks. The system is mainly found in the Northern and Upper regions. The animals are allowed extensive grazing during the day and kraaled in the night. Feeding is, however, a major problem during the dry season when the grasslands are burnt and watering points dry up.

Specialized Horticulture (Shallot Farming)

The most advanced traditional soil management system practised in Ghana in the cultivation of annual crops is that seen in the shallot growing systems at Anloga along the coastline of the Volta Region (Ofori, 1996). The soils are sandy with low nutrient holding capacity. However, farmers have been able to cultivate the same site for over a century and yields of shallots cultivated three times a year are still averaging 6t/ha. Soil fertility is maintained using bat manure, cow dung, and poultry manure

Large Scale Farms

Large scale farms are mainly found in the transition and the northern and coastal savanna zones. Their operations involve clearing of large tracts of land for the production of arable crops such as maize, rice, tobacco, yams and pineapples. The use of heavy machines and improper land clearing and cultivation methods have rendered many sites treeless. Sheet erosion is a common feature on such soils.

Cropping Areas

Available estimates indicate that 425,410 ha of land is put to arable crop cultivation in Northern Region (PPMED, 1994). Rivers, forest and game and wildlife reserves occupy a further 870,000 ha. It is assumed that only 10% of the land is occupied by human settlements and that 70% of the land of the Northern Region is the potential area for livestock rearing (RELC, 1997). About 315,369 ha of land is under crop cultivation in the Upper East Region (MOFA, 1998). The Tono and Veve irrigation dams together cover 1.1% of the cultivable area of the region. About 250,000 ha are cultivated annually in the Upper West Region (UWADEP, 1995).

Water resources

Ghana has abundance of water resources. It is drained by three major river basins. The basins are Volta, South-western and Coastal river systems. These cover 70%, 22% and 8% respectively of the total area of the country. The major rivers include river Volta, Pra, Tano, Offin, Ankobra and Birim. Inland water constitutes 5% of the total land area. The total amount of water that is drained by these rivers is 54.4 billion m³, of which 39.4 billion m³ originate from the country and 17.3 billion m³ originate from outside the country. Indeed

the country is not under water stress. The quality of major surface waters is generally good for multi-purpose usage with their pH within the range of 6.3 to 7.5

Yield in groundwater varies from 4.5m³/hr to 18.4m³/hr depending on the nature of the geological formation. The estimated annual recharge varies between 157.7 mm and 193.1 mm with an average of 175.4 mm. This represents between 13.4 and 16.2% of the mean annual precipitation of between 900mm and 2000mm/annum.

Each year the amount of water available to each member of the population is about 2893.6m³. However, spatial and temporal distribution of freshwater is uneven, and several places experience water shortages during the dry season, particularly Cape Coast and Koforidua, the Central and Eastern regional capitals of Ghana. Many urban water supply systems are however not always operational. The problem is particularly acute in Accra where alternative supplies are limited.

About 42.1% of Ghanaians have access to pipe-borne water; 24.9% use natural (usually unprotected) sources of water; and 33% use groundwater. 80.3% of the urban population and 18.8% of rural dwellers have access to potable water supply. The effective access to potable water is 72% or less.

Estimates of water requirements from surface water source for irrigated agriculture were 16,236million m³ (1970), 34,932 million m³ (1980) and 178,350 million m³ (2000) respectively (Nathan Consortium, 1970). In 2003 it was estimated that water demand for irrigation was about 617.5million m³ and is expected to increase to about 4114million m³ in 2020. These represent the total water withdrawal from the White Volta, Black Volta, Lower Volta, Pra, Todzie/Aka and Coastal Basins. Land areas to be irrigated in the river basins were estimated to increase from 9,356 ha in 1970 to 21,627 ha in 1980 and 116,073 ha in 2000. The potential of irrigation and the stages of development in the various regions of Ghana are summarized by Ahenkorah *et al.* (1994). The figures indicate that the actual performance has not kept pace with the projections.

Irrigation Potential and Stages of Development of Various Projects

Region	Project	Potential Area (ha)	Development (ha)
Greater Accra	Ashiaman	200	120
	Dawhenya	500	200
	Weija	1500	225
	Asutsuare	4000	1800
Volta	Aveyime	800	200
	Afife	880	880
	Kpandu-Torkor	400	100
Eastern	Dadieso	300	20
	Amate	200	100
Central	Okyereko	100	40
	Mankessim	500	10
Ashanti	Akumadan	200	80
Brong Ahafo	Tanoso	200	60
	Subinja	60	60
Northern	Bontanga	500	500
	Libga	-	50
	Golinga	-	20

Upper East	Ve Tono	1000 2500	1000 2500
------------	------------	--------------	--------------

Source: Adapted from Irrigation Development Authority, Ghana (Unpublished) 1994

Energy

Consumption

The Gross Domestic Product per unit of energy use was 3.8 in 1990, 4.3 in 1995 and 4.8 in 2001. The main source of energy used in Ghana comes from fuel wood, that is firewood and charcoal. In the year 2000 about 16 million tonnes of woodfuel was consumed. Half of this was used in charcoal production. Statistics show that this account for 64% of primary energy used in Ghana.

About 80% of households in Ghana depend on woodfuels for domestic use in addition to commercial and industrial and the demand for woodfuel has been on the increase. If this trend of consumption continues, Ghana is likely to consume more than 25 million tonnes of fuel wood by the year 2020.

Petroleum products

The country consumes about 38,000 bbl/day (2001 est.) of petroleum products. This is mainly in the transport sector. The bulk of petroleum products is imported from Nigeria. By 2001 it was estimated that Ghana produced oil to the tune of 7,000 bbl/day while oil reserves is about 8.255 million bbl. Ghana consumed 521,000 tons of petrol, 721,000 tons of diesel and 145,000 tons of kerosene in 2001.

Importation of crude oil and petroleum products have been a drain on the foreign earnings of the country taking about 40% of export earnings in the 1980 which has reduced to average of 13% in 2000.

Projections of fuel consumption ('000 tonnes) 1995-2000

Fuel	1990	1995	2000	Growth Rate %
LPG	6	11.55	22.24	14.0
Kerosene	167	168.68	170.37	0.6
Charcoal	637	812.99	1,037.61	5.0
Fuelwood	7,019	7,941.35	6,984.91	2.5

Source: Adapted from Ampadu-Agyei et al. (1994)

Types of land degraded

Types of land degradation include soil erosion, desertification, salinization and plinthite formation. These are more pronounced in the desert prone areas.

Soil Erosion

Soil erosion is most pronounced in Northern and Brong Ahafo regions and is mostly caused by rainfall and wind. Bojo (1996) estimated that the gross annual economic loss due to erosion ranged from 2-5% of the Agricultural Gross Domestic Product in Ghana.

Data compiled by the Soil Research Institute (Asiamah 1987) and shown below shows that about sixty nine percent of the land area of Ghana is affected by severe, very severe sheet and gully erosion.

Erosion hazard on regional basis (km²)

Region	Slight to moderate sheet erosion	Severe sheet and gully erosion	Very severe sheet and gully erosion
Northern	23,310	19,062	23,330
Upper East	4,574	3,774	964
Upper West	7,288	4,470	7,148
Brong Ahafo	10,697	20,932	5,219
Volta	6,615	7,376	2,901
Ashanti	7,115	11,826	6,017
Greater Accra	3,005	101	85
Eastern	3,090	11,015	2,852
Central	2,002	7,780	521
Western	2,745	16,913	3,675
Total	70,441	103,249	54,712

Source: Asiamah (1987)

Desertification.

In Ghana, total land area prone to desertification is 35% (about 83, 489km²). The Upper East Region, Northern Region and Upper West Region face the greatest hazard. Other areas include the southern part of Volta Region, parts of Greater Accra Region and southern Central Region. Land area prone to desertification doubled in recent years.

Desertification in Ghana

Description	Area	Percentage
Low	17,000km ²	7.47
Moderate	112,000km ²	48.78
High	34,000km ²	15.15
Very high	2000km ²	1.04
Total	165,000km ²	

Salinization

The soils along the coastal zones of Ghana are most affected by salinization. These soils comprise about 150,000km of solonetz and over 80,000km of solonchacks both making about 40% of soils in the coastal savanna zone. Most of the soils along the coast are degraded by salt intrusion which limits their suitability for crop production. In addition soils under irrigation in this zone and elsewhere are becoming saline due to inappropriate soil and water management.

Iron Pan formation

Plinthite or iron pan is formed in agricultural soils in Ghana. It has been estimated by the Soil Research Institute (Asiamah, 2002) that 128,581km² of the total agricultural land areas of Ghana is being threatened by plinthite. This hardening of the soil is found to be the cause of poor crop yields. Practises which expose and predispose soils to dehydration and iron pan formation include deforestation, overgrazing, bush burning, charcoal production, surface mining , mechanical topsoil removal and improper tillage.

Rehabilitation

Annual progress report (2003) of the Ghana Poverty Reduction Strategy indicates that some progress has been made in environmental protection and natural resources management. This is a result of the reforestation of depleted forest zones. The area under aforestation increased from 17,000 hectares in 2002 to 27,000 hectares in 2003.

Socio-economic indicators related to desertification and drought

People and economy

Ghana has a population of 18.8 million (2000), with annual growth rate of 2.7 %. This includes 51% women and 49% men. With the current growth rate of 2.7% the estimated population for 2003 was 20.5million. (UN, 2003)

There is a progressive increase of rural urban migration from 23% to 32% based on analysis of census data from 1960 to 1984. However the GLSS (2000) showed a 10% rural urban migration. About 66 % of the people live in the rural areas while 34% live in the urban areas. About 8.7 million Ghanaians are economically active that is 54 % (15-64 years). Out of this 88.8% are employed. The private informal sector employs 81%, while the Government employs 8.7%, agriculture/forestry accounts for (50%) of the economically active persons with trading 14.5% and manufacturing10.8%.

Life expectancy at birth is 57.2years (1990), 59.9years (2000), 57.8years (2003) while the infant mortality rate per 1000 live births is 126 in 1990 and 100 in 2000.

Human Development

A survey published in 2001 on welfare indicators for Ghana shows that 4.6% of the active working population are unemployed (GSS, 2001). Out of this total 5.5% are male and 4.1% are female.

Although the northern part of Ghana comprising Northern, Upper East and Upper West regions account for about 40% of the land area, it is less densely populated and accounts for about 14% of agricultural production in the country (GSS 1995). The low rainfall and the prolonged dry season permit one main cropping cycle during the year. The majority (70%) of people from the northern are employed in agricultural sector and about 10% of the

workforce is underemployed. The remaining 20% are economically inactive especially the youth.

In Ghana, access to primary education is high with an average of 82.2% for children of school going age(6 years). Out of this about 67.9% are male and the rest female. (GSS,2001).

Youth (ages 15-24) literacy rate countrywide is improving. In 1995 it was 81.8%, in 1995 it was 87.1%, in 2001 it improved to 91.6% while in 2002 it was 92.2%

Literacy , however, remains very low in the Northern Region. Nearly 58% of all heads of households never went to school. However access to primary education is high, about 70% of households have access to primary education. Nonetheless the literacy rate of 16.8% is low and is the lowest of all the regions of Ghana.

The adult literacy rate of Upper West Region is 22% and is about one half of the national average and one of the lowest in Ghana. Roughly 62% of adult males and less than 40% of adult females are literate. This region has the lowest number of school age children in school as primary enrolment rate is 36%. Similarly 8.4% households in the region has access to secondary education.

In 1990 the country has a Gross Domestic Product (GDP) of US\$5.8 billion, US\$6.3 billion in 1995, US\$5.8 billion in 2001 and US\$.4 billion in 2002 (World Bank 2004). The Gross National Income (GNI) per capita was US\$390.0 in 1990, US\$360.0 in 1995, US\$290.0 in 2001 and US\$270.0 in 2002 (World Bank 2002)

Ghana's economy is based mainly on agriculture, mining and tourism. The main staple crops are cassava, yam, plantain, cocoyam, maize, sorghum, millet and rice.

Production of Selected Food Crops ('000Mt)

Crop	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Cassava	5,973	6,025	6,611	7,111	7,000	7,172	7,845	8,107	8,966	9,731	10,239
Yam	2,720	1,700	2,126	2,275	2,408	2,703	3,249	3,363	3,547	3,900	3,813
Plantain	1,322	1,475	1,637	1,823	1,818	1,913	2,046	1,932	2,074	2,279	2,329
Cocoyam	1,236	1,148	1,408	1,552	1,530	1,577	1,707	1,625	1,688	1,860	1,805
Maize	961	940	1,034	1,008	996	1,015	1,015	1,013	938	1,400	1,289
Sorghum	328	324	360	353	333	355	302	280	280	316	338
Millet	198	168	209	193	144	162	160	169	134	159	176
Rice (paddy)	157	162	221	216	197	281	210	215	253	280	239
Rice (milled)*	94	97	133	130	118	169	126	129	152	168	143

Source: SRID

*60% of paddy

The industrial crops which are grown mainly for export include Cocoa, Coffee, Sheanut , Seed Cotton , Tobacco and Oil Palm. The production figures for series of years are shown below.

Production of Industrial Crops (Mt.)

Year	Cocoa ¹	Coffee ¹	Sheanut ¹	Seed Cotton ²	Tobacco ³	Oil Palm ⁴
1990	295,052	957	NA	NA	1,530	NA
1991	293,352	4,872	5,040	11,160	1,160	NA
1992	242,817	2,710	1852	14,250	1,740	NA
1993	312,122	370	10,964	17,460	1,725	NA
1994	254,652	4,116	9,479	23,350	2,230	879,278
1995	309,406	6,330	19,840	26,290	1,700	901,170
1996	403,000	6,330	22,680	17,735	2,000	984,394
1997	322,490	2,880	21,504	24,953	2,020	955,505
1998	409,360	8,370	34,886	33,803	2,390	1,022,010
1999	397,675	3,965	17,465	38,127	2,556	1,031,919
2000	436,634	1,956	30,771	35,503	2,457	1,066,426*
2001	389,591	1,379	19,882	17,506	1,233	1,102,087*
2002	340,562	1,464	27,160	18,313*	2,155	NA
2003	496,846	NA	NA	NA	2,150	NA

Sources: 1. Cocobod, Accra; 2. Agricultural Development Bank. 3. British American Tobacco Co. 4. Oil Palm Companies (GOPDC, TOPP, BOPP, NOPL) and Individual Plantations

NA: Not Available

* Value based on projection from past years' production.

The bulk of the cattle sheep and goat are located in the Northern, Upper East and Upper West regions. This area accounts for about 79% of total production. About 15% of the livestock production also comes from the dry coastal savannah, Keta – Accra plains. The production figures are listed below.

Livestock Population (Million)

Type of livestock	1991	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Poultry	10,572	12,170	12,289	13,083	14,589	15,888	17,302	18,810	20,472	22,032	24,251	26,395
Sheep	2,162	2,127	2,216	2,070	2,419	2,496	2,576	2,658	2,743	2,771	2,922	3,015
Goats	2,194	2,130	2,204	2,156	2,233	2,659	2,792	2,931	3,077	3,199	3,230	3,560
Cattle	1,195	1,169	1,217	1,123	1,248	1,260	1,273	1,288	1,302	1,315	1,330	1,344
Pigs	454	397	381	365	355	347	339	332	324	312	310	303

Source: Veterinary Services Directorate, MoFA, Accra

The Ministry of Food and Agriculture provides policy framework for the efficient production and distribution of agricultural products.

Science and technology

There are over six scientific institutions engaged in desertification related work. These include:

- Council for Scientific and Industrial Research (CSIR) Soil Research Institute, Kwadaso, Ashanti Region
- University of Development Studies, Tamale, Northern Region

- CSIR Water Resources Research Institute, Accra
- Forest Research Institute of Ghana (FORIG), Kumasi
- Meteorological Services Department, Accra
- Agricultural College, Nyankpala Northern Region
- Savanna Agricultural Research Institute-Nyankpala

Data sources

Ghana Statistical Service; Ghana Living Standard Survey 4, (2000)

Nathan Associates (1970); Ghana Sector Studies. Water Resources General Report.

Ministry of Finance and Economic Planning, Accra Ghana.

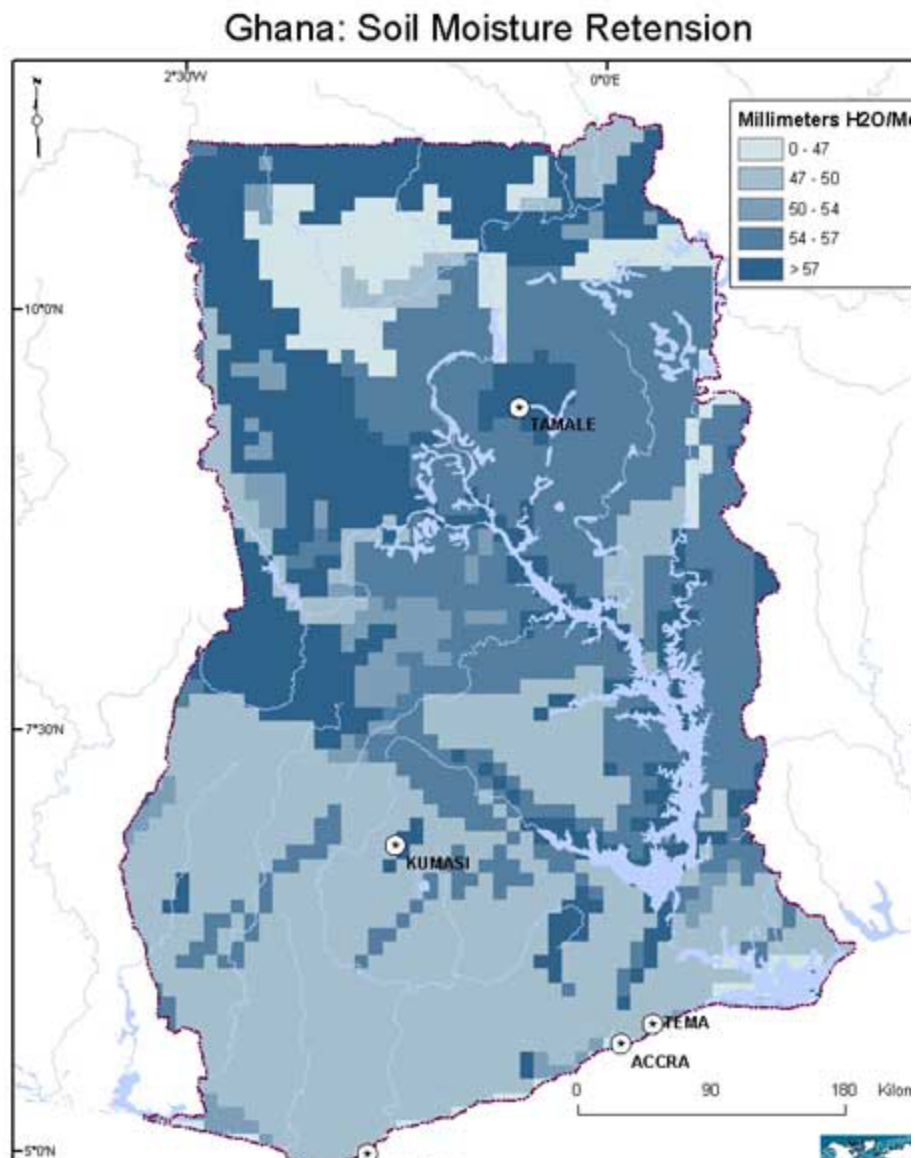
Ghana Statistical Service. Core Welfare Indicators Questionnaire Survey, 2001. Accra Ghana

Yaw Osafo Marfo; Ghana, Millennium Development Goals Report, 2003

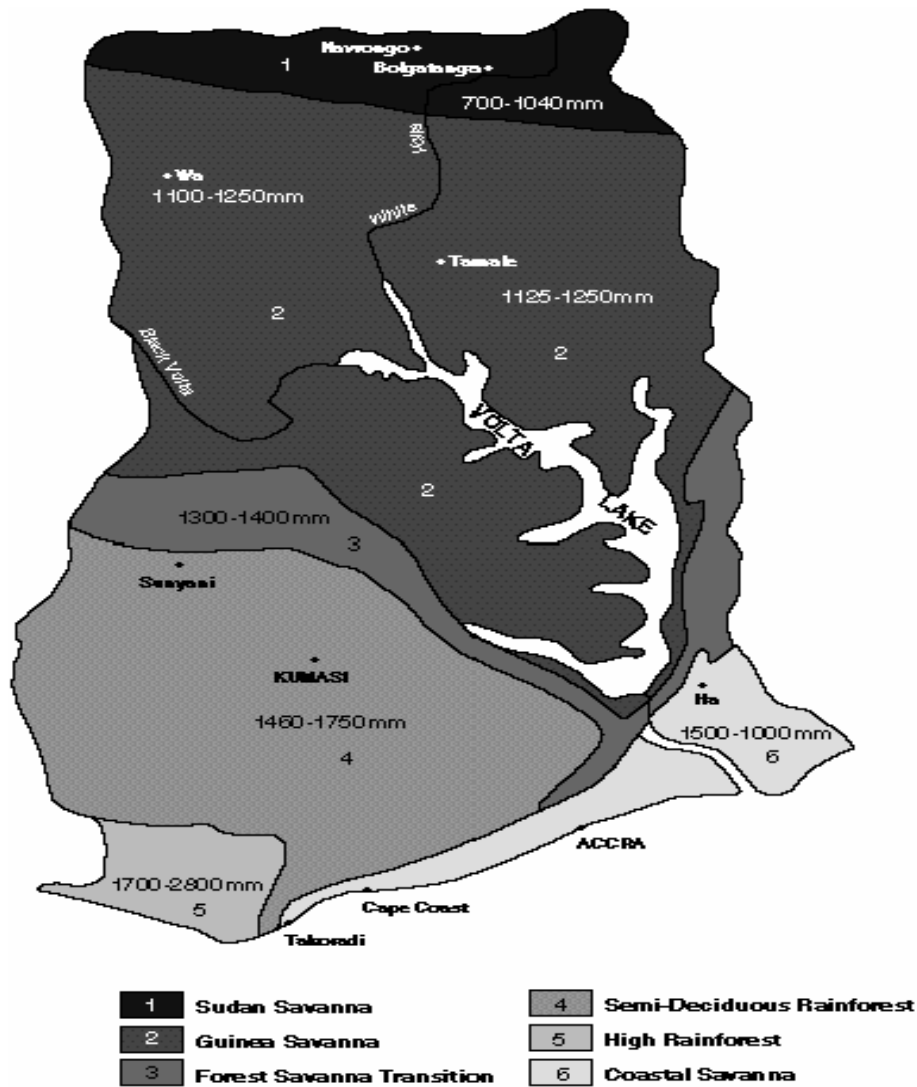
Ghana Government: Ghana Poverty Reduction Strategy. 2001

Council for Scientific and Industrial Research; Gainsnews Vol.4 No.1; June 2004, Accra

World Development Indicators Database, April 2002



Map of Ghana showing Ecological Zones



Legend

