

Institutional, Legal and Economic Instruments in Ghana's Environmental Policy

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Abstract

This paper reviews the state of the environment in Ghana and explores the potential for the use of institutional, legal and economic instruments in environmental management in the specific context of this developing country.

The environmental situation in Ghana is characterised by desertification, land degradation, deforestation, soil erosion, desertification and inadequate water supply in the Northern regions of the country. The population as a whole is growing at a rate of 3% per annum, with even greater urban growth rates, due to rural out-migration. Large parts of the coastal zone in the south are rapidly developing to become one large suburbanised area. Water quality is particularly threatened in the urban and industrialised areas, which are mainly located in the southern part of the country. The coastal lagoons and coastal waters are moderately to heavily polluted. Erosion extends along the whole Ghanaian coast with excesses, for example in the Keta area, where during the last century over 90% of the original buildings have been washed away by the sea. The obvious environmental consequences of the mining sector are illustrative of the environmental threats caused by a fast growing industry and industrialising agriculture, in a country where environmental policy is only in its formative years. Desertification, food insecurity and coastal erosion all contribute to an increasing number of environmental refugees.

Environmental policy in Ghana is a post-Rio phenomenon. Environmental laws, a Ministry of Environment, Science and Technology, an advisory National Committee for the Implementation of Agenda 21 and a fully mandated environmental administration

have been established.

The choice of instruments for environmental management is increasingly influenced by the specific State of African environmental and technological capacity and by a call for the recognition of the role of traditional customs in nature conservation. Moreover, there is an unmet need for regional, transboundary co-operation in the West African sub-continent.

Ghana is located in the central-southern area of the West African sub-region along the Gulf of Guinea. The Greenwich meridian cuts through the country from north to south. The country extends between 4.5 degrees north on its southern coast and 11 degrees north inland; it is therefore not far from the equator. Ghana covers an area of 23.9 million hectares, spanning two major ecological zones. High forest is confined to the south-western third of the country, while savannah woodlands cover the north and coastal areas.

Within these zones rainfall ranges from 900 mm in the coastal savannah to 2100 mm in the forest belt. The highest precipitation occurs in the extreme south-west, reaching 3000 mm per year. The rainfall pattern is bimodal with a major peak in June/July and a minor one in September. The driest period comes between October and February.

The surface water regime is determined by thirteen river basins (Amuzu, 1997). The largest is the Volta River which has been dammed at Akasombo to form one of the largest man-made lakes in the world. A second hydroelectric plant is located at Akuse. The catchment area of the Volta covers about 70% of the country. The only natural lake is Lake Bosomtwi, which has a total area of 48 km² and reaches depths of 72 meters. It is located in central-south Ashanti region.

The 560 km coastline, from east to west, predominantly consists of beaches and several lagoons, some of which are tidal and brackish.

Groundwater is found at a shallow depth in the weathered zone of the Crystalline Basement Complex (Amuzu, 1997).

Ghana's population is estimated to be 18 million inhabitants in 1997. The population is unevenly distributed across the country with 2 to 3 million people living in the Accra Metropolitan Area, which covers less than 1% of the land surface. 25% of the population lives in the coastal zone, which represents 6% of the land area of the country (World Bank, 1996).

Like many countries in the sub-region, following independence in 1957, Ghana embarked on a programme of economic development to alleviate poverty and raise the standard of living of its inhabitants. The process of economic development in Ghana is, to a large extent determined by the mining and timber industries and a rapidly industrialising and export oriented agricultural sector, mainly based upon cocoa and oil palm, but diversifying into a wide array of tropical fruits and vegetables. Economic development in Ghana is associated with rapid population growth and increased urbanisation (EPC, 1991).

This paper contains four main sections. After an introduction, the paper examines the principal determinants of the environmental profile of Ghana along nine axes: land use, forestry and wildlife, human settlements, water quality, coastal areas, industrial pollution, mining, hazardous chemicals and environmental displacement.

The trends in environmental policy in Ghana during the pre- and post-Rio periods are briefly presented in section 3. The state of environmental management is discussed in the last section. Special emphasis is given to the institutional, legal and financial instruments for environmental management. The paper specifically discusses aspects of the use of these instruments and their specific characteristics in the context of a developing country.

In this way, the paper aims to define environmental management in this West African country, not only taking into account the specific elements of the physical environment, but also those of the human and cultural environment.

Key environmental issues

Nine main elements of key importance for Ghana's environmental quality are discussed in this section. These elements include: land use, forestry and wildlife, human settlements, water quality, coasts and wetlands, industrial pollution, mining, hazardous waste and chemicals and environmental displacements.

Land use

The drylands in the north of the country suffer from the same environmental problems as other areas of the Sahel zone in the sub-region. A period of prolonged drought which lasted from the early 1980s till 1994, during which rain fall dropped by 30% compared to the previous period, severely contributed to the degradation of the environment. The Northern savannah and woodlands particularly suffered during this period (EPC 1991; Nsial-Gyabaah 1994).

Land degradation is only one of the environmental stresses on agricultural land in Ghana. The clearing of forests through the use of bushfires leads to low agricultural yields, which in turn put more pressure on the land to be used for cultivation. This need for more agricultural land is important in a country where the agricultural sector accounts for more than 40% of the GNP and 75% of the population earns its living from agriculture (EPC 1991).

The traditional shifting cultivation method, crop rotation and uncontrolled cattle grazing, and the rapidly increasing use of agricultural chemicals, such as fertilizers and pesticides, also effect the quality of the soil. Table 1 provides an overview of the insecticides and fungicides which were found amongst farmers and in shops during a survey of the South Tongu area of the Lower Volta Basin (Gordon 1997). Note that although DDT and Undene are not recommended, they are widely used among farmers for crops such as peppers and okro. Harmful effects for human consumption can not be ruled out in the areas of the Volta river.

Competition for land amongst the three main economic sectors -agriculture, mining and logging- is another major characteristic of landuse in Ghana.

Forestry and biodiversity

More than 90% of the original 8.22 million hectares of natural forest woodlands with a closed canopy have been logged since the 1940s (EPC 1991), mainly for timber export. Next to timber production, the woodlands are under stress due to exploitation of fuel wood for domestic and industrial uses. Wood is still the main source of energy (Table 2). The shift in the consumption pattern during the first half of the 1990s indicates the response of a policy initiative to move the energy source towards natural gas. Recently, the effect of this policy has been counteracted by more than a 100% increase in the price of liquified petroleum gas - LPG (Domfeh 1997b). Annual loss of forest cover over the whole of the country is estimated at 22,000 hectares (EAP 1988).

In arid and semi-arid areas, one of the extreme consequences of deforestation and the consequent misuse or overuse of the land, is desertification. It is estimated that 35% of the total land area is subject to desertification (EPC 1991). Domfeh (1997a) estimates that the potential income from the degraded area is about 3.1 billion cedis per year, which is 70% of the receipts from the timber production area. Moreover, the total cost is even higher as the country not only loses this income, but must also bear the cost of the rehabilitation.

The upper east region is particularly affected by deforestation. At the same time this region is characterized by high population density (it contains 8.5% of Ghana's population and has an average population density of 87 persons/km², reaching as high as 270 persons/km² in the Bawku district), intensive cropping and large numbers of cattle, sheep and goats. Deforestation is also prominent in the upper west region around Hamile and Lawra and in the Accra plains in the southern part of the country. Deforestation has led to many environmental consequences such as local climatic changes, soil erosion, land degradation, instability in hydrological regimes and loss of biodiversity.

About 1.63 million hectares of Ghana's forests are protected in over 200, sometimes very small, forest reserves (Danso 1996). Many of these reserves were established as shelterbelts against the savannah winds and as protection for headwaters, rather than to serve as reserves for the timber industry. In recent times, however, due to population pressure, the concept of reserve does not protect forests anymore from intensive logging, bushfires and encroachment by farmers. For example, the 125 square miles Koggae Strict Nature Reserve near Ejisu in the Ashanti region has lost 40 square miles

(32% of the area), largely through illegal farming and timber extraction (Otchere 1996).

Reforestation programmes exist only at a small scale level. They are mainly driven by women action groups, NGOs, local communities and some mining companies. The net environmental result of these efforts is negligible compared to the extent of deforestation.

Population and Urbanisation Pressures

With an average of 67 inhabitants per km² in 1995, Ghana can not be described as densely populated (Table 3). However, the high population growth rate of 3.5% over the past few decades nevertheless presents a number of environmental dangers. Eighteen million Ghanaians live in more than 47,800 towns and villages. Although the rural population is growing faster than the number of urban inhabitants in absolute numbers, the general trend is that more people are increasingly concentrated in a few urban centres. Outmigration has progressively reduced the relative share of the population in rural settlements as compared to that of the urban centres which are mainly concentrated along the coastal zone and the economically important mining and forest belt areas.

The population of Accra, the capital city, is growing at an unprecedented rate. In 1948, about 136,000 people lived in Accra. Official estimates currently indicate that Accra has about 1.52 million inhabitants, although unofficial estimates today put it between 2 and 3 million. This estimate includes the population of the sub-urban areas in the

neighbourhood of the capital. The growth rate of the population in Accra is the highest in the country. This is not only due to a natural increase, but also to rural-urban and more recently urban-urban migration, as urban centres such as Kumasi and Takoradi lose their population to Accra (Attipoe 1996).

The rate of urbanisation seems to be beyond the managerial capacity of most of the Metropolitan and Municipal Assemblies. Large parts of these urban areas lack proper access roads and adequate community services. The sewage system in Accra has not seen any major upgrading since the 1970s. The city is now dotted with defective septic or cesspool tanks and various designs of latrines. Given the city's current population and growth rate, the existing system has to cope with far more than it was originally designed for. Expanding and managing the sewage system in the Accra Metropolitan Area is calculated to cost an extra 110 million US\$. Waste management and street maintenance systems will become increasingly difficult. The acute problems of exposure to human excreta are being handled by a programme which aims to implement Ventilated Improved Pit (VIP) latrines.

The situation is complicated by the fact that waste management policy, especially the collection and treatment, is currently in a transition phase. Household solid waste production in Accra is estimated at 0.250kg/person/day. Only 80% of the waste generated in the metropolis is collected. This percentage, however, falls to 35% in Kumasi (Ghana's second largest city) and close to 10% in the northern towns of Bolgatanga, Tamale and Wa (Amuzu 1997). Moderately controlled tipping is the traditional means of waste disposal in Ghana. Excavated quarries and large-scale low-lying grounds are used to deposit the waste, frequently following compaction. Environmental hazards associated with this method include dust dispersion, smoke,

odour, and plagues of insects and rodents. Landfills are therefore frequently treated with large amounts of insecticides and rodenticides, which enhance the leachate problem. Since over 70% of the collected waste in Accra is organic material, composting is regarded as an appropriate (partial) alternative to waste treatment. Recycling is currently non-existent as a policy option, but it has been demonstrated that over 50% of the inorganic waste generated, could be recycled. Incineration is disregarded as a general option since it is the most expensive way to treat household waste. It is recommended that incineration should only be used to treat particular waste streams such as hospital waste (Laryea 1997).

Industrial waste management is still in its infancy. Most industrial waste is released into nearby water bodies or left at uncontrolled dumping sites near its place of origin.

Pipe-borne drinking water in Accra is chlorinated. The supply dates back to the colonial period. Therefore the existing infrastructure is old and needs renovation. The city grows faster than the drinking water distribution capacity. Consequently, quite a number of Accra's inhabitants in the suburbs have to rely upon biologically and chemically contaminated water sources.

Problems associated with sanitary conditions in the rapidly expanding urban and suburban areas, have provoked and aggravated the spread of a number of air and water-borne diseases (Songsore and McGranahan 1993). These environmentally-related diseases represent 60 to 80% of the cases reported in the capital's hospitals and health centres. Among these diseases are: malaria, diarrhoeal diseases, intestinal worms and upper respiratory diseases. Accra is also an endemic zone for cholera and typhoid fever. Infections and parasitic diseases were shown to be the third most important

causes of death in the Metropolis in 1991; circulatory system and upper respiratory diseases being first and second respectively (Attipoe 1996).

Water quality

Many of Ghana's sources of water, especially those which do not drain human settlements, are still in pristine condition. Industrial and mining activities, improper use of agro-chemicals and increasing urbanisation have led to increasing effluent discharges into existing water bodies. In addition, soil erosion caused by poor agricultural practices is causing increased sediment loads in rivers and suspended particles in water bodies.

For example, the Pra and Ankobra basins drain the industrialised area north-west of Accra. Industries in this basin include gold and manganese mines as well as tyre and glass factories. The diamond mine in the region extracts alluvial diamond from the Pra River. The dredging activities substantially increase the suspended solids load of the river.

The Volta River receives discharges from two textile plants, from agricultural activity and from the settlements along the river. The water regime downstream of the Akosombo dam has undergone major changes. The dam has not only stabilised the water regime but also altered the intrusion zone of brackish water. This has influenced not only the occurrence of a wide array of fish species, but also the occurrence of the snail which acts as an intermediate host of bilharzia. As a consequence of the

construction of the dam, bilharziasis has extended its area over 40 km inland along both banks of the river.

Rivers draining urban settlements are particularly polluted by both domestic and industrial effluents. Poor sanitation, inefficient urban water treatment plants and shortfalls in the collection of solid waste are widely regarded as the principal causes for this. The situation in the Accra Metropolis is illustrative. About 2 to 3 million people live in the area and it contains 32% of the country's total manufacturing industry. Approximately 80% of these industries are located within the basin of the Korle lagoon which is seriously polluted, as shown by the high BOD and nutrient levels and the low concentrations of dissolved oxygen. Table 4 compares the quality of the Korle lagoon water with that of another lagoon in the same area, but less impacted by human activities.

Pollution of surface waters directly effects aquatic biota, reduces biodiversity, increases treatment costs of water supplies for domestic and industrial use and limits the use of surface waters for purposes such as recreation. Surface water sources are generally used for water supplies in urban areas. They are derived from some 20 artificial lakes across the country.

Threats to the groundwater have only been partially mapped. Groundwater is extensively used in rural areas. As a rule, it needs no treatment and acts as a buffer storage in times of drought. However, there are scarce records of groundwater pollution. Coastal aquifers and groundwater in the Voltaian Sedimentary basin in the Northern part of the country are known to be highly mineralised with dissolved solids exceeding 1,000 mg/l. Groundwater in the north-eastern areas have been found to

contain fluoride concentrations exceeding 5 mg/l. Consequently, this water is not safe for drinking.

Currently there is no comprehensive, overall water resource management in Ghana. However, a number of sectoral water policies, exist which when put together, can provide guidance for the development and management of water resources (Ayibotele 1994).

Coasts and Wetlands

The coastal areas are under severe environmental stress, both from activities on land and at sea. Part of the problem stems from the intense concentration of population in the coastal area. Ghana's coastal districts represent approximately 6% of the country, but are home to 25% of the nation's population (Table 3). Apart from the urbanisation processes and the associated domestic sanitation problems which were discussed in section 2.3., the area also contains most of the industrial, touristic, agricultural and traffic activities of the country. Consequently, the pollutants in the coastal zone include industrial effluent discharges, household garbage and sewage, agricultural and household chemicals, oil and oil waste from the refinery.

Over 80% of Ghana's international trade is handled by the country's deep water ports at Tema and Takoradi. The port of Tema -20 km east of Accra- alone, handles 66% of Ghana's international trade. Imports constitute 85% of the trade passing through the port. Major imports include crude oil, petroleum products and alumina, pitch and

petroleum coke. The volume and intensity of these activities is increasing. The total number of vessels in Tema increased from 679 in 1987 to 1,022 in 1993. Of these, tanker traffic increased from 25 tankers in 1987 to 100 in 1996 (Torkornoo 1997). The wider Tema area also entails an industrial zone with an attractive fiscal regime, resulting in a wide array of industrial activities, some of which are quite experimental, adventurous and difficult to control by environmental regulations.

Pollution is also caused by activities such as shipping, dredging and drilling for oil and gas off the west coast. Oil pollution is a particular problem in West Africa as 32% of the world's seaborne crude oil passes along the African coast. In the past twenty years, 30 oil spills in excess of 5'000 barrels have resulted from tanker accidents in the sea around Africa. These tanker accidents, however, contribute only 5% of the total amount of oil discharged into the sea. Ninety two percent of these oil spills are due to terminal operations (Amlalo 1997). Ghana's coast is suffering from chronic oil pollution.

The effects of these environmental stresses are manyfold:

- of the 16 coastal lagoons which were studied, 12 were found to be polluted. Of these, two, including the Korle lagoon, were heavily polluted (Amlalo 1997).
- faecal bacteria, resulting from the discharge of untreated household waste water, have been found at all beaches sampled (Afoakwa et al. 1988).
- erosion extends along the entire length of the Ghanaian coast. The effects are most pronounced in the area east of the Volta river delta and near Cape Coast. In the south eastern city of Keta, over 90% of the buildings existing in the beginning of this century, have since disappeared into the sea.

- urban pollution, urban encroachment, salt extraction and fuelwood gathering, all contribute to mangrove degradation, both along the coast and in the Volta delta area.
- the increased fishing activities in the coastal zone, in combination with the increasing industrial and domestic pollution, have caused a significant decline in fish stocks.

Some of these problems have been addressed by international regulations such as the Bamako Convention on transboundary trade of hazardous waste in Africa and the Abidjan Convention (1984) on the marine and coastal environment, both partially covered by national and regional environmental management policies. However, since these conventions have not been ratified, the establishment of an integrated coastal zone management system in the sub-region is still a distant goal.

Mining

Mining is the second most important sector in the Ghanaian economy. The main minerals are gold, diamond, manganese, bauxite, sand, stone, salt and kaolin. Mining occurs both on a large-scale and on traditional small scale levels. Gold is found in the Ashanti, northern, eastern and western regions of Ghana. Artisanal mining of gold by the local population predates the first recorded contact with Europeans in 1847. Capital, intensive and large-scale mining by British and other foreign investors began in the late nineteenth century (Botchway 1990).

By the early 1980s, gold production was in a severe state of decline. However, the industry has since been resuscitated mainly because of economic reforms initiated in 1983. During 1982-1992, gold production tripled and bauxite production increased by a factor of four (Table 5).

The effects of mining and ore processing can be categorised as follows (Tsikata, 1997):

- Land degradation: impacts include deforestation, changes in topography, changes in the drainage pattern, slope instability, accelerated erosion and soil degradation.
- Hydrology and water pollution: impacts include depletion of water resources, changes in hydrology as a consequence of digging and earth moving activities, water logging, ground water percolation and pollution, siltation, increased sediment loads in rivers, toxicity and contamination with heavy metals, arsenic and cyanide pollution, and acid mine drainage.

The Woara Woara river, for example, which is the main source of drinking water for the people of Mpohor in the west, has been poisoned by mercury and other chemicals used by the gold mines. Health problems related to arsenic pollution have been reported in the gold mine areas of Obuasi, Prestea and Tarkwa.

- Vibration, air and noise pollution adversely affect occupational health, but also impact the settlements in the mining area and the ecosystems. The aluminum melter of Kpone causes severe particulate pollution.

Ghanaian environmental policy has increasingly made the mining sector responsible for the environmental damage it causes. Environmental impact assessments, environmental care and management systems on site and the provision of funds for landscape restoration and reforestation are some of the main instruments used to mitigate environmental pollution caused by the mining sector. The most visible aspect of this is

the greening of rehabilitated lands with standard international forestry plants grown on seemingly arid soils. Problems of water and air pollution are marginally monitored and largely unaddressed.

Such efforts by the mining industry, however, have not prevented the residents of Obuasi (where Ghana's largest gold mine -Ashanti Goldfield- is located) from developing concerns about the expansion of the company. Whilst they appreciate the educational and health facilities provided by the company, in addition to the creation of jobs, they worry about land degradation and pollution (Sarpong 1993). In response to these worries in the community, the mining companies have set up farming and community programmes and started educating the local population in how to use the reclaimed sites to grow corn and vegetables after a period of reforestation.

Environmental refugees and displacements

An environmentally displaced person is someone who decides to leave his/her homeplace permanently or temporarily, mainly for reasons of environmental degradation. A refugee is somebody who, during this displacement, crosses national borders.

The problem of environmentally displaced persons and refugees is well known in Ghana. Most prominent are the migrations resulting from the acute environmental problems in the Sahelian countries. For example, during the 1980s, rural people mainly from Niger, Sudan and Tchad moved to Ghana because of the harsh environmental

conditions in their countries. More recently, coastal erosion in parts of Ghana has deprived a number of people of their houses. For example, recent sea erosion caused the destruction of a number of houses in Keta in 1995 and forced about 20 families to be temporarily accommodated in tents on the beach.

Awumbila (1997) investigated responses to food insecurity in four villages in the Bawku east district in the north-east savannah. Food insecurity in this area is mainly a result of the increasing frequency of drought in the region, which only has one rainy season. Sixty-eight women and men were interviewed. Responses are shown in Table 6. Although migration is not the most frequent response, almost half (48%) of the respondents in the study reported that some household members migrated to look for work during the last five years. Most migrants leaving Bawku are destined for the cocoa plantations in Southern Ghana and sometimes in Côte d'Ivoire, whilst a smaller proportion seek employment in the urban centres of Kumasi and Accra. These data show that environmentally displaced persons exist not only as a result of acute economic problems, but also due to gradual environmental changes. This type of research is, however scarce, and is often based upon limited samples, making it difficult to extrapolate the results to a larger scale. Reliable, systematic, comprehensive data on environmental migrants are nonexistent.

Probably the main problem environmentally displaced people face, is that their problem is not specifically recognized by the national governments, the Economic Community of West African States (ECOWAS), or the United Nations High Commission for Refugees (UNHCR). The Commission considers the problem of environmental refugees under its "Emergency and Natural Disasters Programme", which is rather limited in scope. A first step towards the management of this problem would be an international

protocol that specifically recognises the problem of environmentally displaced persons and its impact on national and transboundary security concerns.

Environmental Management in Ghana

This section examines the institutional framework that has been put in place in Ghana to guide environmental policy-making and legislation and the use of legal and economic instruments in the management of the country's natural and human resources for achieving sustainable development. The first part examines the institutional framework. The second part looks into the legal instruments while the third part discusses the use of economic instruments.

Environmental Policy and Implementing Institutions

The main drivers of environmental policy in the country are the government, international organisations and Non-Governmental Organisations (NGOs). It is worth noting that the private sector organisations were not involved in the environmental debate until after the Rio Summit in 1992.

During the pre-Rio period attempts to address environmental problems in Ghana were largely ad-hoc and cosmetic, or at best sector-oriented and therefore limited in scope. Clearly, the United Nations Conference on the Human Environment (UNCHE) held in Stockholm in 1972 was the main stimulus for the creation of environmental policy institutions in Ghana (Boon, 1998).

In 1974, the Government of Ghana established the Environmental Protection Council

(EPC) by NRC Decree 239. The EPC was primarily an advisory and research organisation and it was expected to co-ordinate the activities of other bodies concerned with environmental matters. It had no power to enforce measures for improving the environment or preventing damage to it. It served as a meeting point for the bodies that actually exercised power with regard to the various sectors of the environment and so facilitated the co-ordination of environmental programmes and activities in the country. (EPC, 1991). The members of the EPC included Ministries of Health, Agriculture, Foreign Affairs, Lands and Natural Resources, Industries, Science and Technology, Local Government, Finance, Economic Planning, Works and Housing. The Council also maintained networks through its expert committees on education, natural ecosystems, toxic chemicals, human settlements, etc. However, long before the establishment of the EPC, many legal enactments existed in the country and empowered various official bodies which actually exercised executing powers with regard to environmental care and protection. These powers were however widely scattered among the bodies involved and no one of them could be said to have enjoyed exclusive control of the whole of the environment or even of significant portions of it.

The Rio Earth Summit in 1992 made Ghana and many developing countries to realise that their economic prosperity actually depends on the maintenance of a high quality of the environment. In the case of Ghana, a National Environmental Action Plan (NEAP) was approved for implementation in 1993. Based on this programme, a National Environmental Policy (NEP) was defined. The policy seeks to ensure reconciliation between economic development and natural resource conservation, to make a high quality environment a key element supporting the country's economic and social development. The main elements of the policy include legislation; preparing and adopting sectoral plans; preparing and adopting standards and regulations; institutional

strengthening of the EPA, the National Development Planning Commission (NDPC), District Assemblies, Community Groups, NGOs, selected sectoral agencies; interagency co-ordination, and an institutional structure for integrated land-use planning. The specific objectives of the policy are : maintaining ecosystems and ecological processes essential for the functioning of the biosphere; ensuring sound management of natural resources and the environment; adequately protecting humans, animals and plants, their biological communities and habitats against harmful impacts and destructive practices, and preserve biological diversity; guiding development in accordance with quality requirements to prevent, reduce, and as far as possible, eliminate pollution and nuisances; integrating environmental considerations in sectoral structural and socio-economic planning at the national, regional, district and grassroots levels; seeking common solutions to environmental problems in West Africa, Africa and the world at large (EPA, 1996).

The main post-Rio institutions established to facilitate the formulation and implementation of Ghana's environmental policy are the Ministry of Environment Science and Technology (MEST), the Environmental Protection Agency (EPA) and the District Assemblies (DAs). The EPA is scientifically supported by a wide array of national research institutions, while the DAs rely upon Regional Environmental Offices (REOs) and Special Environmental Projects (SEPs). The organigram of these institutions is presented in figure 1. The involvement of so many agencies in the implementation of the country's environmental policy and programmes clearly calls for an effective co-ordination, monitoring, evaluation and control.

In 1993, the Government established a Ministry of Environment, Science and Technology (MEST). In its task of co-ordinating the implementation of Agenda 21, the

Ministry has set up a National Committee for the Implementation of Agenda 21 (NACIA 21), which also liaises with other relevant Ministries and Government Departments.

The Environmental Protection Agency Act (Act 490) transformed the Environmental Protection Council into an Agency having, inter alia, regulatory and enforcement roles in 1994. The EPA is given full mandate and responsibilities for regulating the environment and ensuring the implementation of Government policies relating thereto (EPA, 1996). Its key objectives are: ensuring that the implementation of environmental policy and planning are integrated and consistent with the country's desire for effective, long-term maintenance of environmental quality; providing technical assistance to the District Assemblies to enable them meet their responsibilities for managing the local environment; working in partnership with stakeholders; guiding development with the aim of preventing, reducing and as far as possible eliminating pollution and nuisances; initiating and pursuing formal and non-formal environmental education programmes; collecting, collating and disseminating information and promoting and supporting research programmes needed to ensure sound environmental management and use of environmental and natural resources; applying the legal processes in a fair, equitable and efficient manner to ensure responsible environmental behaviour in the country; and continuously improving EPA's performance to meet changing environmental trends and community aspirations.

Quite a number of other institutions and organisations are also involved in the formulation and implementation of environmental policy and programmes in Ghana. They include the Ministry of Food and Agriculture, the Forestry Department, the National Energy Board, the Ministry of Works and Housing, the Department of Parks

and Gardens, the Architectural and Engineering Services Corporation and some research institutions such as the Water Resources Research Institute (WRRRI). Clearly, an effective implementation of the policy and programmes requires a good degree of co-ordination amongst these institutions.

The National Development Planning Commission (NDPC) was set up under the the National Development Planning Law of 1989 to formulate and advise government on comprehensive national development strategies and to ensure that the planning and development strategies and programmes are effectively carried out. Within its mandate, the NDPC clearly has a significant role to play in the monitoring, evaluation and control of national development programmes, including environmental policy and actions (EPC, 1991).

The government's policy of decentralisation of administration to the District Assemblies (DAs) under the Local Government Law (PNDC Law 207) accords the Assemblies a central role in the implementation of the NEAP. (EPC, 1991). One of the important statutory functions of the EPA under the Environmental Protection Agency Act, 1994 (Act 490) is liaising and co-operating with government agencies, the DAs and other bodies and institutions to control pollution and generally to protect the environment. The role of the DAs in environmental management in the country has been defined as:

“District Assemblies will be the organ through which national policies and programmes on the environment will be translated into action at the local and district levels....through their members and their action programmes will serve as vehicles for creating awareness at the grassroots level of the complex interaction

between development and environment in order to ensure improved quality of life for the broad mass of the people.” (EPA, 1996)

In order to achieve this, the DAs have set up District Environmental Management Committees (DEMCs) to monitor and co-ordinate environmental protection and improvement activities at the district level. Community Environmental Committees (CECs) have also been established as the organs through which the environmental programmes of the District Assemblies are carried out.

The most common environmental problems being faced by the District Assemblies include the generation of waste from commercial activities and littering; dumping of household waste in unauthorised areas; and overcrowding resulting from construction of unauthorised buildings and structures. Other problems include incidence of bush fires, soil erosion, deforestation, land degradation and coastal erosion, water pollution, air pollution, noise pollution, pollution by toxic chemicals, industrial pollution and dumping of toxic waste.

Finally, a number of international institutions and NGOs are assisting Ghana in a variety of ways to implement its environmental policy and programmes. They include the World Bank, the United Nations Programme for Development, and Friends of the Earth.

Legal Framework and Instruments

For many years, Ghana has been a very reliable partner in international conventions. Prior to the Stockholm Conference, the country had participated and signed at least fifteen international conventions and treaties on environmental issues from the International Plant Protection Convention of 1951 to the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxic Weapons and their Destruction in 1972. Of these 15 conventions, three are not yet ratified. The country has also signed the Rio Conventions, but they still have to be ratified by Parliament.

Table 7 provides an overview of laws entailing important environmental clauses and targeting the principal industrial sectors during the period 1963-1986. Although this list is incomplete, these regulations are illustrative of the history of environmental legislation in the country. As in many other countries, this period has been characterised by an ad hoc approach to environmental legislation in which environmental issues are recognised, but where environmental protection is not the central target of the legislation. This early period should also be seen in the colonial tradition of “use oriented” instead of “resource oriented” legislation, a situation which has continued until recently.

However, the most important process in influencing contemporary environmental legislation in Ghana is associated with the 1992 World Conference on Environment and Development (Rio de Janeiro, Brazil). The recommendations of the Brundtland Report (WCED 1987), the Rio Declaration on Environment and Development and Agenda 21, contributed to the formulation of national environmental policies (contained in the 1987 draft National Environmental Protection Programme) into normative prescriptions,

institutional arrangements and procedural requirements for the enforcement of environmental goals and objectives.

In 1993, the Ministry for the Environment, Science and Technology was established and in 1995 the Environmental Protection Agency (EPA) was set up on the basis of the 1994 Environmental Protection Agency Act (Act 490). This act defines a set of policy actions, related investments and institutional strengthening activities that will help Ghana's development strategy more environmentally compatible. The functions of the EPA are those of a fully fledged environmental administration and include compliance enforcement, providing advice on environmental issues, environmental planning, co-ordination, education, research, launching and controlling environmental permits, setting of environmental standards, pollution control and environmental information dissemination.

Act 490 also provided for the establishment of a National Environment Fund from grants from government, levies collected by the EPA in the performance of its duties, and donations from the general public. In addition, a National Committee for the Implementation of Agenda 21 is to be established to accelerate the building of capacity for sustainable development. Under the co-ordination of the National Union of Environmental Non-governmental Organisations (NUENGO), non-governmental organisations can also participate in the implementation of environmental policies in the country (ILO 1996). Appropriate incentives and sanctions will be put in place to ensure compliance with the provisions of the policy. Effective environmental education, environmental monitoring, and international co-operation are also essential.

Environmental Impact Assessment (EIA) is central to preventive environmental management in Ghana. An early regulation on EIA, the Ghana Investment Code, dates from 1985 and requires EIA for new investments. Shortly after its establishment in 1995, the EPA managed to organize the required legal and institutional framework to guide the contemporary environmental impact assessment process in the country. In 1995, 114 environmental assessment applications were received; of them 29 required environmental impact statements (EIS). As shown in table 8, applications for projects in the public utility sector were most numerous, followed by mining, manufacturing, infrastructure and forestry. There was only one application in the tourism and one in the agricultural sector.

In 1996, a total of 32 environmental impact statements were submitted, most of them in the mining and manufacturing sector. Note also the introduction of the energy sector in EIS, which dates from this year onwards.

The practice of EIA in Ghana is in its initial stage. Further action needs to be taken to make EIA obligatory and not voluntary, to set the required criteria and procedures for implementation, to establish the responsibilities and rights of the different actors and to include strategic environmental assessment (Abaidoo 1997). Clearly, for a developing country as Ghana where microprojects are prevalent, the use of EIA should, in the initial stages, be limited to bigger projects.

More recently, the Pesticides Control and Management Act (Act 528, 1996) was passed by Parliament. The country has also established standards on noise and ambient air quality. A more comprehensive set of legal environmental norms, including emission standards for industry, is currently in preparation. The latter being the result of two

years of field investigations, comprehensive desktop research and wide consultations with stakeholders and the general public.

Using its fundamental juridicial options, EPA appeals for more liability and compensation rules, not only to ensure compensation and restoration in the event of damage, but also to prevent environmentally damaging activities. EPA would like to see the criminal law more intensively used in environmental management and calls for a legal regime of enforcement. They consider environmental organisations to be essential actors in the initiation, establishment and control of environmental policy and advocate an environmental associations law. Following the Portuguese example, this can entitle associations to file lawsuits to prevent or to stop environmental damage, to assist in penal proceedings related to the environment and to ask public collaborators to perform environmental quality tests (Abaidoo 1997).

From the discussion above, Ghana's EPA appears to be a young, motivated, progressive and dedicated modern environmental administration. On the other hand, the organisation is equally handicapped by its current state of development. With limited means, the organisation has to put a new, systematic and comprehensive legal system into action, for which neither the global view, nor the specific goals, nor the fundamental legal philosophy are fully established. Moreover, the public at large has high expectations from the new administration which it can hardly fulfil. In this way, the current state of environmental law in Ghana and its supporting administration is characteristic of a country which only recently embarked upon systematic environmental management.

The use of Economic and Financial Instruments

Environmental management in Ghana was until now characterised by a “command and control” approach. The limitations of this approach included an acute shortage of capital, government funds, managerial skills, administrative and enforcement capacities. Such resources and capacity are scarce in most developing countries. At least in theory, the use of economic instruments might overcome some of these difficulties. However, the application of economic instruments to environmental management may pose major difficulties. Their implementation in OECD countries is very slow. In this context, the appropriate question to ask is “what is the extent of the role of economic instruments in environment management in a developing country such as Ghana ?”.

Ghana has many reasons to use economic instruments in the management of its environment. With the depletion of its tall forests and timber revenue in sight, with decreasing yields from the mining sector, biologically dead lagoons due to industrial pollution, it is most recognised that Ghana for a long time externalised costs which actually should have been calculated in the pricing of its resources and products.

Table 9 lists a selected number of examples which show that in spite of various constraints and different development scenarios, economic instruments can be used to reach environmental objectives and targets in developing countries and in countries with economies in transition.

The reasons cited above for using economic instruments for environmental management in Ghana and successful experiences from abroad stimulated the country to set up a system of taxes and charges to discourage the import of old cars. Technically, the penalty is a tax paid by the importers of cars of various specifications which at the moment of import exceed a defined age from the date of manufacture. For example, luxury cars between 5 and 10 years old attract a tax between 800 and 2000 US\$. However, this penalty had a serious limitation as it failed to achieve its environmental targets for the following reasons:

- a) In Ghana, it is still cheaper to import an old car than buy one which is less than 5 years old.
- b) Imports of (eventually very old) scrap engines are not affected by the tax; as a consequence the regulation is easy to circumvent.
- c) The oldest cars, which are already in the car park and cause most of the pollution, are not taxed.

This experience enabled the country to evaluate the limitations of the use of economic instruments and environmental taxes: particularly the difficulties associated with calculating the right tax rate, targeting the tax and ensuring its environmental effectiveness. Other limitations of the use of taxes include: flexibility, dynamic efficiency, equity, ease of introduction, monitoring and enforcement, predictability and acceptability. Acceptability of environmental taxes in a developing country such as Ghana is a serious problem. Low income per capita implies a higher marginal utility of income and a lower willingness to pay for environmental improvements and amenities. Therefore, when a development project and environmental protection are in conflict, there is a high likelihood that the choice will be influenced by striving towards the realisation of the former.

In spite of these limitations, there is, however, an overall positive attitude towards the use of economic instruments in environmental management, mainly for the following reasons:

- a) Tax revenues in Ghana are constrained by a narrow tax base, low incomes and limited tax collection capacity, which are principal reason for the country's budget deficits. It is therefore difficult to add the cost of the new environmental administration and its policy ambitions to the national budget. At the same time, the revenue aspect of environmental taxes has a special appeal to governments in developing countries.
- b) The economy of Ghana and those of most, if not all, West African countries are in the formative stage of their development. Since these economies are still more flexible and less overburdened with social and political pressures, in comparison to the situation in industrialised countries, it is easier to apply economic instruments. Developing countries are therefore in a better position than industrialised countries to introduce economic instruments for environmental management.

Income and the flexibility of the system are attractive but insufficient conditions for the success of economic instruments in developing countries. A careful selection of specific instruments that fit the particular problems is required. Also, the country's cultural traditions and social organisation are critical factors to be considered in selecting and introducing incentive based instruments for environmental management and sustainable development.

Opportunities and Costs associated with relying on Economic Instruments

In its attempt to attain a sustainable balance between economic growth and sound environmental stewardship in Ghana, the EPA (1996) has adopted :

“An integrated environmental planning and management system established on a broad base of public participation, efficient implementation of appropriate programmes and technical services, giving good counsel on environmental management as well as effective and consistent enforcement of environmental laws and regulations. The EPA is an implementing Agency, a regulatory body and catalyst for change towards sound environmental stewardship.”

A number of instruments have been defined to ensure the achievement of these objectives: optimum sustainable yield in the use of resources and ecosystems; use of most cost-effective means to achieve environmental objectives; use of incentives in addition to regulatory measures; delegation of decision-making and action to the most appropriate level of government; polluter pays for the cost of preventing and eliminating pollution and nuisances caused by him; public participation in environmental decision-making; and international co-operation (Boon, 1998).

The implementation of these instruments in Ghana is difficult. For example, the lack of human resources at the EPA, the District Assemblies and environmental organisations makes it almost impossible to monitor and enforce environmental regulations in the country. Capacity and institutional building have to be upgraded. While the

participation of the public in environmental decision-making has theoretically been enhanced by the Government's decentralisation concept, the lack of incentives to motivate and involve the population is a fundamental problem. The economic and financial instruments such as pollution charges, product charges, deposit refund systems, user charges and fiscal and financial subsidies are even more difficult to manage. The very low income levels of the majority of the population, especially in the rural areas, makes it politically and socially difficult to insist on implementing the polluter pays principle on an across-the-board basis.

Discussion and conclusions

State of the Environment

Describing the state of the environment in Ghana is a difficult task because of the fragmentary nature of the information. A national “State of the Environment” study does not yet exist.

The picture presented by the state of the environment in Ghana indicates an environment stressed by desertification, land degradation through improper agricultural practices, deforestation, destructing mining activities and coastal erosion. This picture is complemented by rapid industrialisation, involving both the manufacturing sector and the intensification of agricultural activities. The fast rate of urbanisation is turning large parts of the coastal zone into one big suburbanized megapolis with limited environmental care systems.

Environmental Management and Policy

Environmental policy and management are in a rather early stage of development. The Rio Conference (1992) was most influential in the review of previous policy positions on the environment, the documentation of National Environmental Action Plans (NEAP) and in the installation of a modern, fully legally mandated national

environmental administration (EPA). In addition, the 110 districts are assisted by the EPA to develop district environmental plans. EPA is a young, motivated and dynamic administration which advocates a progressive attitude towards environmental legislation, and points to the specific potential in the use of economic instruments in achieving environmental policy targets in the economies of developing countries.

Although in an early stage of development, environmental policy and management is effective as shown by the three important development activities that have affected by the evolution of environmental influences, which are described in Box 1.

African Perspectives

The discussion is increasingly influenced by evolving ideas on the African perspective to environmental problems and their management. This perspective is not only about the specificity of environmental problems and their socio-economic context, in which poverty and insecurity are overriding elements. Equally important is the finding that Africa has its own specific potential to manage its environmental problems. The African Research Centre for Technology (ARCT) has developed specific applications of solar energy use, biogas, gari (cassava preparation) processing with minimal firewood input, biscuits and palm oil extraction, which not only respond to local needs, but can be seen as advanced environmentally compatible responses to traditional polluting or resource consuming processes.

The realisation that policy approaches which are used in industrialised countries are not automatically appropriate in a development context, reinforces the African perspective. The huge cost involved in household waste incineration is a notorious example.

The African perspective does not only apply to technological approaches to environmental problems. The call to take into account traditional customs relating to, for example, hunting and fishing and the acknowledgement of their nature protection capacity in the administration of contemporary environmental law, adequately illustrates the African view on environmental management. Appiah-Opoku and Mulamootil (1997) analysed the nature and operations of indigenous Ghanaian institutions, their ecological knowledge, beliefs, practices, and social norms that are relevant to the environmental assessment process in the country. They advocate the need to establish environmental assessment and co-operative management boards which include representatives of indigenous institutions. In addition, the introduction of technical dictionaries and training manuals based on indigenous ecological knowledge and their human environmental practices might be a significant contribution to the upgrading of the current environmental impact assessment practice.

The Developing Economy factor

The African perspective also applies to the search for the specificity of economies in developing countries when it comes to developing, establishing and using institutional, legal and economic instruments for environmental policy. It may be necessary to emphasize that economic instruments might prove to be more effective in their

preventive role against environmental damage in developing countries than in countries with more developed, but less flexible economies.

Transboundary Co-operation

The increasing need for international collaboration at the regional and sub-regional levels provides another aspect of the African perspective. This need is partially based upon a growing number of transboundary projects (for example, the natural gas pipeline from Nigeria to Côte d'Ivoire) and problems (oil pollution, desertification, environmental refugees) in the West African sub-region. Moreover, the environmental policies in the different countries of the sub-region are now emerging. At this early stage, the different administrations, decision-makers and other target groups of the environmental policy process in West Africa might benefit substantially from shared experiences. For these reasons and from the point of view of contents, West Africa seems mature for regional environmental legislation and the required initiatives for monitoring, maintenance and compliance. The institutional requirements seem, however, to lag behind. The Economic Community of West African States (ECOWAS), a sub-regional co-operation body in the region, might be the appropriate level for action. It is however in need of serious vitalisation as far as environmental issues are concerned.

Ghana's dedication to move towards a broad framework for sound management of its resources can only be realised if sufficient, well targeted human and institutional capacity is developed in the near future. Therefore, building this capacity within all

actors and target groups of environmental management is the most important priority field of action.

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| Farmers | | Chemical Shops | |
|---------------------|-------------------|-----------------------|-------------------|
| Insecticides | Fungicides | Insecticides | Herbicides |
| Karate | Koxide | Sumicombi 30EC | Basta 20SL |
| Dursband | DDT | Sumithion 50 | Basagram-PL2 |
| Cymbush | Undene | Actellic 25EC | Rilof |
| | Furandene | Karate 25EC | Ronta |
| | | Trebon | Dual |

Table 1: Availability and use of agro-chemicals and pesticides by farmers in the Lower Volta Basin South Tongu area (Gordon 1997)

| | 1991 | 1996 |
|------------|-------------|-------------|
| Wood fuel | 80 % | 73 % |
| Crude Oil | 13 % | 20 % |
| Hydropower | 7 % | 7 % |

Table 2: Consumption pattern (in %) of energy in Ghana in 1991 and 1996 (after Gogo 1997)

| | Coast | Ghana |
|--|--------------|--------------|
| Land area (x1000 km ²) | 15.6 | 238.54 |
| Population (x1000) | 4,104 | 16,446 |
| Urbanization (%) | 51.5 | 35.4 |
| Population density (/km ²) | 263 | 67 |

Table 3: Land surface, population and urbanisation degree in the coastal districts of Ghana as compared to the country as a whole (World Bank 1996)

| Water quality (mg/l) | | | | | | | |
|----------------------|-----|-----|------|---------------------|---------------------|---------------------|------|
| | pH | DO | BOD | PO ₄ (P) | NH ₄ (N) | NO ₃ (N) | F |
| Korle Lagoon | 7.1 | 4.4 | 98.9 | 0.86 | 3.80 | 0.30 | 0.80 |
| Sakumo II | 8.2 | 8.0 | 12.5 | 0.08 | 0.15 | 0.18 | 0.34 |

Table 4: Water quality in the Korle and Sakumo II lagoons (after Amuzu 1997). DO is Dissolved Oxygen; BOD is Biological Oxygen Demand; phosphate is measured as atomic phosphor; ammonia and nitrate are measured as atomic nitrogen.

| | 1982 | 1990 | 1992 | 1995 |
|-----------------|-------------|-------------|-------------|-------------|
| Gold (ounce) | 337'754 | 541'408 | 998'195 | 1'708'531 |
| Manganese (ton) | 132'232 | 246'869 | 276'019 | 186'901 |
| Bauxite (ton) | 92'954 | 368'659 | 399'155 | 530'389 |

Table 5: Gold, manganese and bauxite production in Ghana during the period 1982-1995. Data are provided by the Minerals Commission, Ghana (after Tsikata 1997)

| Main coping strategy | Absolute number of respondents | % |
|------------------------------|---------------------------------------|------------|
| Sale of animals | 44 | 65 |
| Sale of agricultural produce | 7 | 10 |
| Selling firewood | 6 | 9 |
| Borrow | 5 | 7 |
| Migrate | 5 | 7 |
| Casual labour | 1 | 2 |
| Total | 68 | 100 |

Table 6: Coping responses to food insecurity, 1996, Bakwu East District, North-Eastern Ghana (after Awumbila 1997)

| Year | Law | Reference |
|-------------|---|------------------|
| 1963 | Minerals (Off-Shore) Regulations | L.I. 257 |
| 1964 | The Oil in Navigable Waters Act | Act 235 |
| 1969 | The Ghana Water and Sewerage Corporation (GWSC) | L.I. 1233 |
| 1984 | The Petroleum Exploration and Production Law | PNDCL 84 |
| 1986 | Minerals and Mining Law | PNDCL 153 |

Table 7: Selected laws entailing main environmental clauses in Ghana during the period 1963-1986 (after Domfeh 1997b)

| Sector | Number of EIS submitted | |
|----------------|-------------------------|------|
| | 1995 | 1996 |
| Agriculture | 1 | 2 |
| Mining | 10 | 13 |
| Manufacturing | 3 | 11 |
| Public utility | 1 | 1 |
| Infrastructure | 11 | 2 |
| Forestry | 2 | 1 |
| Tourism | 1 | - |
| Energy | - | 2 |
| Total | 29 | 32 |

Table 8: Number of Environmental Impact Statements (EIS) by sector submitted to Ghana's EPA in 1995 and 1996.

| Country(ies) | Economic instrument(s) | Target area(s) |
|---|---|---|
| India | Private water rights | Water quantity |
| Zaire, Côte d'Ivoire, Central African Republic | Concession bidding, forest fees, timber taxes, environmental bonds | Forestry |
| Malaysia | Effluent charge system | Palm oil industry |
| Singapore | Marginal cost pricing | Traffic congestion in the inner city |
| Puerto Rico | Transferable development rights | Coastal conservation |
| Costa Rica | Prospecting rights | Biodiversity |
| Central and East European countries | Pollution charges | Water, air, waste |
| Poland, Lithuania | Tradable permits | Industrial emissions |

Table 9: Selected examples of experience with economic instruments for environmental management in developing countries and in countries with economies in transition (after Tetteh 1997)

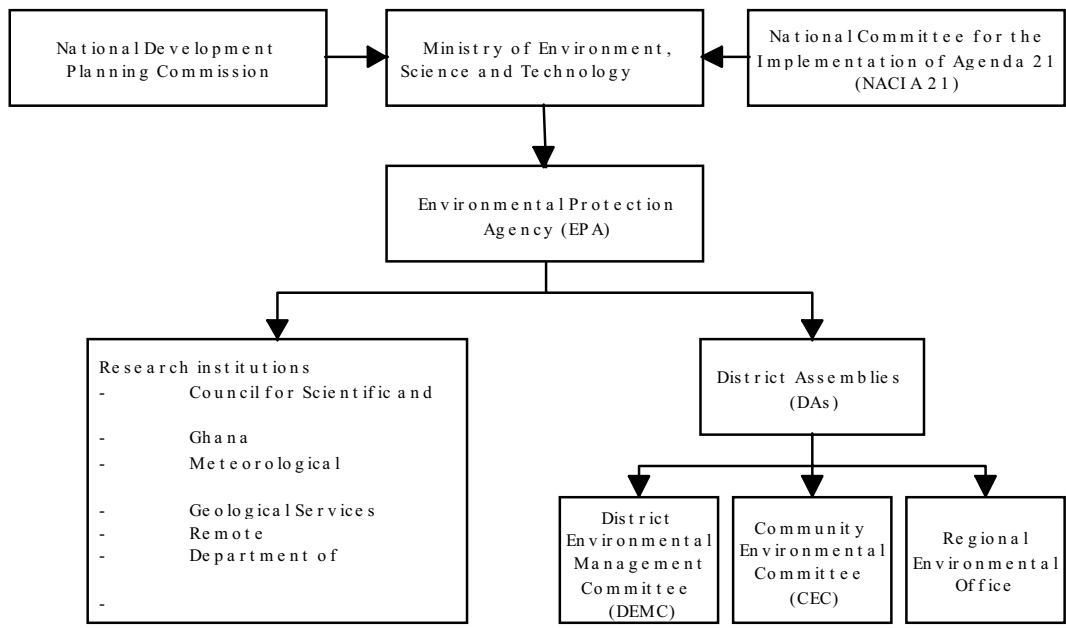


Figure 1: Organigram of the environmental policy making, advisory and implementing institutions in Ghana (after Boon, 1998)

To illustrate the implementation of the environmental policy in Ghana, this section briefly describes one post-Rio and two pre-Rio developmental activities which have affected in a significant way the environment.

The first example concerns the Ashanti Goldfields Company Ltd. (AGC) located in the town of Obuasi in the Adansi District of the Ashanti Region. Until 1994, it was known as the Ashanti Goldfields Corporation. Following the Economy Recovery Programme embarked upon by the Government of Ghana in 1983 and the subsequent Structural Adjustment Programme, the AGC succeeded in attracting substantial amounts of foreign direct investment for expanding and renovating its operations. Being the largest single mining activity in the country and having been mining gold in the Obuasi area for almost a century, it is clear that it poses serious environmental challenges. Some of these problems included the clearing of the natural vegetation, pollution of water bodies and the air which in turn caused serious health problems for the workers and the local population. Pressure mounted by the workers, the local population and the EPC made the company to recognise the negative environmental impacts the company was causing. Consequently, it established a Loss Control Department in 1992 which aimed at raising the safety, health and environmental consciousness of the workers and redressing the degradation of the physical environment as well as the health hazards the residents of Obuasi were being exposed to. Environmental regulations were developed and the co-ordination of operations reinforced through participation by management and workers and weekly inspections. An emergency rescue station has been built in every mining shaft. The degraded environment will be revegetated; investing US \$350,000 to provide safe drinking water for communities in the mining area; construction of a US \$8 million Environmental Laboratory for use in monitoring air

and water pollution. The company's environmental policy statement includes: to ensure that within economic limits and the need to be internationally competitive, the company's activities are carried out with due regard to ecological and environmental factors through implementation of international practices; to operate in compliance with the spirit and letter of the government of Ghana's environmental legislation; to employ the highest occupational health and safety standards; and to maintain good communications with persons and communities affected by the company's operations and to make employees aware of the need to protect the environment and motivate them in taking proper care of it.

The second example of a development project is the National Plan of Action to Combat Desertification (NPACD). After the experience of a severe drought in 1983 which resulted in bushfires that caused severe damage to life, land and property all over the country, the then Environmental Protection Council (EPC) solicited international support to combat the problems of desertification. The Governing Council of the United Nations Environment Programme (UNEP) and United Nations Development Programme decided favourably in May and June 1984 to add Ghana to the list of countries eligible to receive assistance through the United Nations Sudano-Sahelian Office (UNSO) in combating desertification (Benneh and Agyepong, 1990). A total of 22 projects requiring external funding to the tune of US \$10 million were identified. A National Plan of Action to Combat Desertification (NPACD) was prepared which covers the monitoring, assessment and surveys of climate, water, soils, vegetation, rangeland and socio-economic situation; land use policy and planning; environmentally sound management of land resources; legislation; science and technology; education and training; and national machinery required to contain the problem. Since 1989, a

Desertification Control Unit has been established.

A post-Rio development project is Ghana's Environmental Resource Management Project (GERMP) which is operationalising the National Environmental Action Plan (NEAP) which is being funded by the World Bank and the United Nations Development Programme (UNDP). The main concern of GERMP is to put in place the institutional and technical capabilities required for effective environmental monitoring, policy formulation and co-ordination; to support a pilot programme to combat soil degradation and erosion; and to help prevent further destruction of the fragile resource base in the coastal zone.

Box 1: Examples of large-scale post-Rio development projects in Ghana