

INTERNATIONAL TROPICAL TIMBER ORGANIZATION

ITTO

PROJECT DOCUMENT

TITLE	CONSERVATION AND UTILIZATION OF MEDICINAL PLANTS IN GHANAIAN FORESTS FRINGE COMMUNITIES
SERIAL NUMBER	PD 424/06 Rev.2 (F)
COMMITTEE	REFORESTATION AND FOREST MANAGEMENT
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SUMMARY

Over 60% of the population in Ghana depends on plant parts for health delivery. This is because medicinal plants are of critical importance in poor communities where even relatively cheap western medicines remain prohibitively expensive. The continued availability of many of these plants is in jeopardy. A workshop organized to solicit views on the state of medicinal plants in Ghana revealed that in several forest fringe communities, the loss of medicinal plants means not only an immediate loss of livelihood but also rapid erosion on the knowledge and efficacy of their use. Again, there is no attempt whatsoever to conserve the medicinal plants both timber and the non-timber forest products (NTFPs). Therefore, habitat destruction and over-exploitation means sources of medicinal plants are becoming increasingly scarce. In recent times, herbalists and collectors travel long hours over long distances in search for specific medicinal plants. Sometimes they travel to other ecological areas for their suitable plant species. The project will focus on documenting the distribution, availability (endangered, common), adapt conservation methods and focus on sustainability of supply of medicinal plant from three different ecological zones. This project will also promote and train forest fringe communities on biodiversity conservation (both timber and non-timber forest products (NTFPs), propagation and management techniques, sustainable harvest and utilization of medicinal plant species.

EXECUTING AGENCY FORESTRY RESEARCH INSTITUTE OF GHANA

COOPERATING GOVERNMENTS ---

DURATION 48 MONTHS

APPROXIMATE STARTING DATE TO BE DETERMINED

BUDGET AND PROPOSED SOURCES OF FINANCE	Source	Contribution in US\$	Local Currency Equivalent
	ITTO	429,138.00	
	Gov't of Ghana	107,955.40	
	TOTAL	537,093.40	

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PART I: CONTEXT

1. Origin

This project is derived from three main projects, namely:

1. Conservation and Sustainable Use of Medicinal Plants in Ghana", funded by the Darwin Initiative for the Survival of Species to support the long term conservation and sustainable use of medicinal plants in Ghana.
2. Forestry Research Institute of Ghana (FORIG) and the Centre for Scientific Research into Plant Medicine (CSRPM) cooperative study to conceptually develop strategies on efficient utilization and conservation techniques to establish protocols for mixed medicinal plant species plantation system in home gardens.
3. Northern Savannah Biodiversity Conservation Project (NSBCP), supported by the World Bank. The NSBCP activities are focused on documentation and strengthening the conservation and management programs of flora and faunal biodiversity in the northern savannah zone. Other activities include the identification of demonstrable medicinal plant species cultivation practices.

In the year 2002, Conservation report edited by Harriet Gillett published jointly by Aburi botanic Garden in Eastern Region of Ghana, Department of Botany Botanic Gardens, Legon, Accra and Conservation International on "Conservation and Sustainable Use of Medicinal Plants in Ghana", funded by the Darwin Initiative for the Survival of Species to support the long term conservation and sustainable use of medicinal plants in Ghana centred on a broad approach involving development of medicinal plant gardens at the two Botanic Gardens (Aburi and Accra). The two gardens located in Southern part of Ghana are primarily educational resource centres for plant accessions. They are not easily accessible to the public. Whilst the plant population at the nursery was recorded to be 4,196 potted seedlings and 463 on beds, the project team carried out propagation trials on 20 selected plants.

Poverty is associated with the rural savannas and rural forest areas, which account for 60% of total poverty in Ghana. Communities in these areas cannot afford to seek modern health care facilities but depend on medicinal plants for their health needs. The traditional medical practitioners can be located every 2 kilometres in these deprived areas in Ghana. These traditional medical practitioners harvest plants of medicinal value from nearby forests indiscriminately without replacement. This situation calls for urgent action to develop alternative strategies to promote the production, utilization and conservation of medicinal plant species in general and threatened species in particular to cover the entire forest and savanna areas in Ghana principally in rural fringe communities to compliment Government's efforts to provide good and affordable health care. To address this problem the Forestry Research Institute of Ghana (FORIG) organized a workshop in collaboration with the Traditional medical practitioners living in forest fringe communities to conceptually develop strategies on efficient utilization and conservation techniques. A team of researchers from FORIG have come together to put up this proposal to develop the strategies and to establish protocols for rehabilitating degraded natural forests, establish medicinal plant plantation systems and ensure availability and sustained use that will provide goods and services to improve livelihoods in deprived rural forest fringe communities in Ghana.

2. Sectorial Policies

The objectives of this project are in conformity with the overall goal of Ghana to meet the demands of Convention on Biological Diversity obligations, Ghana's 1994 Forest and Wildlife Policy and the Forestry Department Master Plan (1996). This is to conserve and sustainably develop the nation's plant resources while maintaining environmental quality and perpetual flow of benefits to the health sector. Specifically, the priority objectives of the 1994 Forest and Wildlife Policy include: Manage and enhance Ghana's permanent forest estate for conservation of biological diversity and sustainable production of domestic and commercial produce; and promote research-based and technology-led forestry and wildlife management, utilisation and development to ensure resource availability, socio-economic growth and environmental stability.

Strategies outlined in the 1994 Forestry and Wildlife Policy, the land policy reform in 1999 that addressed equitability of access to land regardless of gender, marital and migrant status and supported by the proposed project are: *in-situ* and *ex-situ* conservation initiatives towards restoring a significant proportion of medicinal plants; promotion of resource development programmes aimed at

encouraging regeneration of harvested high-valued and endangered medicinal plant species, address the problem of losing medicinal plants, an important both timber and non-timber forest product through forest degradation and over-exploitation that ultimately leads to sustainable management of the medicinal plants.

Programmes and Operational Activities

The Forestry sector of Ghana has its objective to generate information for sustainable forest management, maximize utilization of the forest products while avoiding waste and stimulate the development of more value-added products to provide economic benefit to all Ghanaians. Emphasis is laid on the conservation of flora and fauna species in different ecosystems so that the existing natural forest estate is prevented from further degradation in species diversity. The Forestry sector encourages harvesting of forest resources based on principles of sustainable yields, environmental conservation and enhancement of biodiversity. Medicinal plants can be protected by international, national or local laws or by self-regulation by those involved. Laws and regulations can help ensure the sustainability of supplies of medicinal plants in relation to the protection of plants and their habitats. The Convention on Biological Diversity (CBD), in force since 1992, is the major international conservation convention. In April 2002, a conference of signatories to the CBD in The Hague adopted a Global Strategy for Conservation of Plants. This aims to strengthen plant conservation across the board, for example by encouraging greater sustainability in the use of plant resources, and promoting education and training.

The global strategy is intended to harmonize with existing international initiatives addressing various aspects of plant conservation. Some of the most significant are UNESCO's Man and the Biosphere (MAB) Programme (concerned with ecosystem management and scientific research), the Plant Conservation Programme of the Species Survival Commission of IUCN, the Convention on International Trade in Endangered Species (CITES) and the FAO Global Plan of Action for Plant Genetic Resources for Food and Agriculture. Major relevant regional initiatives include the Plant Conservation Strategy for Europe and the Southern African Botanical Diversity Network (SABONET). Few countries have laws specifically for medicinal plants (Lange 1998). In some countries the commercial collection of medicinal plants is controlled by permit and it is implemented in the Democratic Republic of Congo for the collection of *Rauwolfia* species. The European Herb Growers Association (EUROPAM) is currently developing Good Agricultural Practice and Good Wildcrafting Practice Guidelines. At the global level, the World Health Organization (WHO) is also developing the Good Sourcing Practice Guidelines (Good Agricultural Practice Guidelines and Good Field Collection Guidelines). Such of these strategies cannot be said to exist in Ghana in particular and in Sub-Saharan Africa as a whole. For a successful implementation of the conservation strategies in line with the global initiatives, total knowledge of distribution, methods of harvesting and uses of medicinal plants in Ghana would have to be documented and guidelines prepared for its sustainable utilization.

PART II: THE PROJECT

1. Project Objectives

1.1 Developmental Objective:

The developmental objective of this proposal is to "To develop conservation and sustainable utilization strategies for medicinal plant species within forest fringe communities of different ecological zones in Ghana"

1.2. Specific Objectives

1. To document the distribution, utilization (endangered, common) and practice conservation methods for sustainable supply of medicinal plants from three different ecological zones in Ghana.

2. Justification

2.1 Problem to be addressed

The World Health Organization (WHO) encourages the development and utilization of traditional medicine in the Primary Health Care delivery in developing countries. This policy is based on the sound recognition of the role that traditional medicine plays in health care programmes in most developing countries. The WHO estimates that conservatively, between 60% and 90% of the populations of these countries rely on medicinal plants either totally or partly for their health care needs and 70% of the people in Africa depend on traditional medicines.

Some trees with known medicinal properties are harvested indiscriminately without replacement as timber and the 1994 Forest and Wildlife Policy do not offer the much needed protection to the medicinal plants in general. Therefore there is over-exploitation of medicinal plants, non-timber forest products and potential ones by timber contractors and the forest fringe communities with no control by the Ghana Forestry Commission. The medicinal plant both timber and non-timber forest products (NTFPs) species may abound in designated forest reserves and the sanctuaries (e.g. sacred groves) and on farmlands but are under serious threats of degradation. Ghana comprises of 5 major ethnic groups living in different ecological zones. However, no part of Ghana is ethnically homogeneous. The plant species of medicinal value are also diverse within each ecological zone and may only be found in a particular ecosystem. Little effort has been made to assess the supply and demand, develop guidelines for sustainable harvesting and propagation of medicinal plant species. Conservation strategies and education on the part of the government, non-government and other stakeholders are inadequate.

Traditional medicines from plants species are administered in various forms. They could be powder, decoctions, dried extracts, whole roots, bark, wood and leaves extracts, poultices, infusions, juices and tinctures. The OAU/STRC ethno-botanical project has documented more than 700 medicinal plants of Ghana.

Table 1: Some plant species, medicinal uses and status in their natural habitats

	Plant species	Habit	Medicinal Uses	Status
1.	<i>Cryptolepis sanguinolenta</i>	climber	cold, catarrh, persistent headaches & migraine	EN
2.	<i>Calotropis procera</i>	Tree	cold, catarrh, persistent headaches & migraine	EN
3.	<i>Clausena anisata</i>	shrub	cold, catarrh, persistent headaches & migraine	EN
4.	<i>Ocimum basilicum</i>	herb	cold, catarrh, persistent headaches & migraine	EN
5.	<i>Marantochloa flexuosa</i>	herb	boils	EN
6.	<i>Khaya senegalensis</i>	Timber	boils	EN
7.	<i>Xylopia aethiopica</i>	Tree	boils	NT
8.	<i>Canthium subcordatum</i>	Tree	antihypertensive herb	V
9.	<i>Parkia clappertoniana</i>	Tree	antidiabetic properties	V
10.	<i>Anarcadium occidentale</i>	Tree	antidiabetic properties	V
11.	<i>Parkia biglobosa</i>	Tree	antidiabetic properties	V
12.	<i>Carissa edulis</i>	Tree	anemia	V
13.	<i>Ximenia americana</i>	Shrub	Diarrhea and skin ulcers	EN
14.	<i>Rauwolfia vomitoria</i>	Tree	malaria, lumbago, hypertension	V
15.	<i>Cola nitida</i>	Tree	herpes and fracture	EN
16.	<i>Griffonia simplicifolia</i>	climber	pelvic congestion fracture	NT

17. <i>Catheyanthus roseus</i>	herb	whooping cough and jaundice	EN
18. <i>Garcinia afzelii</i>	Tree	sexual impotence and dysentery	EN
19. <i>Garcinia kola</i>	Tree	abdominal pains and oral hygiene	EN
20. <i>Milicia excelsa</i>	Timber	cough	EN
21. <i>Khaya senegalensis</i>	Timber	convulsion, malaria, hemorrhoids and anaemia sexual weakness	EN
22. <i>Alstonia boonei</i>	Tree	sexual weakness, numbness, hemorrhoids, arthritis	V
23. <i>Monodora myristica</i>	Tree	sexual weakness, numbness, hemorrhoids, arthritis	NT
24. <i>Mitragyna stipulosa</i>	Tree	female infertility, chest pains and anaemia	NT

EN = endangered

V = Very much used

NT = Not threatened

Source: J.R. Cobbina (2005)

In Ghana, about 11 million people live in forest areas. Forest and woodlands constitute a huge biological wealth and Ghana is rated the 8th successful biodiversity conservation among 50 African countries. Trends of deforestation rates have been quoted as 0.8% in 1970, 2% in 1980, 1.3% in 1990 and 1.7% in 2005. Thus, only 16 out of the 266 gazetted (forest reserves) are in good health. The cost of forest depletion of timber resources is estimated at \$270 million per annum and NTFPs at \$30 million per annum. Medicinal plants belong largely to the timber and the NTFPs in addition to fauna parts. Thus, medicinal plants are in serious threat of over-exploitation leading to eventual extinction.

Table 2: Ratios of doctors (practising Western medicine) and traditional medical practitioners (TMPs) (practising largely plant-based medicine) to patients in East and Southern Africa (Marshall, 1998) and Ghana (Addae-Mensah, 2004).

Country	Doctor: Patient	TMP: Patient
Ethiopia	1: 33,000	1: 7142 (overall)
Kenya	1: 833 (urban – Mathare)	1: 987 (urban - Mathare)
Malawi	1: 50,000	1: 138
Mozambique	1: 50,000	1: 200
		1: 1639 (overall)
South Africa	1: 17,400 (homeland areas)	1: 700-1200 (Venda)
Swaziland	1: 10,000	1 : 100
Tanzania	1: 33,000	1 : 350-450 (Dar es Salaam)
Uganda	1: 25,000	1: 708
Ghana	1: 9,804	1: 911

About 65-70% of the population in Ghana depends on traditional medicines. A traditional Medical Practitioner to allopathic proportions is 11:1. About 71% of medical doctors in Ghana live in two big metropolitan cities only i.e. Accra (50%) and Kumasi (21%). Modern health care is still beyond reach of many. The Ghana Health Policy of health services proposition that within 8 km, all communities will have access to medical facilities is far from realization. In most rural communities, however, Traditional Medical practitioners are within 1 km distance (Addae-Mensah, 2004).

The herbal preparations are administered in different doses by fetish priests and herbalists. The forest fringe communities benefit from this health system most simply because, health posts or centres are not within their reach and if they are present, the poor forest fringe communities cannot afford to buy the prescribed drugs. They would rather harvest and use medicinal plants from the wild for their health needs. Usually, training in harvesting of plants for herbal preparations and practices are always handed down within family lineages through oral tradition. Trainings are restricted to a particular tribe, clan, family or individual and it is undertaken in secrecy. There is no written document on information about handling of medicinal plants regarding harvesting, regeneration and general

ecological consequences of unsustainable exploitation and utilization of these plants. It is therefore important to identify and document each useful plant species of medicinal value in each of the ecological zones and habitat, match species to their uses and the disease(s) they can cure and adopt some conservation measures to ensure sustainability. Ghana is a signatory to the Convention on Biological Diversity and as such we propose to identify, assess supply and demand, develop guidelines for sustainable harvesting, and monitor the state of medicinal plants within the country, including *in-situ* and *ex-situ* conservation actions and to identify processes having adverse impact on these plants.

2.2 Intended Situation after Project completion

At the end of the project, 18 forest fringe communities, three each from the six ecological zones would have been trained in the development of sustainable harvesting and utilization and conservation methods of medicinal plants in their locality. It is intended that the trained participating communities will cascade the training to other communities. This approach will facilitate transfer of technology and encourage sustainable development of medicinal plants to improve the traditional health delivery systems in rural poor forest fringe communities. Encouraging natural regeneration, enrichment planting and protection of the productive forests for the supply of medicinal plants would ensure sustainable supply of medicinal plants. Natural forests which have been degraded to adversely affect sources of supply of medicinal plant species would have been restocked. Establishing home gardens of medicinal plant species by the forest fringe communities would create jobs, improve income sources of the collectors and create awareness of biodiversity conservation to the various stakeholders so as to relieve the pressure from the over-harvesting of medicinal plants from the wild. The threatened medicinal plants which are harvested as timber will be available and will become easily accessible to reduce man hours spent on scouting for desired plant species for patients who may be in critical conditions of their illness. The strategies adopted for medicinal plants conservation will lead to the achievement of sustainable forest management in Ghana.

The results from market intelligence, sustainable harvesting guidelines, propagation and cultivation techniques developed, conservation methods and the training programmes within the scope of this project will provide the base-line information needed by the government and people of Ghana and multilateral agencies to support sustainable use of the country's genetic resources, encourage entrepreneurs to establish rural pharmaceutical industries in traditional medicines where the raw material will be readily available based on the principle of sustainable forest management.

This output will create jobs, increase income sources, and improve health and general livelihoods of forest fringe communities. The intentions and actions outlined in this proposal will assist Ghana to meet the requirements of the Convention on Biological Diversity of which she is a signatory. Above all, rehabilitation of degraded natural forests through *in-situ* natural regeneration, reforestation and establishment of plantations through agroforestry in *ex-situ* conservation methods and combined with promotion of lesser used NTFPs would have been achieved to the benefit of local communities who may be involved in the project.

PROBLEM TREE

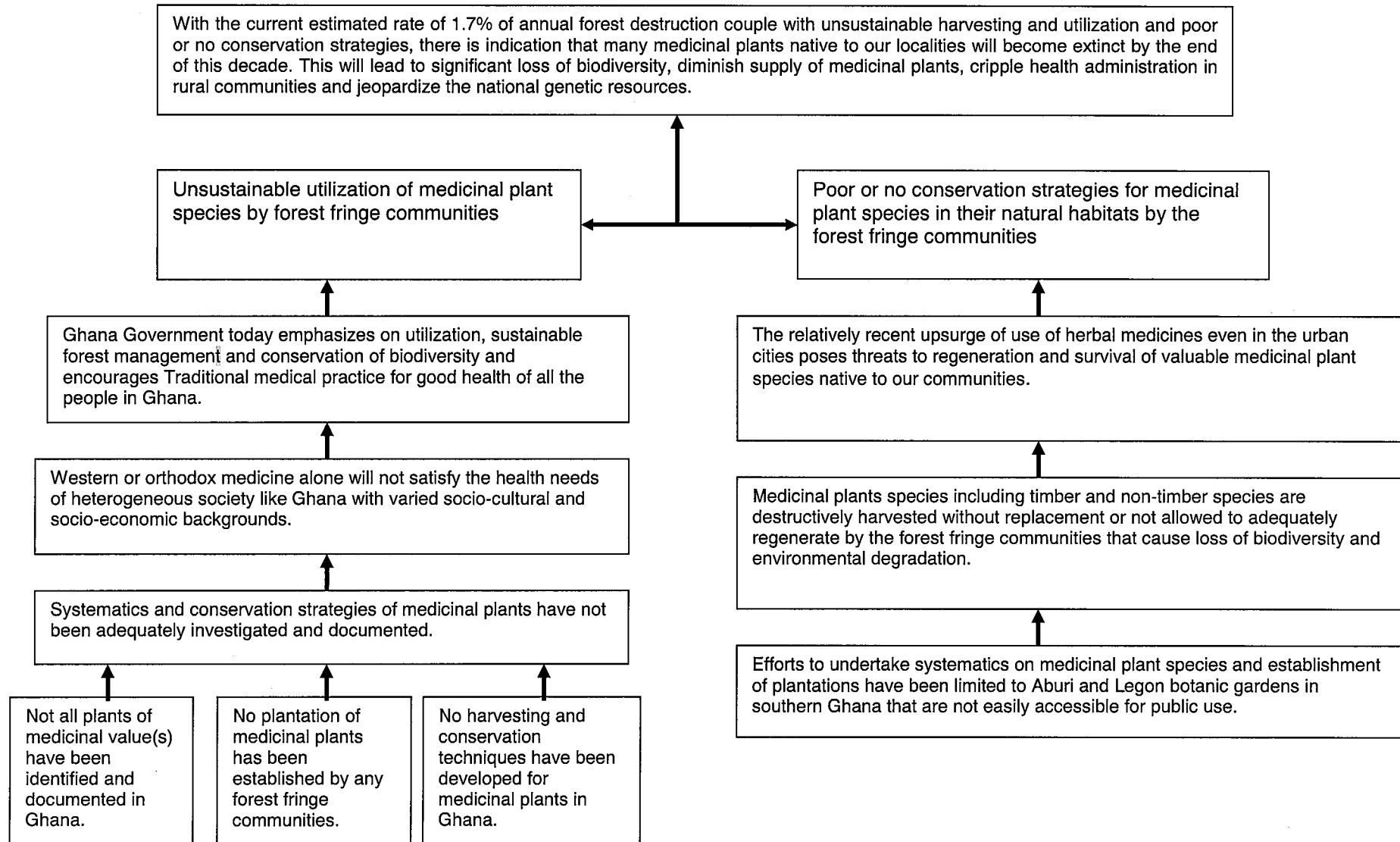
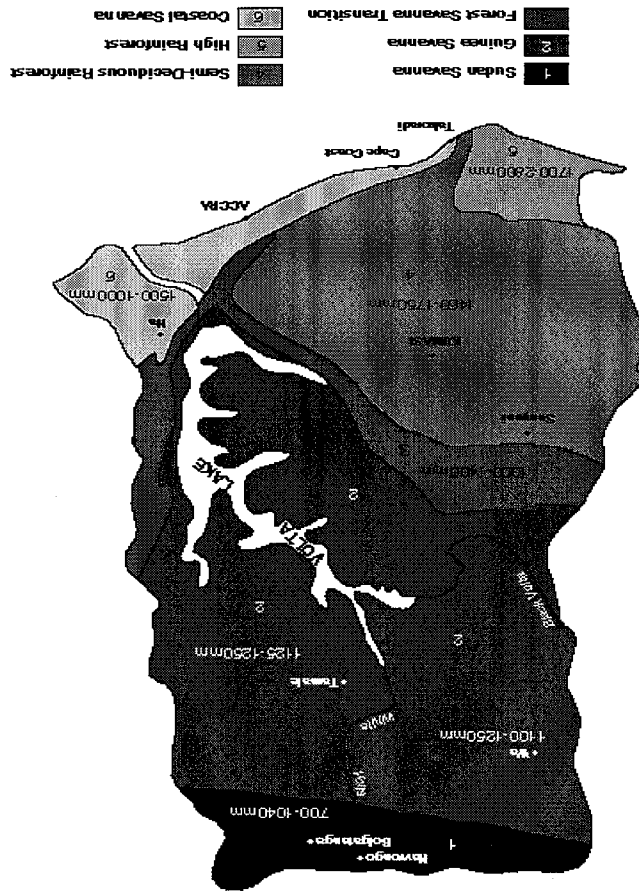


Figure 1. Map of Ghana showing the six (6) major ecological zones. (Modified from: J.A. Timbilla & H. Braimah, 1994)



2.3 Project Strategy

2.3.1 *Ethno-botanic and medicinal plants survey*

The objective of this proposal is to identify and document the market trends (demand and supply) and prescribe sustainable utilization of medicinal plant species in Ghana to protect them from over-exploitation. Most of the medicinal plants especially the tree species are also important timber species. Ghana is divided into six (6) ecological zones (Fig. 1), i.e. Sudan savanna, Guinea savanna, Forest savanna transition, Semi-deciduous rain forest, High rain forest and Coastal savanna. Within each zone, one district will be identified. In each district, five (5) communities would be selected and the selection would be based on the closeness to protected area and the presence of traditional medical practitioners or herbalists and fetish priests and collectors in consultation with the District Traditional Medical Practitioners' Association. Three communities in each of the identified districts will be selected for Rapid Diagnostic Appraisal (RDA). The fringe community members (herbalists and fetish priests and collectors) will lead scientists to the field where they harvest the medicinal plants to conduct ethno-botanic survey on important medicinal plant species, perform systematics on the plant species and collect specimen samples for herbarium storage. The plants will be authenticated and the voucher specimen lodged at the herbarium of Forestry Research Institute of Ghana (FORIG), Kumasi. The criteria for selecting the medicinal plant species will include the following:

- (1) Species that are harvested in large quantities in the wild or elsewhere.
- (2) Species that the whole plant is used (leaves, wood, roots bark, etc).
- (3) Species that belong to different habitats.

In the end, the ecological zones could be grouped into two main broad zones i.e. Forest and Savanna and the data synthesized. This will offer the opportunity for the investigators to gather adequate information on all plants with medicinal values under different ecosystems of the ecological zones. Technical assistance and some incentives will be given to participating communities. Some traditional tariffs, fees for sourcing information from the fetish priests and any other taxes or monies for pacifications or purification demanded will be honoured. However, such incentives will be restricted to members who will be ready to release information to the research team members. Facilities for better upkeep of the collected samples will have to be updated.

TERI undertook a study in the Biligiri Rangaswamy Temple Wildlife Sanctuary in India to determine what levels of major non-timber medicinal plants harvest that would be sustainable. For the purpose of the project, sustainable use of medicinal plant was defined as 'the level of harvest at which a species can maintain its population at natural or near-natural levels and the harvest, will not change the species composition of the community'. The criteria for selecting the species for study included: (1) The species that are harvested in large quantities by pharmaceutical industries in the sanctuary or elsewhere. (2) Species that represent different parts of a plant. (3) Species that belong to different habitats. The study became apparent that for the survival of the wild populations, either alternative species be explored as supplement or their wild population would have to be supplemented by cultivation to minimize collection from the wild.

At the 5th Conserve Africa Foundation (CAF) conference in Nairobi, Kenya, 15-26 May 2000, issues were made on African inventory and genetic assessment of medicinal plants and recommendations were made on: a) Community-based in-situ conservation and management of ecosystems with high medicinal plant species diversity. b) Development of sustainable harvesting guidelines of wild medicinal resources. c) Identification and development of cultivation/propagation practices and d) information dissemination, networking, education and awareness raising programmes.

Hamilton (2003) of IUCN emphasized that most work by conservationists on medicinal plants should be with those people who own, manage or make use of these species, or else own or manage the land on which they grow. It is in working with such stakeholders that the special meanings of medicinal plants to people can best be 'exploited'. Billions of people in the world rely chiefly on herbal medicine, while millions gain income from their wild harvest or cultivation, or are involved in their trading or processing. Probably, the single most important 'role' for medicinal plants in biological and ecological conservation stems from the foundations that they can provide for the involvement of people in conservation of natural habitats (Schopp-Guth & Fremuth, 2001). Therefore the 'biological beneficiaries' of 'medicinal plant conservation' are not necessarily only the medicinal plants themselves.

A project of the WWF-Nepal Programme with the People and Plants Initiative, at Shey Phoksundo National Park, is developing community-based systems for the sustainable harvesting of medicinal plants, combined with the strengthening of local medical services (practitioners of Tibetan Medicine) (Lama et al., 2001). The Forest Department of the Great Himalayan National Park, India, is promoting cultivation of medicinal plants as an income-generating enterprise linked to conservation (Pandy & Tandon, 2002). The emphasis is on women, in recognition of their economically marginalised status and their special interest in plant resources.

The Foundation for Revitalisation of Local Health Traditions (FRLHT) is active across the southern corner of India with an integrated programme of conservation, health security and livelihood support, centred around medicinal plants and plant-based medicine (Mrudula, 2002). FRLHT encourages the foundation of micro-credit groups, and seeks to prioritise health problems and related local remedies. Species in demand, and also endemic and threatened species, are grown in nurseries, and planted out in demonstration plots, home gardens, and for enrichment planting in areas of degraded forest.

2.3.2 Conservation

2.3.2.1 Ex-Situ- Establishment of plantations (home gardens) of medicinal plants

Unregulated collection of wild plants for medicinal purposes poses a serious threat to the survival of some potentially useful plants. As the demand for medicinal plants continues to rise, the natural stock alone will not meet the supply. In fact, the existing stock of species is rapidly getting extinct and that calls for urgent measure to reverse this trend. Sustainable management of medicinal plant species is important, not only because of their value as a potential source of new drugs but due to reliance on medicinal plants for health care. Although the value of medicinal plants is widely recognized by both rural and urban dwellers, researchers have not introduced appropriate strategies, which may lead to the efficient utilization and management of the medicinal plants, which are commonly used by the communities. Usually, medicinal plants are collected from the wild without replacement or without ensuring their continuous natural regeneration. They are over-exploited, harvested throughout the year. It is very difficult to control this practice and the surest way of conserving medicinal plants species for posterity is to introduce domestication methods. Domestication may be one of the means of achieving medicinal plant conservation and reducing the exploitation pressure exerted on naturally occurring plant species. This protects plants that are being threatened in their natural habitats. Other measures which help to conserve medicinal plant species include cultural practices and taboos, religious and spiritual beliefs. The project seeks to train local communities on domestication (ex-situ conservation) of wild plant species especially threatened species in home gardens and reforest degraded habitats during the project life. The medicinal plant species will be ranked according to their use, diversity and scarcity. Planting materials of the threatened top 10 medicinal plants under the selecting criteria in each selected forest fringe community will be collected and established in FORIG nursery. The seedlings will be multiplied in the nursery and supplied to the participating herbalists in each of the districts. Individual participant of this project will be assisted to establish mixed plantations of the nursed medicinal plant species and other useful plant species under each of the selecting criteria in home gardens. Cultivation is commercially attractive because there is greater control over quality and supply. Its feasibility depends on a species' ability to thrive as a mono-crop, while its economic viability depends on the volumes required. The medicinal plants likely to be cultivated will be those that are high yielding and responsive to economies of scale. Cultivation is particularly advantageous for growers where there are long-standing partnerships and contractual arrangements to supply manufacturers. Cultivation is a promising means of meeting an expanding market while reducing pressure on populations of wild plants (Lange 1998). Cultivation can have the potential to save wild populations of medicinal plants, thus contributing towards conservation of their genetic diversity. Conservation of genetic diversity can also be achieved through ex-situ efforts involving botanic gardens and seedbanks, preferably in combination with in-situ measures. Furthermore, the removal of whole plants destroys rootstocks, so that they become unavailable as sources of new shoots. Increased cultivation would reduce the need for wild harvesting. In Guatemala, the German Ministry for Economic Cooperation and Development (BMZ) has shown that medicinal plants can be integrated successfully into traditional farming systems with food-crops such as maize, beans and vegetables, and that they can provide a regular income (Eid 2000).

The loss of habitat is the major factor contributing to the depletion of natural resources in Africa. Among the genetic resources are medicinal plant species that are gathered from the wild. Conservation of medicinal plants, especially endangered ones depend largely on the conservation of the ecosystem in which they occur. Methods for the propagation and cultivation of selected medicinal plant species in home gardens, mixed plantations, degraded habitats rehabilitation through enrichment planting, natural regeneration and as components of agricultural diversification through agroforestry for use will serve as an additional source of medicinal plants that will yield more income. The project would assist communities to identify localities and traditional healers who themselves are farmers to cultivate selected medicinal plant species for mass production. Despite the recognition of the importance of medicinal plants and their traditional use in the health care system, they remain undervalued. The increasing demand in urban centres for traditional medicines is placing increasing pressure on the wild resource-base. Market and field surveys that have been carried out by Plant Resources of Tropical Africa (PROTA-Ghana), African Forestry Research Network (AFORNET) ethnobotany project and other projects will be studied to ascertain the degree of pressures exerted on wild populations and their habitats in Ghana and to better understand local community

dependence on medicinal plants for health care. The Nogouchi Memorial Institute in Ghana conducts research into plant medicines. The Centre for Scientific Research into Plant Medicine in Ghana has a depth of knowledge into the efficacy of some plant medicines. These pieces of information would provide input to the national databases and priority setting for in-situ and ex-situ conservation and cultivation activities. The establishment of pilot farmer-based cultivation (agronomic) trials outside reserves and protected areas would utilize farmer knowledge to ensure a sustainable supply of medicinal plants and products. Currently, medicinal plants collected wild from the forests especially from the protected or reserved forests are without any form of rehabilitation or replacement and are constantly being harvested without given the opportunity for the plants to regenerate. This project seeks to determine the value of medicinal plant species and/or their products which will augment efficient management thereby leading to sustained supply. It will help develop procedures for evaluating and managing medicinal plants by making available to the participating herbalists procedures and applications for harvesting and cultivation. It will facilitate the formation of local community networks on medicinal plants, which will be linked to existing conservation structures to make them more efficient. The ex-situ conservation is predominantly for the purpose of complementing the in-situ measures. The components of biological diversity, genetic resources, adopting measures for recovery and rehabilitation of threatened medicinal plant species, their re-introduction into natural habitats, regulation and management of collection from natural habitats would not threaten ecosystems but will lead to sustainable forest management of the natural resources.

2.3.2.2. *In-Situ conservation*

The habitats from which the plants are collected will be in consultation with the herbal medicinal plants collectors, herbalists and fetish priests in each district, subjected to in-situ conservational measures. The conservation of vulnerable habitats and species by designation of parks or reserves can attract tourists and provide jobs to local people with few other opportunities for regular employment. The local corroborators (i.e. traditional medicine practitioners, medicinal plants collectors and drug manufacturers) of this project will be trained in natural regeneration techniques, silvicultural practices (enrichment planting, reforestation, etc) and incentives will be provided. Training of local herbalists and collectors in general nursery and field management of medicinal plant species will be undertaken for reforestation in degraded areas. Slow-growing, space-demanding, or low-yielding species are less likely to be economically attractive to commercial growers. Wild harvesting is generally much cheaper than expenses incurred in the establishment of plantations. Collection from the wild may be unavoidable or even preferable for those many medicinal plants that grow slowly or are difficult to domesticate or for which only small quantities are needed. The cost of wild-collection is typically much less than that of cultivation. But risks associated with wild collection include: permits for collections of plants may be refused; collection sites may be too far from the utilization points to increase time for its preparation and marketing, improper handling of harvested plants over long distances for several days may affect potency; over-harvesting of endemic species with very restricted geographic distributions can be vulnerable to extinction; loss of genetic diversity through the reduction or elimination of local plant populations with unique genetic characteristics and the unnecessary destruction of plants resulting from careless and unsophisticated harvesting practices (Harnischfeger 2000). At a recent Ghana Federation of Traditional Medicine Practitioners (GHAFTRAM) in collaboration with Universal Development Organization (UDO) (an NGO) forum organized in Kumasi, Ghana, the traditional medicine practitioners have recognized the alarming rate at which medicinal plants depletion from the natural forests has been. Many of the practitioners have expressed the desire to reforest degraded lands that support their livelihood. The collectors at the forum also showed interest for ensuring sustainable supply of medicinal plants. But, the risks expressed were availability of land, ownership and user rights. Fortunately, the 1994 Ghana's forest policy is now shifting from complete restrictive resource use (with permit) to total right of use if the resource is established, natured or protected. This paradigm shift will contribute to the success of this proposal and will motivate the forest fringe communities for their participation. The Government of Ghana in 1999 launched a programme of land policy reform and that there has been an approved equity in benefit sharing between the government, traditional leaders, landowners and the land using communities especially for timber but the other NTFPs of which medicinal plants form part may be used in full without restriction. The participating communities will therefore have the absolute right of use whether the in-situ conservation method is undertaken in reserve forests, individual lands or on community farmlands.

2.3.3 *Harvesting*

At the GHAFTRAM and UDO forum, it was learnt that medicinal plants are traded by specialised collectors living in forest fringe communities from all over the country and are sent to the urban towns for sale. The manufacturers of traditional medical products buy their raw materials from them in early hours once a week. It was revealed that medicinal plants are harvested without neither permit nor any guidelines from the Forestry Commission. Therefore, collectors have been operating their business in forest reserves and

sacred groves. Thus, no harvesting methods have been prescribed for them. The traditional methods of harvesting the medicinal plant species will be monitored by scientists and herbalists of the fringe community together. The destructive methods employed that lead to eventual death of the plant species will be investigated and appropriate harvesting method(s) prescribed. The extinction of some ancient plants species – probably caused by its uncontrolled harvest – provides a warning of the need for sustainable management of medicinal plants. The uncontrolled harvest has not necessarily benefited the traditional harvesters/collectors or the continuation of the stocks on which they have depended. Harvesting from the wild is generally providing a supplementary income for the poorest people in communities (Lange 1998). On the other hand, small-scale cultivation of medicinal plants in multi-cropping systems can be a means by which low-income families can boost their earnings. Both wild harvesting and cultivation have social dimensions. Taken together, locally-based cultivation and wild harvesting can be effective means of providing income for the poorest sectors of society and contribute to social stability, while supporting reforestation and conservation.

2.3.4 *Utilization*

The traditional methods of herbal preparations will be refined by applying a modified form of scientific methods of extraction. Training in basic hygiene of the working environments of the herbalists and their patients will be conducted so as to reduce the risk of infection and complications. Training in harvesting techniques that will enhance regeneration and growth of the medicinal plant species will be done to the various stakeholders in the trade. Destructive harvesting techniques, habitat loss and alteration are threatening the local survival of species or varieties.

2.4 Target Beneficiaries

The activities in this proposal will bring sanity into the activities of all stakeholders in traditional medical practices and improve health delivery systems in Ghana in general and in rural areas in particular. The socio-economic life in rural areas will improve and ecological benefits will extend to the Ghanaian people. The economic life of principal native medical practitioners including collectors of medicinal plants will improve. The plantations to be developed will serve as gene pool for biological resource studies for scientists and for research activities into traditional medicine. Ghana needs to seriously consider conserving plants especially timber species that play important roles in the health sector. It is our hope that the results of the studies will stimulate the interest of small-scale industries in pharmaceuticals to be established in rural communities to provide jobs and to diversify the economy of Ghana whose major sources of cash inflows has been timber, cocoa and mineral exports. In addition, the *in-situ* and *ex-situ* conservation strategies adopted will lead to the conservation of biodiversity and demonstration of community participation. Who knows may be in the nearest future, an indigenous medicinal plant species in the established home gardens gene bank may help to develop drugs to combat malaria and the dreadful HIV and AIDS disease. At village level in many developing countries and more traditional societies, medicinal plants can provide some of the strongest links between people and nature. Maintaining such links through the sustainable harvesting and utilization of medicinal plants can be a crucial factor to ensure the continuation of those traditional socio-cultural behaviours.

2.5 Technical and Scientific Aspects

2.5.1 *Bioprospecting and conservation of medicinal plants*

Medicinal plants are harvested from the wild and it is now resulting in over-exploitation of wild stocks of some species. Cultivation will particularly be advantageous for growers who practice traditional herbal medicine. Domestication of a species can be difficult and expensive. As a result, wild harvesting is likely to remain the only option for many species (Lange 1998). Cultivation of medicinal plants species (especially those that are exploited for timber) is a promising means of reducing pressure on populations of wild plants. Cultivation can have the potential to save wild populations, thus contributing towards conservation of their genetic diversity. Conservation of genetic diversity can also be achieved through *ex-situ* efforts involving botanic gardens and seed-banks, preferably in combination with *in-situ* measures for sustainable forest management.

An advantage in maintaining wild populations of a species, not least through their sustainable harvesting, is that reserves of genetic variability remain. These can also be useful for reinvigorating cultivated stock. It can be assumed that each individual wild population will normally be quite genetically diverse. The sum total of all the wild populations of a species, across its geographical range, constitutes an invaluable resource. Wild populations frequently contain genes of value in plant-breeding – for instance to increase the levels of active principles or to convey resistance to disease. Risks associated with wild collection include: over-harvesting of endemic species with very restricted geographic distributions can be vulnerable to extinction; loss of genetic diversity through the reduction or elimination of local plant

populations with unique genetic characteristics; and the unnecessary destruction of plants resulting from careless and unsophisticated harvesting practices (Harnischfeger, 2000).

Cultivation should not replace wild harvesting of medicinal plants but rather more a case of developing structures that support existing sustainable practices of wild harvest, leading to recognition of the contributions that can be made by both wild harvesting and cultivation. Wild-growing plants are sources of genetic diversity needed for developing new cultivars. On the other hand, demand for medicinal plants can often only be met through extensive cultivation. Both wild harvesting and cultivation have social dimensions. Taken together, locally-based cultivation and wild harvesting can be effective means of providing income for the poorest sectors of society and contribute to social stability, while supporting conservation. A vast quantity of information on medicinal plants is available in publications and on the internet, but, unfortunately, very little of this serves conservation purposes, especially for managers, collectors and growers at field level. Many topics, important for conservation, are little covered, and the information is often unavailable, in practice, to those who might best benefit from it, or comes in unusable forms (Marshall, 1998; Srivastava, 2000).

2.6. Economic Aspects

Economic analyses have shown that medicinal plants have considerably contributed to economic welfare of categories of people by providing and generating reasonable income. They also contribute to household self-sufficiency in food security through accumulation of savings and minimization of risks. Traditional healers in rural areas seldom derive income from health care practices. However, their primary source of income of livelihood is farming. There are categories of people who depend on medicinal plants for their livelihoods. The first category is those who harvest, prepare the drugs and use to cure diseases or ailments for fees (referred to as the herbalists, fetish priests, etc.) who live in deprived communities (forest fringe communities) or where health facilities are non-existent or inadequate. The second group is those who trade in the raw medicinal plants materials but are not practitioners. These are the collectors who travel far and wide into the forest areas (both reserved and non-reserved areas) in search of medicinal plants to harvest for the market. They are predominantly the poor rural forest fringe community members. The third category is those who buy from the collectors and use the raw materials for herbal preparations for sale on the drug market. These people are the manufacturers who are resident in most cases in the urban areas. Managing the forest for medicinal plants in collaboration with the local communities is more sustainable from ecological and social perspectives. Conversion of wild-collection into cultivation without participation from the forest fringe communities may cause the traditional knowledge about medicinal plants to disappear, because the local population is often not involved in using their own natural resources any more and has to search for other occupations. The local populations have been collecting medicinal plants from the wild to support household incomes. Therefore, changing from wild collection to complete cultivation may take away a means of livelihood for the poorest members of society, often also contributing to a loss of social cohesion. Thus even if cultivation in some cases contributes to the conservation and sustainable use of medicinal plants it may well be unsustainable in socio-economic terms if the stakeholders are not part of the process. This conflict is what the proposal seeks to address.

From the categories outlined above, a cross section of the populace depends on medicinal plants for survival. From the wild prospectors through the local herbalists, the drug manufacturers and distributors to the consumers, there is a wide range of markets for the medicinal plants and their products. Some recommendations from the Commonwealth Medicinal Plants Forum for Commonwealth Africa held in Cape Town in 2000 were to ensure that:

1. *National and international regulations concerning the collection and export of "endangered" medicinal plants incorporate the views and opinions of all stakeholders prior to their implementation.*
2. *Lobby for changes in the regulatory environment which in many countries actively hinders the development of medicinal plant production, value addition and trade.*
3. *Find mechanisms to disseminate technical and economic information on the production and trade in medicinal plants both in Africa and to Africa from outside centres of herbal research and development.*
4. *Develop product specifications for key African medicines that are appropriate to different markets and end users.*
5. *Stimulate international trade by sensitizing the Afro-American and African emigrant populations living in Europe and USA as to the benefits and value of African products.*
6. *Promote a greater worldwide awareness of the rich heritage of African medicine and a greater respect for African based science and research into herbal drugs.*
7. *Encourage regional co-operation between producers and processors of medicinal plants in order to reap the benefits of economies of scale needed for value added activities.*
8. *Develop trade promotion programmes that help African producers and exporters raise their profile on international markets.*

Implementation of this project will mark the renaissance of medicinal plants networking among various stakeholders in Ghana in its trade (both local and international). This strategy may influence the policy direction of the government of Ghana so as to improve and secure the economic life of traditional medical practitioners. The existence of GHAFTRAM would therefore ensure effective and efficient networking among the various stakeholders and can be empowered to ensure sustainable supply and marketing of medicinal plants and products and influence policy decisions that will create a climate of political will for regulatory reform. The Government of Ghana recently supported a study by Forestry Research Institute of Ghana (FORIG) into the trends in supply and demand of medicinal plants and their products. The study indicated that there is increasing supply of medicinal plants mainly due to increased demand. There is a B. Sc degree course on herbal medicine introduced in Kwame Nkrumah University of Science and Technology (KNUST), College of Health Sciences that trains students in the practice of herbal medicines. These are as a result of increasing knowledge on the use and importance of most of these products for medicine and for food. Despite their high curative potentials, these products are inexpensive causing increased patronage for them particularly among the urban poor and causing a rise in the number of dealers in the trade. Demand is increasing for most medicinal plant species due to increased recognition of natural plant cure. However, over 100 species are reported to be in high demand but are scarce and unavailable or rare. Increasing forest depletion mainly by bush fires, agriculture and extraction of timber from the forest have caused populations of medicinal plants to decline. A further decline in the supply of most species is likely to occur and could lead to scarcity and associated high prices of these products. At the present rate of vegetation loss, most of the plant species may go into extinction, calling for cultivation of some species and conservation of marshy areas to sustain the trade. Lack of better preservation techniques during periods of abundance and to retain their value over time, i.e. prolong their shelf life is lacking. Extraction from mostly natural sources with very little conservation threatens the resource base to sustain the increasing demand and interests in herbal medicine. The local market is capable to consume any quantity of medicinal plants and products that will be available because more herbal drug manufacturers are being established. There is the opportunity to trade on the international market in medicinal plants and their products if there will be proper networking to add value to the medicinal plants as encouraged by the Commonwealth Medicinal Plants Forum for Commonwealth Africa.

2.7. Environmental Aspects

We do not anticipate any significant environmental problems but rather this proposal will assist in sustainable forest management and Ghana to meet the requirements of the Convention on Biological Diversity. The World Conference on Science (Budapest, 1999) recommended that scientific and traditional knowledge be integrated in interdisciplinary projects dealing with links between culture, environment and development in areas such as the conservation of biological diversity, management of natural resources, understanding of natural hazards and mitigation of their impact. Local communities and other relevant players should be involved in these projects.

2.8 Social aspects

Harvesting medicinal plants from the wild is generally difficult and time consuming, providing a supplementary income for rural people such as traditional healers, women, children and the retired – generally the poorest people in communities (Lange 1998). On the other hand, small-scale cultivation, often in multi-cropping systems, can be a means by which low-income families can boost their earnings. In Guatemala, the German Ministry for Economic Cooperation and Development (BMZ) has shown that medicinal plants can be integrated successfully into traditional farming systems with food-crops such as maize, beans and vegetables, and that they can provide a regular income (Eid 2000). Where harvesting is regulated by custom or law, wild-harvesting can be sustainable and of benefit to conservation, as well as maintaining sources of income for local people. At village level in many developing countries and more traditional societies, medicinal plants can provide some of the strongest links between people and nature. Maintaining such links through the sustainable management, harvesting and utilization of plant species can be a factor to ensure the continuation of those traditional cultural landscapes.

The conservation of vulnerable habitats and species by designation of parks or reserves can attract tourists and provide jobs to local people with few other opportunities for regular employment. Cultivation of medicinal plants will result in gains for conservation and social welfare, particularly in rural poor communities in Ghana. Lange (1998) emphasised that wild harvesting of MAPs provides cash income for the poorest sectors of society, especially in non-industrialised countries. However, prices paid to these people for the material collected are generally lower than for cultivated material. Wild-harvesters sometimes have the additional problem of little certainty that traders will return regularly to purchase their harvests.

The issue of landownership is very crucial in any attempt to manage the production and harvesting of medicinal plants. The usual practice of collection of wild plants has in most cases not been linked to

landownership in Ghana. However, with the growing commercialization of medicinal plants, landowners are beginning to restrict plant collectors from encroaching on their lands. Most people who do the collection are poor and have no land. The categories of identified landowners in Ghana include the chiefs, family heads, individuals and Forestry Commission (in the case of forest reserves). The project will consult the various landowners when necessary to secure lands on agreed terms so that both in-situ and ex-situ activities of plant conservation can be carried out without restraint. The strategy of rehabilitation of degraded habitats, establishing home gardens and introducing medicinal plants into farming systems by this project is a means to ensure that the conflict of ownership and the right to use are eliminated. However, there is the tendency of pilfering from the in-situ conservation especially by the wild plants collectors but this negative tendency may be reversed once conservation of the medicinal plants will be undertaken in protected areas within the landscapes of the communities.

2.9 Risks and related mitigating measures

The major risks likely to be associated with the medicinal plants cultivation (both in-situ and ex-situ conservation) methods are the inability or difficulty of producing planting materials from some of the plants species. In such cases, genetic engineering strategies for producing planting materials will be adopted after it is discovered. Another risk is the incidence of wild fires. The Ghana Fire Service is mandated to deal with fire and its outbreaks and will be encouraged to form Anti-Bush Fire Volunteer squads within members (herbalists) of the participating communities of this project and conduct training programmes on prevention, detection and field practical demonstrations on control of bush fires. The entire communities will benefit from these training programmes on the dangers and control of bush fires. Deforestation and urbanization are major sources of threats to plant availability to sustain the industry. Indiscriminate logging and farming including cultivation of swampy areas and other fragile ecosystems, over exploitation of certain plants may cause decline in the supply of some plants collected locally from the wild. An increase in demand arising from popularization of traditional medicines which are also cheaper and believed to be more effective in treating common ailments such as malaria and other fevers may lead to increased harvesting. Improper harvesting methods for the collection of plant parts particularly, tree barks and roots, may be challenges to this project. Only a few individuals are currently making some attempt to cultivate or retain some species on farms and gardens. Cultivation of endangered medicinal plant species will ensure their continued availability. The challenges above posed by the use of medicinal plants will be addressed by this project since it is in collaboration with the forest fringe communities. The training aspects of the project will address the vulnerability and the risks issues that the medicinal plants are exposed to especially in the areas of degradation of fragile ecosystems, unsustainable harvesting methods, over-exploitation, preservation and the cultivation strategies to respond to the market demands. The popularization of medicinal plants in the health care delivery system in Ghana will encourage many people especially the forest fringe communities to participate in this project. The issue of land tenure and the right of use will be resolved by partnership with landowners under this project coupled with policy reforms on the part of government as a result of formidable influences from medicinal plants network groups within the health sector. There is the opportunity for the participating communities to see this project as an opportunity to derive alternative livelihood incomes for associating with the medicinal plants for their own benefits aside their traditional farm incomes.

3. OUTPUTS

23. Specific Objective To document the distribution, utilization (endangered, common) and practice conservation methods for sustainable supply of medicinal plants from three different ecological zones in Ghana.

- Output 1** Medicinal plant species in different ecological zones identified.
- Output 2** Inventories of medicinal plant species in the three ecological zones in Ghana conducted and documented.
- Output 3** Herbarium samples collected and preserved.
- Output 4** Uses of identified medicinal plant species documented.
- Output 5** In-situ conservation of medicinal plant species achieved.
- Output 6** Ex-situ conservation of medicinal plant species achieved.
- Output 7** Communities trained in propagation, management and conservation measures.

4. ACTIVITIES

Output 1 Medicinal plant species in different ecological zones identified

Activity 1.1 Sites selection (districts and communities)

Activity 1.2 Selection of participating communities

Activity 1.3 Consultative meeting and interactions with the community members for briefing

Activity 1.4 Preparation of the RDA material

Activity 1.5 Conduction of RDA during the 2nd interaction with the participating communities.

Output 2 Inventories of medicinal plant species in the three ecological zones in Ghana conducted and documented

Activity 2.1 Reconnaissance visits to communities of the three ecological zones for project sensitization

Activity 2.2 Choice or selection of medicinal plants collectors, herbalists, etc for the inventory in each of the ecological zone

Activity 2.3 Field visits by scientists, collectors, herbalists, fetish priests, etc to plants habitats and species for identification and to record mode and frequency of harvesting.

Output 3 Herbarium Samples collected and preserved

Activity 3.1 Improve facilities and prepare FORIG's herbarium for samples storage

Activity 3.2 Field collection and handling of herbarium samples

Output 4 Uses of identified medicinal plant species documented

Activity 4.1 Consultative meetings with fringe communities on the uses of medicinal plant species

Activity 4.2 Validation of information gathered on uses of the same plant species.

Activity 4.3 Record the overlaps of uses of the same or different plant species.

Output 5 In-situ conservation of medicinal plant species achieved

Activity 5.1 Assess populations of medicinal plant species in specific habitats

Activity 5.2 Evaluate the causes of low populations in specific localities (by scientists, collectors, fetish priests, herbalists etc).

Activity 5.3 Designate and protect fragile habitats (Chiefs, landowners, Assembly members, etc)

Activity 5.4 Monitor regeneration and diversity (by scientists, collectors, fetish priests, herbalists, etc)

Activity 5.5 Monitor and evaluate growth in protected areas (by scientists, collectors, fetish priests, herbalists, chiefs, Assemblymen, etc).

Output 6: Ex-situ conservation of medicinal plant species achieved

Activity 6.1 Improve facilities in FORIG's permanent nursery at Fumesua

Activity 6.2 Prepare the nursery grounds to receive materials for propagation

Activity 6.3 Collection and handling of seeds and other propagation materials

Activity 6.4 Processing of propagation materials in the nursery

Activity 6.5 Care and maintenance of seedlings in the nursery

Activity 6.6 Inspect sites for home garden establishment in various communities

Activity 6.7 Assist participants with simple gardening tools

Activity 6.8 Assist communities to offer protection to home gardens

Activity 6.9 Monitoring and evaluation of established home gardens performance

Activity 6.10 Give incentives to better performing plantation in each community

Output 7 communities trained in propagation, management and conservation measures

Activity 7.1 Purchase materials for training manuals preparations

Activity 7.2 Prepare training manual for the *in-situ* conservation (regeneration and transplanting)

Activity 7.3 Prepare training manual for the *ex-situ* conservation (home gardening)

Activity 7.4 Prepare training manual for care and maintenance of the home gardens

Activity 7.5 Give training by scientists on nursery practices and management to collectors, herbalists, fetish priests, etc

Activity 7.6 Give training by scientists on effects of bad harvesting and over-exploitation to all stakeholders

Activity 7.7 Give training by scientists on biodiversity conservation to all stakeholders

Activity 7.8 Monitor, assess and evaluate training sessions by stakeholders

5. Logical Framework Matrix

PROJECT ELEMENTS	INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>DEVELOPMENT OBJECTIVE To develop conservation and sustainable utilization strategies for medicinal plant species within forest fringe communities of different ecological zones in Ghana</p>			
<p>SPECIFIC OBJECTIVE To document the distribution, utilization (endangered, common) and practice conservation methods for sustainable supply of medicinal plants from three different ecological zones in Ghana.</p>	Adoption of medicinal plants conservation measures by the herbalists, collectors of the forest fringe communities	Established medicinal plants home gardens reports,	No socio-cultural restrictions
<p>OUTPUT 1 Medicinal plant species in different ecological zones identified</p>	List of medicinal plant species available	Brochures, Published reports,	Co-operation between Collectors, herbalists, fetish priests and scientists
<p>OUTPUT 2 <i>Inventories of medicinal plant species in the three ecological zones in Ghana conducted and documented</i></p>	<i>List containing populations of medicinal plant species available</i>	<i>Stockings rates of medicinal plants species in published reports</i>	<i>Co-operation between all stakeholders</i>
<p>OUTPUT 3 Herbarium samples collected and preserved</p>	Herbarium specimen available for research and educational purposes	Publication on medicinal plants in the herbarium	Facilities at FORIG's herbarium is improved
<p>OUTPUT 4 <i>Uses of identified medicinal plant species documented</i></p>	<i>Publications on wider applications of medicinal plants</i>	<i>Published reports</i>	<i>Co-operation between all stakeholders</i>
<p>OUTPUT 5 <i>In-situ conservation of medicinal plant species achieved</i></p>	<i>Increased medicinal plant populations</i>	<i>Published reports</i>	<i>Co-operation between local fringe communities and scientists; Degraded and/or protected forests available</i>
<p>OUTPUT 6 Ex-situ conservation of medicinal plant species achieved</p>	Plantations of medicinal plants	Technical and scientific reports	Land is available for establishment
<p>Output 7 <i>Communities trained in management and conservation measures</i></p>	<i>Sustainable use of medicinal plant species in the project areas</i>	<i>Manuals, technical and scientific reports</i>	<i>Protected project sites, continuation of conservation after project life, training programmes practiced & observed</i>

6. Work plan

ACTIVITY	SCHEDULE															
	YEAR 1				YEAR 2				YEAR 3				YEAR 4			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Output 1 Medicinal plant species in different ecological zones identified																
Activity 1.1 Sites selection	x	x														
Activity 1.2 Selection of participating communities	x	x														
Activity 1.3 Consultative group meeting	x	x	x	x		x		x		x		x		x		x
Activity 1.4 Preparation of the RDA material	x	x														
Activity 1.5 Conduction of RDA	x	x	x	x		x					x				x	
Output 2 Inventories of medicinal plant species in the three ecological zones in Ghana conducted and documented																
Activity 2.1 Reconnaissance visits by project team for sensitization	x	x														
Activity 2.2 Choice or selection of collectors, fetish priests and/or herbalists for the inventory in each of the ecological zone	x	x														
Activity 2.3 Field visits to plants habitats and species identification and record mode and frequency of harvesting by scientists and collectors, herbalists, fetish priests, etc.		x	x	x	x	x	x		x		x		x		x	
Output 3 Herbarium samples collected and preserved																
Activity 3.1 Improve facilities and prepare FORIG's herbarium for samples storage	x	x														
Activity 3.2 Field collection and handling of herbarium samples			x	x	x	x	x		x		x		x		x	
Output 4 Uses of identified medicinal plant species documented																
Activity 4.1 Consultative meetings with community members (collectors, fetish priests, herbalists herbal drug manufacturers) on uses	x	x	x	x		x		x		x		x		x		x
Activity 4.2 Validation of information gathered on uses				x	x	x	x			x	x			x	x	
Activity 4.3 Record the overlaps				x		x		x		x		x		x	x	
Output 5 In-situ conservation of medicinal plant species achieved																
Activity 5.1 Assess populations in specific habitats				x			x				x				x	
Activity 5.2 Evaluate the causes of low populations in specific localities (by scientists, collectors, fetish priests, herbalists etc).					x		x				x					x
Activity 5.3 Designate and protect fragile habitats (Chiefs, landowners, Assembly members, etc)					x		x				x					
Activity 5.4 Monitor regeneration and diversity (by scientists, collectors, fetish priests, herbalists, etc)					x				x				x			
Activity 5.5 Monitor and evaluate growth in protected areas (by scientists, collectors, fetish priests, herbalists, chiefs, Assemblymen, etc)						x				x				x		

ACTIVITY	SCHEDULE															
	YEAR 1				YEAR 2				YEAR 3				YEAR 4			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Output 6 Ex-situ conservation of medicinal plant species achieved																
Activity 6.1 Improve facilities in FORIG's nursery	x	x														
Activity 6.2 Prepare the nursery grounds		x	x													
Activity 6.3 Collection and handling of seeds, etc			x	x	x											
Activity 6.4 Processing of propagation materials			x	x	x											
Activity 6.5 Care and maintenance of seedlings			x	x	x	x	x	x	x	x	x	x	x	x	x	x
Activity 6.6 Inspect sites for private nursery establishment				x	x											
Activity 6.7 Assist with simple gardening tools				x	x											
Activity 6.8 Assist to protect home gardens				x	x	x			x				x			
Activity 6.9 Monitor sites & established home gardens				x		x		x		x		x		x		
Activity 6.10 Monitor and evaluate established home gardens performance								x			x	x			x	x
Activity 6.11 Provide incentives				x	x				x				x			
Output 7 Communities trained in propagation, management and conservation measures																
Activity 7.1 Purchase items for training manual	x															
Activity 7.2 Prepare manual for the <i>in-situ</i> and Ex-situ conservation			x	x												
Activity 7.3 Prepare training manual for care and maintenance of the home gardens			x	x												
Activity 7.4 Prepare training manuals on harvesting techniques of both wild and home garden plants			x	x												
Activity 7.5 Give training by scientists on nursery practices and management to collectors, herbalists, fetish priests, etc				x	x	x										
Activity 7.6 Give training by scientists on effects of bad harvesting and over-exploitation to all stakeholders				x	x											
Activity 7.7 Give training by scientists on biodiversity conservation to all stakeholders				x	x											
Activity 7.8 Monitor, assess and evaluate training sessions by stakeholders						x	x				x				x	

7.0 BUDGET

7.1 PROJECT BUDGET BY ACTIVITY

Outputs and Activities	Inputs		Unit Costs	Man-Month	Quarter Year	Budget Component	Total Amt (\$)
	Units and Quality	No.					
Output 1 Medicinal plant species in different ecological zones identified							
Activity 1.1 Sites selection	(1) National expert	1	300	6	Q1, Q2-Y1	12	1,800
	(2) Socio-economists	1	200	6		17	1,200
	(3) Technicians	2	100	6		15	1,200
Activity 1.2 Selection of participating communities	(1) National expert	2	300	6	Q1,Q2-Y1	12	3,600
	(2) Socio-economists	1	200	6		17	1,200
	(3) Technicians	2	100	6		13	1,200
Activity 1.3 Consultative group meeting	(1) National expert	1	300	30	Q1, Q2, Q3, Q4-Y1, Q2, Q4-Y2, Q2, Q4-Y3, Q2, Q4-Y4	12	9,000
	(2) Socio-economists	1	200	30		17	6,000
	(3) Technicians	2	100	30		11	6,000
Activity 1.4 Preparation of the RDA material	(1) National experts	2	300	6	Q1,Q2-Y1	11	3,600
	(2) Socio-economists	1	200	6		12	1,200
	(2) Technicians	2	100	6		10	1,200
Activity 1.5 Conduction of RDA	(1) National expert	1	300	21	Q1, Q2, Q3, Q4-Y1, Q2, Q4-Y2, Q2, Q4-Y3, Q2, Q4-Y4	17	6,300
	(2) Socio-economists	1	200	21		18	4,200
	(3) Technicians	2	100	21		12	4,200
Output 2 Inventories of medicinal plant species in the three ecological zones in Ghana conducted and documented							
Activity 2.1 Reconnaissance visits for project sensitization	(1) National expert	1	300	6	Q1, Q2-Y1	12	1,800
	(2) Socio-economists	1	200	6		17	1,200
	(3) sociologist	1	200	6		15	1,200
	(4) Technicians	2	100	6		17	1,200
Activity 2.2 Choice or selection of collectors, fetish priests and/or herbalists for the inventory in each of the ecological zone	(1) National expert	1	300	6	Q1, Q2-Y1	12	1,800
	(2) Socio-economists	1	200	6		17	1,200
	(3) Sociologist	1	200	6		15	1,200
	(4) Technicians	2	100	6		18	1,200
Activity 2.3 Field visits to plants habitats and species identification and record mode and frequency of harvesting (Scientists, collectors, herbalists, fetish priests, etc).	(1) National Experts	1	300	27	Q3, Q4-Y1, Q1, Q2, Q3-Y2, Q1, Q3-Y3, Q1, Q3-Y4	12	8,100
	(2) Taxonomist (Botanist)	1	200	27		15	5,400
	(3) Technicians	2	100	27		17	5,400
	(4) Collectors, herbalists, etc	20	50	10		62	10,000
Output 3 Herbarium samples collected and preserved							
Activity 3.1 Improve facilities and prepare FORIG's herbarium for samples storage	(1) National expert	1	300	2	Q1,Q2-Y1	41	600
	(3) Herbarium Curator	1	200	2		51	400

Activity 3.2 Field collection and handling of herbarium samples	(1) National expert	2	300	9	Q1,Q2-Y1	12	5,400
	(2) Technicians	2	200	9		17	3,600
	(2) Herbarium Curator	1	200	9		18	1,800
Output 4 Uses of identified medicinal plant species documented							
activity 4.1 Consultative meetings with selected community members (herbalists, fetish priests, herbal drugs manufacturers, etc) on uses	(1) National expert	1	300	18	Q1, Q2, Q3, Q4-Y1, Q2, Q4-Y2, Q2, Q4-Y3, Q2, Q4-Y4	11	5,400
	(2) Sociologist	1	200	18		13	3,600
	(3) Socio-economist	1	200	18		17	3,600
	(4) Technicians	1	100	18		12	1,800
Activity 4.2 Validation of information gathered on uses	(1) National expert	1	300	2	Q4-Y1, Q1, Q2, Q3-Y2, Q2, Q3-Y3, Q2, Q3-Y4	11	600
	(2) Sociologist	1	200	2		13	400
Activity 4.3 Record the overlaps	(1) National expert	1	300	2	Q4-Y1, Q2, Q4-Y2, Q2, Q4-Y3, Q2, Q3-Y4	11	600
	(2) Sociologist	1	200	2		13	400
Output 5 In-situ conservation of medicinal plant species achieved							
Activity 5.1 Assess populations in specific habitats	(1) National expert	1	300	27	Q4-Y1, Q3-Y2, Q3-Y3, Q3-Y4	13	8,100
	(2) Technicians	2	200	27		11	10,800
	(3) Taxonomist	1	200	27		18	5,400
	(4) Community members (collectors, herbalists, fetish priests, etc)	20	50	10		61.1	10,000
Activity 5.2 Evaluate causes of low populations in specific localities	(1) National expert	1	300	12	Q1, Q4-Y2, Q4-Y3, Q4-Y4	18	3,600
	(2) Technicians	2	200	12		19	4,800
	(3) Community members (collectors, herbalists, fetish priests, etc)	20	50	10		62	10,000
Activity 5.3 Designate and protect fragile habitats	(1) National expert	1	300	9	Q1, Q4-Y2, Q4-Y3, Q4-Y4	11	2,700
	(2) Sociologist	1	200	9		13	1,800
	(3) Community members (chiefs, assembly men, etc)	10	50	3		63	1,500
Activity 5.4 Monitor regeneration and diversity in protected areas	(1) National expert	1	300	9	Q2-Y2, Q1-Y3, Q1-Y4	11	2,700
	(2) Technicians	2	200	9		13	3,600
	(3) Community members (collectors, herbalists, fetish priests, etc)	10	50	9		61	4,500
Output 6 Ex-situ conservation of medicinal plant species achieved							
Activity 6.1 Improve facilities in FORIG's nursery	(1) National expert	1	300	2	Q1, Q2-Y1	41	600
	(2) Technician	2	200	2		17	800
Activity 6.2 Prepare nursery grounds	(2) Technician	2	200	2	Q2, Q3-Y1	17	800
	(3) Casual labour	6	50	2		61	600

Activity 6.3 Collection & handling of seeds, propagating materials, etc.	(1) National expert	2	300	9	Q3, Q4-Y1, Q1-Y2	12	5,400
	(2) Technician	3	200	9		17	5,400
	(3) Casual Labour	3	50	9		64	1,350
Activity 6.4 Processing of propagation materials	(2) Technician	2	200	2	Q3, Q4-Y1, Q1-Y2	17	800
	(3) Casual labour	6	50	2		12	600
Activity 6.5 Care and maintenance of seedlings	(1) National expert	1	300	39	Q3, Q4-Y1, Y2, Y3, Y4	12	11,700
	(2) Technician	2	200	39		17	15,600
	(3) Casual labour	6	50	39		65	11,700
Output 7 Communities trained in propagation, management and conservation measures							
Activity 7.1 Purchase items for training manual	(1) National expert	1	300	1	Q3- Y1	51	300
	(2) Technician	1	200	1		52	200
Activity 7.2 Prepare manual for the <i>in-situ</i> and Ex-situ conservation	(1) National expert	1	300	1	Q1, Q2, - Y2	53	300
	(2) Technician	1	200	1		54	200
Activity 7.3 Prepare training manual on care maintenance of the home gardens	(1) National expert	1	300	1	Q3, Q4-Y1	55	300
	(2) Technician	1	200	1		56	200
Activity 7.4 Prepare training manuals on harvesting techniques of both wild and home garden plants	(1) National expert	1	300	1	Q4-Y1, Q2-Y2	57	600
	(2) Technician	1	200	1		58	400
Activity 7.5 Give training on nursery practices and management	(1) National expert	1	300	4	Q2, Q3, Q4-Y1, Q1, Q2-Y2	12	1,200
	(2) Technician	1	200	4		17	800
	(3) Community members (collectors, herbalists, fetish priests, etc)	30	50	1		61.2	1,500
Activity 7.6 Give training on effects of bad harvesting and over-exploitation	(1) National expert	1	300	4	Q4-Y1, Q1-Y2	17	1,200
	(2) Technician	1	200	4		14	800
	(3) Community members (collectors, herbalists, fetish priests, etc)	30	50	1		61.3	1,500
Activity 7.7 Give training on biodiversity conservation	(1) National expert	1	300	4	Q3, Q4-Y1, Q1-Y2	17	1,200
	(2) Technician	1	200	4		14	800
	(3) Community members (collectors, herbalists, fetish priests, etc)	30	50	1		61.4	1,500
Activity 7.8 Monitor, assess and evaluate training sessions	(1) National expert	1	300	2	Q2, Q3-Y2, Q3-Y3, Q3-Y4	19	600
	(2) Technician	1	200	2		17	400
	(3) Community members (collectors, herbalists, fetish priests, etc)	30	50	1		61.5	1,500
Total (Activities) = 258,650							
Field supplies						51	2,000
Nursery supplies and management						52	6,000
Herbarium supplies and management						53	2,000
Vehicle						41	26,000
Vehicle maintenance						54	8,500
Fuel/lubricants						55	13,750

DSA						31	4,000	
PhD Research Assistantship						16	14,250	
To attend Professional meetings						35	9,000	
Computer & Accessories						42	3,200	
Office supplies						56	4,000	
Steering committee meetings						61	6,000	
Total (Non-activity related) = 98,700								
ITTO Monitoring and Evaluation								
<i>ITTO Monitoring costs</i>						81	40,000.0	
<i>Programme support costs @ 8%</i>						82	31,788.0	
Grand Total						99	429,138.0	

7.2 OVERALL BUDGET BY ACTIVITY BY SOURCE

OUTPUTS/ ACTIVITIES + Non-Activity Based Expenses	10. Project Personnel	30. Duty Travel	40. Capital Items	50. Consumable Items	60. Miscellaneous	70. Administration (EA)	ITTO M & E	Grand Total
Output 1 Medicinal plant species in different ecological zones identified								
Activity 1.1 Sites selection	3,450	250			500			4,200
Activity 1.2 Selection of participating communities	4,000	1,000			1,000			6,000
Activity 1.3 Consultative group meeting	14,000	1,000		2,000	4,000			21,000
Activity 1.4 Preparation of the RDA material	2,500			2,000	1,500			6,000
Activity 1.5 Conduction of RDA	5,700	500		2,000	6,000	500		14,700
Subtotal 1	29,650	2,750		6,000	13,000	500		51,900
Output 2 Inventories of medicinal plant species in the three ecological zones in Ghana conducted and documented								
Activity 2.1 Reconnaissance visits for project sensitization	3,450	500	550	400	500			5,400
Activity 2.2 Choice or selection of collectors, fetish priests and/or herbalists for the inventory in each of the ecological zone	3,450	1,000		500	450			5,400
Activity 2.3 Field visits to plants habitats and species identification and record mode and frequency of harvesting.	20,000	2,150	1,300	3,400	2,050			28,900
Subtotal 2	26,900	3,650	1,850	4,300	3,000			39,700
Output 3 Herbarium samples collected and preserved								
Activity 3.1 Improve facilities and prepare FORIG's herbarium for samples storage			600	200	200			1,000
Activity 3.2 Field collection and handling of herbarium samples	4,000	1,250		2,150	3,400			10,800
Subtotal 3	4,000	1,250	600	2,350	3,600			11,800
Output 4 Uses of identified medicinal plant species documented								
activity 4.1 Consultative meetings with community members on uses	2,000	1,000		5,000	4,900	1,500		14,400
Activity 4.2 Validation of information gathered on uses	1,000							1,000
Activity 4.3 Record the overlaps	1,000							1,000
Subtotal 4	4,000	1,000		5,000	4,900	1,500		16,400
Output 5 In-situ conservation of medicinal plant species achieved								
Activity 5.1 Assess populations in specific habitats	12,000	3,150		8,500	8,500	2,150		34,300
Activity 5.2 Evaluate causes of low populations in specific localities	6,000	2,000		4,500	5,500	400		18,400
Activity 5.3 Designate and protect fragile habitats	2,500	500	500	500	500			4,500
Activity 5.4 Monitor regeneration and diversity	4,000	1,800		2,000	3,000			10,800
Subtotal 5	24,500	7,450	500	15,500	17,500	1,350		68,000
Output 6 Ex-situ conservation of medicinal plant species achieved								
Activity 6.1 Improve facilities in FORIG's nursery			800	600				1,400
Activity 6.2 Prepare nursery grounds				600	800			1,400
Activity 6.3 Collection & handling of seeds, propagating	3,700	1,000		3,500	3,950			12,150

materials, etc.								
Activity 6.4 Processing of propagation materials				400	1,000			1,400
Activity 6.5 Care and maintenance of seedlings	15,400		1,000	2,000	20,600			39,000
Subtotal 6	19,100	1,000	1,800	7,100	26,350			55,350
Output 7 Communities trained in propagation, management and conservation measures								
Activity 7.1 Purchase items for training manual					500			500
Activity 7.2 Prepare manual for the <i>in-situ</i> and Ex-situ conservation				300	200			500
Activity 7.3 Prepare training manual on care maintenance of the home gardens				300	200			500
Activity 7.4 Prepare training manuals on harvesting techniques of both wild and home garden plants				500	500			1,000
Activity 7.5 Give training on nursery practices and management	1,300	500		500	1,000	200		3,500
Activity 7.6 Give training on effects of bad harvesting and over-exploitation	1,300	500		500	1,000	200		3,500
Activity 7.7 Give training on biodiversity conservation	1,300	500		500	1,000	200		3,500
Activity 7.8 Monitor, assess and evaluate training sessions	1,300	200		400	600			2,500
Subtotal 7	5,200	1,700		3,000	5,000	600		15,500
								Grand sub-total = 285,650
Field supplies				2,000				2,000
Nursery supplies and management			3,000	3,000				6,000
Herbarium supplies and management			1,200	800				2,000
Vehicle			26,000					26,000
Vehicle maintenance				8,500				8,500
Fuel/lubricants				13,750				13,750
DSA	4,000							4,000
PhD Research Assistantship	14,250							14,250
To attend Professional meetings (National experts)		9,000						9,000
Computer & Accessories			3,200					3,200
Office supplies				4,000				4,000
Steering committee meetings					6,000			6,000
Subtotal 8	18,250	9,000	33,400	32,050	6,000		Total (Non-activity related) = 98,700	
ITTO Monitoring and Evaluation (M & E)								
<i>ITTO Monitoring Costs</i>							40,000.0	40,000.0
<i>Programme support costs @ 8%</i>							31,788.0	31,788.0
Grand Total								429,138.0

7.3 CONSOLIDATED TOTAL PROJECT BUDGET BY SOURCE: ITTO AND GHANA GOV'T

		Unit cost	Qty	Unit	TOTAL	ITTO	GHANA
10. Project Personnel							
National Experts							
11	Prin. Investigator	1,000	48	Man-month	48,000	19,400	28,600
12	Management Specialist	1,000	48	Man-month	48,000	19,400	28,600
13	Sociologist	1,000	31	Man-month	31,000	14,402	16,598
14	Socio-economist	1,000	24	Man-month	24,000	12,000	12,000
Training (PhD)							
15	Graduate Assistantship	14,250	6	Man-month	14,250	14,250	
16	Technicians	200	48	Man-month	9,600	9,600	
17	Casual labour	100	390	Man-month	39,000	39,000	
18.1	Community members	50	841	Man-month	42,050	42,050	
18.2	Herbarium curator	200	48	Man-month	9,600	9,600	
19	Component Total				265,500	179,702	
30. Duty travel							
31	DSA				4,000	4,000	
32	Vehicle maintenance				8,500	8,500	
33	Fuel and lubricants				13,750	13,750	
34	Professional meetings				9,000	9,000	
39	Component Total				35,250	35,250	
40. Capital Items							
41	Vehicle				26,000	26,000	
42	Computer & Accessories				3,200	3,200	
43	Field supplies				2,000	2,000	
43	Nursery supplies				3,000	3,000	
44	Herbarium supplies				600	600	
49	Component total				34,800	34,800	
50. Consumables Items							
51	Office supplies				4,000	4,000	
52	Community Field supplies				36,498	36,498	
53	Nursery Management				12,000	12,000	
54	Incentives for communities				46,100	46,100	
55	Herbarium management				3,000	3,000	
59	Component Total				101,598	101,598	
60. Miscellaneous							
61	Steering Comm. Mtgs.				6,000	6,000	
69	Component total				6,000	6,000	
70. Executing Agencies' Management Costs							
71	Contingency (5%)				22,157.4		22,157.4
79	Component Total				22,157.4		22,157.4
80. ITTO Monitoring & Evaluation							
81	Monitoring costs				40,000.0	40,000.0	
82	Progr. Support costs (8%)				31,788.0	31,788.0	
89	Component total				71,788.0	71,788.0	
99	Grand total				537,093.4	429,138.0	107,955.4

7. 4 YEARLY PROJECT BUDGET BY SOURCE - ITTO

		TOTAL	YEAR 1	YEAR 2	YEAR 3	YEAR 4
10. Project personnel						
National Experts						
11	Prin. Investigator	19,400	4,850	4,850	4,850	4,850
12	Management Specialist	19,400	4,850	4,850	4,850	4,850
13	Sociologist	14,402	3,601	3,601	3,601	3,601
14	Socio-Economist	12,000	3,000	3,000	3,000	3,000
Training (PhD)						
15	Graduate Assistantship	14,250	14,250			
Other Labour						
16	Technicians	9,600	2,400	2,400	2,400	2,400
17	Casual labour	39,000	9,750	9,750	9,750	9,750
18.1	Community members	42,050	10,512.5	10,512.5	10,512.5	10,512.5
18.2	Herbarium curator	9,600	2,400	2,400	2,400	2,400
19	Component Total	179,702	55,613	41,363	41,363	41,363
30. Duty Travel						
31	DSA	4,000	2,000	1,000	500	500
32	Vehicle maintenance	8,500	2,300	2,200	2,000	2,000
33	Fuel and lubricants	13,750	5,000	4,000	3,000	1,750
34	Professional meetings	9,000			4,500	4,500
39	Component Total	35,250	9,300	7,200	10,000	8,750
40. Capital Items						
41	Vehicle	26,000	26,000			
42	Computer & Accessories	3,200	3,200			
43	Field supplies	2,000	2,000			
44	Nursery supplies	3,000	3,000			
45	Herbarium supplies	600	600			
49	Component total	34,800	34,800			
50. Consumables						
51	Office supplies	4,000	1,000	1,000	1,000	1,000
52	Community Field supplies	36,498	18,249	9,124.5	9,124.5	
53	Nursery Management.	12,000	6,000	2,000	2,000	2,000
54	Herbarium Mgt	3,000	1,000	700	700	600
55	Incentives for community members	46,100	11,525	11,525	11,525	11,525
59	Component Total	101,598	37,774	24,350.5	24,350.5	15,125
60. Miscellaneous						
61	Steering Comm. Mtgs.	6,000	1,500	1,500	1,500	1,500
69	Component total	6,000	1,500	1,500	1,500	1,500
70. E/A Mgmt Costs						
71	Contingency (5%)	0				
79	Component Total	0				
80. ITTO M & E						
81	Monitoring costs	40,000.0	10,000.0	10,000.0	10,000.0	10,000.0
82	Prog. Support costs (8%)	31,788.0				
89	Component total	71,788.0				
99	Grand total	429,138.0	166,934.0	102,359.5	105,159.5	94,685.0

7.5 YEARLY PROJECT BUDGET BY SOURCE - GHANA GOV'T

	Source	Year 1	Year 2	Year 3	Year 4	Total
10. Project Personnel	Ghana Gov't	26,988.9	26,988.9	26,988.9	26,988.9	107955.4
30. Duty travel		-	-	-	-	-
40. Capital items		-	-	-	-	-
50. Consumable items		-	-	-	-	-
60. Miscellaneous		-	-	-	-	-
70. E/A Mgmt costs		-	-	-	-	-
80. ITTO M & E		-	-	-	-	-
99. Total		26,988.9	26,988.9	26,988.9	26,988.9	107955.4

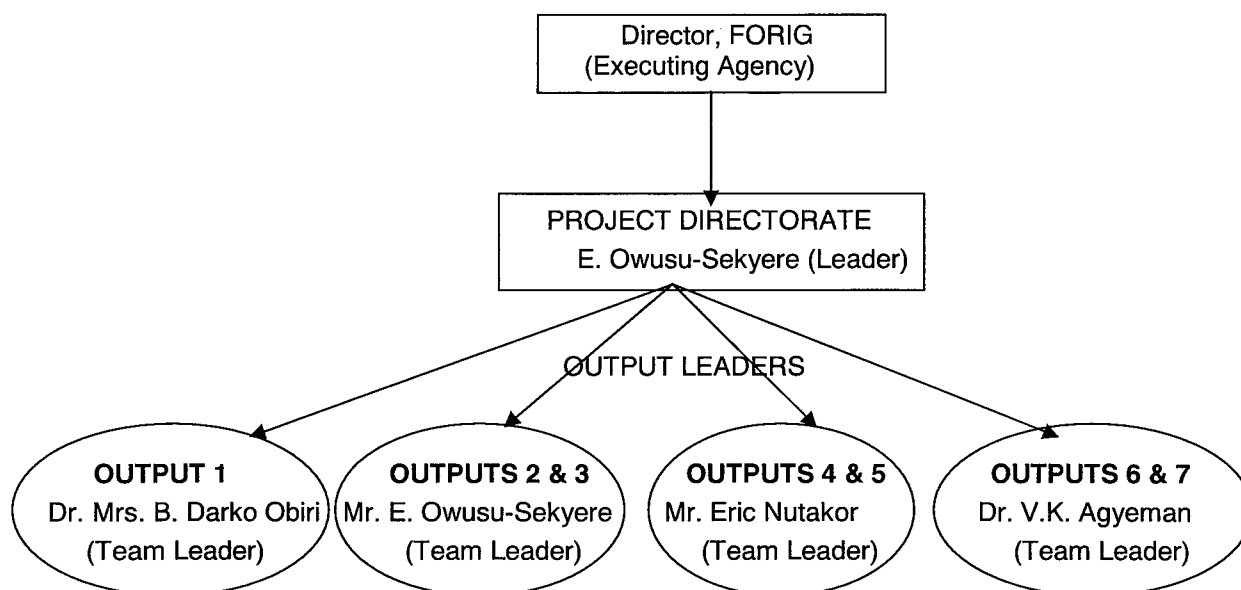
7.6 ANNUAL DISBURSEMENTS

Executing Agency	Year 1	Year 2	Year 3	Year 4	TOTAL
<i>FORIG</i>	<i>156,934.0</i>	<i>92,359.5</i>	<i>95,159.5</i>	<i>84,685.0</i>	<i>429,138.0</i>
<i>ITTO M & E</i>	<i>10,000.0</i>	<i>10,000.0</i>	<i>10,000.0</i>	<i>10,000.0</i>	<i>40,000.0</i>
Grand Total	166,934.0	102,359.5	105,159.5	94,685.0	469,138.0

PART III OPERATIONAL ARRANGEMENTS

1. Management Structure

Organization chart, Co-ordination and Integration of Activities



The Project Directorate will meet monthly, while the whole project team will meet quarterly to review project progress.

Key project staff and their responsibilities

Personnel	Institution	Responsibility
1. Ebenezer Owusu-Sekyere Project leader (PI)	FORIG*	-Responsible for inventory of medicinal plant species in the three ecological zones and supervise the preservation of herbarium specimen samples -Responsible for managing and coordinating all project activities, including preparations/submission of reports to ITTO. -Responsible for documentation on medicinal plant species. -Responsible for information and documentation on uses of medicinal plants.
2. Victor K. Agyeman Management Specialist	FORIG	-Responsible for establishment of medicinal plants in home gardens. -Responsible for training programmes on conservation of medicinal plant species.
3. Eric Nutakor (Sociologist)	FORIG	-Responsible for socio-cultural attitude on medicinal plant species. - Will play a key role in designating areas for in-situ conservation.
4. BEATRICE OBIRI-DARKO (Socio-Economist)	FORIG	Will be responsible for socio-economic impressions and evaluations on medicinal plants.

* FORIG: Forestry Research Institute of Ghana, Kumasi, Ghana

2. Monitoring, Reporting and Evaluation

2.1 Monitoring

The project will be subjected to annual monitoring by representatives of ITTO. The first monitoring mission will visit FORIG and the project locations approximately 12 months of the project start-up, on a date to be determined jointly between ITTO and the project management. Subsequent monitoring visits will be determined after the first visit. Project Progress Reports would be presented to the ITTO two months before Council Session meetings. The presentation of Project Technical Reports would occur whenever relevant technical results are foreseen. FORIG has qualified Account Staff who will handle the finances of the project and the oversight responsibility will be the Director of the Institute for successful implementation of the project.

2.2 Reporting

Project progress reports will be completed and submitted to ITTO at least four weeks before ITTO monitoring visits, and six weeks before ITTC sessions. The first progress report shall be prepared and submitted to ITTO not later than 12 months after the commencement of the project. Other reports will be prepared and submitted upon request by ITTO.

2.3 Evaluation

Visible impact of the project will be observed at end of the project, hence ex-post evaluation is recommended.

2.4 Future Operations and Maintenance

- a) Monitor and assess progress of established home gardens
- b) Continue to educate forest fringe communities on biodiversity conservation
- c) Encourage and assist the communities to sustain the establish plantations of medicinal plants.

Funding for a possible follow-up project will be sought from the government of Ghana, ITTO or other funding agencies.

PART IV: TROPICAL TIMBER FRAMEWORK

1. Compliance with ITTO 1994 Objectives

While the project is related to many of the ITTO objectives it relates directly to the following:

- To contribute to the process of sustainable development;
- To enhance the capacity of members to implement a strategy for achieving sustainable harvesting and utilization of medicinal plants of which timber species are included.
- To promote and support research and development with a view to improving forest management and efficiency of utilization as well as increasing the capacity to conserve and enhance other forest values of medicinal plants in producing tropical forests;
- To encourage members to support and develop NTFPs like the medicinal plants reforestation and forest management activities as well as rehabilitation of degraded forest land, with due regard for the interests of local communities dependent on forest resources.

2. Compliance with ITTO Action Plan

- Support activities to secure the tropical timber resource base
- Assess opportunities for, and promote development of, non-timber forest products and forest services which can improve the economic attractiveness of maintaining the forest resource base.
- Assess the current and potential productivity of major tropical forest types, taking into account the need to promote future growth and effective regeneration;
- Land use planning which defines forests appropriate for production and provides sufficient representation through protected, reserved and conservation areas to ensure biodiversity
- Incorporate operational knowledge of forest ecosystem behaviour in planning and management prescriptions.
- Develop and promote the implementation of guidelines for the management of tropical forests, the restoration of degraded tropical forests and the rehabilitation of degraded forest land.
- Improve the productive capacity of natural forests, where appropriate, through intensified silvicultural practices, better utilization of medicinal plant species, the promotion of non-timber forest products, guided natural regeneration, enrichment planting and reforestation;
- Strengthen and intensify training of forest fringe communities and other stakeholders in management of medicinal plant species and in the management of both natural forests and plantations.

The above ITTO objectives and goals are met specifically as follows:

1. Sustainable forest management: The in-situ methods of conservation of the medicinal plant species including protection of fragile ecosystem to be developed by this proposal will ensure rapid regeneration and growth and increase diversity of species recruitment. Since medicinal plants could be either timber and/or non-timber forest resource, they could be harvested when appropriate collection methods, training in handling and maintenance of this important resource coupled with protection mechanisms put in place in collaboration with the forest fringe communities, continuous supply sources will be guaranteed. Thus, the forests through these management options will offer sustainable supply of medicinal plants to satisfy the diverse interests (various stakeholders) in medicinal plants. The home garden plantation system combines planting tree species, shrubs and other plant species of medicinal value in a manner that mimics the natural forest, providing various intermediary products as well as timber for landowners. The inclusion of several high-value species in the matrix of relatively low risk but valuable species in the plantations will ensure sustainable supply of highly diverse tropical forest resources for future generations. Our ability to demonstrate that protection of fragile ecosystems will protect high risk species from extinction. The establishment of home gardens and their management targeted to the forest fringe communities will reduce the pressure of over-exploitation of medicinal plant species from the natural forests.
2. Biodiversity conservation and enhancement of Ecological Stability: The relatively high diversity of medicinal plant species (including timber trees, shrubs and other plant species) to be planted or regenerated, together with training and protection by the local forest dependent communities will lead to the conservation of the genetic, structural and functional diversity of the selected ecological zones in Ghana.
3. Institutional strengthening and capacity building: The project will strengthen the capacity of the Forestry Research Institute of Ghana to develop its human resource and broaden its research base. Mr. Ebenezer Owusu-Sekyere, a staff of FORIG and currently completing PhD at Tottori University in Japan will be the lead scientist and will be supported by Drs. V.K. Agyeman, Mrs. Beatrice Darko Obiri and Mr. Eric Nutakor all of FORIG.

ANNEXES

A

1. Profile of the Executing Agency

The Forestry Research Institute of Ghana (FORIG), which is the Executing Agency, is responsible for undertaking forestry research and is the principal centre for all forestry research in Ghana. The institute has excellent facilities and a good crop of research scientists who would be capable of implementing project activities.

The mission of FORIG which is a forestry research institute and which is the executing agency is to conduct use focused research that generates scientific knowledge and appropriate technologies which enhance the sustainable development, conservation, and efficient utilisation of Ghana's forest resources; also disseminate the information for the improvement of social, economic and environmental well being of the people of Ghana.

COMPLETED AND ON-GOING ITTO ASSISTED PROJECTS

PROJECT TITLE	YEAR STARTED	COMP. DATE	BUDGET TOTAL	COLL. INST.	PROJECT LEADER	TRAIN COMP.	EQUIPMENT
Iroko Project	1999	2002	\$287,000	SFIT, Zurich	Dr. Cobbinah	Graduate	Vehicle Bio-tech Lab.
ITTO PD 4/98 Rev. 1 (F)	1999	2004	\$428,006	Aberdeen Univ.	Dr. Agyeman	Graduate	Vehicle Shade House
Rehab. of degraded forests	2000	2005	\$272,000	IRNR, KNUST	Dr. Blay	-	Vehicle
Alternative Mixed Plantation	2004	2008	\$ 301,750	NAU, USA	Dr. Paul Bosu	Graduate	Vehicle

2. Infrastructure of the executing agency

The Institute's permanent offices and laboratories are located at Fumesua, near Kumasi. In addition, FORIG has research centres in other ecological zones namely Mesewam, Bobiri, Amantia (Moist, Semi-Deciduous Forest), Benso (Wet Evergreen) and Bolgatanga (Savannah Zone). The laboratories of the Institute have a wide range of equipment for research and development, including herbarium, permanent nursery and a biotechnology laboratory. The institute's library facilities are quite good with a fair number of reference materials.

Budget for Years 2000 - 2002

BUDGET ITEM	YEAR		
	2000 (US\$)	2001 (US\$)	2002 (US\$)
Personal Emoluments	326,901	394,766	465,733
Administrative Activity Expenses	36,271	22,102	31,627
Service Activity Expenses	10,770	6,563	19,288
Investment Activity Expenses	26,769	-	7,962
TOTAL	400,711	423,431	524,610

1 US\$ = ₵6,500 in 2000, 1US\$ 7,200 in 2001 and 1US\$=7,600 in 2002

3. Personnel***Research Grade Staff***

Quantitative experts with post-graduation degrees	-	29
Quantitative experts with graduation degrees	-	9
Quantitative of middle level technicians	-	33
Quantitative of administrative personnel	-	21
Supporting Staff	-	<u>184</u>
TOTAL NUMBER OF FORIG PERSONNEL	-	<u>276</u>

B. CURRICULUM VITAE

1. EBENEZER OWUSU-SEKYERE

Address: Forestry Research Institute of Ghana (FORIG), Up Box 63, KNUST Kumasi Ghana

Education: B.Sc. (Hons.), Natural Resources Management, 1989.
M.Sc. Agroforestry, 1995. University of Science and Technology (UST), Kumasi, Ghana.

Career/experience: 1995-present Research Scientist (currently, completing PhD dissertation at United Graduate School of Agricultural Sciences, Tottori University, Japan).

RELEVANT WORK DONE: Team Leader: Impact of Changing Land Cover on the Production and Ecological Functions of Inland Valleys in West Africa (VINVAL) Project: EU-INCO-DEV Contract ICA4-CT-2001 – 2005.

Team leader: Woodlot/fuel wood establishment on degraded agricultural lands using fast growing trees component of the AGSSIP Agroforestry under Natural Resource Management Programme from 2002-date.

Team leader: Development of methods for establishment of timber species on croplands component of the AGSSIP Agroforestry under Natural Resource Management Programme from 2002-date.

Forestry Team Leader: Inland Valley Consortium (IVC), Collaborative Project with CRI, SRI, WRI and FORIG. 2004 – Date.

PROJECT DUTIES: Responsible for documentation on medicinal plant species, information and documentation on uses of medicinal plants under activities of Outputs 2 and 3. Responsible for managing and coordinating all project activities, including preparations and submission of reports to ITTO.

2. VICTOR KWAME AGYEMAN

EDUCATION: PhD 1994(Forestry), University of Aberdeen, U.K.

M.Phil. (Forest Management) 1990. University of Science and Technology, Ghana.

B.Sc. (Hons) Natural Resources Management, 1985. University of Science & Technology, Ghana.

Career/experience: Research Scientist, FORIG, 1990-1996, Senior Research Scientist FORIG, 1996 to date.

RELEVANT WORK DONE: Project leader for ITTO PD 4/98 Rev. 1 (F). Part of Project Implementation Team of NRMP Programme supported by the World Bank and Ghana Government

PROJECT DUTIES: Project leader and also responsible for Output 6 and 7 - establishment of medicinal plants in home gardens and training programmes on conservation activities of the study.

3. BEATRICE DARKO OBIRI (MRS)

- Education:** Ph.D. (Socio-Economics) University of Wales, Bangor, UK, 2004.
 MSc. (Agroforestry) Aberdeen University, Scotland, UK, 1995.
 B.Sc. (Hons) Agricultural Economics. KNUST, 1992, Kumasi, Ghana.
- Career/experience:** Research Scientist (Socio-Economics). FORIG. 1997-date.
- RELEVANT WORK DONE:** Socio-Economic impacts of timber industry, Rattan and Bamboo research and issues related gender and rural forestry.
 Ethnobotanical survey of some economic plants on the Kumasi Central Market, Ashanti Region-Ghana.
 Development of mixed farm plantations with communities in the Bobiri Forest Reserve area-Ashanti Region (ITTO, PD256/03 Rev. 1 (F))
- PROJECT DUTIES:** Will be responsible for socio-economic impressions and evaluations on medicinal plants under activities of Output 1 of the study.

4. ERIC ELIKE NUTAKOR

- Education:** M.Phil. Silviculture and forest Management KNUST, 2006.
 B.A. (Hons.) Social Sciences, 1987, University of Science and technology, Kumasi: (Law, Geography, Sociology)
- Career/experience:** Assistant Research Scientist (Social Scientist), Forestry Research Institute of Ghana 1995-2005
 Research Scientist (Social Scientist), Forestry Research Institute of Ghana March 2005-date
- RELEVANT WORK DONE:** Tree Management Systems in Ghana. ITTO Project PD 41/95:
 Piloting Collaborative Forest Management Systems in Ghana. FORIG/ PB-FD, Kumasi.
 Chain Saw Lumber Milling and trade in West Africa DFID/FORIG
- PROJECT DUTIES:** Will be responsible for socio-cultural attitude on medicinal plant species and will play a key role in designating areas for in-situ conservation under activities of outputs 4 and 5 of the study.

ANNEX C

Modification table of the 33rd Expert Panel

No.	Recommendations by 33 rd Expert Panel	Action Taken
1	Improve ex-situ conservation in relation to SFM requirements under project strategy	<i>Ex-situ conservation in relation to SFM requirements improved and italicised in text (pages 11 and 12).</i>
2	Describe market opportunities and challenges with sale of medicinal plants under economic aspects	<i>Market opportunities and challenges described under economic aspects and italicised in the text (pages 14 and 15).</i>
3	Clarify problem of ownership for local communities for ex-and in-situ conservation under social aspects.	<i>Problem of ownership for ex-situ and in-situ conservation clarified under social aspects and italicised in the text (pages 15 and 16).</i>
4	Develop separate section 2.9 on risks and related mitigating measures.	<i>Section 2.9 Risks and related mitigating measures developed and italicised in the text (page 16).</i>
5	Improve logical framework matrix for outputs 2, 4, 5 and 7.	<i>Outputs 2, 4, 5 and 7 in logical framework matrix improved and italicised in the text (page 18).</i>
6	Revise budget Sub-component 81, 82 and total ITTO project costs.	<p>a) <i>Budget Sub-component 81 revised based on US10, 000.00 per year for the monitoring and evaluation costs totalling US40, 000.00 for the 4-year project and italicised throughout the budgets for only the ITTO Monitoring and Programme support costs in the text (Pages 24, 26, 27, 28 and 29).</i></p> <p>b) <i>The programme support costs (Sub-component 82) adjusted based on Sub-component 81 and the standard rate of 8% of the total ITTO project budget costs accordingly and italicised in all the budgets for only the ITTO Monitoring and Programme support costs in the text (Pages 24, 26, 27, 28 and 29).</i></p>
7	Include annex of recommendations of the 33 rd Expert Panel.	<i>Annex of recommendations from the 33rd Expert Panel included and respective modifications directed and italicised in various sections of the main project proposal document. A copy of the recommendations from the 33rd Expert Panel is attached as ANNEX D. (Page 38).</i>

ANNEX D Recommendations of the 33rd Expert Panel

PD 424/06 Rev.1 (F) Conservation and Utilization of Medicinal Plants in Ghanaian Forest
Fringe Communities (Ghana)

Assessment by the Thirty-third Panel

A) Overall Assessment

The Panel noted that most of the specific recommendations made by the 32nd Expert Panel meeting had been addressed. However, the Panel also noted that some minor weaknesses remained in the revised version of the project proposal for the following sections and sub-sections: project strategy on ex-situ conservation, economic aspects, social aspects, risks, logical framework matrix and budget.

B) Specific Recommendations

The proposal should be revised taking into account the overall assessment and the following:

1. Improve the sub-section under the project strategy, regarding the ex-situ conservation, by adding relevant information showing the relation to SFM requirements;
2. More fully describe, under economic aspects, the market opportunities and challenges associated with the sale of medicinal plant products;
3. Clarify, under social aspects, the problem of ownership for local communities involved in the project implementation regarding ex-situ and in-situ conservation activities;
4. Develop a separate Section 2.9 on risks and related mitigating measures;
5. Improve the logical framework matrix with relevant Indicators for Outputs 2, 4, 5 and 7, and also with important assumptions in relation to the risks presented under Section 2.9;
6. Revise the budget as follows:
 - a) Adjust the budget Sub-component 81 to the standard rate of US\$10,000.00 per year for the monitoring and evaluation costs (US\$40,000 for a 4-year project), and
 - b) Recalculate the ITTO programme support costs (Sub-component 82) specified in the budget so as to conform with new standard rate of 8% of the total ITTO project costs, as decided by the 35th ITTC (see the model budget table on page 27 in the *ITTO Manual for Project Formulation*); and
7. Include an Annex that shows the recommendations of the 33rd Expert Panel and respective modifications in tabular form. Modifications should also be highlighted in the text.

C) Conclusion

Category: 1 (New system) The Panel concluded that the project proposal could be commended to the Committee with incorporation of amendments.