

Sarfo-Mensah, Paul; Oduro, W.

Working Paper

Traditional Natural Resources Management Practices and Biodiversity Conservation in Ghana: A Review of Local Concepts and Issues on Change and Sustainability

Nota di Lavoro, No. 90.2007

Provided in Cooperation with:

Fondazione Eni Enrico Mattei (FEEM)

Suggested Citation: Sarfo-Mensah, Paul; Oduro, W. (2007) : Traditional Natural Resources Management Practices and Biodiversity Conservation in Ghana: A Review of Local Concepts and Issues on Change and Sustainability, Nota di Lavoro, No. 90.2007, Fondazione Eni Enrico Mattei (FEEM), Milano

This Version is available at:

<https://hdl.handle.net/10419/74206>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

**Traditional Natural Resources
Management Practices and
Biodiversity Conservation in
Ghana: A Review of Local Concepts
and Issues on Change and
Sustainability**

P. Sarfo-Mensah and W. Oduro
NOTA DI LAVORO 90.2007

SEPTEMBER 2007

NRM – Natural Resources Management

Sarfo-Mensah, P. *Bureau of Integrated Rural Development, College of Agriculture and Natural Resources (CANR), Kwame Nkrumah University of Science and Technology (KNUST), Kumasi, Ghana*

Oduro, W. *Wildlife and Range Management, Faculty of Renewable Natural Resources, CANR, KNUST, Ghana*

This paper can be downloaded without charge at:

The Fondazione Eni Enrico Mattei Note di Lavoro Series Index:
<http://www.feem.it/Feem/Pub/Publications/WPapers/default.htm>

Social Science Research Network Electronic Paper Collection:
<http://ssrn.com/abstract=1017238>

The opinions expressed in this paper do not necessarily reflect the position of
Fondazione Eni Enrico Mattei
Corso Magenta, 63, 20123 Milano (I), web site: www.feem.it, e-mail: working.papers@feem.it

Traditional Natural Resources Management Practices and Biodiversity Conservation in Ghana: A Review of Local Concepts and Issues on Change and Sustainability

Summary

This paper reviews the importance of traditional natural resources management practices in Ghana. It highlights the roles of traditional beliefs, taboos and rituals in the management and conservation of key natural resources in the country. The paper is based on desk studies undertaken as part of anthropological studies conducted in the forest-savanna transitional agroecological zone of Ghana to study the spirituality of forests and conservation. Among the major conclusions of the paper is that although the potential of traditional natural resources management for biodiversity conservation in Ghana is enormous, the sustainability of these practices is seriously threatened. This stems from the rapid changes in the belief systems. Both biophysical and socio-economic factors were found to underlie these changes. The breakdown of traditional beliefs and associated taboos which underpin traditional natural resources management practices were found to be the greatest threat to the sustainability of these practices. The paper recommends that more anthropological research should investigate local perceptions of forest space and landscape, biodiversity conservation and traditional beliefs, and their significance for natural resources management. Such studies would provide valuable insights into the changing values of local people in relation to protected areas such as sacred groves and forest reserves and the management of other natural resources.

Keywords: Forest –Savanna Transition, Sacred Groves, Traditional Beliefs, Biodiversity Conservation, Change and Sustainability

JEL: Q2, Q57

Address for correspondence:

Paul Sarfo-Mensah
Kwame Nkrumah University of Science
Bureau of Integrated Rural Development and Technology
Private Mail Bag
UST Kumasi
Ghana
E-mail: pksm01@yahoo.com

1. INTRODUCTION

The interpretation of nature amongst most ethnic groups in Ghana, as elsewhere in West Africa, has influenced most aspects of social, material and spiritual life (Rattray 1923; Frazer 1926; McLeod 1981). Among the Akans, the predominant ethnic group in Ghana and who occupy the forests in the country, interpretation of nature did not only determine local interaction with the environment but also fashioned the practices for the management of natural resources (McCaskie 1995; Abayie Boateng 1998). Comprehensive discussions on the culture of the Akans have been done by several authors including Rattray (1923), McLeod (1981), McCaskie (1995) and others. In this paper, the key concepts and interpretation of nature in Ghana, particularly amongst the Akans is reviewed. An overview of traditional natural resources management is given with a focus on practices associated with natural resources. The vital roles of beliefs, rituals and taboos in traditional natural resources management are emphasised. Finally, are discussion on change and sustainability of traditional natural resources management practices.

2. MATERIALS AND METHODS

The material produced in this paper is based mainly on a literature survey the author undertook as part of an anthropological studies conducted in four communities in the transitional agro-ecological zone of Ghana to study the spirituality of forests and conservation between April 1999 and March 2000 by the author. The communities studied were Bofie and Nchiraa in the Wenchi District; and Buabeng-Fiema and Dotabaa in the Nkoranza District, of the Brong Ahafo region (Figure 1). Key issues investigated were the dynamics of change in natural resources and their associated traditional management practices. Some of the qualitative data gathered from the field have been used as anecdotes

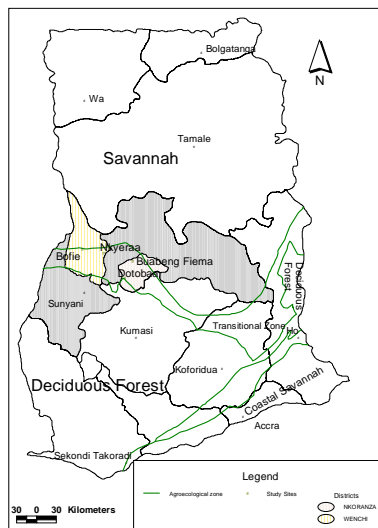


Figure 1. Location of research area

3. LOCAL CONCEPTS OF AND PERCEPTIONS ABOUT NATURAL RESOURCES

Amongst the Akans, and indeed amongst other ethnic groups and tribes in Ghana (Rattray 1923; Frazer 1926; McLeod 1981; McCaskie 1995) and across West Africa (Frazer 1926; Fairhead and Leach 1997), local concepts and interpretations of nature link it inextricably with the social, material and spiritual life of the people. The following summary provides an outline of concepts and interpretations of nature amongst the Akans.

It is important to note that the Akans make a clear distinction between bush (*wura'm*) and settlement (*efie*) (McLeod 1981; McCaskie 1995). Bush encompasses vegetation and all other natural resources including wild animals. The bush was considered to be a realm set apart from that of man and contained fierce beasts (*sasabonsam* and *mmoatia*) and some of the great gods (Busia 1951; McLeod 1981). *Sasabonsam*, a legendary mythical figure considered responsible for all the woes of mankind and to which mishaps and everything evil were attributed (McLeod 1981; Abbiw 1990), and *mmoatia* (dwarfs) made the bush dangerous to visit. Humans went into the bush at their own peril (McLeod 1981). Many, like hunters who sought their livelihoods from the bush, were careful to obtain talismans (*asuman*) and medicines to protect themselves against its dangers.

The bush was also an area of potential power (*tumi*) where medicines could be acquired, and where gods might reveal themselves to men and women whom they 'seized' and drove deep into the forest, or where strange objects could be found, or given by *mmoatia* (McLeod 1981; Akyeampong and Obeng 1995). Even today, people become disoriented and get lost in the bush. It is a custom that dangerous and disruptive people are driven into the bush and away from the order of the town. In the past, witches (*abayifo*) and those who committed grossly-polluting offences, if they were not executed, were driven into the bush. In most communities there are clear distinctions between the edge of the village and the bush. Towards the edge of the settlement are the areas associated with the removal of the dirt and decayed materials of the village, its excrement and its corpses, and the temples for the controlled entry of supernatural beings originating from outside (the river, the sky and the bush). Thus the town and forest, the realm of the dwelling (*efie*) and the bush (*wura'm*), are separated by the edges of the village (*Kurotia*), a symbolic ally as well as a physically distinct zone. In the past, it was common to find a formal barrier (*panpim*) usually made up of a few thin logs. This was not to prevent entrance; it was intended instead as a mystical protection for the village against the dangers and powers which dwelled in the bush and, as such, it represented the end of the village, the realm of man, and the beginning of the wild (McLeod 1981). Thus, amongst the Akans, though the bush contained essential necessities of life such as game, wild food, medicinal plants and herbs and *tumi*, they were hesitant to enter there. Use of the bush was, for most ordinary people, restricted to those areas on farms. Even this level of contact with the wild was considered dangerous. Contact was especially dangerous for women and children (Busia 1951; Arhin 1967) whose daily exposure to the wild was restricted to farms. Therefore, the Akans viewed bush with awesome reverence and fear. However, at the same time they considered it as an area which they hoped to conquer because of the need to expand their settlements (*efie*) due to population growth (McCaskie 1995).

Next in consideration is the division of the various components of the bush: trees (*nnua*), rivers (*nnsuo*), animals (*mmoa*) and soil or mother earth (*asase yaa*). Because *tumi* was generally associated with the bush, the Akans considered the individual components of the bush to be inherently endowed with *tumi*. They were regarded generally as gods or abodes of gods and should be revered (Frazer 1926; McLeod 1981; McCaskie 1995). For example, the soil or earth was given a motherly status *asase yaa* (literally meaning 'mother earth'; *yaa*: means a Thursday-born female amongst most Akans). In terms of ranking as gods, *Asase yaa* was ranked second to the Sky God (*Onyame*), the Supreme Creator and the most important of all the Ashanti deities. The status of *asase yaa* was due to the belief that it was through her

fruits and bountifulness that humans survived (Rattray 1923; Frazer 1926; Abayie Boateng 1998). The belief amongst several tribes and of Akans that their ancestors originated from the earth or they came from holes in certain deep forests reinforces this perception (Rattray 1923). The propitiation of the local Earth-god is deemed of utmost importance for, were it neglected, famine would surely follow as a consequence of the wrath of the deity. Her righteous indignation is excited by the spilling of human blood on the ground and by the commission of incest, for such acts are thought to pollute the soil. When such a deed has occurred, the local Earth-god has to be appeased (Frazer 1926). Earth-gods are considered to reside in natural objects such as clumps of trees, rocks of large size or remarkable appearance and ponds; but clumps of trees are regarded as their favourite homes (Frazer 1926). The emphasis given to tree clumps as the favourite abode of Earth-gods underlies the importance the Akans give to trees in terms of endowment of spiritual potency, *tumi*. This belief has been found to have influenced significantly the interaction of Akans with the forest and other natural resources (McLeod 1981; McCaskie 1995).

As indicated above, rivers, trees and animals are considered by the Akan to be sources of *tumi* and can be gods or have the capacity to become gods. Rivers are considered to be great gods, and of all the intermediary gods between man and the Sky God, river-gods are considered the most important. The most powerful ones are referred to as *atano* in Ashanti after the Tano river (Sarpong 1974). Next in greatness to rivers are the *abosom*; superhuman beings which, like the *atano*, come into contact with mankind by possessing individuals (*Okomfo*) to serve them (McLeod 1981). Plants and animals are considered to be living entities of almost the same physical and spiritual composition as human beings. The key distinction is that plants and animals do not possess a soul (*kra*) like human beings. However, they possess a close equivalent called *sasa*, something absent from human beings. The *sasa* of a tree or animal can either be 'light' (*hare*) or 'heavy' (*duru*) (McCaskie 1995). Thus, the *sasa* in certain trees, plants or animals is comparatively harmless and negligible. Such entities have no power for evil, and may be discounted as a source of dangerous threats. On the other hand, those with heavy *sasa* are dangerous and vindictive (McCaskie 1995). It is no wonder, therefore, that in the Akan cosmology such 'heavy' plants and animals are found in the forest. This also conforms to the belief referred to earlier that the favourite abode of the Earth-god is in clumps of trees. The Akans, therefore, make a distinction between different types of vegetation and accord the forest with the highest social, material and spiritual value (Arhin 1967; McLeod 1981; McCaskie 1995). Accordingly, the *sasa* of most plants and animals in the forest requires propitiation before use (McLeod 1981; Falconer 1992).

An important point that must be emphasised in concluding this section is that the above concepts and perceptions about natural resources form an integral part of the religious beliefs of the Akans which, to a large extent, are based on the worship of nature (Rattray 1923; Frazer 1926; McLeod 1981). It is not surprising that rituals, propitiation and prohibitions, key components of traditional religion amongst the Akans, form integral part of their traditional natural resources management.

4 MANAGEMENT OF KEY RESOURCES

In Ghana, as noted above, traditional natural resources management, as in other parts of Africa, is shaped around local rules and regulations (Ntiemoa-Baidu 1995; Abayie Boateng 1998). These rules and regulations are most often enshrined in religious or cultural beliefs and superstitions and enforced by prohibitions called *akyiwadie*. These have no legal backing, but the beliefs have been strong enough in the past to make people obey the regulations (Ntiemoa-Baidu 1995). There is a wide range of prohibitions related to the utilization of natural resources. For example, sexual activity in the bush (*Ahantwe*) was considered by the Akans to be a sacrilege (*efi*) against the fertility of *asase yaa*, mother earth. Similarly, several tribes and groups in Ghana consider some days to be sacred; (*nnabɔne* singular *dabɔne*) to mother earth when farming or going to the bush is forbidden. These days are considered to be

the resting days of *asase yaa* (Abayie Boateng 1998). In Akan 'yaa' as noted earlier means Thursday-born female, and also considered to be the name of mother earth. Thursday was, therefore, regarded as a day when no one should farm or go to the bush. Mother earth was considered to be taking a rest on that day (Abayie Boateng 1998). Non-farming days reduce the considerable pressure on land and other natural resources. They are also presently used for civic works or communal works in many rural communities (McLeod 1981). In the context of natural resources management, they enhance biodiversity conservation and minimise the continuous use of natural resources (Ntiemoa-Baidu 1995; Abayie Boateng 1998).

Based on the above concepts, traditional natural resources management in Ghana may be classified into the following categories: protection of particular ecosystems or habitats (such as sacred groves and sacred rivers); protection of particular animals or plant species (such as totem and tabooed species); and regulation of the exploitation of particular natural resources (such as a closed season for harvesting or hunting) (Ntiemoa-Baidu 1995; Abayie Boateng 1998). The practices concerned relate to trees, forests, wildlife, marine and coastal systems as well as to farming systems (Abayie Boateng 1998). It is important to emphasise that most of the individual practices are based on religious beliefs which, as mentioned earlier, are enforced by taboos. The environmental wisdom and ethics expressed through these religious beliefs have been very useful tools in resource management. For instance, the belief that the earth has a power (*tumi*) of its own which is helpful if propitiated and harmful if neglected, is a strong moral sanction against the wanton destruction of the environment (Appiah-Opoku and Hyma 1999).

Trees

In most traditional settings in Ghana, trees useful to humans such as Odum (*Milicia excelsa*) and African Mahogany (*Khaya ivorenses*) are regarded as gods and possess special spiritual powers (Abbiw 1990; Falconer 1992). Also, they can, as noted by Sarpong (1974), be the "residential areas" of spirits and gods and should, therefore, not be felled without some rituals being performed (Abayie Sarpong 1974; Abayie Boateng 1998). For example, in most societies amongst the Ashantis, it has been noted that craftsmen will endeavour to propitiate certain trees before they cut them (Busia 1951). According to Busia, an Ashanti craftsman will offer an egg to the Odum tree saying, "I am about to cut you down and carve you; do not let me suffer harm". This taboo has contributed to the protection and sustainable use of these trees. Some of the trees in this category are tall palms, Betene (*Elaeis guineensis*) and Osese (*Funtumia* spp.), used for carving stools. Also, the Shea Butter (*Butrespermum parkii*) and Dawadawa (*Parkia clappertoniana*) trees in the northern savanna zone are similarly protected for their economic importance. Among other ethnic groups in the north, such as the Dagomba and the Mamprusi, there are chieftains in charge of useful trees to ensure that they are not cut or destroyed in any way (Abayie Boateng 1998).

There are other trees which are not regarded as useful (i.e. in economic and spiritual considerations), but are considered to have other relevance for environmental purposes such as the Akonkodie (*Bombax buonopenzense*) and Onyina (*Ceiba pentandra*) in the forest and the Baobab (*Adansonia digitata*) in the savanna. Most trees in this category are protected by rules which forbid cutting or setting fire to them, and each member of the community is responsible for ensuring that others comply with the regulation. For example, in the Nkoranza traditional area in the Brong Ahafo region, Senya (*Ficus* spp.) is protected because of its environmental qualities particularly for soil fertility improvement (Kwaku Akowuah *pers. comm.*). Such trees are protected by a 'traditional powerful oath' (*ntam*), which spiritually binds all members of a paramount area or a community to a stool or a god. Anyone who contravenes the rules and regulations for their protection is sanctioned accordingly. These sanctions could include a sheep, a bottle of alcoholic spirits (schnapps) and cash fines (Kwaku Akowuah *pers. comm.*). Swearing by *ntam* is accepted amongst traditional religious believers as a declaration of the truth and exoneration from false accusations or crimes.

Another factor considered important for conservation and the protection of trees are their medicinal qualities (Abbiw 1990). Trees considered to have medicinal properties are not only protected for their usefulness in curing, but are also considered sacred and to have spiritual powers, *tumi*. The spirits of such trees can hunt whoever felled or burnt them (Sarpong 1974; McCaskie 1995). For example, Falconer (1992) found in several communities in the high forest zone of the south that most medicinal trees are considered sacred. Falconer indicates that the 'odii' (*Okoubaka aubrevellei*), the 'odum' (*Milicia excelsa*) and the 'ahomakyem' (*Spiropetalum heterophyllum*) are considered sacred and that there are taboos that protect them or rituals that have to be performed before they can be used. For example an egg must be given to the 'ahomakyem' climber before a piece can be cut for use. To use any part of 'odii', a libation must be poured. The tree cannot be approached at mid-day and the person must be naked. If exploited, these species are not to be felled or uprooted, and they are used in small quantities (Falconer 1992). It has been observed that these traditional rules restrict use, instil fear of retribution from the spirits which possessed these trees, enhance their protection and prevent inappropriate utilisation (Dorm-Adzorbu *et al.* 1991; Anane 1997).

Closely related to the above is the belief that some trees offer spiritual protection for the entire community. For example, Rattray (1923) found that a fig tree in the sacred grove at Santemanso, near Asubengya in Ashanti, was regarded as a sanctuary for the entire community. Anyone from the community sentenced to death and passing in the vicinity of the fig tree escaped death. Rattray indicates that an annual ritual performed in the sacred grove usually took place around the tree, and interprets this as recognition of the symbolic significance of the magic and religious powers of the tree. Similarly, the 'sumee' plant (*Costus afer*) is believed to have powers to drive evil spirits from a village (Falconer 1992). For example, when disease strikes a village it is swept with the plant and the debris piled on the outskirts. By this act, it is believed that the evil spirits haunting the village with the disease would have been driven away (Falconer 1992). Also, some trees are revered for the spiritual protection they offer individuals or families. For instance, a special cut branch of *Onyame Dua*, literally 'God's tree' (*Alstonia boonei*), was in the past used commonly in almost every compound of Ashanti as an altar to the Sky God (*Onyame*), from whom they sought spiritual protection (Rattray 1923; McLeod 1981).

Forests, sacred groves and sanctuaries

Amongst several forest-dwelling people of the south, especially the Ashantis and the Brongs, there is a categorisation of vegetation into three major types: *kwa*e (forest), *esere* (savanna) and *mpe* (the transition between *kwa*e and *esere*) (Afikorah-Danquah 1998). Of the three categories, forests are considered the most important culturally, economically and ecologically (Abbiw 1990; McCaskie 1995; Afikorah-Danquah 1998). The forest environment is noted to have made a significant impact on the social life of many tribes in Ghana. Amongst the Akans, the forests and the matrilineal clan systems have been observed as two important factors which have exercised a profound influence on social organisation (Akyeampong and Obeng 1995). Therefore, the designation of vegetation as 'forest' (*kwa*e) and their conservation, especially for religious purposes, in many parts of Ghana dates back several centuries. For example, Rattray (1923) found amongst the Ashantis (Asubengya people) that, for centuries, *kwa*e has been a distinct vegetation type in their cosmology and is highly revered for reasons including the presence of spirits and the origins of their ancestry. The trees in forests, especially large trees, are considered to have spiritual powers, *tumi*, which can be appropriated for several purposes (Rattray 1923; McLeod 1981; Falconer 1992). Even in the northern savanna regions, patches of forests have been similarly regarded (Dorm Adzorbu *et al.* 1991).

Forests, as noted above, are perceived generally amongst most tribes in Ghana to be the abode of spirits such as dwarfs (Abbiw 1990). Folklore has it that the forest is the domain of the mythical *Sasabonsam* (McLeod 1981; Abbiw 1990). Other local perceptions are based on the socio-economic and environmental value of the forests as sources of fertile land for

cultivation, timber, food, household utilities, game, medicinal plants and for the maintenance of environmental and ecological stability (Ntiama-Baidu 1991). Traditional conservation approaches to the forest have, therefore, been based on these local perceptions. For these reasons, patches of forests have been protected and, in some instances, non-forested areas have been nurtured deliberately to evolve into forests. Amongst the prominent traditional approaches are sacred groves and sanctuaries.

Sacred groves (including sanctuaries) are common features in southern Ghana (Falconer 1992). The total number of sacred groves in Ghana is unknown, although a survey by the Forestry Commission returned a figure of 1,904 groves, of which 79.1 per cent were in the south (Ntiama-Baidu 1995). Whilst many groves are too small to be of biological significance, a number of them have potential for biodiversity conservation. Over 80 per cent of sacred groves in Ghana serve as watersheds for catchment areas where they protect sources of drinking water (Anane 1997). Several categories of groves exist ranging from a few metres to several hectares in size (Dickson 1969; Dwomoh 1990). Many are small (less than one hectare), often comprising an object (such as a tree, stone or rock) considered to be a god and its immediate surrounding shrine (*Abosompow/Asoneyeso*), all of which is protected. Often, the patch of forest (*Mpanyinpow*) in which the royals of a particular village are buried is protected because of respect for the dead and the belief that the ancestral spirits lived there (Falconer 1992; Ntiama-Baidu *et al.* 1992). Entry into such forests is prohibited, and only a limited class of people (such as members of the royal family, village elders or clan heads) are allowed access for burial purposes. Often, patches of forest are protected because they support sacred totem or tabooed species that are believed to have special spiritual or cultural values and associations. Many clans in Ghana have a wild animal or plant species as their symbol. For example, the leopard (*Panthera pardus*) is the symbol of the Bretuo clan of the Akan people. Traditionally, such species are strictly protected. In some cases even touching of the species is forbidden. The Buabeng-Fiema Monkey Sanctuary is an example of a grove protected because the forest supports black and white African Colobus (*Colobus polykomos*) and Lowe's Mona monkeys (*Cercopithecus campbelli*) which are sacred to the local people (Akowuah *et al.* 1975; Ntiama-Baidu 1987; Fargey 1991; Ntiama-Baidu *et al.* 1992).

Like other traditional conservation approaches, sacred groves and sanctuaries are protected, conserved and maintained through a combination of taboos, prohibitions, beliefs and restrictions (Fargey 1991; Dorm Adzorbu *et al.* 1991; Ntiama-Baidu *et al.* 1992; Anane 1997). These rules and regulations have been found to vary between and within communities (Falconer 1992). For example, in some cases entry into a sacred grove or sanctuary is strictly limited, but in other areas they may be exploited or their use restricted to certain forest resources. Falconer (1992) found in the village of Nanhini in the south west of Ghana, which has the Numafoa and Kobri sacred groves, that one grove cannot be farmed or used for hunting, nor can snails be collected. However, the palms can be tapped for wine and medicines gathered. In addition, lands adjacent to sacred groves with streams in them are not supposed to be used on the sacred days of the deities associated with the groves. Most sacred groves and sanctuaries in Ghana have sacred days (*dabɔne*) (Adomako *et al.* 1998). The days are often in remembrance of a particular historical event such as a battle in which the deity in the sacred grove played a role (Rattray 1923; Falconer 1992). The existence of sacred days may also be associated with the belief that the deity is performing some beneficial services, as is believed by the Ga tribe in relation to the manufacture of hoes and cutlasses by the blacksmith god in the Guako sacred grove of Pokuase, Ghana (Adomako *et al.* 1998).

It is important to note that although the social, cultural, economic and ecological importance of sacred groves and sanctuaries have been recognised, their management and survival have only recently become important to the government (NGOs) and civic bodies in Ghana (Dorm Adzorbu *et al.* 1991; Anane 1997; Abayie Boateng 1998). The late recognition of this has been a major contributory factor in the decimation of many sacred groves and the threat to the survival of those remaining (Anane 1997). Many communities recognise that very little has been done to support their effort to protect these traditionally-based practices which are

increasingly coming under threat. It has been pointed out that the fact that sacred groves have survived so far is purely because of the strong traditional beliefs upheld by the local people and because of spiritual, religious and cultural attachments to the groves (Ntiama-Baidu 1995).

Water bodies

Amongst most ethnic groups in Ghana there exist beliefs that regard the majority of water bodies as deities (Rattray 1923; Ntiama-Baidu 1991 and 1995; Abayie Boateng 1998; Entsua-Mensah *et al.* 1998). Rivers sometimes assume the role of god of the state (*Omanbosom*), ruling over the various functions of the state (Rattray 1923; Ohemeng Boakye 1980; McLeod 1981). Such designated rivers are very common amongst the Akans and are protected and worshipped at several spots along their courses. This tradition has been used to protect the headwaters of several river bodies, especially those that served as potable water sources for a community or group of communities. Rattray (1923) mentions the example of River Tano, which rises in the Brong Ahafo region, and Ohemeng Boakye (1980) referred to the River Bosompra that runs through Kwahu in the eastern region of Ghana. Such rivers are also revered and protected because they are regarded as the source of life and fertility; barren women go to bathe in these waters in the hope of being fertilised (Ohemeng Boakye 1980).

Rivers and their immediate surroundings, especially forest, are protected on the basis that the spirit of the river resided in the area. Consequently, there are a variety of rules and regulations which prevent human contact with sacred groves such as taboo days, as noted earlier. Other regulations and controls are available on the exploitation of fisheries and other aquatic resources, and the use of adjacent lands for farming and logging. For example, there exist taboos against the clearing of vegetation for farming right up to the edges of streams and rivers (Abayie Boateng 1998). Farmers are encouraged to leave a strip of land (*Abasafa aduasa*) that is "about 30 metres", which should not be cleared on both sides of the streams and rivers. According to Abayie Boateng (1998), the benefit of this conservation method is quite obvious to any environmentalist, and local people are aware that it checks excessive evaporation from the rivers and streams. Other taboos, such as the disallowing of menstruating women to collect water from rivers, prevent the defilement of river deities and gods (Sarpong 1974; McLeod 1981). The issue of menstrual blood in traditional beliefs has been treated extensively in anthropology as a source of potent force (Douglas 1966). Amongst the Akans it has been emphasised as a source of "impurity" to gods and deities (McLeod 1981), because a woman during her menstrual period is believed to possess *tumi bɔne* or bad *'tumi* (Kwaku Akowuah *pers. comm.*). It may be conjectured that women, who were considered to be the most frequent users of water, were prohibited from entering the vicinity of rivers when they were menstruating to prevent degradation and conserve these vital resources. In most communities rivers provided the main source of drinking water (Ntiama-Baidu 1995).

Conservation of marine resources is managed similarly on the basis of religious beliefs and superstitions associated with fetishes enforced by taboos. For example, coastal ethnic groups have taboo days during which there is no fishing (Ntiama-Baidu 1991; Entsua-Mensah *et al.* 1998). Tuesday is regarded by several coastal settlements as the sacred day of the sea god, *Nana Bosompo* (Abayie Boateng 1998). This is said to have the effect of giving both the fishermen and the fished day of rest, and probably, as noted amongst the farming communities above, to assist village cohesion if the rest day is observed (Entsua-Mensah *et al.* 1998). In addition, there is a long period of time during which nobody goes fishing. This resting period coincides with the time when fish lay their eggs (Abayie Boateng 1998). But, in several fishing communities, the system of the non-fishing day and the long rest period are reported to be breaking down due to disregard for the taboos associated with them. Concern has been expressed about the sustainability of these practices and livelihoods in the communities (Ntiama-Baidu 1991; Entsua-Mensah *et al.* 1998).

Land management and farming systems

In the traditional context, land management and farming systems are inextricable. Perhaps this explains why changes in the farming systems have been amongst the most important causes of change in the quality and productivity of land in Ghana (Benneh and Agyapong 1990). Also, farming strategies have been considered to be amongst the major modes of managing the environment in the country (Amanor 1994).

Traditionally, as was indicated earlier, land is considered sacred amongst most tribes in Ghana, and revered as the provider of life (Frazer 1926; Sarpong 1974; Abayie Boateng 1998; Kuntu-Mensah 2000). Amongst the Akans, land is considered to belong to the living, the dead and the unborn generations. In fact, the living are believed only to be caretakers of the land on behalf of the two other parties, and it is believed that those who mismanage or misappropriate land will be punished by the ancestors who are considered to be keenly interested in matters related to land (Frazer 1926). Frazer suggests that ancestral spirits are believed to be the real land-owners; the living are only their tenants at will. This belief has guided land tenure amongst several ethnic groups in Ghana, which is based on customary laws. For example, amongst several Akan groups, land is traditionally regarded as a communal resource but is vested in the chiefs who are regarded as the custodians of the land. Sale of land is, therefore, forbidden and individuals can only obtain land from their family heads or through clan heads (Benneh 1965). Similar beliefs underlie land allocation amongst other major ethnic groups in Ghana. For example, amongst the Tallensi of northern Ghana, land ownership and use rights are strictly regulated by clan and kinship ties, and by moral and ritual values of the ancestor cult and earth cult (Meyer 1945).

Land tenure and its related institutions have been treated extensively in the literature by Hunter (1963), Hill (1970), Benneh (1965), La Anyane (1972), Asenso- Okyere *et al.* (1993) and Amanor 1994). What has been highlighted generally is that changes are taking place in the various tenurial arrangements across the country. Some writers have, indeed, suggested a need for further changes on the basis that the existing traditional tenure systems are inconsistent with the development aspirations of the country (La Anyane 1972). Specific features of the Ghanaian land tenure systems, which are said to constitute barriers to development, are their failure to ensure that those who will obtain the greatest economic returns from the land will have sufficient use of that land. They are also criticised for not conserving soil fertility, for causing fragmentation of land and encouraging land disputes (La Anyane 1972). La Anyane emphasises that these limitations have prevented labour mobility. This thinking, which is in line with modern market economics, is irreconcilable with the traditional principle of accountability to the ancestors (Anane 1997; Abayie Boateng 1998). This probably accounts for the inertia of most traditional authorities towards land tenure reforms (La Anyane 1972).

Like customary tenurial arrangements, traditional farming systems which enhance conservation and good land husbandry have come under tremendous pressure for change (Abayie Boateng 1998). Traditional farming systems were developed on the principle of a belief in and regard for mother earth (*asase yaa*) as a deity (Anane 1997; Abayie Boateng 1998). In order to allow her to continue to play a motherly role and to enhance biodiversity, traditional farming systems amongst the Akans were fashioned through laws and regulations to allow sustainable use of the land (Abayie Boateng 1998; Appiah-Opoku and Hyma 1999). For example, soil fertility restoration was achieved through fallow management, shifting cultivation and the use of simple farm tools such as hoes, axes and cutlasses (Sarris and Shams 1991; Abayie Boateng 1998). Mixed cropping, crop rotations and cropping systems including agro-forestry (e.g. trees dispersed on croplands) mimicked the forest landscape and enhanced biodiversity (Gyasi 1997). As noted earlier, taboo days for farming, which are common amongst the Akans and other tribes in Ghana, were enforced on the basis of the belief that mother earth, ancestral spirits and other gods roamed the land on such days to improve soil fertility and to undertake other beneficial tasks in the landscape (Abayie Boateng

1998). This reduces the pressure on the land and enhances fertility restoration (Appiah-Opoku and Hyma 1999). Traditional farming systems have many advantages that include the minimisation of soil erosion, the preservation of agro-biodiversity, the maintenance of ecological stability and the enhancement of food security and a balanced diet (Benneh 1997). In fact, they can be considered to be organic farming systems because they rely on natural soil fertility regeneration or the limited use of artificial fertilisers (Benneh 1997; Gyasi 1997). Sarris and Sham (1991) conclude that mixed cropping, an important component of traditional farming systems, enables many small-scale farmers across Ghana to reduce the risks associated with variations in seasonal rainfall, reduce weeding requirements and make optimal use of soil moisture and nutrients. The systems allow a cultivated piece of land to rest for a period long enough for the recuperation of soil fertility. However, in several parts of Ghana, traditional farming systems have undergone drastic changes and many practices are disappearing (Benneh 1997; Abayie Boateng 1998). Increasingly, mechanised farming using higher inputs (fertilisers, herbicides, pesticides) is being practised on medium and large-scale holdings growing mono-crop maize, rice and industrial crops (cotton and tobacco). In Brong Ahafo, in the northern Ashanti and the Northern regions where soil fertility has been reduced by shortened fallow periods or continuous cropping, fertiliser use is increasing (Sarris and Sham 1991).

Although traditional farming practices are undergoing changes, it has been argued that these are in reaction partly to forces of change that were imposed externally on the systems (Amanor 1997). A lack of understanding of the complexity of forces and strategies devised by farmers to counter these forces has meant that there is little basis for ameliorating the pressures exerted by these forces (Gyasi 1996; Amanor 1997). It has also undermined the appreciation of the improvements and adaptations that farmers are making in the traditional systems for enhancing the environment and their livelihoods (Gyasi 1996; Amanor 1997). For example, Amanor (1994) has noted that, within the forest areas of Ghana, many of the problems of environmental degradation do not result solely from the present methods of bush fallow cultivation. He points out that the impact of the history of cocoa cultivation, the problems of regenerating cocoa once the original monoculture of cocoa has died out, and the tenurial system which emerged in the cocoa era, are accountable for some of the adaptations by farmers (Amanor 1994 and 1997). He also emphasises that the environmental problems in the forest zones, which are emerging as a result of the movement from mono-cultivation of cocoa to food crops under bush fallow, is not a product of the latter system but a crisis generated in the cocoa sector. Farmers have made considerable improvements in the traditional systems including the methodical extension of forest to degraded adjacent lands by managed pioneer fallow and improved soil fertility through minimum tillage practices (Amanor 1997). They have also modified cropping patterns to counter edaphic and biophysical changes (Gyasi 1996). Unfortunately, farmers who undertake these innovations are concentrated in badly-degraded areas, and are likely to be dismissed by agricultural and environmental sciences as "robbers of the soil", aimless shifting cultivators" or "backward farmers" (Amanor 1997). Therefore, these traditions and others which can make enormous contributions to sustainable land management and environmental conservation are either being ignored or not taken seriously by policy makers in the country (Anane 1997; Okra 1998). This is because many of the practices are untenable under present socio-economic conditions; population being the critical factor (Amanor 1994; Benneh 1997; Gyasi 1997; Abayie Boateng 1998). However, some of the intrinsic values and practices that are conservation-orientated have persisted (Benneh 1997; Abayie Boateng 1998).

5. ISSUES OF CHANGE AND SUSTAINABILITY

From the foregoing, it is clear that changes in traditional natural resources management and the sustainability of practices in Ghana are important areas of concern (Fargey 1991; Amanor

1994; Ntiemoa-Baidu 1995; Gyasi 1997; Abayie Boateng 1998). Both biophysical and socio-economic factors have been cited as responsible for these changes. However, in recent times, it is increasingly being stressed that the rapid change is due to the breakdown of traditional beliefs and associated taboos. As demonstrated in the examples above, beliefs, rituals and taboos underlie the majority of traditional natural resources management practices. The reason for the central role of these beliefs is that, in Ghana as in other parts of West Africa, the spirituality of local people serves as the basis for all human endeavours and is reflected in their worldview (Millar 1995). Several of the traditional management practices, although they are undergoing changes, have retained some of their intrinsic practices despite production pressures. This has partly been attributed to the fact that many local people still perceive them to be associated with gods and ancestors which are still revered (Dorm Adzorbu *et al.* 1991; Fargey 1991; Falconer 1992; Ntiemoa-Baidu 1995; Gyasi 1996; Abayie Boateng 1998).

Typical examples of change, coupled with maintenance of sustainability in traditional management practices, have been demonstrated in sacred groves. Unfortunately, it has been concluded in several studies (Fargey 1991; Dorm Adzorbu *et al.* 1991; Ntiemoa-Baidu 1995; Gyasi 1996; Hagan 1998) that the erosion of traditional beliefs threatens sacred groves and sanctuaries. A number of sacred groves have gradually been encroached upon by surrounding farms and a number have already been lost to development projects, facilitated by the erosion of traditional beliefs (Environmental Protection Council 1976; Ntiemoa-Baidu *et al.* 1992; Gyasi 1996). The breakdown of beliefs that protect these areas has been attributed to western-type education and religion, to the immigration of people who may have no respect for local traditions, and to a lack of modern legislation to reinforce traditional rules (Fargey 1991; Falconer 1992; Ntiemoa-Baidu 1995). Falconer (1992) has observed that, as a result of the uneven impact of these factors, 'sacredness', the prominence and protection of sacred groves varies considerably between and within communities. Many groves have been encroached upon because the fear which used to be associated with them no longer operates (Abayie Boateng 1998). Similarly, Ntiemoa-Baidu (1991) has noted that traditional beliefs and associated taboos for the conservation of coastal lagoons are no longer respected. For instance, she indicates that fishing activities continue in Sakumo lagoon daily, despite the prohibitions of sacred days and closed seasons; draw-nets of varying mesh sizes are used regularly, which do not conform to the rules stipulated by the traditional authorities. Ntiemoa-Baidu (1995) and Entsua-Mensah *et al.* (1998) have made similar conclusions in other studies.

An important point that has been stressed regarding these changes is that they have led to overexploitation and degradation of the natural resources base of several communities. This has eventually undermined the sustainable management of natural resources and the livelihoods of the local people (Ntiemoa-Baidu 1995; Anane 1997; Gyasi 1997; Abayie Boateng 1998). An encouraging finding, however, is that some of the natural resources protected by these practices have managed to survive despite increasing pressure on them (Dorm Adzorbu *et al.* 1991; Fargey 1991; Falconer 1992; Ntiemoa-Baidu 1995; Nsiah-Gyabaah *et al.* 1996). The Buabeng Fiema Monkey sanctuary and the Bofie sacred grove in the northern transitional zone are typical examples (Fargey 1991; Ntiemoa-Baidu 1995; Nsiah-Gyabaah *et al.* 1996). In the southern transitional zone, Gyasi (1997) has recorded the Gyamfuase sacred grove and, in the northern savannas, the Malshegu sacred grove has been identified by Dorm Adzorbu *et al.* (1991). In the forest zone, Falconer (1992) mentions the Numafoa sacred grove as highly revered; even the most ardent Christians believe in the protective powers of the goddess. She indicates that the grove was not burnt in the 1983 bush fires, although much of the surrounding area was burnt, and as a result its boundaries are defined sharply. Many people gave her testimonies of the visits of the goddess to the settlement and her healing powers. Similarly, the boundaries of the Kobri sacred grove, also in the forest zone, are well respected despite increasing land pressure, although some damage occurred in 1983 during the bush fires (Falconer 1992). The survival of some of these practices has raised the question of variations in attitudes towards different beliefs and practices within and between communities. The need to understand fully these differences in order to promote further research to support the conservation of traditionally-protected areas,

and the practices which have maintained them, has been emphasised (Falconer 1992; Anane 1997).

6. CONCLUSION

The discussions in this paper demonstrate that traditional natural resources management in Ghana is enshrined in religious beliefs and practices. The need to investigate these issues for conservation has been emphasised in recent times. Although changes in these practices have been acknowledged, and threats to their sustainability raised, most researchers still agree that their potential influence on environmental and agricultural resources conservation and sustainability of livelihoods is enormous (Amanor 1994; Gyasi 1997). In particular, the important role of these practices in the conservation of biodiversity through sacred groves has been highlighted (Fargey 1991; Falconer 1992).

However, a much clearer understanding of spiritual and mystical beliefs, and the related local institutions associated with traditional natural resources management, is needed (Ntiama-Baidu 1991; Falconer 1992; Amanor 1997). Such an assessment would provide valuable insights into the changing values of local people in relation to the protection of forests and other natural resources (Falconer 1992).

Government and non-governmental organisations should fund integrated social and biological research at several locations in the country to promote a better understanding of traditional management practices.. Currently, little detailed scientific research on beliefs, taboos and practices associated with traditional natural resources management is being carried out to establish their significance for conservation. Although these management practices may be shrouded in complex myths and beliefs and may appear to have no scientific basis, many traditional practices and beliefs have been shown to be based on scientific principles (Ntiama-Baidu 1995; Appiah-Opoku and Hyma 1999). Collaborative research involving anthropologists and natural scientists may help explain the scientific and social value of beliefs related to traditional natural resources management in the study area and other parts of Ghana. This may enhance the acceptability of these traditions, many of which have conservation potential.

REFERENCES

- Abayie Boateng, A. 1998. 'Traditional conservation practices: Ghana's example'. *Institute of African Studies Research Review*, Vol. 14, No 1, 42-51.
- Abbiw, D.K. 1990. *Useful Plants in Ghana*. Intermediate Publications. The Royal Botanical Garden, Kew.
- Adomako, E.E., J.K. Adomako and T.P. Bayliss-Smith. 1998. 'Conservation by Tradition: The Case of the Guako Sacred Grove', in Amlalo D.S., L.D. Atsiatorme and C. Fiati (eds.), *Proceedings Of The Third UNESCO MAB Regional Seminar On Biodiversity Conservation And Sustainable Development In Anglophone Africa (BRAAF)*, Cape Coast, 9-12th March 1997. Accra: Environmental Protection Agency (EPA).
- Afikorah-Danquah, S. 1998. 'Local Resource Management in the Forest-Savanna Transition Zone: The case of Wenchi District, Ghana'. Report of Case Study for research on 'Environmental Entitlements: The Institutional Dynamics of Environmental Change'. Institute of Development Studies (IDS), University of Sussex.
- .
- Akowuah, D.K., K. Rice, A. Merz and V.A. Sackey. 1975. 'The children of gods'. *Journal of Ghana Wildlife Society*, Vol. 1, No.2, 19-22.
- Akyeampong, E. and P. Obeng. 1995. 'Spirituality, Gender, and Power in Ashanti History'. *The International Journal of African Historical Studies*, Vol. 28, No. 3, 481-508.
- Amanor, K. 1993. Wenchi Farm Training Project: Social/Environmental Baseline Study. Report prepared for the Overseas Development Administration.
- Amanor, K.S. 1994. *The New Frontier: Farmers' Responses to Land Degradation: A West Africa Case Study*. London: Zed Books.
- Amanor, K.S. 1997. 'Interacting with the Environment: Adaptation and Regeneration of Degraded Land in Upper Manya Krobo', in Gyasi, E.A. and J.I. Uitto (eds.), *Environment, Biodiversity and Agricultural Change in West Africa: Perspectives from Ghana*. Tokyo: United Nations University Press.
- Anane, M. 1997. 'Religion and Conservation in Ghana', in Alyanak, L. and A. Cruz (eds.), *Implementing Agenda 21: NGO Experiences from around the World*. New York: United Nations Non Liaison Services.
- Appiah-Opoku, S. and B. Hyma. 1999. 'Indigenous institutions and resource management in Ghana'. *Indigenous Knowledge and Development Monitor*, Vol. 7, Issue 3, 15-17.
- Arhin, K. 1967. 'The Structure of Greater Ashanti (1700-1824)'. *Journal of African History*, 8, 1, 65-85.
- Benneh, G and G.T Agyapong. 1990. *Land degradation in Ghana*. London: Commonwealth Secretariat, and Legon: Department of Geography and Resource Development, University of Ghana.
- Benneh, G. 1965. 'Land tenure and farming systems in Nkrankwan, a village in the pioneer-cocoa area of Ghana', in Anderson, T.J. (ed.), *Land tenure and Agrarian Reform in Africa and the Near East: An Annotated Bibliography*. Boston, Mass: G.K. Hall & CO.
- Benneh, G. 1997. 'Indigenous African Farming Systems: Their Significance for sustainable Environmental Use', in Gyasi, E.A. and J.I. Uitto (eds.), *Environment, Biodiversity and Agricultural Change in West Africa: Perspectives from Ghana*. Tokyo: United Nations University Press.
- Busia, K.A. 1951. *The Position of the Chief in the Modern Political System of Ashanti*. London, OUP.
- Dickson, K.B. 1969. *Historical Geography of Ghana*. London: Cambridge University Press.
- .

- Dorm Adzorbu, C., O. Ampadu-Agyei and P.G. Veit. 1991. *Religious Beliefs and Environmental Protection: The Malshegu sacred grove in Northern Ghana*. WRI Washington, DC, USA and Acts Press, Africa Centre for Technology Studies, Kenya.
- Douglas, M. 1966. *Purity and Danger: An Analysis of the Concept of Pollution and Taboo*. London: Routledge & Kegan Paul.
- Dwomoh, D. 1990. 'Forest Conservation: The contribution of sacred groves: A study of Sekyere West District, Ashanti Region'. B.A (Hons.) Dissertation, Geography Dept., University of Ghana, Legon.
- .
- Entsuah-Mensah, M., N.G. Willoughby and H.R. Dankwa. 1998. 'Ghana's coastal lagoon fisheries: Is traditional management sufficient?' Unpublished Manuscript submitted to *Coastal Management Journal*. Washington DC, USA.
- Fairhead, J. and M. Leach. 1994. 'Natural Resources Management: The Reproduction and Use of Environmental Misinformation in Guinea's Forest-savanna transition zone'. *IDS Bulletin*, Vol. 25, No. 2, 81-87.
- Fairhead, J. and M. Leach. 1997. 'Culturing trees: socialised knowledge in the political ecology of Kessia and Kuranko forest islands of Guinea', in Seeland, K. (ed.), *Nature is Culture: Indigenous Knowledge and Social Cultural aspect of trees and forests in Non European Cultures*. London: Intermediate Technology Publication.
- Falconer, J. 1992. 'Non-timber Forest Products in Ghana', Main Report, ODA.
- Fargey, P.J. 1991. 'Assessment of the conservation status of the Buabeng Fiema Monkey Sanctuary', Report submitted to the Flora and Fauna Preservation Society.
- Frazer, J.G. 1926. *The Worship of Nature*. Volume 1. London: MacMillan and Co.
- .
- Gyasi, E.A. 1996. 'Gyamfiase, Ghana: A Study in Threat and Counteracting Threat to Indigenous Forest Groves and Sustainable Forest Management Systems'. *Paper presented at Workshop on Contested Terrain: West African Forestry Relations, Landscapes and Processes*. Centre of West African Studies, University of Birmingham, Egbaston, 12-13 April 1996.
- Gyasi E.A. 1997. 'Background and Objectives of the Study of Production Pressure and Environmental Change in the Southern Forest-Savanna Transition Zone', in Gyasi, E. A. and J.I. Uitto (eds.), *Environment, Biodiversity and Agricultural Change in West Africa: Perspectives from Ghana*. Tokyo: United Nations University Press.
- Hagan, G.P. 1998. 'Traditional Laws and Methods of Conservation and Sustainable use of Biodiversity', in Amlalo D.S., L.D. Atsiatorme and C. Fiati (eds.), *Proceedings Of The Third UNESCO MAB Regional Seminar On Biodiversity Conservation And Sustainable Development In Anglophone Africa (BRAAF), Cape Coast, 9-12th March 1997*. Accra: Environmental Protection Agency (EPA).
- La Anyane, S. 1972. 'Effects of land tenure on migration, labour mobility and employment in Ghana', in Anderson, T.J. (ed.), *Land tenure and Agrarian Reform in Africa and the Near East: An Annotated Bibliography*. Boston, Mass: G.K. Hall & CO.
- Levine, R.A. 1973. 'Research Design in Anthropological Field Work', in Naroll, R. and R. Cohen (eds.), *A Handbook of Method in Cultural Anthropology*. New York and London: Columbia University Press.
- McCaskie, T.C. 1995. *State and Society in pre-colonial Ashanti*. Cambridge University Press.
- McLeod, M.D. 1981. *The Ashanti*. British Museum Publication Ltd.
- .
- Ntiamoa-Baidu, Y. 1991. 'Conservation of coastal lagoons in Ghana: the traditional approach'. *Landscape and Urban Planning*, Vol. 20, 41-46. Amsterdam: Elsevier Science Publishers B.V.

- Ntiamoa-Baidu, Y. 1995. 'Indigenous vs. Introduced Biodiversity Conservation Strategies: The case of protected areas systems in Ghana'. *African Biodiversity Series*, Number I, May 1995, 1-11. Washington: The Biodiversity Support Program.
- Ntiamoa-Baidu, Y., L.J. Gyamfi-Fenteng and D. Abbiw. 1992. 'Management strategy for Sacred Groves in Ghana', Report prepared for the World Bank and the Environmental Protection Council.
- Owusu, J.K. 1976. *Oral traditions of Sampa, Hani, Debibi, Namasa, Banda, Broahane and Mengye (Menji) - Brong Ahafo*. Institute of African Studies, University of Ghana. Legon.
- Rattray, R.S. 1923, 1969. *Ashanti*. New York: Negro University Press. Originally published in 1923 at the Clarendon Press.

NOTE DI LAVORO DELLA FONDAZIONE ENI ENRICO MATTEI

Fondazione Eni Enrico Mattei Working Paper Series

Our Note di Lavoro are available on the Internet at the following addresses:

<http://www.feem.it/Feem/Pub/Publications/WPapers/default.htm>

<http://www.ssrn.com/link/feem.html>

<http://www.repec.org>

<http://agecon.lib.umn.edu>

<http://www.bepress.com/feem/>

NOTE DI LAVORO PUBLISHED IN 2007

NRM	1.2007	<i>Rinaldo Brau, Alessandro Lanza, and Francesco Pigliaru: <u>How Fast are Small Tourism Countries Growing? The 1980-2003 Evidence</u></i>
PRCG	2.2007	<i>C.V. Fiorio, M. Florio, S. Salini and P. Ferrari: <u>Consumers' Attitudes on Services of General Interest in the EU: Accessibility, Price and Quality 2000-2004</u></i>
PRCG	3.2007	<i>Cesare Dosi and Michele Moretto: <u>Concession Bidding Rules and Investment Time Flexibility</u></i>
IEM	4.2007	<i>Chiara Longo, Matteo Manera, Anil Markandya and Elisa Scarpa: <u>Evaluating the Empirical Performance of Alternative Econometric Models for Oil Price Forecasting</u></i>
PRCG	5.2007	<i>Bernardo Bortolotti, William Megginson and Scott B. Smart: <u>The Rise of Accelerated Seasoned Equity Underwritings</u></i>
CCMP	6.2007	<i>Valentina Bosetti and Massimo Tavoni: <u>Uncertain R&D, Backstop Technology and GHGs Stabilization</u></i>
CCMP	7.2007	<i>Robert Küster, Ingo Ellersdorfer, Ulrich Fahl (lxxx): <u>A CGE-Analysis of Energy Policies Considering Labor Market Imperfections and Technology Specifications</u></i>
CCMP	8.2007	<i>Mònica Serrano (lxxx): <u>The Production and Consumption Accounting Principles as a Guideline for Designing Environmental Tax Policy</u></i>
CCMP	9.2007	<i>Erwin L. Corong (lxxx): <u>Economic and Poverty Impacts of a Voluntary Carbon Reduction for a Small Liberalized Developing Economy: The Case of the Philippines</u></i>
CCMP	10.2007	<i>Valentina Bosetti, Emanuele Massetti, and Massimo Tavoni: <u>The WITCH Model. Structure, Baseline, Solutions</u></i>
SIEV	11.2007	<i>Margherita Turvani, Aline Chiabai, Anna Alberini and Stefania Tonin: <u>Public Policies for Contaminated Site Cleanup: The Opinions of the Italian Public</u></i>
CCMP	12.2007	<i>M. Berrittella, A. Certa, M. Enea and P. Zito: <u>An Analytic Hierarchy Process for The Evaluation of Transport Policies to Reduce Climate Change Impacts</u></i>
NRM	13.2007	<i>Francesco Bosello, Barbara Buchner, Jacopo Crimi, Carlo Giupponi and Andrea Povellato: <u>The Kyoto Protocol and the Effect of Existing and Planned Measures in the Agricultural and Forestry Sector in the EU25</u></i>
NRM	14.2007	<i>Francesco Bosello, Carlo Giupponi and Andrea Povellato: <u>A Review of Recent Studies on Cost Effectiveness of GHG Mitigation Measures in the European Agro-Forestry Sector</u></i>
CCMP	15.2007	<i>Massimo Tavoni, Brent Sohngen, and Valentina Bosetti: <u>Forestry and the Carbon Market Response to Stabilize Climate</u></i>
ETA	16.2007	<i>Erik Ansink and Arjan Ruijs: <u>Climate Change and the Stability of Water Allocation Agreements</u></i>
ETA	17.2007	<i>François Gusdorf and Stéphane Hallegatte: <u>Compact or Spread-Out Cities: Urban Planning, Taxation, and the Vulnerability to Transportation Shocks</u></i>
NRM	18.2007	<i>Giovanni Bella: <u>A Bug's Life: Competition Among Species Towards the Environment</u></i>
IEM	19.2007	<i>Valeria Termini and Laura Cavallo: <u>"Spot, Bilateral and Futures Trading in Electricity Markets. Implications for Stability"</u></i>
ETA	20.2007	<i>Stéphane Hallegatte and Michael Ghil: <u>Endogenous Business Cycles and the Economic Response to Exogenous Shocks</u></i>
CTN	21.2007	<i>Thierry Bréchet, François Gerard and Henry Tulkens: <u>Climate Coalitions: A Theoretical and Computational Appraisal</u></i>
CCMP	22.2007	<i>Claudia Kettner, Angela Köppl, Stefan P. Schleicher and Gregor Thenius: <u>Stringency and Distribution in the EU Emissions Trading Scheme –The 2005 Evidence</u></i>
NRM	23.2007	<i>Hongyu Ding, Arjan Ruijs and Ekko C. van Ierland: <u>Designing a Decision Support System for Marine Reserves Management: An Economic Analysis for the Dutch North Sea</u></i>
CCMP	24.2007	<i>Massimiliano Mazzanti, Anna Montini and Roberto Zoboli: <u>Economic Dynamics, Emission Trends and the EKC Hypothesis New Evidence Using NAMEA and Provincial Panel Data for Italy</u></i>
ETA	25.2007	<i>Joan Canton: <u>Redealing the Cards: How the Presence of an Eco-Industry Modifies the Political Economy of Environmental Policies</u></i>
ETA	26.2007	<i>Joan Canton: <u>Environmental Taxation and International Eco-Industries</u></i>
CCMP	27.2007	<i>Oscar Cacho and Leslie Lipper (lxxxii): <u>Abatement and Transaction Costs of Carbon-Sink Projects Involving Smallholders</u></i>
CCMP	28.2007	<i>A. Caparrós, E. Cerdá, P. Ovando and P. Campos (lxxxii): <u>Carbon Sequestration with Reforestations and Biodiversity-Scenic Values</u></i>
CCMP	29.2007	<i>Georg E. Kindermann, Michael Obersteiner, Ewald Rametsteiner and Ian McCallum (lxxxii): <u>Predicting the Deforestation-Trend Under Different Carbon-Prices</u></i>

CCMP	30.2007	<i>Raul Ponce-Hernandez (lxxxii): <u>A Modelling Framework for Addressing the Synergies between Global Conventions through Land Use Changes: Carbon Sequestration, Biodiversity Conservation, Prevention of Land Degradation and Food Security in Agricultural and Forested Lands in Developing Countries</u></i>
ETA	31.2007	<i>Michele Moretto and Gianpaolo Rossini: <u>Are Workers' Enterprises Entry Policies Conventional</u></i>
KTHC	32.2007	<i>Giacomo Degli Antoni: <u>Do Social Relations Affect Economic Welfare? A Microeconomic Empirical Analysis</u></i>
CCMP	33.2007	<i>Reyer Gerlagh and Onno Kuik: <u>Carbon Leakage with International Technology Spillovers</u></i>
CCMP	34.2007	<i>Richard S.J. Tol: <u>The Impact of a Carbon Tax on International Tourism</u></i>
CCMP	35.2007	<i>Reyer Gerlagh, Snorre Kverndokk and Knut Einar Rosendahl: <u>Optimal Timing of Environmental Policy: Interaction Between Environmental Taxes and Innovation Externalities</u></i>
SIEV	36.2007	<i>Anna Alberini and Alberto Longo: <u>Valuing the Cultural Monuments of Armenia: Bayesian Updating of Prior Beliefs in Contingent Valuation</u></i>
CCMP	37.2007	<i>Roeland Bracke, Tom Verbeke and Veerle Dejonckheere: <u>What Distinguishes EMAS Participants? An Exploration of Company Characteristics</u></i>
CCMP	38.2007	<i>E. Tzouvelekas, D. Vouvaki and A. Xepapadeas: <u>Total Factor Productivity Growth and the Environment: A Case for Green Growth Accounting</u></i>
CCMP	39.2007	<i>Klaus Keller, Louise I. Miltich, Alexander Robinson and Richard S.J. Tol: <u>How Overconfident are Current Projections of Anthropogenic Carbon Dioxide Emissions?</u></i>
CCMP	40.2007	<i>Massimiliano Mazzanti and Roberto Zoboli: <u>Environmental Efficiency, Emission Trends and Labour Productivity: Trade-Off or Joint Dynamics? Empirical Evidence Using NAMEA Panel Data</u></i>
PRCG	41.2007	<i>Veronica Ronchi: <u>Populism and Neopopulism in Latin America: Clientelism, Trade Union Organisation and Electoral Support in Mexico and Argentina in the '90s</u></i>
PRCG	42.2007	<i>Veronica Ronchi: <u>The Neoliberal Myth in Latin America: The Cases of Mexico and Argentina in the '90s</u></i>
CCMP	43.2007	<i>David Anthoff, Cameron Hepburn and Richard S.J. Tol: <u>Equity Weighting and the Marginal Damage Costs of Climate Change</u></i>
ETA	44.2007	<i>Bouwse R. Dijkstra and Dirk T.G. Rübelke: <u>Group Rewards and Individual Sanctions in Environmental Policy</u></i>
KTHC	45.2007	<i>Benno Torgler: <u>Trust in International Organizations: An Empirical Investigation Focusing on the United Nations</u></i>
CCMP	46.2007	<i>Enrica De Cian, Elisa Lanzi and Roberto Roson: <u>The Impact of Temperature Change on Energy Demand: A Dynamic Panel Analysis</u></i>
CCMP	47.2007	<i>Edwin van der Werf: <u>Production Functions for Climate Policy Modeling: An Empirical Analysis</u></i>
KTHC	48.2007	<i>Francesco Lancia and Giovanni Prarolo: <u>A Politico-Economic Model of Aging, Technology Adoption and Growth</u></i>
NRM	49.2007	<i>Giulia Minoia: <u>Gender Issue and Water Management in the Mediterranean Basin, Middle East and North Africa</u></i>
KTHC	50.2007	<i>Susanna Mancinelli and Massimiliano Mazzanti: <u>SME Performance, Innovation and Networking Evidence on Complementarities for a Local Economic System</u></i>
CCMP	51.2007	<i>Kelly C. de Bruin, Rob B. Dellink and Richard S.J. Tol: <u>AD-DICE: An Implementation of Adaptation in the DICE Model</u></i>
NRM	52.2007	<i>Frank van Kouwen, Carel Dieperink, Paul P. Schot and Martin J. Wassen: <u>Interactive Problem Structuring with ICZM Stakeholders</u></i>
CCMP	53.2007	<i>Valeria Costantini and Francesco Crespi: <u>Environmental Regulation and the Export Dynamics of Energy Technologies</u></i>
CCMP	54.2007	<i>Barbara Buchner, Michela Catenacci and Alessandra Sgobbi: <u>Governance and Environmental Policy Integration in Europe: What Can We learn from the EU Emission Trading Scheme?</u></i>
CCMP	55.2007	<i>David Anthoff and Richard S.J. Tol: <u>On International Equity Weights and National Decision Making on Climate Change</u></i>
CCMP	56.2007	<i>Edwin van der Werf and Sonja Peterson: <u>Modeling Linkages Between Climate Policy and Land Use: An Overview</u></i>
CCMP	57.2007	<i>Fabien Prieur: <u>The Environmental Kuznets Curve in a World of Irreversibility</u></i>
KTHC	58.2007	<i>Roberto Antonietti and Giulio Cainelli: <u>Production Outsourcing, Organizational Governance and Firm's Technological Performance: Evidence from Italy</u></i>
SIEV	59.2007	<i>Marco Percolo: <u>Urban Transport Policies and the Environment: Evidence from Italy</u></i>
ETA	60.2007	<i>Henk Folmer and Pierre von Mouche: <u>Linking of Repeated Games. When Does It Lead to More Cooperation and Pareto Improvements?</u></i>
CCMP	61.2007	<i>Arthur Riedacker (lxxx): <u>A Global Land Use and Biomass Approach to Reduce Greenhouse Gas Emissions, Fossil Fuel Use and to Preserve Biodiversity</u></i>
CCMP	62.2007	<i>Jordi Roca and Mònica Serrano: <u>Atmospheric Pollution and Consumption Patterns in Spain: An Input-Output Approach</u></i>
CCMP	63.2007	<i>Derek W. Bunn and Carlo Fezzi (lxxxi): <u>Interaction of European Carbon Trading and Energy Prices</u></i>
CTN	64.2007	<i>Benjamin Golub and Matthew O. Jackson (lxxxiii): <u>Naïve Learning in Social Networks: Convergence, Influence and Wisdom of Crowds</u></i>
CTN	65.2007	<i>Jacob K. Goeree, Arno Riedl and Aljaž Ule (lxxxiii): <u>In Search of Stars: Network Formation among Heterogeneous Agents</u></i>
CTN	66.2007	<i>Gönül Doğan, M.A.L.M. van Assen, Arnout van de Rijt, and Vincent Buskens (lxxxiii): <u>The Stability of Exchange Networks</u></i>
CTN	67.2007	<i>Ben Zissimos (lxxxiii): <u>Why are Trade Agreements Regional?</u></i>
CTN	68.2007	<i>Jacques Drèze, Michel Le Breton, Alexei Savvateev and Shlomo Weber (lxxxiii): <u>«Almost» Subsidy-free Spatial Pricing in a Multi-dimensional Setting</u></i>
CTN	69.2007	<i>Ana Babus (lxxxiii): <u>The Formation of Financial Networks</u></i>

CTN	70.2007	<i>Andrea Galeotti and Sanjeev Goyal (lxxxiii): <u>A Theory of Strategic Diffusion</u></i>
IEM	71.2007	<i>Francesco Bosello, Enrica De Cian and Roberto Roson: <u>Climate Change, Energy Demand and Market Power in a General Equilibrium Model of the World Economy</u></i>
ETA	72.2007	<i>Gastón Giordana and Marc Willinger: <u>Fixed Instruments to Cope with Stock Externalities An Experimental Evaluation</u></i>
KTHC	73.2007	<i>Oguzhan Dincer and Eric Uslaner: <u>Trust and Growth</u></i>
CCMP	74.2007	<i>Fei Teng and Alun Gu: <u>Climate Change: National and Local Policy Opportunities in China</u></i>
KTHC	75.2007	<i>Massimiano Bucchi and Valeria Papponetti: <u>Research Evaluation as a Policy Design Tool: Mapping Approaches across a Set of Case Studies</u></i>
SIEV	76.2007	<i>Paolo Figini, Massimiliano Castellani and Laura Vici: <u>Estimating Tourist Externalities on Residents: A Choice Modeling Approach to the Case of Rimini</u></i>
IEM	77.2007	<i>Irene Valsecchi: <u>Experts and Non-experts</u></i>
CCMP	78.2007	<i>Giuseppe Di Vita: <u>Legal Families and Environmental Protection: is there a Causal Relationship?</u></i>
KTHC	79.2007	<i>Roberto Antonietti and Giulio Cainelli: <u>Spatial Agglomeration, Technology and Outsourcing of Knowledge Intensive Business Services Empirical Insights from Italy</u></i>
KTHC	80.2007	<i>Iacopo Grassi: <u>The Music Market in the Age of Download</u></i>
ETA	81.2007	<i>Carlo Carraro and Alessandra Sgobbi: <u>Modelling Negotiated Decision Making: a Multilateral, Multiple Issues, Non-Cooperative Bargaining Model with Uncertainty</u></i>
CCMP	82.2007	<i>Valentina Bosetti, Carlo Carraro, Emanuele Massetti and Massimo Tavoni: <u>International Energy R&D Spillovers and the Economics of Greenhouse Gas Atmospheric Stabilization</u></i>
CCMP	83.2007	<i>Sjak Smulders and Edwin van der Werf: <u>Climate Policy and the Optimal Extraction of High- and Low-Carbon Fossil Fuels</u></i>
SIEV	84.2007	<i>Benno Torgler, Bruno S. Frey and Clevo Wilson: <u>Environmental and Pro-Social Norms: Evidence from 30 Countries</u></i>
KTHC	85.2007	<i>Elena Bellini, Ugo Gasparino, Barbara Del Corpo and William Malizia: <u>Impact of Cultural Tourism upon Urban Economies: An Econometric Exercise</u></i>
NRM	86.2007	<i>David Tomberlin and Garth Holloway: <u>Trip-Level Analysis of Efficiency Changes in Oregon's Deepwater Trawl Fishery</u></i>
CTN	87.2007	<i>Pablo Revilla: <u>Many-to-One Matching when Colleagues Matter</u></i>
IEM	88.2007	<i>Hipòlit Torró: <u>Forecasting Weekly Electricity Prices at Nord Pool</u></i>
ETA	89.2007	<i>Y. Hossein Farzin: <u>Sustainability and Optimality in Economic Development: Theoretical Insights and Policy Prospects</u></i>
NRM	90.2007	<i>P. Sarfo-Mensah and W. Oduro: <u>Traditional Natural Resources Management Practices and Biodiversity Conservation in Ghana: A Review of Local Concepts and Issues on Change and Sustainability</u></i>

(lxxxi) This paper was presented at the EAERE-FEEM-VIU Summer School on "Computable General Equilibrium Modeling in Environmental and Resource Economics", held in Venice from June 25th to July 1st, 2006 and supported by the Marie Curie Series of Conferences "European Summer School in Resource and Environmental Economics".

(lxxxii) This paper was presented at the Workshop on "Climate Mitigation Measures in the Agro-Forestry Sector and Biodiversity Futures", Trieste, 16-17 October 2006 and jointly organised by The Ecological and Environmental Economics - EEE Programme, The Abdus Salam International Centre for Theoretical Physics - ICTP, UNESCO Man and the Biosphere Programme - MAB, and The International Institute for Applied Systems Analysis - IIASA.

(lxxxiii) This paper was presented at the 12th Coalition Theory Network Workshop organised by the Center for Operation Research and Econometrics (CORE) of the Université Catholique de Louvain, held in Louvain-la-Neuve, Belgium on 18-20 January 2007.

2007 SERIES	
CCMP	<i>Climate Change Modelling and Policy</i> (Editor: Marzio Galeotti)
SIEV	<i>Sustainability Indicators and Environmental Valuation</i> (Editor: Anil Markandya)
NRM	<i>Natural Resources Management</i> (Editor: Carlo Giupponi)
KTHC	<i>Knowledge, Technology, Human Capital</i> (Editor: Gianmarco Ottaviano)
IEM	<i>International Energy Markets</i> (Editor: Matteo Manera)
CSRM	<i>Corporate Social Responsibility and Sustainable Management</i> (Editor: Giulio Sapelli)
PRCG	<i>Privatisation Regulation Corporate Governance</i> (Editor: Bernardo Bortolotti)
ETA	<i>Economic Theory and Applications</i> (Editor: Carlo Carraro)
CTN	<i>Coalition Theory Network</i>