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Full Length Research Paper

A study of pre-colonial and contemporary methods of gold mining in Ghana

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The advent of colonialism and the introduction of modern scientific mining in Ghana during the last decade of the nineteenth century enabled European mining companies to gain control over the mining industry. This effectively excluded Africans from participating in the gold mining industry except as labourers and artisans. This article compares and contrasts the pre-colonial methods of mining with modern artisanal or small-scale mining popularly known in Ghana as *galamsey* and also provide reasons to explain why traditional or pre-colonial mining is still vibrant in the gold-rich Akanland in modern-day Ghana.

Key words: Auriferous, traditional mining, *galamsey*, scientific mining, Akyem Abuakwa, Adanse, Wassa

INTRODUCTION

Within the considerable and expanding literature on the economic history and anthropology of West African societies, the story of pre-colonial mining is still a relatively neglected area. Of course, most of the classic European sources on the history of the Akan region of Ghana refer to gold mining as one of the central occupations of the people. These accounts affirm that in pre-colonial days, gold could be found on the surface to some extent in almost all the auriferous Akan states in Ghana.

In pre-colonial times, gold mining was one of the mainstays of the economies of Asante, Denkyira, Akyem, Wassa and many other Akan states. Oral traditions and early Dutch and English sources repeatedly mention Ahanta, Aowin, Nzema (Apollonia), Sefwi, Assin as well as Twifo, and to a limited extent, Kwahu, as rich gold areas. Rich supplies of gold continued to be found in Bono Takyiman, Banda, Gyaman and other parts of Bono Ahafo and the Northern region (Dumett, 1979). This study on indigenous mining methods includes some evidence from each of the major Akan mining states for a general overview, but principal attention will focus on the survival of indigenous mining despite the advent of modern (scientific) mining in Wassa, Akyem Abuakwa and Obuasi in Adanse, which is now part of Asante.

The main argument of this article is that, despite the existence of large multinational mining firms such as ANGLOGOLD Ashanti, Newmont Ghana Gold Company Limited, Goldfields Ghana Limited, Bogoso Goldfields, traditional or pre-colonial gold mining has retained its vigour and survived when it was supposed to have withered with the onslaught by modern mechanised companies.

METHODOLOGY

This study is based on a twelve month field work in Obuasi, Akwatia in Akyem Abuakwa, Tarkwa in the Wassa West District, all in southern Ghana between 1998 and 1999. The choice of these towns was informed by the mining activities in these areas by the Ashanti Gold Fields Corporation (AGC) now ANGLOGOLD ASHANTI, Newmont Ghana Gold Company Limited, Goldfields Ghana Limited, Bogoso Goldfields, etc. Key persons such as the aged, ex-employees of the mining companies and traditional rulers known to have knowledge related to pre-colonial and scientific mining were interviewed using a special interview guide. Archival data was also used in writing this article. Besides, published and unpublished literature on mining in Ghana was reviewed and made use of to cross-check, evaluate or supplement the archival and oral data. These were in the form of journal articles and books.

Context

The Adanse state is today part of Asante and owes allegiance to the Golden Stool. Historically, however,

Adanse emerged as a state earlier than their one time vassals, Denkyira and Asante. The Adanse state emerged probably during the twelfth century and it is traditionally known in Akan cosmogony as the place where God started the creation of the world (Reindorf, 1898, Ward, 1966 and Buah, 1980). Before the Europeans came to the Gold Coast in 1471, the people of Adanse were already mining gold. From 1482 till the end of the sixteenth century, the Portuguese established themselves at Elmina, building a castle and trading European goods for gold from Adanse (Arhin, 1978). The Dutch, the Danes and the English also followed the Portuguese to the Gold Coast to trade in gold in the sixteenth and seventeenth centuries. In 1601, Muller was probably referring to Adanse gold when he stated that it was in the rich mountains in the interior that the best gold sold on the coast could be found (Perbi, 2004). In the middle of the seventeenth century, a Dutch official on the Gold Coast, describing the people of the interior of the Gold Coast to his superiors in Amsterdam, referred to the "rich gold countries of Adanse" (Dumett, 1998). Writing within the same period, Bosman and Barbot (1967) stated that gold from Adanse, which they referred to as "Accany", was so pure and fine that the best gold was called "*Accani sika*" (Accany gold).

The modern state of Adanse lies south of Bekwai. It is bounded on the south by River Pra, on the east by Banka and Asante Akyem and on the West by Denkyira. Its population in 1984 was about 233,902 (Ghana Population Census, 1984). The Adanse people occupy the hilly lands of Twisa and Moinsi. Much of Adanse land consists of a dense luxuriant tropical forest. The state enjoys a good amount of rainfall and possesses some of the best agricultural lands in Ghana. In the pre-colonial era, the vast stretches of land were exploited mainly for hunting, subsistence agricultural production and gold mining (Bowdich, 1817).

Another auriferous area in Ghana is Wassa. Of the four main auriferous kingdoms of the Akan region – Asante, Denkyira, Akyem and Adanse – the political history of Wassa is relatively shrouded in obscurity. The region known as Wassa or Warsha – "a land rich in gold" – had been well known since Portuguese times and its location had been specified in the famous Dutch map of the 1620s (Dumett, 1987). Contrary to earlier assumptions by Eva Meyerowitz (1974), it is now known that the two moderns states of Wassa Amenfi and Wassa Fiase did not exist during the first three centuries of the gold trade, but were, in fact, the results of the late eighteenth and early nineteenth century developments.

The original heartland of Wassa lay north of River Bonsa, south of the Offin River, east of River Ankobra and west of the Bosompra River; it was situated further inland and covered a smaller expanse of territory than the two modern Wassa states. Wassa was bounded on the south-west by the state of Gwira, which also contained rich goldfields and on the south by Ahanta. Old Wassa never attained the status of a structured kingdom such as that of Akwamu or Denkyira, let alone Asante. It did not develop a large disciplined army, a centralised government, or a network of administrators who could settle disputes or collect taxes in tributary areas. Indeed, mention is made of the independent *abirempon (*The Abirempong were local headmen who acted as Chiefs or rulers of the Wassa people since the institution of Chieftaincy did not exist in their culture) controlling the politics of Wassa in the early 1700s, two centuries after the Portuguese described it as an important mining region. While Wassa possessed rich auriferous lands, its complex political history suggests that the desire of kings and chiefs to control gold mining was hardly a sufficient condition for the achievement of central consolidation. From the earliest centuries of European contact through to the 19th century, Wassa was described as a scantily populated, thickly-forested region, a state whose soil was not particularly fertile and where agriculture did not flourish. One of the first direct references to Wassa is also one of the most revealing. Olefert Dapper, the Dutch chronicler, reported in the 1660s that "the inhabitants spend all their time mining and sow no grain, they are supplied [with food by their neighbours..."] (Dumett, 1987). There were few towns or large villages. Even in the richer mining areas, most of the people lived in small hamlets of three or four cottages. Later European sources confirmed that the Wassa people cultivated yams, a little rice, and other basic crops, but the sources also observed that like the Akyems, they were not very good farmers. Wassa is the area with the longest tradition of industrial gold mining in Ghana.

The modern state of Akyem Abuakwa occupies much of the western half of the Eastern region of modern Ghana. It shares boundaries with Kwahu to the north and north-west and with Krobo, New Juaben and Akuapem to the east and south-east. In the south, Akyem Abuakwa is bounded by Agona and in the west by Akyem Kotoku. Much of Akyem Abuakwa is lowland and consists of dense luxuriant tropical rain forest (Addo-Fening, 1997; Afrifa, 2000).

An important landmark on the Akyem Abuakwa landscape is the densely forested Atewa Range (Akyem Hills), which runs almost down the centre of the state in a north-south direction from Anyinam, Asamankese, cutting off western Akyem Abuakwa from the state capital Kyebi. In the north, the Atewa Range is separated from the Kwahu and Begoro Mountains by the Birem Valley. The state's main river, the Birem, takes its source from the Atewa Range. Into the Birem itself, flow numerous small rivers and streams. The state enjoys a good amount of rainfall and possesses some of the best agricultural lands in Ghana. In the pre-colonial era, the vast stretches of land were exploited mainly for hunting, subsistence agriculture and gold mining. Birem Valley in Akyem Abuakwa was well known for its richness in gold. There are repeated references, in European records, to Akyem

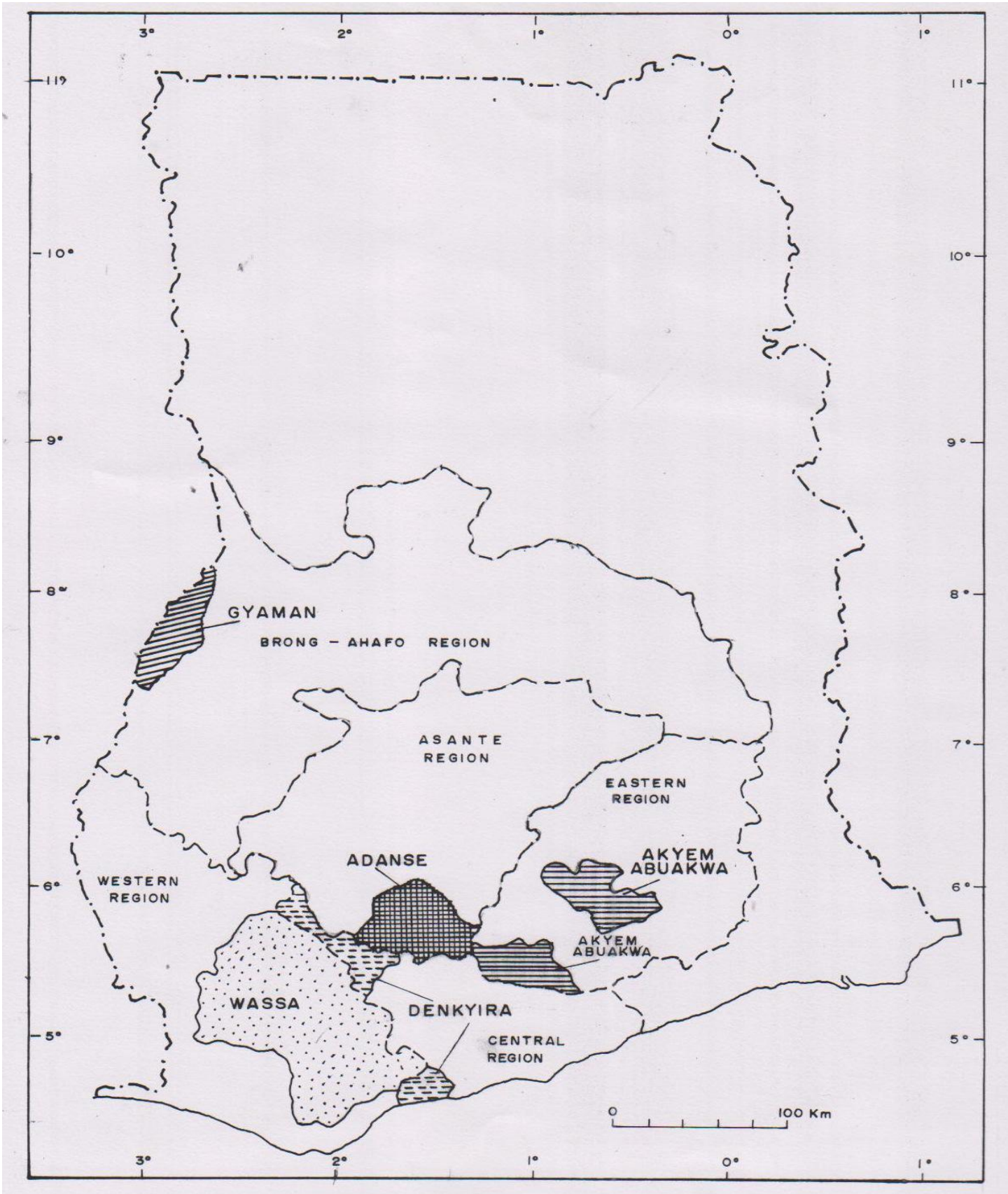

Figure 1: Map of Ghana showing the major auriferous Akan states (Source: original from the author)

Abuakwa territory as a principal source of gold (Addo-Fening, 1988). Bossman remarked that Akyem 'furnishes us with large quantities of gold as any land I know ...' (Ward, 1966; Addo-Fening, 1988). A Dutch report of 1701 described Asante, Denkyira and Akyem as the "three mightiest and richest countries from which practically all the gold has come" to the coast (Addo-Fening, 1988). Denkyira and Akyem were described around 1703 as "the two gold-bearing countries ... the only two districts which possess gold at its source ...' (Addo-Fening, 1988). Aside from the fact that Akyem Abuakwa was the sole supplier of gold, the deep distinguishing colour of the gold made it the purest and most valuable of all the gold exported from the Gold Coast (Bosman, 1698; Barbot, 1732; Macdonald, 1902; Addo-Fening, 1976). Anville's map of the Gold Coast, drawn in 1729, refers to Akyem Abuakwa as very large and rich in gold (Daaku, 1969; Afriffa, 2000) The Danish trader R. F. Rømer writing in the nineteenth century noted that Akyem Abuakwa traders sent only a few slaves but plenty of gold to the coast (Addo-Fening, 1997; Perbi, 2004). The Basel missionary, Baum, in 1857 said that "for the Akims, gold is their god" (Addo-Fening, 1997). In his writings, Geo Macdonald simply refers to Akyem Abuakwa as "auriferous Akim" (Macdonald, 1902). Apart from gold, Akyem Abuakwa land is also diamondiferous (Junner, 1958; Kwakye, 2007).

Traditional Methods of obtaining Alluvial Gold

The history of gold is unequalled by that of any other metal because of its value in the minds of men. From the earliest times, people have always prized gold as the most valuable commodity because of the worth which is attached to it as an article of ornamentation and also because of its conventional value as a basis for currency. Mining has had a long history in Africa, particularly gold mining. Africa is the world's largest producer of gold. West Africa in particular has been a major gold mining area for many centuries with activities dating back to the beginning of the fifth century. The earliest available records indicate that the forest peoples of modern Ghana mined gold for several centuries before the Portuguese landed on the Guinea Coast of West Africa. The focus of the early Atlantic traders in Ghana was gold. Ghana is a major player in the gold mining industry globally and in Africa in particular. The country is ranked 10th in the league of producers and the second, only after South Africa, in Africa (Tsuma, 2009).

Traditional gold mining in Ghana can be evaluated according to three main categories. The most common type was washing or "panning" for alluvial gold along the banks of streams and rivers and along ocean shores, particularly those near river estuaries. Second, and probably the most important form of mining in terms of the numbers of workers involved and returns of gold, was shallow-pit surface mining on either the crests or sides of hills or in the sedimented valleys of ancient river beds. The third type was deep-shaft mining for reef gold. Gold mining was largely a seasonal activity. Some placer mining and shallow pit mining took place all year-round; but panning for river gold tended to be best in the early rainy season. Deep shaft mining was mainly a dry season activity – occupying the time of men after harvesting in December and reaching a peak just before planting in April, when the water table was low (Dumett, 1987).

Placer mining

It is not known when gold mining commenced in the Gold Coast, but it is certain that the local inhabitants were accustomed to winning gold prior to the arrival of the Portuguese in 1471. At that time, nearly all the gold appear to have been obtained from streams and rivers in the rain forest and in coastal sands, where it had been washed down from the interior by rivers and rains (Kimble, 1963; Gocking, 2005). Bosman (1698) states that the gold was obtained in or between certain hills and in river gravels where the streams enter the sea. Women would flock to the seashore after a heavy rain to pan for gold. Sand carried down from the interior deposited at the sides of river estuaries were said to be a lucrative source of placer gold on the coast. According to him, the collection and washing of beach gravels and sand at Elmina and Axim were done by women and boys after violent rains Quoting directly from Bosman (1967) "They used large troughs and trays, which they filled with sand and gravels and washed repeatedly with fresh water till all the lighter materials was removed. The concentrate containing the gold was washed again in a small tray until all the dross was removed".

This was corroborated by Barbot (1732) when he wrote that the stream beds at the base of hills or beneath waterfalls were especially rich sources of alluvial gold. He noted that the young men might plunge into even the most rapid streams and scoop up all they could from the bottom in shallow brass or calabash bowls. The most common and effective method, however, seems to have been for the women and boys to scoop holes in the alluvial earth or gravel on the river banks or in whirl pools on the shallow sides, rather than descend into the centre of the rushing torrent itself. Important traditional alluvial washing sites could be found along the banks of rivers such as Tano, Ankobra and its tributary the Bonsa, the smaller Butre and Jimi rivers, the rivers Pra, Tain and Ofin and the Birem valley of Akyem Abuakwa in the Eastern region of Ghana. In the pre-colonial era, much of this river gold was washed down to the sea shore and turned towns and villages near the coast or at the mouths of rivers into active areas for panning by women and children during the rainy season. In Wassa, Nzema, Akyem and Asante, panning for gold along river banks dates back to centuries (Dumett, 1998). River bed placer mining by traditional diggers and panners continued long

after the advent of scientific mining.

Organised on a family basis, panning for alluvial gold in stream beds in the forest areas and along coastal shorelines was primarily the work of women, adolescent girls and young boys. Adult males might also participate in digging holes close to river banks. Women's alluvial gold washing could be dictated in some states by strict customs. Thus, in one Wassa substate, panning for gold was restricted to Tuesdays, Thursdays and Sundays (Dumett, 1998). Still alluvial gold washing was not always organised as a group or family activity. In Denkyira, Akyem and Asante, individual women could go to the local river at any time and pan for gold.

The process of separation was extremely laborious and time-consuming. It required repeated washing – perhaps as many as five or six times of a given amount of river-bed gravel to isolate a tiny amount of fine gold. In a series of stages and by rotation "shaking" of a calabash bowl or special wooden trays known as *akorow, posie, aposna* and *tokrowa* (Garrard, 1980). Experienced women would gradually wash away the debris until only fine grains of gold remained. The last or smallest tray which they used might be coloured black to better reflect the fine grains of gold. Afterwards, they would dry out what remained in the sun or over a fire. It was an arduous process requiring great experience, care and patience. Early explorers reported that almost the whole of the sandy gravel beneath the surface soil was auriferous. This is confirmed by Meredith (1812) when he stated that "... Women of Cape Coast... convey the earth to the sea side, where with much ingenuity and perseverance, they examine it and put the earth into a wooden bowl, where it undergoes frequent ablutions by a circular motion until the lighter parts are washed away... It then undergoes a careful elimination and frequent washings; and the gold at length is perceived at the bottom of the bowl, where it is allowed to remain until the whole earth is washed away...."

In Akyem and Asante, the general term used for all gold washing bowls was *sika kuduo*. (Addo-Fening, 1976; Arhin, 1978). Experienced prospectors from Australia and South Africa reiterated that the skill of a West African woman with a brass bowl far exceeded anything they had seen at Ballarat or on the Rand (Dumett, 1987).

Traditional Methods of Identifying Gold in Auriferous Regions in Ghana

Gold was not mined on the coast but further inland. Historically, Denkyira, Wassa, Gyaman and the Pra and Ofin basin in Asante and Birem valley in Akyem Abuakwa were well known not only for their wealth in gold but also for their exploits in the mining of the precious metal. Most Akan areas of Southern Ghana are well endowed with huge deposits of gold, but due to the unsophisticated technology of the time, indigenous miners found it increasingly difficult to identify the gold impregnated areas. Gold prospectors dug pits in places where nuggets had been washed out during the rains and therefore offered hope of recovery of sufficient quantities. According to the elders of Fomena, areas of potential gold finds were indicated during the April rains when pebbles gleaming with gold grains were washed out. In Fomena, children often searched for grains of gold in streets and ditches after heavy rainfalls (Interview with Elders of Fomena, 1998).

Ideal excavation sites were the lands bordering the rivers and streams and the deposits of dried-out valleys or ancient river beds. The valleys of rivers Jimi, Birem, Pra, Bonsa, Tain and Ofin were known to be auriferous. Certain types of vegetation were believed to be associated with auriferous soils. Valuable formations of vein-gold might be discovered by sheer luck, by recognising perculiarities of the surrounding surface of vegetation, or by following the course of an outcrop. According to a tradition recorded by Daaku, Ntim Gyakari, the then *Denkyirahene* (Denkyira king), discovered gold with the help of such vegetation in a local stream at Boberase in Adanse during the late seventeenth century in the course of his war against Asante. Narrating the story, the elders said that "When he got to our stream, he realised from the type of plants growing by it that the land was rich in gold. He, therefore, put up camp here for three days to wash the soil for the gold. When he left our people took up digging" (Daaku, 1969).

In addition, some elders in Akrokyere claimed that in the past auriferous sites could be revealed in dreams by their forefathers. Finally, earth of a blue-black or grey appearance along river beds and banks provided clues to auriferous strata. In some places, a nugget of gold was again buried, in order that a more bountiful supply may be obtained in the future, and tradition has it that in some places the presence of a thin white smoke or vapour leads to a rich deposit. The presence of ferns is also regarded as a sign of ground rich in the precious metal. Fetish too played an important part in West African gold findings (Macdonald, 1902).

Traditional methods of extracting gold

Shallow-pit Mining

Shallow-pit sub-surface openings, known as *mmoaboa*, were the most common form of indigenous gold mining and the principal source of the gold dust and nuggets produced by the auriferous Akan miners. This gold was subsequently exported to North Africa and Europe during the pre-colonial era. The surface was opened either in small holes, dug by individuals or in larger excavations such as trenches or broad pits (sometimes up to eight feet in diameter) with entire families working together on the project. These pits were usually not more than three to ten feet deep. Miners found little difficulty in getting to

the sedimentary deposits of fine gold and nuggets (where they existed) which underlay the upper strata of the topsoil, laterite, clay and gravel. Expert European miners reported that the alluvial gold of the Gold Coast lay much closer to the surface, typically, than was the case in the other goldfields of the world they had worked in (Dumett, 1987).

European prospectors at Wassa and Akyem in the eastern region found the land on either side of the well-trod footpaths literally scarred with small holes averaging about 3 ft in diameter, into which the unwary might easily fall during the hours of darkness. Accounts recorded by Bowdich in the early nineteenth century, and later by Freeman, make it reasonably clear that placer mining in rivers and digging in small surface holes were also the most common types of mining in Asante and in Gyaman (Dumett, 1979).

Deep level reef gold mining

The more serious indigenous form of mining during the pre-colonial era involved digging a shaft. The nineteenth century European observers raised a discordant voice as to the technical expertise of the African pre-colonial reef gold miners. They argued that African gold mining could only be described as “primitive” and “inefficient”. Africans were marginalised as incapable of sinking deep shafts, using timbering, making adits and tunnels, or of extracting deep-level reef gold. In spite of the fact that most pits were dug in softer sub-surface sedimentary deposits, it would be wrong to assume that no deep level mining was undertaken or that miners using traditional methods were incapable of cutting into the hardest quartz reefs. It is also incorrect to suppose that African workers were totally unfamiliar with tunnelling. The depth and size of an indigenous shaft varied considerably according to the geologic terrain, the kinds of earth encountered, the preferences of the miners, and fluctuating levels of ground water (Dumett, 1979). One common type of pit was the bottle-shaped opening – long and narrow at the top and neck but widening at the centre and bottom – where miners chipped away at the cavelike sides and ceiling. Most excavations ran from ten to twenty feet in depth. However, there are numerous cases in the records of shafts which were sunk to depths of eighty to hundred feet, and sometimes even more (Romer, 2005). Such deep shafts were generally of the “chimney pipe” type and is known in the local Twi language as *amena pea nkron* (Arhin, 1978). Workers went down by use of bamboo ladders, foot and hand holes dug in the sides, or simply by opposing leg and back pressure against the walls. In Wassa and Asante, the most typical intermediate size mine was the bell-shaped or bottle-shaped excavation known as *nkron*, narrow at the top but widening at the lower levels into a dome-shaped mining chamber (Arhin, 1970). The usual method was to use a kind of digging stick fitted with an iron tip. This soil chisel was used to dig a vertical shaft through the hard laterite crust until the end of the gold bearing earth or the shaft hit the water table. Such a shaft might also continue for hundreds of metres twisting and turning as the miners followed the gold until the source ran out. Figure. 2 shows some of the traditional mining implements. In 1812 Meredith described the natives’ dig “... as if forming a well until they come to a dark coloured stone which is recovered by grinding the stone to powder and washing it” (Meredith, 1909).

The roof of the shaft was supported with timber to prevent it from caving in or collapsing. The shaft was so narrow that miners could only support themselves between its walls when descending through it. Usually steps were cut into the sides of the shafts to help miners climb up and down.

When it became too difficult to go any deeper, the work in the shaft was abandoned and another was dug, often only a few meters away. To help light up the dark underground, miners developed a special lamp, made of clay and lighted by wicks of cotton cloth soaked in palm oil. A horizontal tunnel linked the bases of the shafts. Yet within this context, innovations continued to take place. While it is true that Akan miners lacked the knowledge of heavy timbering required for very long tunnelling or driving adits straight into the sides of hills, they occasionally used short tunnels to connect their *nkron*. By the 1860s and 1870s, miners in Wassa and Asante were using bamboo poles bound together by ropes and reinforced with cross-timbers – known as “lagging” – to shore up their vertical shafts (Dumett, 1998). Some gold fields were honeycombed by a complex network of shafts connected by short tunnels from 4 to 20 ft in length. Between the main shafts, a series of small openings were used for ventilation. In addition, miners at Wassa built palm-leaf sheds over their mine holes to protect against the rains (Burton and Cameron, 1883).

When the miners hit a hard gold-bearing rock, they devised a strategy to overcome it. Fires were also lit on the quartz exposed in a shaft till the rock heated up. The heated rock was doused with cold water to cause it to crack and make it easier to break up. The miners attacked a pillar of reef gold quartz by trying first to dig the earth and break the rock out from around it, thus exposing the gold laden pillar or block on all sides. Next they went into the bush to gather a special kind of dense, slow burning wood, which was stacked in big piles against the rock. Underground bonfires had to be kept burning for three to four days and, perhaps, longer in order to be effective. After a reasonable period of time, the miners returned to douse the heated rock with cold water to cause it to crack and make it easier to break up, then they attacked it with their chisels. There are also cases where small amounts of gunpowder were used to blast reef gold (Skertchly, 1878; Holes, 1926; Rickard, 1934; Turner, 1932; Arhin, 1970, 1974).

The Nzema people were known for their physical vigour

and for bringing improvement (through tools and working methods) to the miners' art. One of their most innovative techniques was that of fire-setting in difficult-to-penetrate deep reef gold mines (Dumett, 1987). This innovative technique was one of their glorious contributions to the pre-colonial mining enterprise in Ghana. Indeed, this ground-breaking technique was highly scientific because it worked on the principle of expansion and contraction in physics. The setting of fire to the quartz added immense heat to the ore and therefore raised the temperature of the rock. And the fact that this heat was sustained for several days meant that the ore was heated to the greatest possible extent; a feat that can be attained in modern times through the use of blast furnaces. According to the law of expansion, when heat is applied to a substance, the molecules that make up the substance drift apart from each other and therefore causes the expansion to take place. When the miners doused the heated ore with cold water after many days of heating, there was a rapid cooling which caused the rock to crack and consequently facilitated the easy crushing and removal of the gold from the ore. In this way, the indigenous African miners were applying the principles of physics without their knowledge of the discipline.

In most cases, Nzema families appeared to have migrated to Wassa in small groups only for the duration of the mining season. However, in some instances, they settled permanently and took up farming as well. Some accounts also credit the Nzemas with being the first to mine for gold at certain sites in Asante, such as Obuasi (Interview with Donkor, 1998).

N. R. Junner, the leading modern authority on gold mining geology in Ghana believes that the narrow pits were sunk originally as prospecting shafts and when gold was found in them, they served as individual claims. Circular pits of similar dimensions are of considerable antiquity and were sunk by natives in their search for gold in other countries such as Zimbabwe and French Guinea, and were employed by the Romans in Spain (Rickard, 1934).

While it would be wrong to believe European accounts which suggest that little or no reef gold was mined or that African miners were unwilling or unable to obtain ore from hard rock, it would also be wrong to exaggerate the quantities of gold recovered from deep-reef mining or to attribute importance to such mining throughout the entire Akan region. First, there were definite physical constraints against deep digging beyond a certain level. Presence of groundwater, lack of ventilation, and cave-ins were frequent problems. Second, the sinking of deep shafts could involve a considerable gamble as much time could be lost following false leads. If a group of miners did not strike payable ore within 20 feet, the shaft was often abandoned. Third, much of the gold recovered from deep-shaft mining was from softer sedimentary layers, siliceous layers or fragmented portions of the reef formation rather than from the hardest reef or rock containing gold. Fourth, even if miners were fortunate enough to strike a rich vein, much time and labour were required to produce the pure gold. Sometimes miners would penetrate very deep through the various sedimentary layers – topsoil, laterite, red sandy clay – only to find that access to the gold-bearing vein was blocked by a thick layer of impenetrable rock (Dumett, 1987).

Tools and Implements

In the course of time, indigenous Akan gold miners used appropriate technology in devising different types of mining tools and extractive techniques. The most commonly used implement in shallow-pit mining was a digging hoe or adze (which is similar to the Akan cultivating tool known as asɔ), the metal head being about two inches broad and six inches long. But G. E. Ferguson, the Fante geologist and surveyor, when passing through the Upper Birem Valley of Akyem Abuakwa in 1890, noted that local diggers had developed a more specialised digging instrument – a kind of narrow bladed spade with a long handle – known in Twi as sɔsɔ toa (Dumett, 1987). Pressing the ends of this digging tool against the walls of the shaft, the miner also used it for support in descent and ascent. Dredgers for river gold sometimes used the sɔsɔ tupre, a kind of shovel to dig out the alluvial sands (Arhin, 1970).

Methods of gold extraction varied between regions from the most rudimentary to fairly sophisticated methods based on locally developed iron tools. As a result of long experimentation, some relatively advanced mining techniques developed in some states closer to the coast, such as Wassa, to the point where miners used iron picks and shovels to open the ground, applied mallets and chisels to hard rock, and substituted ladders for hand footholds for descent and ascent. There is also evidence that by the late nineteenth century, workers in some districts were using windlasses to haul up roped ore buckets and to lower miners into the shafts on slings. The limitation of this type of mining is that it was difficult for miners to move laterally beneath the surface and tunnelling was not that common. In the pre-colonial era, special days were set aside for communal digging, during which men and women had to produce gold for the kings in their respective states.

Scientific Mining in Ghana

From the fifteenth to the first half of the nineteenth century, mining in Ghana was wholly an African activity. Using simple but effective technologies, the gold diggers of Gyaman, Denkyira, Wassa, Asante and Akyem Abuakwa, among others, supplied Europe with enormous quantities of gold. The second half of the nineteenth century, however, saw the native gold mining industry in

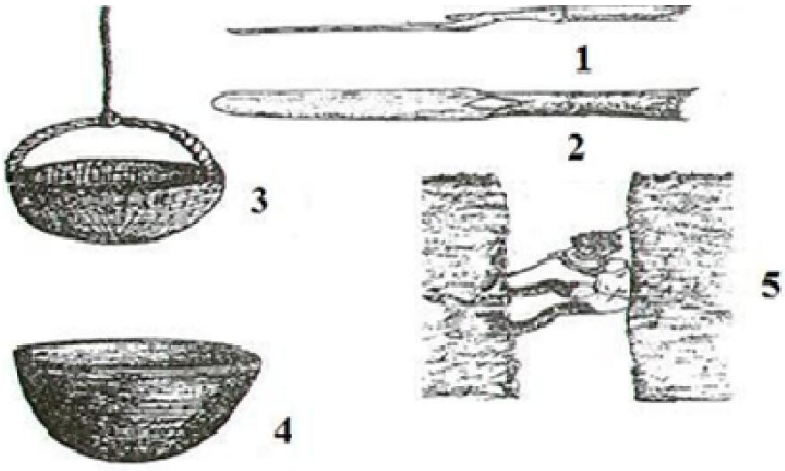

Figure 2 :Traditional mining implements. *1. Soso toa 2. Soso tupre 3. Small can with rope attached 4. Koro 5. Amena pea nkron*. From G. E. Ferguson (1891). As Found in Kwame Arhin, Gold Mining and Trading among the Ashanti in Ghana, *Journal des Africanites* 48: 1, 1978

Ghana declining. This decline was the outcome of a blend of factors such as the emancipation of slaves and pawns which robbed the native mines of their source of labour, the demonetisation of gold dust (1889) which for centuries had been the main medium of exchange, and European imperialism which steadily left out Africans from the mining industry and turned it into a European monopoly (Addo-Fening, 1997). In the wake of the Southern African mineral revolution sparked off in 1869-1871 by the discovery of large quantities of diamonds in the region of modern Kimberley and sped up in 1886 by the discovery of gold at Witwatersrand in Central Transvaal, large mining companies emerged. With their huge capital and modern technology, De Beers Diamond Company and Cecil Rhodes' Consolidated Goldfields deprived individual diggers of their entitlements, bought out rivals and secured complete monopolies of the diamond and gold mining business in Southern Africa. From then on, the role of Africans in the mining business was reduced to that of manual labourers. Hopeful of replicating the South African experience in West Africa, scores of European concession seekers congregated in the Gold Coast in the first decade of the nineteenth century to negotiate grants of mining concessions with the local rulers. Such was the rush for mining concessions that the Land Bill of 1897 was drafted to control it. Between 1897 and 1900, no fewer than nine concessions were leased in Akyem Abuakwa (Adm 11/1/1105 PRAAD, Accra). By 1915, as many as seven gold mining companies had also sprung up in the Adansi area alone (Junner, 1935; Gold Coast Annual Report, 1936-37; Anin, 1980). Between 1881 and 1888, eleven mining companies belonging to both local and expatriate concessionaires sprang up in the Tarkwa district in the Wassa area (Dumett, 1998).

Traditional mining was relatively speaking, not labour intensive. The average size of labour required for a traditional mine varied with the scale of operations. In general, the traditional mine labour force was not different from that used in farming, craft work and long distance trade. The indigenous miner prospected for and mined gold with his family members and slaves. The men dug the pits often with the help of their sons. It was an advantage for a man to have several wives, as they and their children provided the labour required for panning (Interview with Brenya, 1998). Traditional mining required a small labour force because it was a part time job for the farmer-miner who used mining as a supplement to subsistence farming and craftwork. Thus, the scale of an indigenous mining operation was very limited in size. *Ipsofacto* the technique used, was simple and required minimal capital. Besides, since it was a small scale part time job, it did not require any special skills.

By contrast, modern mining was a highly technical, labour and capital-intensive industrial undertaking. Accordingly, a large workforce was required ranging from unskilled labourers and clerks to highly trained technicians and professionals. The range of jobs needed for modern mining included carpenters, masons, black-smiths, fitters, timber men, blast men, chemical treatment men, engineers, etc. The entry of Europeans into a previously exclusively African field of activity revolutionised the mining industry in the Gold Coast. The industry became highly mechanised. By 1931, the Consolidated African Selection Trust (CAST) had installed eight plants on its Akwatia concessions (Adm 26/6/49 PRAAD, Accra). Two six-ton boilers and four lorry loads of pipes were transported to the Akwatia mine in December 1933 (Adm 26/6/49 PRAAD, Koforidua). By January 1934, the Holland Syndicate Mine at Takorase

had two plants working (Adm 26/6/49 PRAAD, Koforidua). A significant result of the boom in scientific mining in the Gold Coast was that, as in South Africa, the role of the African in the mining industry was reduced largely to that of a labourer on wages (Addo-Fening, 1997). There were close to about 400 Africans in the hire of Holland Syndicate Diamond Company at its two plants at Takorase in Akyem Abuakwa by January 1934 (Addo-Fening, 1997). Most of all, the greater use of European technology in the mining industry in the Gold Coast stalled the growth of the indigenous technology. The small number of African entrepreneurs who entered the mining business in the first twenty years of the twentieth century were coerced by the objective conditions of the time to choose European technology so as to be competitive (Addo-Fening, 1997). They were, however, constrained from the onset by lack of adequate capital and trained manpower. By 1930, all the African concession holders in Akyem Abuakwa had withdrawn from the mining industry leaving the field to be dominated by expatriate mining companies (Addo-Fening, 1997). An industry that had been the economic backbone of the Akan mining areas in the Gold Coast for over four centuries was discarded by the people in the 1930s and 1940s. Pit-mining completely died away and the technology was gradually lost. All that remained of the native gold mining industry was sporadic washing for gold in river beds carried out as a hobby by the elderly and physically inactive women (Addo-Fening, 1997).

The expatriate mining companies did not experience serious shortage of surface labour in the early stages of its operations. The main difficulty of these corporations was how to maintain a labour force for the dangerous and unpleasant underground work. By the middle of 1909, there was a labour shortage in the Gold Coast, which was described as “acute” (Gold Coast Mines Report, 1909). The 1910 Annual Report of the West African Chamber of Mines showed that “all the local supply of native labourers was exhausted and the industry was faced with a serious shortage (Gold Coast Mines Report, 1909).

This problem came about as a result of the fact that most of the Akan migrant mine labourers resented underground work. They believed that underground mining was associated with unfriendly spirits. In addition, they viewed underground mining as a low status activity associated with slaves and, therefore, degrading (Interview with Amponsem, 1999; COS 96/249).

The Akans could reasonably subsist on the cultivation of traditional food crops (yams, cocoyams, cassava, bananas, plantain and green vegetables) supplemented by hunting and fishing. Consequently, there was no pressing need for them to sell their labour to Europeans to earn a living (Interview with Amponsem, 1999; COS 96/249).

Most men from the Akan forest states valued their freedom and independence of action to being on the pay roll of the mining companies for a long time. The people of Adanse and the other Akan migrants, who settled among them, were interested in the lucrative rubber business in the early twentieth century, hence their negative attitude to underground mining (Willcocks, 1904; Interview with Amponsem, 1999; COS 96/249). Besides, the notion of payment of a fixed wage per unit of time was unknown in traditional Akan society (Rattray, 1929; Interview with Sakrakyire, 1999).

Low wages paid to the unskilled labourer was not the only unattractive feature of the mines. The tasks assigned to the labourers were also arduous, dirty and dangerous. Local women who were employed as porters by the mining companies to carry the ore to the crushing plant performed one of the most difficult tasks (Interview with Akuoko, 1999).

The shortage of underground labour was worsened by the cocoa boom of the 1930s. The rapid growth of the cocoa industry created new income opportunities, many of them more attractive than the work in the mines. Labourers who offered their services to carry cocoa beans from the Akan forest to the coastal towns for transhipment could earn between 10 and 15 shillings a day as against 4 shillings a day in the mines (Ofosu-Mensah, 1999).

The reduction in the supply of Kru labourers due to the development of rubber plantations in Liberia and the unwillingness of the Akans to work underground made AGC consider the importation of unskilled labourers from the Northern Territories of the Gold Coast (Szerezewski, 1965). The Acting Governor of the Gold Coast, commenting on the labour shortage in the Colony and Asante, stated that “Foreign labour was unavailable and no reliable labour could be obtained from Ashanti where the people are strongly averse to any form of systematic work and therefore the only alternative was labour from the Northern Territories” (Adm 56/1/84 PRAAD, Accra).

The unwillingness of the Akans to work with the expatriate mining companies made the first European companies that came to Tarkwa and Aboso in the Wassa district in the late 1870s find it increasingly difficult to employ and adapt Africans to capitalistic wage labour. They held it essential though costly to continue a “tributary” method of payment (one-third to the workers, two-thirds to the company) as a transitional scheme to attract workers (Dumett, 1987). In spite of this, the indigenous miners were demotivated to work as labourers for the mining companies because of the low wages they received. In 1926 labourers at AGC received wages averaging from 1s, 6d to 2s per day. The labourers were expected to work nine hours per day for five days and six hours on Saturdays, making a total working week of fifty-one hours (Adm 56/1/188 PRAAD, Accra). All these contributed to making work in the modern corporations

unpopular among the Akans of Southern Ghana.

Small Scale Artisanal Mining (*Galamsey*)

Having armed themselves with some scientific mining practices like the use of mercury and cyanide to recover gold, several ambitious indigenous miners deserted the European mining firms to embark on the extraction of gold by themselves using the combination of traditional mining techniques with modern scientific methods. The new hybrid system that combined these two technologies is locally referred to as galamsey (artisanal small scale mining) which is similar to the practice of garimpeiros (Agbesinyale, 2003) in Brazil. They were the only miners of gold and diamond in the traditional economy until 1905 when the colonial authorities through legislation made their operations illegal (Akabzaa, 2000). They therefore braved all the odds to return to their former occupations after experiencing the hazards and injustice of the new order in the industry.

This group of miners lacked enough capital and their operations were labour intensive with low rates of recovery. They also suffered from poor access to markets and support services, and had to depend on middlemen who facilitate the transfer of their goods to the market. Their operations are in health risk areas, bearing a significant impact on the environment (ghanaweb.com, 2010). In Tarkwa, this practice is historical and Dummet (1998) argues that most of the mining communities engaged in galamsey, a trade that was passed on through generations (Tsuma, 2009). By 2008, there were there were 39 small-scale registered mining concession holders within the Tarkwa area alone. In addition, there were over six thousand illegal miners, who have no permanent operating sites in the area. The operations of these small-scale miners are in direct conflict with the large-scale mining companies as they compete for prospecting space (Akabzaa, 2000). However, some scholars argue that migrants engage in galamsey work much more than the indigenes (Tsuma, 2009).

The secession of the local miners to embark on their own mining interests allowed them freedom to create and enjoy their wealth without having to share it with the foreigners. This brought about a class of wealthy small-scale miners in the Akan regions of the country. It initially also engendered a sense of satisfaction as the people became self employed and also gained from the expatriates in the sense that they had been able to enhance traditional mining techniques with some modern scientific technology.

Similarities and differences between galamsey and traditional mining

Galamsey and traditional mining are indistinguishable in terms of the implements used and technologies involved. The modern small-scale artisanal miners utilise old techniques of digging their trenches with the same implements that were used in the olden days. It is associated with pickaxes, shovels, sluices, pans and a variety of rudimentary implements used for processing and concentration.

However, the difference between the two is that, whereas the old traditional miners abandoned their shafts upon hitting the water table, the *galamsey* miners of today use of water pumps to pump the water from from their shafts and continue with their activities. They also use crushers and explosives (dynamites) to blast the hard rocks whereas the traditional miners of old set fire to the hard rocks for several days and doused it with water to break them. Artisanal miners of today also use the 'inner tyre tube', as a rudimentary means of concentrating ore, using the inner tube of an automobile. Again, *galamsey* is slightly more advanced than traditional mining in the application of mercury and cyanide to retrieve gold, whereas the native miners did not know how to recover the gold when it was locked up in sulphides or similar refractory minerals. Unoxidised ores of this type were therefore not worked by them. Finally, there is a contrast between *galamsey* and traditional mining in terms of the labour used. Whereas the traditional miner used his family and slaves (if he had any) to mine gold, modern *galamsey* mining tends to have a higher concentration of labourers engaged in arduous manual work for menial wages. Such intensive manual work weakens the immune systems of miners, making them even more susceptible to diseases and illnesses, particularly malaria (Pardie and Hilson; 2006). Figure 3 is a picture of two illegal galamsey miners cramped in a shaft which they dug using crude *technology.*

Why people embark on small-scale artisanal mining "*galamsey*"

It is important at this stage to examine what really pushes people into the dangerous galamsey business despite all the odds being against the practice. The following are some of the reasons that drive people into this very difficult and arduous enterprise. Firstly, gold mines are attractive, especially for those hoping for a lucky break. In their search for a better life, large numbers of the unemployed, largely young people from communities near mine sites move to the mining towns. Unfortunately, they are often unable to secure jobs due to their low educational qualifications. The majority of these young people resort to the galamsey work and play a key role in the number of migrants who currently influence galamsey work in Tarkwa, because of their success or assumed success in the trade (Tsuma, 2009).

Secondly, most young people engaged in galamsey are driven by the prestige and high lifestyle that miners enjoy.

Figure 3: Picture of two illegal galamsey miners in a shaft which they dug using crude technology. Source: www.myjoyonline.com/photogallery

On the average, galamsey miners make close to US$100 per day and, since they appear to be guaranteed the same each day, they spend it luxuriously. Despite the illegal identity of galamsey miners, they do continue to influence decisions at the local level, as well as within the formal mining sector (Ayling and Kelly, 1997).

Social injustice is the third reason that forces people into this a deadly venture. All the major companies and corporate entities are located in the capital city of Accra with few regional branches in the regional capitals. As a result, jobs are concentrated in the large cities so people in the hinterlands look to small-scale illegal mining or

galamsey as a gainful "employer" no matter how abhorrent this "employer" is. In addition to this social injustice is the problem of general genuine job seekers. Today, there is a high level of graduet unempoyement in Ghana. There are simply not enough jobs being created by the economy and therefore, the scale of unemployment inevitably pushes genuine job seekers into illegal mining (ghanaweb.com, 2010).

Following the government's implementation of Economic Reform (Structural Adjustment) Programme in the late 1980s, state-owned gold mining companies were sold out to private companies. The result is that as part of their cost-cutting measures, these companies retrenched a lot of workers. Workers who were retrenched from these companies shifted their expertise to the galamsey industry for survival (Akabzaa, 2000).

Mention must be made of the apparent accusations being levelled against mining companies in certain gold-rich communities like Obuasi, Prestea and Bogoso. Some practitioners of galamsey argue that their lands have been appropriated by mining companies and as they cannot farm, they find a means of survival, hence, *ve*nturing into illegal mining: a case of a hungry man being an angry man. But some mining companies in the Western and Ashanti regions have adopted the policy of corporate social responsibility by helping the unemployed youth to go into agriculture. This policy, as laudable as it is, has failed as more and more people are digging their own graves in collapsed tunnels. The simple rationale being that illegal miners do not see agricultural projects and ventures as a way of making money as much money as galamsey. Unfortunately, farming in Ghana is seen as an occupation for the poor (ghanaweb.com, 2010).

Another factor that attracts people into the *galamsey* operation is the promise of wealth. People who mine gold on their own make fortunes more quickly than most other professions. Therefore, some people choose artisanal mining over learning as a vocation because they believe they can make make money faster.

The socio-cultural significance of gold in traditional rich areas in Ghana combined with the continued difficulty in enforcement and monitoring may all have contributed to non-compliance with the law banning *galamsey* (Ofosu-

Mensah, 1999). Since the beginning of recorded history, gold has played a very important role in the Akan economic and social order. Gold compares with all that is elegant and precious, hence the demand for it has been great and men have stopped almost at nothing to acquire it. From ancient times gold has been desirable for its intrinsic value and it continues to play an important part in the fabrication of royal regalia and in ceremonies of state. People are thus, motivated to enter into the illegal world of *galamsey* because of the ready local market for gold in Ghana.

Regardless of the illegality of *galamsey* operations, the gold produced still finds its way into the formal market. As long as gold produced illegally finds its way into the legal market, the struggle to stamp out the practice will yield minimal fruit. Powerful individuals within the formal mining sector play a key role in ensuring that the gold produced through *galamsey* finds market in the formal gold market. In Ghana, this role is played under the domain of the District Small Scale Mining Centres, which are responsible for marketing legal small-scale operations as well as collecting the gold for local consumption. Powerful individuals – who hold top positions in government, traditional councils and in mining multinational companies - own these mining sites. Such individuals make it difficult to effectively clamp down on the influence of *galamsey* operations, and keep the local demand for gold by acting as middlemen to the agencies responsible for mining. These individuals also keep the market chain for mercury open despite the ban of 1933, which prohibits the trade and use of mercury in any mining operations (Tsuma, 2009).

Problems Associated with Small-Scale Artisanal Mining (*Galamsey*) in Ghana

The clandestine activities of *galamsey* bring in its wake economic, environmental, health and social problems to the society and the country as a whole. This section of the paper highlights on some of the teething problems and complications that have plagued Ghana as a result of the activities of illegal small-scale miners.

The first point to consider is the human cost of *galamseying*. A lot of lives have been lost through illegal mining. Many people have been buried in the earth due to collapsed pits, tunnels and workings. These openings are normally dug using primitive methods and are usually, weakly supported by timber. Mined out pits which are not filled abound in mining communities and are death traps to humans and animals.

Secondly, small-scale artisanal mining which was a respected tradition in Ghana for centuries became a persecuted profession after the British colonised the region in the early 19th century and banned the practice. The purchase of concessions conferred on the expatriate mining companies enormous rights and powers. All occupiers of land within the boundaries of the lease, held tenancies at their will and nobody could embark on mining activities on the lease without the consent of the mining companies. Section 24 of the Concessions Ordinance of 1900 prohibited any person from searching for minerals without a prospecting licence, while Section 34(1) restricted prospective African mining entrepreneurs to the use of indigenous technology (Gold Coast Ordinances for the year 1900; Adm 29/6/42 PRAAD, Koforidua). This attempted to exclude the local people or the indigenous miners from the mining industry which had been their main business up to the 1880s and turned it into the exclusive preserve of European capitalists.

Again, since virtually all the auriferous lands where the artisanal miners could operate have been leased to large scale mining companies, the activities of such miners in such concessions are considered as intrusions and incurr the wrath of the law. In the past European mining companies did not only seek to monopolise the mining industry, they also tried to extinguish the Africans' freedom of movement within their own territory. In an obvious breach of the provision in the Concessions Ordinance that guaranteed the Africans' customary rights within the limits of a concession "in respect of shifting cultivation, collection of firewood and hunting snaring of game" (Simensen, 1975) the Akyem Abuakwa people for instance were refused free access to concessions for those purposes. Regulation No. 15 of 1926 was one of the most malicious pieces of legislation ever passed in the Gold Coast. This was according to Addo-Fening (1997) similar to the Bantustan policy and the Pass Laws of Apartheid South Africa and was clearly in conflict with the guarantees of the Abuakwa people's rights as defined by the Concessions Ordinance of 1900.

More than 70% of the land surface in the Tarkwa-Prestea-Bogoso-Abosso-Nsuta areas is under concession licences to various mining companies operating in the area. These companies have in their custody large tracts of land for which less than 50% is utilised for mining. Farming is not allowed in the concessions unless authorised by the company. Even where permission is given the communities are constrained to cultivate seasonal crops such as maize, vegetables, cassava and plantain. They are not allowed to grow perennial or cash crops such as cocoa, palm and coffee, which are dominant crops in the area. The companies contend that allowing such perennial crops means paying compensation for such farms should mining activities extend to such places. This in effect has adverse repercussions for the people of the neighbouring communities whose productivity is reduced and thus finds himself continuously wallowing in abject poverty on a rich land of gold and agriculture.

Moreover, small-scale *galamsey* mining was banned by the government because of the indiscriminate use of certain chemicals such as mercury and cyanide in the operations of the artisanal miners. The use of mercury in

artisanal mining extends over two centuries. In Ghana, the main process of recovering gold during the pre-colonial era was gravity separation in a pool or stream water (Junner, 1958; Gocking, 2005). A case is often made that mercury amalgamation is the preferred practice in the sector because it is a reliable and portable means for concentrating and extracting gold from low-grade ores (Pardie and Hilson, 2006). The ore is crushed, washed and amalgamated in mercury to extract the gold. In the course of the colonial period, a lot of mining firms that were working in the Gold Coast made extensive use of mercury to retrieve gold. With no rigorous legislations or environmental concerns regarding acquisition, use and disposal, mercury was the most appropriate choice for many of the gold-mining companies operating in the country. Then, with time, an informal market for mercury developed to service the increasing number of artisanal miners who also saw mercury as 'miracle' chemical for gold extraction from ores. The large pool of retired, retrenched but generally semi-skilled and readily available labour force from the large-scale exploration and mining firms that operate in remote areas in Ghana also fuel, though indirectly, the mercury trade through their possession of the chemical and their knowledge of its usage (Nyame, 2010).

This accessibility and convenience notwithstanding, what is often overlooked in such simplistic analysis is the socio-economic burden imposed by mercury. With most of these illegal miners being illiterates, they unknowingly use hazardous methods to process their gold. Mercury is poisonous, and when discarded into streams, it builds up in fish consumed by the locals. research conducted by Amegbey *et al.* (1994) in the localities of Dumassi and Tarkwa reported that vegetation, streams and crops contained an elevated concentration of mercury. Samples of soil, elephant grass, mud fish and fern collected from farms in Obuasi and Dunkwa-on-Offin were observed to contain exceptionally high levels of mercury and showed signs of persistent bioaccumulation (Golow and Adzei, 2003). Mercury in humans can cause kidney problems, arthritis, loss of memory, miscarriages and psychotic reactions (Tsuma, 2009).

The Mercury Ordinance of 1933 was, therefore, passed by the colonial government to regulate the purchase and prohibit the sale of mercury to the natives. According to Terray (1974), the arrival of the colonialists on the Gold Coast signalled the beginning of the battle to gain control over these mineral-rich areas. For the colonial government, gaining control of mining areas first meant weakening the control of chiefs and other local structures that described the strength of the African society at that time. The ordinance was therefore the law that might have weakened these local structures. Through this legislation, the use of mercury by African miners was regarded illegal. The promulgation of the Mercury Law began the process of criminalisation of the African miner. With the use of mercury banned, African mining corporations were impaired and cracks began to appear in what had been a solid system of gold production and trade. Without mining, the chiefs did not have the same influence and control over their subjects, because they did not have leverage in terms of labour demands anymore (Tsuma, 2009). However, attempts by various governments to enforce the law banning mercury have been unsuccessful largely due to the growing importance of artisanal gold mining as a major economic activity (Nyame, 2010).

There is also the argument that artisanal or *galamsey* mining operations have exposed the tribal people of the Akan auriferous areas to various other risks including mercury poisoning, contamination of rivers and other water sources, deforestation, prostitution, sexually transmitted diseases like syphilis and HIV/AIDS, increased drug use and crime. For instance, the concentration and prolonged mining activities by both large and small-scale mining concerns in the area have given rise to various environmental problems. For instance in the pre-colonial period, the vast stretches of Obuasi land were exploited mainly for hunting and subsistence agricultural production. In the early 1900s the people of Adanse used the forest for cocoa plantation and other food crops (Ofosu-Mensah, 1999). Modern mining has however affected agricultural activity adversely. First existing cocoa farms were destroyed to make way for mining activities hence Adanse lost much of its luxuriant tropical forest suitable for cocoa production. Secondly, the smoke from the treatment plant where the sulphide ores were roasted and processed for gold was poisonous and this also killed the cocoa trees in Adanse between 1930 and 1960 (COS 19/2/28 PRAAD, Accra). The poison also affected raffia trees and other food crops. The mining concession which carried the right of felling timber led to deforestation of the dense luxuriant tropical forest of Obuasi and its surrounding villages between 1940 and 1960 (COS 19/2/28 PRAAD, Accra). This led to loss of farmlands for agricultural activities in Adanse. This problem was not peculiar to Adanse alone, it run through all the other Akan mining states.

Land degradation from illicit mining activities reduces biodiversity and can subsequently decrease the availability of medicinal plants (Barbier, 1989; Biodiversity Support Programme, 1993; SRMP, 2000). A local herbalist certified by the Traditional Medical Practitioners Association in Ghana (TMOAG) claimed that the mining activities of *galamsey* destroy medicinal plants that are used for treating a variety of ailments, including anaemia, asthma, gonorrhoea, measles and typhoid. The healer indicated that it was still possible to find the herbs but he often had to travel longer distances to obtain plants that were once found near his shop. This shows the potential of mining activities to deplete local natural resources that can treat the health problems of people in Akwatia and surrounding areas (Yelpaala and Ali, 2006).

One major complaint concerning the erosion of social

values among mining communities relates to increase in prostitution. According to CARE International, a non-governmental organisation working in Tarkwa, there are two types of sex workers in the area: mobile and resident sex workers. The mobile sex workers come mainly from Takoradi, Cape Coast, Accra, Kumasi and Obuasi. This group, according to a CARE representative, targets expatriate staff working with the mining companies and prosperous *galamsey* operators. The resident sex workers service mostly the local workers employed with the large mines and the *galamsey* community. Some of these sex workers had initially gone to Tarkwa and other mining towns with the hope of trading or getting a decent job, but soon lost hope and took to prostitution as a survival measure. It is believed that the growing incidence of HIV cases in mining towns like Tarkwa (in fact the highest in the Western Region) is a result of the influx of sex workers to the area. The same reason can be assigned to Obuasi which has the highest HIV/AIDS cases recorded in the country (Akabzaa *et al.*, 2007).

According to health officials in Akwatia in the Akyem Abuakwa traditional area, HIV/AIDS is a significant problem. The incidence of HIV in Akwatia was nearly three times the national prevalence rate, recorded at 8.5% in 2003 (Yelpaala and Ali, 2006).

It is common knowledge among many residents of the various mining towns that an addictive drug sub-culture is growing in these areas. According to the Tarkwa District Planning Officer, the use of drugs is a growing sub-culture of the *galamsey* business in particular. The *galamsey* business, which involves excessive physical exertion, is tasking and risky hence, the high drugs use. The drugs used by these miners are preferred for their performance enhancing qualities, i.e. they consume them with the belief that it would stimulate them to work hard (Akabzaa, 2000). Marijuana or Indian hemp (*cannabis sativa*) and other addictive drugs are on the increase among *galamsey* operators, according to police records. Cocaine use which was believed to be limited to more affluent expatriate communities is now easily obtainable on the open market and patronised by prosperous *galamsey* operators. *Galamsey* camps are markedly characterised by raging violence, sometimes resulting in deaths. Drug use is also confirmed to be widespread among prostitutes and some female workforce in the *galamsey* camps. Some female labourers interviewed confirmed that rape is a common phenomenon in some of the camps in the forest reserves, adding that most of those who carry out these crimes are usually under the influence of drugs (Akabzaa, 2000).

In addition the traditional subsistence life of the mining areas in the Akan region has steadily withered away. One cannot turn a blind eye on the environmental vulnerability of illegal mining in the community and the country. The local populations lose their source of drinking water and this, in effect, breeds a lot of water-borne diseases such as buruli ulcer, bilharzias and other debilitating effects from the usage of polluted water (ghanaweb.com, 2010).

Finally, a point can also be made about the economic hazards which outweigh the money the *galamsey* miners get. The degraded lands have to be rehabilitated and trees replanted under very slow, expensive, time-consuming and tedious afforestation programmes. Illegal mining destroys tarred roads as some of the miners inadvertently dig under public roads. These roads normally need billions of cedis to repair. The cost cannot be easily quantified.

CONCLUSIONS

The tale of indigenous African mining in Ghana has been one of resilience in the face of adversity. For even when it was utterly frowned on and was supposed to have been supplanted by western scientific mining technologies, indigenous African mining technology survived and adapted to the changing times by merging some scientific practices with it and in the process creating a new hybrid form of artisanal mining known as *galamsey*.

In spite of the stiff opposition it received from scientific mining, traditional artisanal mining has survived till today because of its overwhelming importance in the economy of Ghana. As reminiscent of the pre-colonial economy, mining plays an important role in the lives of many Akan people of southern Ghana. The government conceded to the importance of artisanal mining and for that reason the Provisional National Defence Council (PNDC) administration legalised small-scale mining in 1989, because it is an important player in the country's mining sector. The small scale mining sector has been the largest producer of diamonds in Ghana since 2005. As part of the minerals sector restructuring, the small-scale mining sector was formalised through the enactment of PNDC Law 218, the *Small Scale Gold Mining Law*. Under this law, the Small Scale Mining Project, a department of the Minerals Commission is responsible for registering and supervising small-scale miners in the country. The project has so far registered over 600 co-operative and individual small-scale miners (Akabzaa, 2000). Within the Tarkwa area alone, there are 39 small-scale registered mining concession holders. In addition, there are over 600 migratory illegal miners who have no permanent sites operating in the area.

The government has also established the Precious Minerals Marketing Corporation (PMMC) which is the sole governmental agency for the purchase of the gold and diamonds produced of small-scale miners in Ghana. The government has since opened up the marketing to private licensed buyers. Despite the legalisation of their operations, some still operate illegally. The small-scale mining law requires them to register with the Minerals Commission who would grant them licences to operate in specific areas designated for small-scale mining operations. But because of the frustrations they meet in

the registration process, many of them opt to operate illegally. This has given rise to two groups of small-scale miners, those registered and licensed and those operating illegally (*galamsey*).

RECOMMENDATIONS

To ensure that illegal mining or *galamsey* is minimised, there must be a holistic approach to solving the problems that the *galamsey* workers face. In this case it is proposed that the issue should be tackled from the educational side. The government through the Ministry of Education should come up with a curriculum that will contain short courses about mining and its effects on the environment. These courses will seek to portray the wrongfulness, hurtfulness and illegality of indiscriminate mining to the environment and the nation as a whole. These curricula must begin at the basic school level and continue through to the tertiary level. The main point behind it is that, children would educate their parents about the ill-consequences of *galamsey* to their parents and this will go a long way to discourage both practitioners and prospective ones.

Also there is the need for co-operation between the public and the mining companies. The mining companies can, as part of their corporate social responsibilities, encourage industrial farming among the natives in barren areas of the concessions instead of hunting down these miners who intrude on their concessions with dogs and arms. The companies can acquire agricultural machinery and embark on large scale plantations that would employ the youth in their plantations rather than resorting to illegal mining. The assurance of a steady income-generating job (i.e. on the plantation) would compel people to stop the dangerous *galamsey* work and go into paid plantation labourer jobs. This will ultimately ensure peace in the areas affected by the activities of these multinational mining firms in the country.

The fact that traditional artisanal mining has survived up to this day and remains vibrant in the Ghanaian economy goes a long way to justify the prominence of the precious metals in auriferous Akanland and Ghana as a whole.

Finally, it is recommended that *galamsey* operations be legitimised and concessions granted to individuals or groups who wish to take part in the business. However, only persons who meet the requirements for certification in a course by the appropriate government agency on mining should be granted such concessions. In this vein, it is recommend strongly that the government through the Ministry of Local Government and Rural Development in collaboration with the National Commission for Civic Education (NCCE) form a unit to engage all prospective *galamsey* miners and educate them in the local dialect about proper mining methods and careful use of chemicals such as cyanide and mercury before issuing them with certificates that will further qualify them to be awarded concessions.

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Appendix

Table 1: Interviews (oral tradition).Interviews with the elders of Adanse and ex-workers of AGC at Obuasi and some bankers in Accra were conducted in 1998 and 1999.

Names of Interviewees	Age	Occupation	Status
Nana Bonsra Sakrakyire II	60	Lawyer	Royal
Opanin Brenya	86	Farmer	Royal
Nana Kwabena Amponsem	55	Farmer/Store Keeper	ex-AGC Staff
Nana Kwadwo Donkor	80	Farmer	ex-AGC Staff
Nana Ntiako Sakrakyire III	65	Farmer	ex-AGC Staff
Opanin Kwame Akuoko	70	Farmer	ex-AGC Staff