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# The energy crisis: The case of the Economic Community of West African States (ECOWAS), with special reference to Nigeria, Ghana and Burkina Faso

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# THE ENERGY CRISIS: THE CASE OF THE ECONOMIC COMMUNITY OF WEST AFRICAN STATES (ECOWAS), WITH SPECIAL REFERENCE TO NIGERIA, GHANA AND BURKINA FASO.

by
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**Abstract**

The energy crisis of West African countries has assumed major importance over the past few decades. The oil price increases of the 1970s have posed innumerable problems to these countries. But that is hardly the entire story. The vegetation cover of most places have been stripped so bare that people must walk for hours to find the day's supply of firewood, the traditional energy source.

Doing something about the problem involves, first of all, understanding what the situation really is. This study provides an analysis of the spatial, sectoral and social inequalities in energy production and consumption in ECOWAS. Scrutiny of energy resource forms and endowments, and end uses of energy suggests that there are vast asymmetries between areas, groups of people, and their economic set-ups.

An investigation of the energy industry suggests that political-institutional arrangements, explain the structure and dominance of the oil sector, to the neglect of the traditional biomass sector.

Implicit within the above, the study concludes that the success in mitigating the energy crisis lies in effective planning and implementation of energy programmes.

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## CHAPTER 1

## THE PROPOSED STUDY.

### Introduction.

ECOWAS, comprises 16 countries of the West African sub-region. Like many other nations of the "South", the countries within this region are characterised by broad development problems of which energy crises are just one aspect.

The general context of energy (the forms of fuel and power, their supply and use) in the Third World is delineated by the characteristics of the energy sector, the driving forces behind energy demand and supply, and the constraints that limit the abilities of people and governments to achieve their multiple and often conflicting objectives.[1]

Energy is important in the development process of a nation and its adequate supply is a contributor to living standards. There appears to be a positive relationship between energy use and economic growth although the relationship is not always a linear one. Energy consumption in West Africa is, relative to world levels, very low despite the fact that it has numerous energy sources. The present era of high energy prices has terrible consequences for the region. Apart from the fact that commercial energy costs are high, non-commercial traditional supplies are put under great stress, becoming less available and their exploitation time-consuming. The community is therefore confronted with a double

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[1]Pearson, P. and Stevens, P. 'Energy and the Third World', Energy Policy, Vol 20, No 2, p. 90, February 1992.

energy squeeze. Moreover, foreign energy demand requires huge investments of scarce foreign exchange and their local production is associated with significant negative externalities.

In the early 1980s, energy accounted for an estimated 20% of the Private Consumption Expenditure (P.C.E.) of the inhabitants of most countries in the region.[2] The significance of this energy burden is highlighted when one keeps in mind the other problems the people face as well. This is typified by low economic and industrial growth, debilitating debt burdens, high population growth rates, war and famine.

Various obstacles lie in the path of decision makers seeking to find a way out of this problem. Some efforts have been made by governments and people of individual countries to solve the energy problems but with minimal success. The reason is that the conventional solutions to the energy problems tend to be too technical-oriented and the theoretical perspectives of the problems are guided by paradigms which are value-proned. Economic planners for example, guided by their philosophy of market-rationality, have been concerned mainly with problems of oil imports and balance of payments. Other Social Scientists have been focusing on increasing rural energy supplies. But even if a framework was available for an integrated solution, the large urban-rural disparities in energy resource allocation, would still present special problems in these countries. In a general sense, it is this problem that the study

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[2]Food and Agricultural Organisation. 'State of Food and Agriculture'. FAO, Rome, p.185, 1984.

is concerned with.

Briefly, the central objective of this dissertation is to expose and bring to the foreground the spatial differences in energy forms, distribution and consumption, which has been neglected in energy planning in ECOWAS for a long time. Secondly, it considers the extent to which, uneven energy resource endowments, and the inequities in energy development and use (in the sense of spatial concentration of energy resources and productive forces through unequal exchange) are responsible for the existing situation in the countries within the region. In other words, the work analyses the spatial distortion in energy conditions, imposed by human as well as natural resource geography, and most strikingly in the unequal rural versus urban development. Since this spatial dimension is important in West Africa and is critical to any planning effort, it must not be ignored. It is relevant because, it involves and links the problems of agricultural productivity, rural-urban migration, and industrial development.

This is not to under-estimate the importance of other perspectives on the energy problem, especially the national and international systems of trade, pricing and control of commercial supplies. However, these perspectives tend to be overdeveloped to the exclusion of others. But in as much as reality has a multi-dimensional perspective, a broader outlook of a problem is likely to offer better solutions. Indirectly, another objective of this work is to provide alternative solutions to ECOWAS's energy

problems.

Lack of suitable energy data is the major problem for this study. Viewing the energy picture in ECOWAS in very simplistic terms using highly aggregated estimates of energy resource reserves, demand and supply, can be very misleading since these actually vary considerably across different countries. Even in country-specific studies, the use of simple trends and extrapolations can obscure the structural and behavioural aspects of energy supply and demand.

The study has been organised into 8 chapters. Chapter 1 looks at the dimension of the energy problem in ECOWAS countries and reviews some existing literature, while in Chapter 2, emphasis is placed on other geographical and economic considerations.

In Chapters 3 to 5, attention is devoted to the major structural patterns that have characterised the energy sector in West African countries over the past two decades. Some of the trends are reflections of factors such as their rapid development aspirations, industrialisation, urbanisation, and population growth. From this investigation, a theme of a sort emerges, which suggests that energy is inequitably distributed and inefficiently utilised in West African countries.

In addition, an identified energy pattern is the rising consumption of "commercial" energy. Much of this increase has come from rising oil consumption. Furthermore, the urban areas of ECOWAS have witnessed a heavier reliance on traditional forms of energy over time while Electricity has also experienced increased

prominence in terms of relative quantities of different forms of energy consumed. These trends are expected to grow in the future in part due to the fact that the driving forces behind demand are so high. Some of these forces are; rapid industrialisation, high population growth rates and rapid development aspirations.

In Chapter 6, an examination is made into the institutional framework of the energy industry. It was noticed that the greatest centre of power in the energy industry is the National oil company, backed by government might.

The last two Chapters dwell on the solutions to the energy crisis and the summary of the text. In this section, it is recognised that a comprehensive planning and effective implementation of energy policies are a sine qua non to a self-sustaining development in the energy sector. The planning process must consider the Spatial, Sectoral and Social differences that exist in energy supply and demand. In the implementation stage, not only must efforts be concentrated at the local and national levels, but at the regional level as well. Above all, energy planning must be undertaken as part of a broader development planning process. This is because, energy is an important resource factor that is interlinked with other sectors of an economy. In fact, it is the "hub" around which all economic activities revolve, and its planning cannot be isolated from the planning of other sectors.

It is hoped that, with a well coordinated plan, an effective solution can be derived for the energy problem of the community.

Methodology.

This study is an outcome of a library research work that attempts to be qualitative, rather than quantitative. The study is not tied to any particular theory although several concepts are employed as the discussion goes along. The approach is primarily geographical, and second institutional. Various 'models' of energy development implicit throughout are critically evaluated but, for most part, they are found to be narrowly conceived when we look at the problem regionally and with both traditional and commercial energy supplies in mind.

The discussion looks generally at ECOWAS, but focused on Ghana, Nigeria and Burkina Faso as special reference countries. Similarly, a broad consideration of all forms of energy is made, although more attention is focused on oil and fuelwood than on other energy sources. For analytical convenience, both are treated separately in the text, although this is an arbitrary division.

Literature Review.

In the past, development efforts in developing nations have focused mainly on urban areas, and to some extent on agriculture, minerals and other primary resource industries geared for export, but otherwise to the neglect of rural areas. In order to define the energy crisis of West African countries, and for that matter Less Developed Countries (LDCs), one needs to understand its overall context.

There is now an increasing consensus among energy experts that the supply and demand of energy in LDCs will be tight for several years to come. This situation is conceivable in view of two emerging and dominant features in the Third World. The first issue arises out of the degradation and collapse of ecosystems and from the finiteness of some natural resources including fossil fuels. Secondly, inequalities from among and within countries have widened considerably over the past two or three decades, creating unequal social and economic relationships. These situations have largely contributed to a spatial distortion in energy conditions in most LDCs. The recent revolution in energy planning in many of these countries arose from this problem and other related issues.

However, the majority of the energy assessments and plans being undertaken are based on conventional tools developed for advanced societies and focused only on the modern sector. The conceptual models underlying many of the energy studies are based on the notion that economic growth is the objective of all human societies. Traditional fuels are seen as "backward" and therefore

cannot rapidly enhance this objective in developing countries.

The energy problem, which forms part and parcel of the overall development problems of developing nations, was perceived almost entirely as an oil problem. More emphasis was given to this perception as a result of the oil price increases of the 1970s. In fact, the greater part of the literature that exists on the energy crisis of LDCs is devoted to the assessment of the vulnerability and the appropriate responses of countries to sharp oil price increases. In recent times however, some studies on traditional fuels have been featured in the literature. Fried and Schultze (1975) in their study of higher oil prices and the world economy showed that developing countries suffered more from the effects of recession than from the direct effects of the oil price increase. To illustrate the lop-sidedness and to show the state of the literature that exists on the energy problems of developing countries, some of this literature will be reviewed from the energy perspective.

Dunkerley et al (1981) noticed that the developing countries suffered less decline in economic growth than the industrial nations during the 1973 oil price shock. But they asserted that the adjustment process to higher oil prices in these countries may have been assisted by exceptionally favourable, but temporary, conditions of the world economy such as; a generally stable volume of imports and a substantial increase in exports, or by heavy external borrowing, but which cannot be sustained indefinitely.

On the other hand, Boughton (1984) in his study of the

external position of oil-importing developing countries during the oil price shock period, found a marked deterioration in the debt-servicing ability of the countries between 1978-1981. He attributes this situation to the substantial deterioration in the terms of trade of these countries. However, it again appears that energy itself was not the problem so much as its role within the financial situations and commercial relations of developing countries.

Choe (1985) in his study of adjustments to high oil prices in developing nations noted that their primary energy consumption continued to increase rapidly. He also found that in order to reduce the impact of oil price increases, most countries tried to reduce oil consumption through some structural changes in their patterns of energy consumption. For example, there was a slight shift to relatively inexpensive energy sources such as hydro, coal, and natural gas. In the majority of the countries however, domestic petroleum prices were quickly adjusted to international levels.

The appropriate response to the oil crisis has been debated in the literature as well. Different solutions have been advanced which suggests that there is no universal way of addressing the problem. But any particular solution derives from the manner in which the problem is formulated. Problem formulation is an important step in problem solving. Therefore one is tempted to conclude that the best response lies with the best-perceived problem. Unfortunately however, experience in the Social Sciences shows us that problem-formulation is not a value-free exercise but depends on ones interests, ideologies and many other things.

Apparently, two different ideologically-minded researchers may solve a problem differently because they may have different perspectives. One therefore needs multiple perspectives to understand a problem in a broader fashion.

Alm et al (1984) for example view the problem of oil security in terms of a structural change. What this means is that the changing role played by the major oil companies vis-a-vis the major oil producing countries, was perceived to have resulted in inflexible crude oil trade between importing and exporting countries. They link the volatility in the market price of oil and the oil shock of 1979 for example, to this change. They therefore see structural changes in the oil market as an optimal response to the problem. Alm and Weiner also propose that solutions to oil vulnerability cannot be obtained without giving adequate attention to political reality or what can be fashioned as 'real world' problems. By this, they presuppose that although much is understood about the theoretical implications and conceptual responses to oil shocks, solutions lie in overcoming the myriad of political and administrative constraints that operate against its implementation.

Pindyck and Rotemberg (1984) have also pointed out that the macro-economic effects of a sudden or gradual increase in energy prices, such as the reduction in total real income available for domestic consumption and investment, cannot be eliminated by any economic policy. However, they note that, the adjustment effects such as increases in rates of inflation and unemployment which tend to exacerbate the direct effects can be reduced through proper use

of economic policies. This is suggested, to include among others, avoidance of fiscal expansion, and from an energy policy perspective, an introduction of a tariff on imported oil to reflect the social costs of imported oil. This solution of Pindyck and Rotemberg is interesting but one is inclined to think that their proposal seeks to address the symptom and not the cause of the problem. Such an economic solution likely places more emphasis on the 'how' and not the 'why' of the problem.

The literature cited so far is focused on oil and perceives the problem in purely economic terms. This gives us the impression that the problem at hand can be best solved by economic planners.

On the other side of the coin, researchers with some interest in LDC traditional energy problems, such as Goldermberg et al (1981), criticise the way the energy crises have been seen by the world almost exclusively as an oil supply problem. They point out that this is a misguided perception at least because more than half the world's population live in villages and small settlements and cannot afford oil products. The boom and slump in the oil market therefore, does not affect them directly. On the other hand, they say, these people suffer from what some people refer to as 'the other energy crisis', that is the depletion of their traditional biomass resources.

Goldemberg and others however do not establish any link between the two energy sources and crises. Yet there is evidence to suggest that they are far from exclusive and unlinked. At the very least, the shortage or increase in the price of one can lead

to a shift to the other. There have been periods when rural dwellers shifted to paraffin or kerosine use when the price of fuelwood was relatively high and vice versa.

Foley (1986), recognises that the 'woodfuel trap' in developing countries does not only apply to rural dwellers but urban consumers too. The urban poor are mostly affected because as woodfuel prices rise, the amount of money allocated to fuel rises and others rely increasingly on pre-cooked foods which are usually less nutritious than traditional dishes.

The United Nations through its International Development Strategy (IDS) analyses the problem in terms of three main crises - supply crisis, technical crisis and balance of payment crisis resulting from oil imports. Solutions have therefore been modeled on these formulations. As will become apparent later, most of these solutions have hardly succeeded. There are other studies which have examined the energy situation in developing countries.

The UNCTAD (1978) classified 106 countries in a 3 by 3 matrix. Each country was characterised by two parameters at three levels : 1) net energy imports as a percentage of total commercial energy consumption (<25%, 25-75%, >75%); and 2) per capita energy consumption in 1975 in Kg. coal equivalent (<200, 200-1000, >1000). An examination of the classification reveals that the largest group of developing countries (32 countries) had average per capita consumption below 200 Kg. coal equivalent and net imports exceeded 75% of commercial energy consumption.

The World Banks' (1979) country classification of resource

endowments suggests that almost every country has some natural energy endowments. This categorisation does not mean much however in the context of developing nations because the occurrence of energy resources do not automatically imply their use. It is one thing having oil reserves or water resources in a developing country and it is another thing possessing the capital and technological capability to transform them into usable energy forms. This implies that the lack of energy development technology in the developing countries necessitates their transfer from the advanced countries which have them.

At present, it is commonly known that energy consumption in the developing nations accounts for a small fraction of world total, but has been growing fast. The LDCs' share of world energy consumption (excluding traditional biomass fuels) increased from 14% to 23% between 1970 and 1985 (Sathaye et al 1987). In the period between 1973 and 1983, international oil prices increased fivefold in real terms (World Bank 1983). It is obvious, to assume therefore, that if these rates are maintained, then it will be difficult for developing nations (especially oil-importing ones) to maintain their rate of economic growth in the future. Fortunately for most oil-importing developing nations, the real price of oil has dropped since 1985, except for occasional periods of sudden increases such as during the Gulf Crisis. What has failed to be appreciated so far, and perhaps forms the underlying explanation to the energy crisis, is the geographical aspect of energy. This has got to do with the distribution, production and

consumption of energy, and how these vary across space. The main analytical pitfalls that beset the studies mentioned above is that so much emphasis is laid on the functional aspect of energy. Meanwhile, energy is both a functional and spatial manifestation of development. Therefore, to achieve a meaningful development in a country or a region, the appropriate relationship between the functional and spatial aspects must be determined. Invariably, a logical methodology is needed for the exercise.

The methodology for analysing alternative solutions to the energy problems of ECOWAS should therefore avoid the analytical pitfalls that can easily enter discussions of energy problems of developing countries. Taking a clue from Bakke (1980), some of the pitfalls that should be guarded against are the following.

First, even though they are lumped together, ECOWAS is made up of heterogeneous nations. For example, in 1987, Nigeria had a per capita energy consumption of 165 Kilogrames of coal equivalent (Kce) while Burkina Faso had only 30 Kce. While Nigeria and Ivory Coast have a fairly developed industrial economic structure, Burkina Faso and Mali have relatively undeveloped industrial structures. In addition, some of the countries are totally dependent on subsistence agriculture while others depend mostly on mineral exports for their economic survival. These differences must be noted in any energy analysis because they give rise to different implications.

Second, just as there are differences between countries, dissimilarities exist within countries. Urban and rural areas

possess different forms of economic organisation, varying patterns of energy production and consumption, and different energy needs. Even in the urban areas, energy problems differ enormously from one sector to another.

Thirdly, there is the tendency to search for solutions to developing country energy problems by concentrating on energy supply alternatives, requiring massive importation and exploration of oil. The common argument is that per capita commercial energy consumption in developing countries is low and therefore the problem can be solved by increasing energy supplies. It is true that per capita commercial energy consumption is low in West Africa for example, but the situation may look different if traditional energy is considered in addition to this. The energy problem of ECOWAS may not necessarily be found in low consumption figures, but perhaps in inequities in consumption. Most of the commercial energy goes to fuel industries in the cities and the better-off urban-industrial workforce and classes. Rural sectors also use energy inefficiently in technical terms, although they may 'waste' less total energy than motor vehicles or thermal generating plants. There are many opportunities to save energy in these sectors.

Lastly, since conditions differ from place to place, monolithic solutions may not necessarily be found. The solution is not solely in expanding energy supplies, or conservation strategies, or renewable options. The search should involve supplying a country's energy needs for development at the least possible cost. And that means satisfying the consumption needs of

people and utilising energy efficiently.

It is extremely difficult to guard against the above stated pitfalls because of lack of credible data and also a tendency, even among geographers, to perceive them only in terms of gross national statistics and international stereotypes. Pachauri (1983), asserts that Third World energy problem has remained grossly under-researched because of lack of useful data, yet LDC energy developments are important not only because they affect the future of the largest group of humanity, but also because their energy consumption patterns have vital implications for the depletion of global energy resources.

The energy perspectives noted so far are consistent with at least one of the different and in many ways conflicting development theories which attempt to understand, interpret, and solve the energy problems of developing nations. Three of these are the Modernisation, Dependency and Self-Reliance theories of Development.

The Modernisation theory views development as a linear process going through a number of stages. Traditional and advanced societies represent two extreme stages of the development process. It is believed that, with modernisation, it is possible to move from a lower stage to a higher one (Rostow 1960).

The Dependency perspective views development as an imbalanced process between regions resulting from the dominance of one over the other (Williamson 1965; Alonso 1969). The "centre-periphery" concept reflects this dependency paradigm.

Lastly, the Self-Reliance perspective views development as participatory, autonomous and oriented towards meeting basic human needs. According to Ganapathy (1981), all these theories have different assumptions about human nature, social problems and goals, and the processes of change. Therefore, they inform this energy discussion in different ways. For example, in the field of energy, the modernisation paradigm assumes that the ultimate objective of human societies is economic growth. Hence, poor countries must emulate the patterns of energy production and use of the advanced countries in order to attain economic growth.

However, information from historical records show that the modernisation paradigm failed to address the problems of the world's poor in the late 1950s and early 1960s. The spatial and class bias of modernisation innovations and the crisis they created in the long run are well documented (Soja 1980; Lipton 1977; Friedmann 1979). Consequently, this led to several other important initiatives in the world. First, the Pearson Commission in 1969 published its "Partners in Development" international report. This was followed by other reports by the Club of Rome such as "Reshaping the International Order" and the ILO's "Employment, Growth and Basic Needs". Later, the World Bank came out with the World Development Report in 1979 and finally, the U.N. adopted the International Development Strategy (IDS) for the Third Development Decade. It is important to note that these subsequent initiatives also have certain biases because they are embedded with ideologies such as "preservation of the status quo" and its corresponding

international division of labour. They can be linked to the Dependency perspective of development because such a situation creates unequal "core-periphery" relations.

On the other hand, the focus on Self-Reliance empowers people by reducing their dependence on external forces as well as providing a framework for control over their resources and their own affairs. Therefore, ECOWAS's energy crisis can be overcomed within this framework.

Very little research on energy utilisation and supply has been undertaken on West Africa as a whole although a few country studies exist. While the reason for this may be lack of data for most countries, it implies that regional aspects of energy planning and development have not yet assumed a large dimension in West Africa. It is surprising that at the time of writing this piece of work, the only literature that had been found is the paper by Iwayemi (1983), on energy policy issues in West Africa. Another paper by Lazenby and Jones (1987), which discusses the future potentials of hydroelectricity in West Afr a, is interesting and worth mentioning.

## CHAPTER 2

## THE GEOGRAPHICAL AND ECONOMIC SETTING OF ECOWAS.

ECOWAS occupies an area of about 6.2 million square kilometers. It has a population of about 170 million people and more than half live in Nigeria.

Geographically, the region is generally marked by two distinct climatic types; The Equatorial Climate which is found along the southern coast and the Tropical Continental Climate which lies in the north. Both climatic types are characterised by periodic rainfall regimes and seasonally marked dry conditions.

The isotherms and isohyets run east-west across West Africa, dividing it into latitudinal series of main vegetational zones. In general, one finds desert and sahel in the northern part of the region with the Savannah occurring further south and forest along the coast. These zones have important implications for the kind of agricultural production that is possible in each of the countries and biomass fuels. Typically, one finds more livestock production in the Sahelian zones which possess conditions that are less suitable for crop production than in the wetter zones to the south where export crops such as coffee and cocoa are easily grown.

West Africa occupies about one-fifth of Africa but has nearly one-third of its population. Like all Africa, West Africa has both high birth and death rates, the annual rate of population increase in both cases being 2.7%. Nigeria and Ghana have the highest population totals while the Gambia and Guinea-Bissau have the lowest. Overall, it may be the region cannot be said to be

overpopulated yet. However, there has been a phenomenal increase in urban populations and great congestion in some areas.

Urban growth in West Africa is a recent phenomenon of the second half of this century. Terms like 'megapolis', 'urban population bomb', 'urban explosion', and 'planetarisation of the world environment' have been used to describe the situation. The speed of urbanisation in these countries today is not faster than in most of the so-called Third World, but the numbers involved are unprecedented for the region. A typical example is Lagos, capital of Nigeria, housing 10 million people and accounting for 40% of jobs and 50% of the output in the nation's industry and 30% of its commercial activity. Ougadougou, the capital of Burkina Faso, for example, has barely 550,000 inhabitants, but it covers more ground than Paris and a doubling of its population has expanded the urban area threefold in the space of a decade.[3]

Rapid urbanisation of ECOWAS countries, accompanied by fewer opportunities for migrants has created many problems for city inhabitants. Crime, pollution, traffic jams and squalor are characteristic features of the cities. In spite of these problems, it may seem surprising that people from the rural areas still find them attractive and highly irresistible. A popular opinion which is used to explain this situation is the magic of the 'bright-light' concept. But this is only part of the explanation. Other factors are the uneven distribution of high quality infrastructure,

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[3]Cure, C. "Transport, Traffic and Mobility in Sub-Saharan African Cities", The Courier, No 131, p.69, January-February 1992.

both physical (power, roads, water supply, drainage, etc.) and social (education, health facilities, etc). These are the results of decades of uneven government economic planning and policies.

Although West African countries vary tremendously, they are all 'dual societies', consisting of small islands of affluence in vast oceans of at least relatively great poverty. The elite minorities (usually found in the urban formal system or upper circuit) and the poor masses (usually found in the urban informal system or lower circuit and the rural system) differ so much in their incomes, desires and aspirations, and ways of life that, for all practical purposes, they live in two separate worlds. Consequently, the elite and the poor differ fundamentally in their use of energy. The elite are chiefly associated with patterns of luxury-oriented commercial energy use and in contrast, the poor are mainly associated with traditional fuels, essential to their basic survival. One of the major flaws in most energy studies and plans is failure to recognise this 'dual society' context.

In West Africa, as in other developing nations, this social dualism is intertwined with a geographical dualism of the rural-urban dichotomy. Hence, the rural and urban environments are characterised by contrasting energy systems. That too is often absent from national energy assessments and plans.

Population mobility in West Africa, has encouraged rural and urban economies to be open to one another. Thus, for instance the rural to urban exodus has provided the basis for an extension of fuelwood distribution networks from countryside to city. Very high

levels of fuelwood consumption have been noted in West African cities, notably Abidjan, Ougadougou, Kano and Dakar. This phenomenon poses negative environmental implications for the ecosystems of rural societies because the fragile balance between population and wood resources becomes aggravated.

By contrast, urban to rural movements are fewer and are a minor factor in demographic studies. People involved are normally short-term visitors who want to maintain their family ties, and adults who have proceeded to retirement. For reasons such as lack of momentum for commercial activities or conventional markets, the rural areas normally lack commercial fuels.

Agriculture is still the mainstay of the countries within the region. Between 70-80% of the inhabitants are engaged in agriculture and related activities. The exports of most of the countries are dominated by one or two primary crops which form the main foreign exchange earners, and a few minerals. For example, Ivory Coast, Nigeria and Ghana rely heavily on the export of cocoa while Liberia, Guinea and Togo depend on the export of iron ore, bauxite and phosphate respectively.

Economic development in Sub-Saharan Africa in general and West Africa in particular has been slow for the past two decades. This is partly attributable to the economic recession which has hit the world economy since the mid 1970s and basic internal constraints to growth in these countries. In fact, the economies of African countries have been characterised by poor economic performance, adverse balance of payment deficits and sluggish agricultural

growth. Poor performance in the agricultural sector coupled with the situation described above seemingly makes the future of West African economies bleak and appears to many, to bring closer the reality of the Malthusian spectre.

Any study of the economic situation and development of West Africa must recognise the economic legacy of the colonial past. All the countries in the region, except Liberia, have undergone colonial rule. They were already integrated into the World Commercial and Capitalist System before achieving independence, politically. Since colonial times, a world international division of labour has involved Sub-Saharan African countries as the exporters of primary products to the advanced metropolitan countries and as importers of manufactured goods from them. Moreover, in spite of political independence, these countries have not been able to de-link from this 'metropolitan-satellite' economic relationship. In an attempt to reduce their reliance on the metropolitan countries, ECOWAS was set up as a means of regional economic integration in 1975, with the primary aim of improving trade between member countries. According to the treaty, signed in Lagos, the aim of ECOWAS was to:

> "promote cooperation and development in all fields of economic activity particularly in the fields of industry, transport, telecommunications, energy, agriculture, natural resources, commerce, monetary and financial questions and in social and cultural matters for the purpose of raising the standard of living of its peoples, of increasing and maintaining economic stability, of fostering closer relations among its members and of contributing to the progress and development of the African continent".
>
> (West African Annual, 13th Edition).

This noble goal was to be achieved through the creation of a common market for member countries through a variety of measures. In the sphere of energy, the 1981 ECOWAS Conference agreed on a work programme for energy development, involving a regional analysis of energy use and plans for increasing efficiency and finding alternative sources. The creation of an Energy Resource Development Fund was approved in 1982 and in 1983, it was announced that (in co-operation with UNESCO) a regional information centre and data base was to be set up in Dakar, Senegal to disseminate information on renewable energy.

Unfortunately, a review of the activities of ECOWAS suggests that much success has not been achieved in line with these objectives. For example, the initial momentum at cooperation did not continue and subsequent efforts were faced with numerous hinderances. Various reasons can be given to explain the poor performance. From an economic standpoint, member countries produce similar agricultural raw materials and therefore they tend to be generally competitive in their search for foreign markets instead of being complementary. Most of the trade conducted by ECOWAS members are with Europe, North America and Southeast Asia. Only a small proportion of their trade is with one another.

The second point, which is quite related to the first, stems from the fact that the trade links of member countries are stronger with their colonial masters due to the colonial legacy they inherited. In addition, geographically, the spatial structures (networks and nodes) in the various countries have been modelled

in such a way that they inhibit rather than facilitate the movement of goods and services within the community. The structures are geared towards siphoning resources from the hinterlands to the ports for onward shipping to external markets.

Lastly, it is not meaningful to talk about economic cooperation and integration by itself without relating it to the underpinnings of political stability within the region. The recent impacts of the Liberian civil war coupled with the upsurge of political pluralism which has been characterised by sporadic coup d'etats and strikes in the region, are issues worth noting.

All said and done, governments of member states still recognise the need to strengthen cooperation and integration in a lot of areas. As Dr. Abass Bundu, the current executive secretary of ECOWAS said, "West African countries are simply too fragile on their own and need to cooperate among themselves, integrate their economies and achieve regional cohesion" (West Africa, 1991).

If the basis for trade in agricultural raw materials within the community is not very strong, then energy might hold a better promise. The factors which hold some promise for regional energy planning and cooperation are the following. First, although variations exist in resource endowments in the region, on the aggregate regional level, they are abundant. Added to this, some resource-rich countries like Nigeria, Ghana, and Ivory Coast lack the capability to develop national energy schemes. When a group of countries come together, they may be able to raise adequate funds to develop some potential energy projects.

Lastly, some level of cooperation in the energy sector is already evident.

Nigeria, Ivory Coast and Ghana are the most developed countries in the region. These countries have quite promising future industrial potential because they are endowed with enormous quantities of both natural and human resources. Many countries in the community are currently undergoing Structural Adjustment Programmes under the auspices of the IMF and the World Bank. It is hoped that, with time, they will be able to re-organise their economies and set new paths of development for their countries.

## CHAPTER 3

## THE DISTRIBUTION AND STRUCTURE OF ENERGY PATTERNS IN ECOWAS: AN OVERVIEW.

West Africa is endowed with different forms of energy, although some are more concentrated in only few countries. Figure 1 shows the main forms of commercial energy resources found in the region.

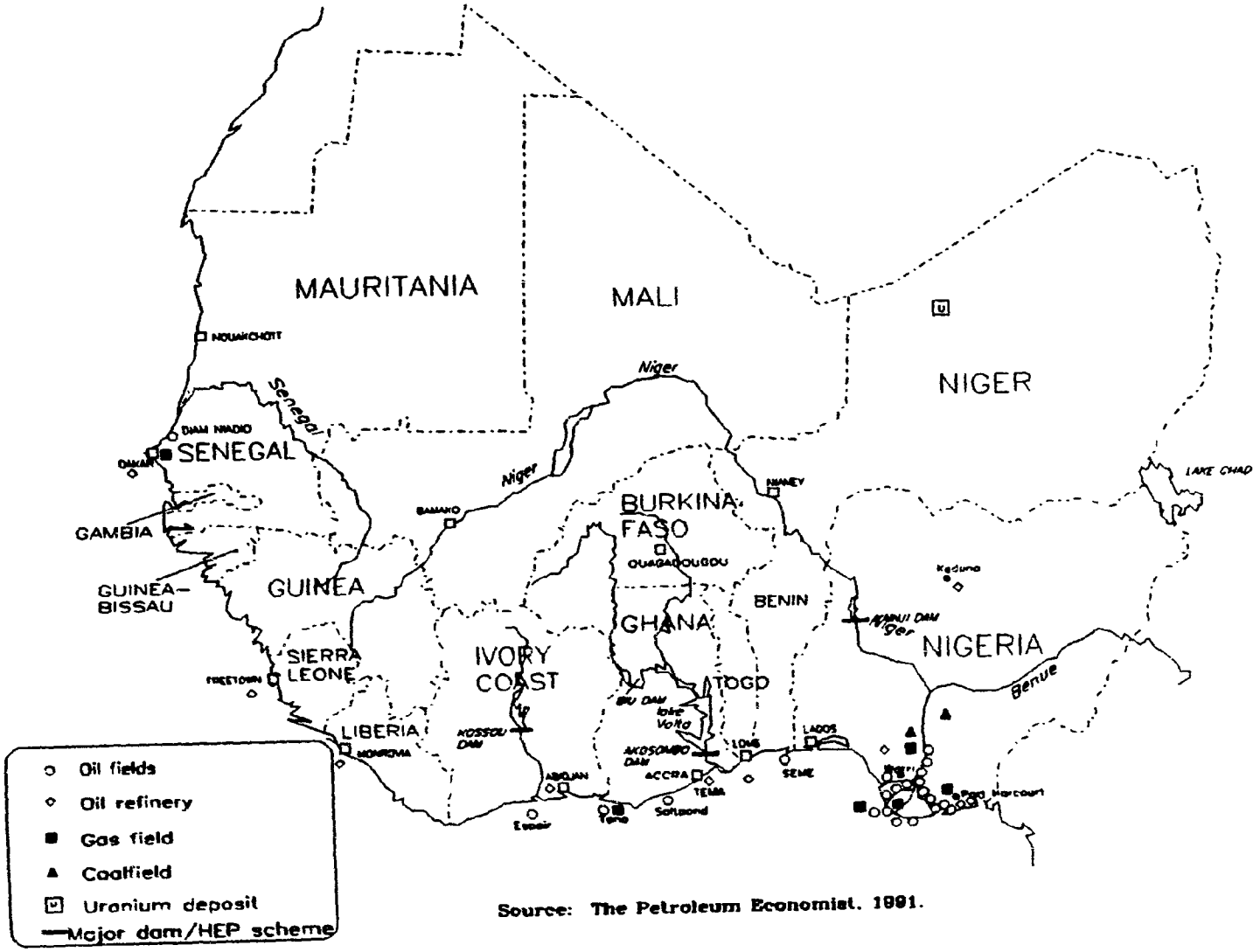
Oil occurs in commercial quantities in Nigeria and has been the number one export commodity for the country since the mid 1960s. The Bendel and Rivers states in Nigeria are noted for large-scale oil production. Small quantities of oil have also been found in Ghana, Benin and Ivory Coast but production has been little or ceased in some of them.

Natural gas occurs in association with oil in Nigeria. A lot of it is burnt as waste and the rest is piped away for electrical power generation and use in industries.

Coal is found at Enugu in Nigeria and it was formerly mined to serve the railways and generate electricity. The coal however is of poor calorific value, high ash content and non-coking. It is therefore better suited as a raw material in the chemical manufacturing industry.

A number of large hydroelectric power installations have been developed on some West African rivers. The largest dams are Akosombo (Ghana), Kainji (Nigeria) and Kossou (Ivory Coast). Power is transmitted through grids from Ghana to neighbouring countries.

**FIGURE 1. ENERGY MAP OF WEST AFRICA**




**Source: The Petroleum Economist, 1991.**

Uranium deposits are found in Niger although at present, not all of the production is exported.

Wood has been a useful and a very important source of energy and since colonial times, for commercial purposes as well as domestic subsistence. It was heavily used on railways and in the early mines. Woodfuel use remains widespread but uneven throughout the region. The greatest potentials are found in the forest areas of Ivory Coast, Liberia, Ghana and Nigeria. On the other hand, the occurrence of wood as a source of fuel is relatively limited in the Sahel region bordering especially on Niamey in Niger, Ouagadougou in Burkina Faso and Bamako in Mali.

In addition to the main sources of energy in current use, others of lesser importance at the moment are solar energy, wind energy, crop and animal residue and animate energy.

Analysis of recent trends in the energy sector in West Africa provides the basis for a detailed analysis of the long-term energy development issues. Energy requirements are met from traditional (mainly firewood, charcoal, agricultural wastes and animal dung) and commercial sources (mainly oil, gas, hydroelectricity and coal)in ECOWAS. While the dependence on liquid fuels for energy supplies is the greatest, the reliance on traditional fuels, mainly fuelwood, is also of striking importance. Fuelwood supplied 35% of total energy in ECOWAS in 1987. The percentage share of gas, electricity and solid fuels are relatively smaller (See Table 1).

Table 1. Energy Supplies in ECOWAS, 1987.

| | Thousand metric tons (coal equivalents) | Percentage Share (%) |
|---|---|---|
| Liquids | 90,508 | 60.9 |
| Fuelwood* | 52,024 | 35.0 |
| Gas | 4,651 | 3.1 |
| Electricity | 1,057 | .7 |
| Solids | 298 | .3 |
| Total | 148,538 | 100.0 |

Source: United Nations, Energy Statistics Yearbook, 1989.

(* The conversion factor for fuelwood is 0.333 as provided by the U.N. Statistical Series. This assumes that 3 cubic metres of wood equals 1 metric ton of coal equivalent).

The pattern of commercial energy consumption reveals a high degree of reliance on liquid fuel, mostly oil. Figures from UNCTAD sources show that the share of liquid fuel in total consumption moved from 89% in 1970 to 84% in 1980, and then fell rapidly to 76% in 1987 (UNCTAD 1989). The relatively dominant position of oil in the earlier period may be due partly to a world-wide substitution of other energy sources for oil because of its lower cost and versatility. Rising oil prices, especially those of 1973-74 and 1979-80 were also partially responsible for the gradual fall in the share of oil in total energy consumption.

Comparing consumption figures with those for production or net production (production minus export) in the years 1970, 1980 and 1987, a declining trend of energy self-sufficiency emerges for the West African sub-region.

Table 2: Primary Energy Self-sufficiency: ECOWAS, 1970-87.

| | 1970 | 1980 | 1987 |
|---|---|---|---|
| Production (million TCE) | 78.22 | 152.29 | 96.69 |
| Consumption (million TCE) | 7.67 | 19.39 | 25.91 |
| Net Export as a % of Energy Production | 86.0 | 85.4 | 73.7 |
| Net Production | 10.95 | 22.23 | 25.46 |
| Prod./Consumption Ratios | 10.19 | 7.85 | 3.73 |
| Net Prod./Consumption Ratios | 1.43 | 1.14 | 0.98 |

$$\text{Self-sufficiency Ratio} = \frac{\text{Production(Net)}}{\text{Consumption}}$$

Source: Calculated from UNCTAD, Handbook of International Trade and Development Statistics, 1989, pp 496-499.

Table 2 shows that ECOWAS had a production/consumption ratio of 10.19 in 1970. This figure fell slightly in 1980 and, by 1987, it was 3.73. Despite the decline, a large surplus still existed and this implied that the region had enough commercial energy to go round if energy trade was to take place just among member countries alone. Unfortunately however, the situation was not all that positive. If the net export of energy is excluded, the degree of self-sufficiency falls exceptionally low. That is, when Net Production is divided by Consumption for 1970, the self-sufficiency ratio is slightly above unity; about 1.43. However, it declines to 1.14 in 1980 and, by 1987, an energy deficit emerges. Such a transition from an energy self-sufficiency situation to a deficit situation has some energy policy implications for countries. They have to make some adjustments to cope up with the deficit.

To some West African countries, a partial solution to such a deficit has been sought by an increasing reliance on traditional fuels. Fuelwood constitutes the main source of traditional energy

in the region. Although many statistics differ on the share of fuelwood in total energy consumption, the general agreement is that, over 60% of energy requirements in the community are met by fuelwood (Dunkerley et al). However, in some countries such as Mali, Niger, and some parts of Ghana, fuelwood is limited in supply and it is as expensive as oil. For example, in September 1987, fuelwood sold for about one and a half times as much as kerosene per unit of energy in Tamale, Ghana (EIU 1987). This observation suggests that the 'fuelwood crisis' in some ECOWAS countries might be more real than the oil crisis.

It is quite difficult to say whether the general energy pattern of ECOWAS countries, as described above, will be the same in the future since projections of energy futures of developing countries are fraught with high levels of uncertainty. However, given the desire of member countries to step up their rates of economic development, their inflexible structural economies and their rapid rate of population increases, there is the possibility that energy requirements in the region will rise in the future. It is therefore imperative to analyse in greater detail the production and consumption structure of the different kinds of energy in the region and to determine their implication for planning.

As was noted in the earlier section of this chapter, variations exist in energy resource endowments in the region (See Fig. 1). While some countries have different types of resources, others have few of them and yet some do not have any at all. Differences can therefore be expected to occur in the energy

production/consumption structure in the different countries. A better picture is given of the energy situation in the region if these differences are considered. This is discussed in later chapters.

## CHAPTER 4

## INTER-COUNTRY AND INTRA-COUNTRY COMMERCIAL ENERGY PERSPECTIVES.

Current available information on ECOWAS energy resources is incomplete and rather fragmentary, because most countries are still very much "unexplored". However, from the available but rather poor information, considerable proven resources of oil, gas and other primary energy resources are shown to exist (OPEC Papers 1980). These resources are not, however, uniformly distributed among the member countries. The 1980 estimates show that 13 out of the 16 countries are considered to possess oil and gas resources (Ibid). Similarly, the same number of countries have hydroelectric resource potentials (Lazenby and Jones 1987). On the other hand, coal and uranium are less equally distributed. Countries in West Africa face energy problems that are in some ways quite different and at the same time similar energy prospects. The broadest distinction between them is that of oil exporters and oil importers. Whereas the oil-exporting countries are likely to benefit from increases in oil prices, the importing countries are likely to experience balance of payment problems as a result the same situation. For example, unlike the situation where the oil crisis of the 1970s and the Gulf Crisis have been a bonanza for Nigeria's economy, the same situation presented difficult economic times for the economy of Ghana. However, this distinction does not capture the energy environments of the respective countries. Therefore, using a 3 by 3 matrix, a classification scheme is developed for the region that takes cognisance of broad demand and supply situations (See Table

3).

On the X-axis of the matrix, the countries are divided into 3 groups (Limited, Moderate and Substantial) of energy resource potentials. The Y-axis also divides the countries into 3 groups (High, Medium and Low) mainly according to the amount of commercial energy consumed, and to a lesser extent, the degree of urbanisation.

Firstly, the level of energy resource endowment seeks to capture the supply environment. It is a rough indicator of a country's potential to reduce its energy costs if it can develop its own indigenous energy resources. Secondly, the per capita energy consumption defines the demand environment. It roughly portrays the amount of energy consumed and the level of industrialisation of a country.

Another demand variable used is urbanisation. Although this is a crude determinant of the level of industrialisation (modernisation) of a country, because of its negative socio-economic consequences, it remains one of the best indices of modernisation in the developing world at the moment.

Table 3. ECOWAS ENERGY CHARACTERISTICS.

| | A Limited Energy Resources | B Moderate Energy Resources | C Substantial Energy Resources |
|---|---|---|---|
| 3 High Commercial Energy Consumption/ Urbanisation | Liberia | Ivory Coast | |
| 2 Medium Commercial Energy Consumption/ Urbanisation | Mauritania<br>Cape Verde<br>Gambia* | Senegal<br>Ghana! | Nigeria |
| 1 Low Commercial Energy Consumption/ Urbanisation | Burkina Faso<br>Niger<br>Guinea-Bissau<br>Togo | Guinea<br>Sierra Leone@<br>Benin<br>Mali | |

Note: The energy resource potential (oil, gas, coal and primary electricity) are based on the World Bank classification, 1980). They refer to the resources that are developable during the next decade. A classification interval of 100 was adopted for commercial energy consumption while intervals for urbanisation was arbitrarily determined. For data used, refer to Appendix 1.

*Figure for percentage urban population unknown.
!High urbanisation.
@Medium level urbanisation

The characteristics of the 3 commercial energy use/urbanisation groups differ. The high energy/urbanisation group has an average per capita commercial energy consumption of approximately 316 Kce. and about 35% of the population lives in urban areas. The medium energy/urbanisation group has an average per capita commercial energy consumption of 153 Kce. and about 74% of the population lives in rural areas. Finally, the low energy/urbanisation group has an average per capita commercial

energy consumption of 54 Kce. and 93% of the population lives in rural areas (See Appendix 1).

One similarity in commercial energy characteristic among the countries or group of countries is their extreme import dependence. The figures in Appendix 1 suggest that, with the exception of Nigeria, net imports of total energy as a percentage of total energy consumed is 98% for all other countries, on the average. Another striking observation is that energy use differs so much among countries at similar levels of development. For example, Cape Verde and the Gambia (Group 2) and Sierra Leone (Group 1) all had similar G.N.P. figures in 1980, but their per capita commercial energy consumption varied greatly. Possibly, the explanation may have to do with differences in energy prices between respective countries or differences in the development strategy of each country. What this implies is that, a country in which domestic energy prices are relatively low or one in which government policy supports import-substituting industries, there is the likelihood for high energy consumption. However, the relationship between high energy use and economic growth is not easily determined. Some countries consume large amounts of energy but attain very low levels of economic well-being. On the other hand, there are others that use relatively smaller quantities of energy and yet attain high levels of economic growth.

This approach to classify ECOWAS countries by energy characteristics, as shown above has some shortcomings. It does not consider traditional energy resources which constitutes an

important source of energy for all West African countries. Consequently, it underestimates the energy consumption of countries classified into Group 1 in the matrix. These countries have large rural populations and may have greater access to traditional energy resources. A second point, which is related to the first, is that no insight is given into within-country differences. It is expected that different activity spaces within West African countries will reflect different energy production and consumption characteristics. It is important to look at this.

Given the lack of data for most ECOWAS countries, a manageable range of conditions, and the differences in energy resource occurrence, further analysis will concentrate on Nigeria, Ghana and Burkina Faso. Nigeria is a net exporter of oil and possesses enormous energy resources. Ghana is an oil-importing country and relies to an appreciable extent on other indigenous forms of energy. Burkina Faso is a net importer of oil and has few energy resources. They belong to different groups of the classification. A generalisation based on the three countries may therefore be fairly representative of the region.

The disparity between energy consumption in the urban and the rural areas within ECOWAS countries is as great as the disparity between the rich and poor nations. The upper-class urban elite consume energy comparable to the levels of the middle and upper classes in the developed nations. The sharp difference between energy consumption by rural and urban populations arises on account of much lower incomes and the lack of conventional markets in rural

areas which leads to a preponderance of traditional fuels being used by rural consumers.

Further to the above, the drive for modernisation in many West African countries has led to the development of industrial complexes in many cities which process and manufacture light consumer goods. The transportation sector, with particular reference to the ownership of private automobiles has also experienced enormous growth especially in the urban areas. Improvements in the standard of living among the urban upper and middle classes have also been characterised by the increasing use of household gadgets such as refrigerators, T.V. sets, radios, gas cookers, etc. These developments, have stimulated the demand for commercial fuels, which have been rising over the years. Table 4 shows the commercial energy Production/Consumption trend in the three countries as well as ECOWAS on the whole.

Table 4: Commercial Energy Production/Consumption in ECOWAS (million metric tons and kilograms of coal equivalent).

| | | | | | Annual mean growth rates | |
|---|---|---|---|---|---|---|
| Country | 1970 | 1980 | 1987 | Per Capita* | 1970-1980 | 1980-1987 |
| Burkina Faso | 0.07 | 0.21 | 0.22 | 30 | 11.9 | 1.1 |
| | ! - | - | - | | - | - |
| Ghana | 1.42 | 1.51 | 1.86 | 128 | 1.6 | 2.6 |
| | !0.35 | 0.77 | 0.57 | | 7.0 | -5.4 |
| Nigeria | 2.74 | 11.99 | 16.89 | 165 | 14.3 | 3.1 |
| | !77.79 | 151.05 | 94.05 | | 4.8 | -2.9 |
| ECOWAS | 7.67 | 19.39 | 25.91 | 143 | 9.1 | 2.6 |
| | !78.22 | 152.29 | 96.69 | | 4.9 | -2.7 |

*Refers to 1987 Per Capita Consumption

! Production figures

Source: UNCTAD, Handbook of International Trade and Development Statistics, 1989, pp. 496-499.

The Table shows that production growth rates declined from 4.9% between 1970-1980 to -2.7% between 1980-1987 in ECOWAS. Similarly, consumption growth rates declined to 2.6% from 9.1% during the same periods. The decline may be explained by the fall in annual average growth rates of real Gross Domestic Product (G.D.P.) between the two periods. In the former period, the annual G.D.P. growth rate was 4.8%, and 0.9% in the latter. Similar trends were exhibited among the 3 countries. But Ghana experienced a mean annual increase in energy consumption, contrary to what occurred in the other 2 countries.

Per capita commercial energy consumption varied greatly between the countries. Nigeria had the highest per capita consumption with an impressive 165 kce. in 1987. Burkina Faso had the least, that is 30 kce.

Of major importance is the share of liquid fuel (mainly oil) in total commercial energy consumption. As illustrated in Table 5, the percentage share of oil was over 94% for the West African region in 1979. Between 1979 and 1989, Burkina Faso maintained a 100% share of oil in commercial energy supplies. Fluctuations were evident in Ghana and Nigeria. Although there were variations in the percentages of oil in energy use over the years, the figures point to the relative important role of oil in the region.

All the countries except Nigeria meet their oil requirements through imports. Available evidence indicates that net imports of energy as a percentage of energy consumed was over 100 for Burkina Faso and above 51 for Ghana (UNCTAD 1987).

Table 5: Share of Individual Fuels in Commercial Energy Consumption, ECOWAS (Percentages).

| | 1979 | | | | 1984 | | | | 1989 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| * | C | O | G | E | C | O | G | E | C | O | G | E |
| Burkina Faso | - | 100 | - | 0 | 0 | 100 | - | 0 | 0 | 100 | - | 0 |
| Ghana | 1 | 65 | - | 34 | 0 | 81 | - | 19 | 0 | 65 | - | 35 |
| Nigeria | 2 | 79 | 15 | 4 | 0 | 64 | 35 | 1 | 0 | 70 | 29 | 1 |
| ECOWAS | 0.4 | 94.2 | 0.9 | 4.5 | 1.1 | 92.5 | 2.2 | 4.2 | 2.2 | 89.6 | 1.8 | 6.4 |

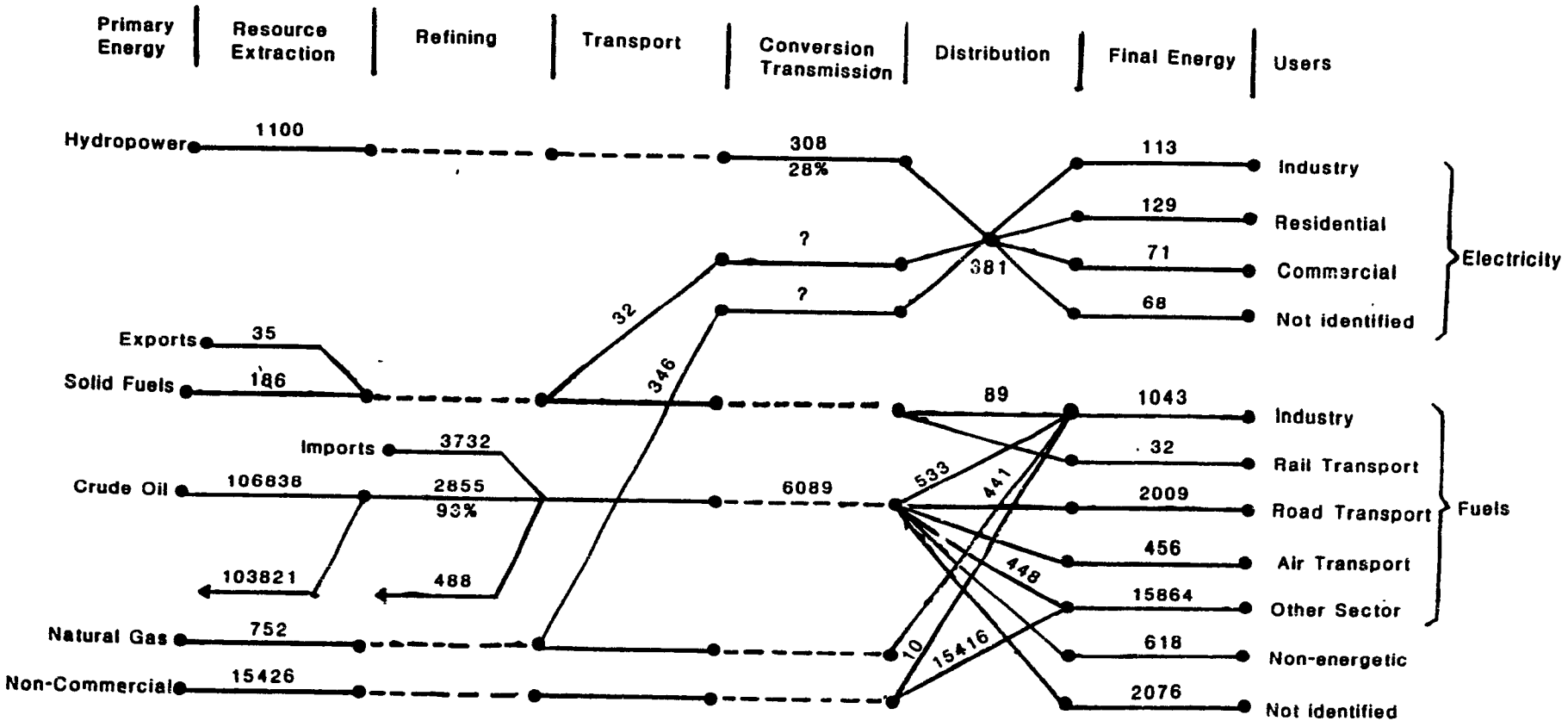
(* C, O, G and E represent Coal, Oil, Gas and Electricity respectively; - means Not Applicable and 0 means Negligible).

Source: Calculated from U.N. Energy Statistics Yearbook, 1989.

Sectoral energy demand analysis in West African countries suggests that there are variations in the relative importance of the various sectors and these also change over time. The major consumer of commercial fuel in ECOWAS cities and towns is the formal sector, which includes modern industry, commercial establishments and government enterprises. These tend to be concentrated in the metropoly because of locational advantages of city size, degree of cosmopolitanism, externalities and the existence of a national and regional infrastructure serving the city and greater accessibility to general and specialised information.

Within urban areas, modern industry alone consumes much of the available electricity and commercial fuels. Calculations based on Figure 2 suggest that an estimated 30% of electricity is used up by Nigerian industries, most of which are located in urban areas.

Figure 2. Energy Flow Diagram of Nigeria, 1977 (Flows in thousand toe/y)




Source: Neu, H.,'Energy Flow in National Economies', in Neu, H. and Bain, D. (eds), National Energy Planning and Management in Developing Countries, 1983.

Furthermore, as much as 17% of commercial fuels is consumed by the same sector. On the other hand, the rural areas are deprived of conventional fuels. Paradoxically, most oil fields and activities of oil production are concentrated in rural areas, but decision making occurs at multinationals' headquarters in distant urban areas. One might expect that oil production and related activities would stimulate peasant economy, but the opposite is the case. The general pattern of most oil-producing areas is to exacerbate rural impoverishment. As noted by Badru (1983), this derives from two related developments, the first of which is the ecological destruction of peasant farms through oil pollution and indiscriminate seisure of peasant land by oil multinationals, backed by the Nigerian State, and secondly, the consequent migration of labour resources from the rural area to the supposedly industrialising urban centres.

The informal sector in the urban areas comprises small businesses and a vast array of services characteristic of most developing world cities. These include self-employed street vendors, service providers, snack and food sellers, etc. In many cities, this sector is the principal source of income for most of the urban poor. It is a major productive sector that utilises non-commercial fuels to a very large extent. It provides services that cannot be met by the formal sector, thus its function is very important to the survival of the urban system.

In Ghana for example, computed sectoral petroleum products consumption figures indicate that the transportation sector

consumes more than half as much petroleum products as all the other sectors combined (Table 6). Apart from Accra, Kumasi

Table 6. Consumption of Petroleum Products by Sectors in Ghana, 1984-1987 (in percentages).

| Sector | 1984 | 1985 | 1986 | 1987 |
|---|---|---|---|---|
| Transport | 58 | 52 | 55 | 54 |
| Industry & Mining | 16 | 12 | 12 | 12 |
| Fishing & Agriculture | 11 | 12 | 9 | 10 |
| Household & Commerce | 15 | 24 | 24 | 24 |

Source: Computed from Turkson, J.K. 'Planning for the Energy Sector in Ghana'. Energy Policy, Vol 18, No 8, Oct. 1990, p 704.

Sekondi-Takoradi and a few other Regional Capitals, which are quite well served with good transportation networks, all the rural areas are devoid of good roads. Over the years, increases of petrol-powered vehicles has been constant in the urban areas of Ghana while walking, the use of bicycles and porters are much more common in the rural areas. As shown in Table 6 above, the share of energy consumption by fishing and agriculture is the least. As elsewhere in West Africa, this reveals the rudimentary structure of fishing and agriculture in the country. In addition, the policy to allocate scarce resources to industrial development of frequently energy-intensive nature located in privileged urban centres, has inevitably resulted in neglect of rural segments of the Ghanaian economy, and particularly agriculture. This has ultimately resulted in increased differentials between rural-urban wage levels and, as a consequence, increased migration pressure on urban areas.

Electricity usage is also becoming quite popular in the urban areas of Ghana. Therefore, the relatively smaller shares of industry and household in total commercial energy consumption may

be accounted for by a greater reliance of these sectors on hydro-electricity.

Apart from oil which supplied over 89% of commercial energy of ECOWAS in 1989, electricity constituted the next major component which supplied about 6% of the total. The percentage was much greater for Ghana than Nigeria and Burkina Faso (See Table 5). The main ways by which electricity is generated in West Africa are through hydro stations and diesel generators, the former being the principal. Diesel generators have proved to be unreliable sources of power supply because of their poor record of operation. In some countries however, they still constitute the main source of electricity supply.

As shown in Table 7, only Nigeria, Ghana and Ivory Coast are countries where hydro supplies the largest share of electricity. There has been a tremendous increase in the production of both hydro and thermal generated electricity between 1970 and 1980. However. the share of thermal production rose from 28% to 35%, most of which is accounted for by Nigeria's large increase.

Similarly, although hydroelectricity constitutes the main form of electricity supply, it is subject to the vagaries of the hydrological cycle. An example is the severity of drought between 1981-84 which posed a constraint on the capacity of the Akosombo dam in Ghana to generate higher levels of power.

Table 7: Hydro/Thermal Mix, ECOWAS (million kwh).

| | 1970 | | | 1980 | | |
|---|---|---|---|---|---|---|
| | Thermal | Hydro | Total | Thermal | Hydro | Total |
| Burkina Faso | 27 | - | 27 | 120 | - | 120 |
| Ivory Coast | 257 | 260 | 517 | 600 | 1200 | 1800 |
| Ghana | 38 | 2882 | 2920 | 68 | 4700 | 4768 |
| Nigeria | 185 | 1365 | 1550 | 2000 | 3000 | 5000 |
| ECOWAS | 1878 | 4803 | 6681 | 5089 | 9341 | 14430 |

Source: U.N. Yearbook of Energy Statistics, various issues.

As was indicated in Table 5, the share of electricity in total commercial energy consumption has been rising over the years. This may be due to a greater recognition among the governments of member states of ECOWAS about the potential role of hydroelectricity in future energy supplies. The Akosombo in Ghana and the Kainji in Nigeria were the largest and the earliest hydro projects to be implemented in the 1960s just after the colonial era. Since then, a series of projects have been undertaken and others are still under construction (See Table 8).

In spite of its increasing role, the distribution of hydroelectricity is at present extremely limited in the majority of the countries. This is because it requires an elaborate and very costly conversion, transmission and distribution systems. However, the industrial and mining sectors have been the main users of the power. A good example is the aluminium smelting industry (VALCO) in Ghana, which accounts for about 60% of the total Akosombo hydroelectric system load.

Table 8: Existing Hydroelectric Projects in ECOWAS.

| Country | Project | Major Rivers | Installed Capacity(mw) |
|---|---|---|---|
| Guinea | Grandes Chutes | Niger | 20 |
| | Donkea | Konkoure | 15 |
| | Kinkon | Fatala | 3.2 |
| | Dabola | | 1.5 |
| Liberia | Mt. Koffee | St. Paul | 64 |
| Sierra Leone | - | - | 2 |
| Benin! | - | Queme | - |
| B. Faso | Kompienga | - | 15* |
| Ivory Coast | Ayame I & II | Sasandra | 50 |
| | Kassou | Bandama | 174 |
| | Taabo | Cavally | 210 |
| | Buyo | Comoe | 180 |
| Mali | Felou | Niger | 0.5 |
| | Sotuba | Senegal | 5.4 |
| | Selingue | - | |
| Mauritania | - | - | - |
| Niger@ | - | Niger | - |
| Senegal | - | Senegal | - |
| Gambia | - | Gambia | - |
| Ghana | Akosombo | Volta | 792 |
| | Kpong | | 160 |
| Guinea-Bissau | - | - | - |
| Nigeria | Kainji | Niger | 760 |
| | Jebba | | 560 |
| | Shiroro | | 600* |
| Togo! | Nangbeto | Mono | 63* |
| | Kpime | | 1.5 |

! Imports hydro from Akosombo, Ghana.
@ Imports hydro from Kainji.
* Under construction.

Source: Lazenby, J.B.C. and Jones, P.M.S. 'Hydroelectricity in West Africa : its Future Role'. Energy Policy, October 1987.

Domestic use of electricity is quite small, but varies between city and countryside. It even varies between an urban upper-class residential area and an urban slum or squatter settlement. An average city dweller in Accra or Lagos uses about 15 times or more as much electricity as a person living in a rural area and benefiting from a rural electrification programme.[4]

[4]Authors Personal Observations From Visits to West African Villages and cities.

From the discussion so far, it can be concluded that commercial energy use in most West African countries is inequitably distributed and largely, dependent on foreign sources. Although major increases in commercial energy consumption probably will be inescapable for the modern sector, it is important that efforts are made to utilise energy efficiently. Apart from this, no energy planning exercise can be considered serious and meaningful in ECOWAS countries that does not address the traditional fuel sector in its own right. As Dr. Charles Wireko-Brobbey (the Policy advisor at the Ministry of Fuel and Power in Ghana) said for Ghana "as a country, 70% of our people live in rural areas, the same areas that provide much of the country's foreign exchange earnings....The pattern of energy consumption indicates that people use more woodfuel - firewood and charcoal. I think we should look rationally at how we apportion national resources, both in terms of our national wealth and our energy needs, to ensure that there is real attempt to address the problems of the whole country, and not the cities alone" (Ephson, 1990). To this end, energy planners may find it useful to focus on the more deep seated socio-economic origins of the energy problems, which lie mostly in the rural sphere.

## CHAPTER 5

## SPATIAL DIFFERENTIATION OF THE TRADITIONAL FUEL ECONOMY OF WEST AFRICAN COUNTRIES: AN ANALYSIS AND DISCUSSION.

The use of fuelwood in any country in West Africa depends on both its supply and demand, and is roughly proportional to the density of population. Consequently, crowded regions in relatively dry environments such as the northernmost districts of Niger, Burkina Faso, Mali and Nigeria are most vulnerable to fuelwood scarcity. On the other hand, relatively wet areas such as the south-western part of Ghana and south-western Nigeria, with high rates of plant growth have adequate fuelwood resources, except in areas where high population densities have resulted in large-scale forest clearances.

Although diversities exist in the energy profiles of West African countries, one generalisation however which is true for all is that all the countries in the region rely heavily on traditional fuels (35%, Table 1), mainly fuelwood. Fuelwood plays a very important role in energy supplies. It is used in households, cottage industries, industrial and service sectors. Some of the common uses of fuelwood are cooking, lighting, drying of agricultural products, tile making and metal working.

Accurate analysis of fuelwood supply and use in West Africa and the developing world as a whole is fraught with difficulties. Data is unreliable and in many instances unavailable due to a lack of standardised units of measurement. Moreover, most fuelwood does not pass through any commercial distribution system. In many parts

of West Africa, especially in the villages, fuelwood cannot be priced because it is gathered free as by-products of cleared agricultural lands or scavenged from the fields. It lies in the so-called 'hidden economy'.

Rates of fuelwood production and consumption vary considerably with the availability of alternative fuels, wood availability, cooking habits, and other factors. Estimates available are normally based on extrapolation of figures, and educated guesses based on subjective observations. Detailed studies of seasonal and geographical variations of traditional fuel use in West Africa are scarce. It is however well-known that in some areas, people use crop residues and animal dung when wood fuels are unavailable or too expensive. A survey by Elizabeth Ernst (1977) in Upper Volta (Burkina Faso) indicates that seasonal variations exist in traditional fuel use. In Burkina Faso, people used crop residues immediately after harvests from nearby fields but carried fuelwood over long distances at other times. Table 9 below shows the level of national reliance on traditional fuels in West Africa.

Table 9: The Role of Fuelwood in Energy Consumption, ECOWAS, 1980 ( thousands of cubic meters and metric tons of coal equivalent).

| | Fuelwood consumption (meters) | Fuelwood consumption (TCE) | Commercial Energy consumption (TCE) | Total Energy supplied by (fuelwood, %) |
|---|---|---|---|---|
| Burkina Faso | 4430 | 1500 | 201 | 88 |
| Ghana | 7050 | 2357 | 1705 | 58 |
| Nigeria | 89160 | 29749 | 11127 | 72 |
| ECOWAS | 157580 | 53753 | 18538 | 69 |

Source: Calculations based on the U.N. Energy Statistics, 1980.

Wood accounted for 69% of all energy in ECOWAS. Table 9 however gives a misleading picture of the relative role of fuelwood in total energy consumption in the region. This is because the calculations are based on straight energy values of the two main forms of energy. A better picture may be given if a conversion is made based on the end use energy efficiency of commercial and traditional fuels. Using an estimated rough conversion rate of 60% and 10% for commercial fuel and fuelwood, the share of fuelwood in total energy consumption declines drastically from 69% to 33% (See Table 10). Technically, in West Africa, the final and useful heat energy derived from fuelwood by users is low because the resource is burnt in very low efficiency traditional stoves. This phenomenon has been of primary concern to technocrats in the field of energy planning in developing countries. However, the sociological contexts under which fuelwood is utilised is often ignored. Apart from the heat derived from wood-burning for cooking purposes, the fire serves as an illuminant, protects families and animals from insects, serves as a cure for stored agricultural crops, and keeps people warm on exceptionally cold nights. Culturally, the stoves symbolise family unity in some African societies. These externalities, which are of a qualitative nature, are very difficult to quantify. Meanwhile, they are very important in the basic survival of villagers, and hence cannot be ignored in any planning effort.

Table 10: The Role of Wood as Energy in ECOWAS, 1980.

| | Commercial Energy | Fuelwood | Total |
|---|---|---|---|
| Consumption (000 TCE) | 18538 | 53753 | 72291 |
| Efficiency of Use, (%)* | 60 | 10 | |
| Useful Energy (000 TCE) | 11123 | 5375 | 16498 |
| Percentage Share of useful energy | 67 | 33 | 100 |

(* This is a rough conversion estimate. Individual fuels have higher or lower conversion rates).

If one goes by the proposed conversion estimate, it implies that in a country such as Ghana, fuelwood accounts for 19% of useful energy supplied. The corresponding figures for Nigeria and Burkina Faso are 31% and 55% respectively. These are low figures compared to those in Table 9.

A large segment of the rural and urban populace in these countries use wood as a principal cooking fuel. Cooking constitutes the largest share of domestic energy requirements in the community. As noted by Hughart (1979), and adapted by Dunkerley et al (1981), 66% of the rural population and 100% of the urban poor population in Sub-Saharan Africa, principally use wood for cooking. Consequently, a shortage of woodfuel will lead to numerous problems for these people.

It has frequently been argued that the rapid depletion of forests and other woody vegetation communities coupled with their low regeneration rates have led to fuelwood shortages in many West African countries. Surprisingly, the situation has been poorly documented in the energy literature of West Africa. Recently however, the studies carried out by the World Bank (1980) and the FAO (1981) throw some light on the problem. A summary of the study

is presented in Table 11.

Table 11: FUELWOOD DEMAND/SUPPLY ANALYSIS, ECOWAS*, 1980-2000.

| | Nigeria | Ghana | B. Faso | Total |
|---|---|---|---|---|
| 1. Population in 1980 (millions) | 81 | 12 | 7 | 145 |
| 2. Projected population, year 2000 | | | | |
| Urban | 50 | 11 | 2 | 98 |
| Rural | 100 | 10 | 10 | 164 |
| 3. Total (2) | 150 | 21 | 12 | 262 |
| 4. Current fuelwood consumption (million $m^3$) | 44 | 6 | 4 | 84 |
| 5. Projected fuelwood consumption, year 2000 (million $m^3$) | 90 | 12 | 5 | 160 |
| 6. Alternate fuelwood substitution (%) | 20 | 20 | 20 | 21 |
| 7. Residual fuelwood demand, year 2000 (million $m^3$) | 70 | 10 | 4 | 123 |
| 8. Area of natural forest (mi. ha) | 10.0 | 5.0 | 3.5 | 33.3 |
| 9. Natural forest fuel supply, % of (7), year 2000 | 15 | 15 | 25 | 16 |
| 10. Net fuelwood requirement (million $m^3$) | 60 | 8 | 3 | 102 |
| 11. Area of plantation needed to meet (10), (million ha) | 5.0 | 0.7 | 0.3 | 8.2 |
| 12. Present area of fuelwood plantations, (thousand ha.) | 20 | 7 | 1 | 46 |
| 13. Balance of new plantations needed to achieve (11) (mi. ha) | 5.0 | 0.7 | 0.3 | 8.2 |
| 14. Balance (13) expressed as an annual programme to year 2000 (thousand ha/annum) | 250 | 35 | 15 | 410 |
| 15. Actual current annual fuelwood planting programme ('000 ha/yr) | 10.0 | 3.5 | 0.5 | 23.5 |
| 16. Factor by which (15) needs to be increased to achieve (14), year 2000 | 25 | 10 | 30 | 17 |

Source: Adapted from World Bank, Renewable Energy Task Force, 'Developing Countries Fuelwood Supply/Demand Analysis, 1980-2000', June 1980.

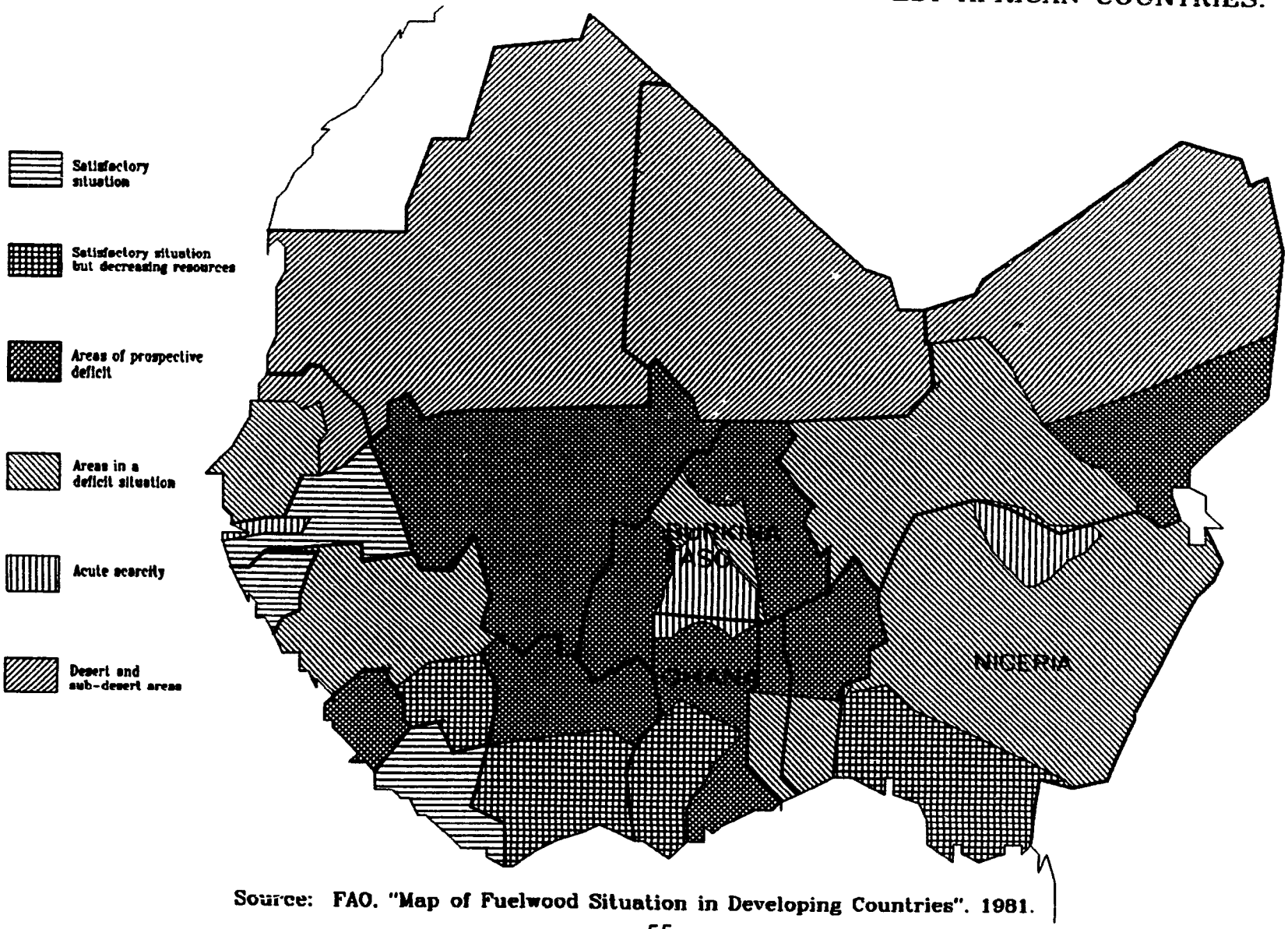
As illustrated in the Table above, by the year 2000, fuelwood demand in the three countries will be far in excess of supply and a serious deficit situation will have occurred. This can be deduced by relating items (7) to (9). The results show that the fuelwood deficit is expected to be more serious in Nigeria and Ghana than

in Burkina Faso. But before this can be realised, then Burkina Faso must achieve a higher (30-fold) increase in the level of plantations being established.

The World Bank study can however be criticised on the grounds that the methodology used to derive some of the variables are based on assumption and guesses. Moreover, the analysis does not take into consideration intra-country variations. However, this can be complemented by the FAO study which differentiates between areas of acute scarcity, deficit, prospective deficit and satisfactory situations within countries (Refer to Figure 3). Acute scarcity implies that fuelwood resources have been so reduced that minimum supplies can no longer be ensured. Deficit situations exist when fuelwood resources are below requirements, obliging people to over exploit. Prospective deficit means that fuelwood resources are higher than requirements but a transition toward a crisis situation by the year 2000 is evident. Satisfactory situation represent conditions where resources considerably exceed present and foreseeable needs. Biswas and Biswas (1985) named deficit situations to exist in Central Burkina Faso and Southern Nigeria, prospective deficit situations to be found in Burkina Faso (western, eastern), Ghana (northern, southern) and Nigeria (southern).

One must note however that, isolated patches of fuelwood satisfactory conditions are sometimes found within general areas of deficit situations.

Figure 3. THE FUELWOOD SITUATION IN WEST AFRICAN COUNTRIES.




Source: FAO. "Map of Fuelwood Situation in Developing Countries". 1981.

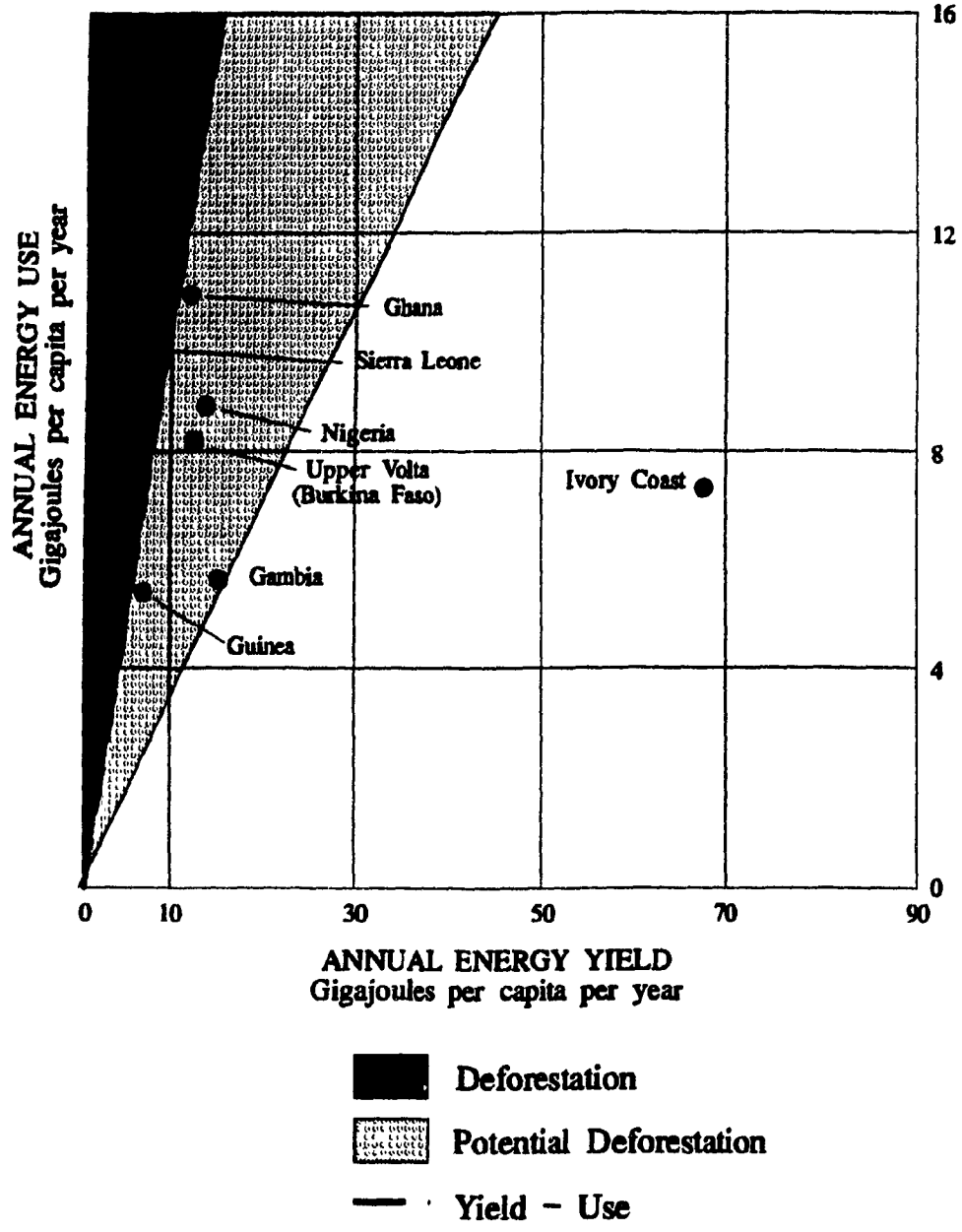
Therefore, the approach to fuelwood studies such as this can be carried out better on a small scale because shortages tend to be site-specific.

The consequences of fuelwood scarcity has contributed to deforestation in specific localities where the patterns of land and forest use are inherently destructive. Figure 4 shows that all the three countries under discussion are facing prospective deforestation although the situation is more advanced in Ghana. Analysis of the whole deforestation scenario involves too many factors to be discussed in detail here. However, it can be argued that fuelwood harvesting is not the major or primary cause of deforestation in West Africa but is certainly a contributory factor. On the other hand, commercial woodfuel markets have been shown to be attributable factors in forest loss in Ouagadougou and Kano (Eckholm et al, 1984).

This formulation of scarcity is one diagnosed by professional analysts and technical personnel of the World Bank and the FAO. It is absolute scarcity and is measured and understood abstractly. Consequently it is taken as defining the fuelwood problems of developing countries and used as the basis for assessing solutions in many countries. These solutions are discussed in the later part of this chapter.

A logical approach to understanding the woodfuel problem cannot be summarised however in a simple formula which applies everywhere in West Africa or the Third World in general.

Figure 4.
West African Countries: Firewood - Yield and Use




Source: Adapted from Shell Briefing Service, "Energy in Developing Countries", 1980.

Various groups of people in different areas are affected differently by fuelwood scarcity. But this important spatial and class dimension is usually neglected by planners in their attempt to find solutions to the problem.

It is important to note that energy has been ample in rural areas all over the world for millenia. The harmony between rural people, their economic and household activities and nature, which provides renewable energy, continued through untold centuries except for occasional disruptions by famines, earthquakes and other disasters.

In the rural areas of West African countries, as in other developing nations, fuelwood was to a large extent a free good, a by-product of normal agricultural activity. Almost certainly, pressures on wood supply were light, and there were little preferences for particular species of wood for burning purposes. In recent times, the situation has changed drastically as pressure is mounted on wood resources in rural areas from a variety of sources.

Pressure comes on woodfuel resources in rural areas because of drought which kills off many trees, agricultural mechanisation which induces soil erosion and the growing need for additional land to grow crops. Recent urban demands have also tended to create highly specific pressures on resources, both in terms of product and location. As population grows in rural areas, the need to cultivate lands on which fuelwood was formerly collected increases. With time, rural people have to walk for long distances to look for

fuelwood. The people who are mostly affected are the poor and landless families and women. In addition to performing countless tasks, rural women in West Africa have to provide fuel for cooking the household meals. As the fuelwood scarcity intensifies, branches of living trees are polarded or whole trees are coppiced and used as fuel. Also, people have increasingly been forced to burn millet straw, other crop residues and sometimes cow dung, which could otherwise be used to help regenerate their soil.

More often than not, rural woodfuel consumers have been criticised for their reckless cutting of trees and wasteful use of wood for fuel. Efforts are being made to educate them about environmental degradation and other problems that are likely to occur as a result of forest depletion. Knowledge in the Behavioural Sciences however teaches us that, the skills and perceptiveness of rural people are grossly underestimated. As Foley (1986) points out 'they do not need visitors from the cities to tell them what is happening around them. They have been able to survive from generation to generation because of their good knowledge of the environment in which they live'.

To the outside observer, the rural folk may appear to be afflicted by a shortage of wood which was caused by themselves. They are judged as "irrational people with suicidal tendencies". But to the rural consumers, they have become the "helpless victims of the woodfuel trap". What needs to be understood here is that, to the rural consumers, woodfuel scarcity is just part and parcel of the overall general poverty problem facing them. Food, water,

shelter and health are other needs that call for attention and cannot be separated from the woodfuel problem.

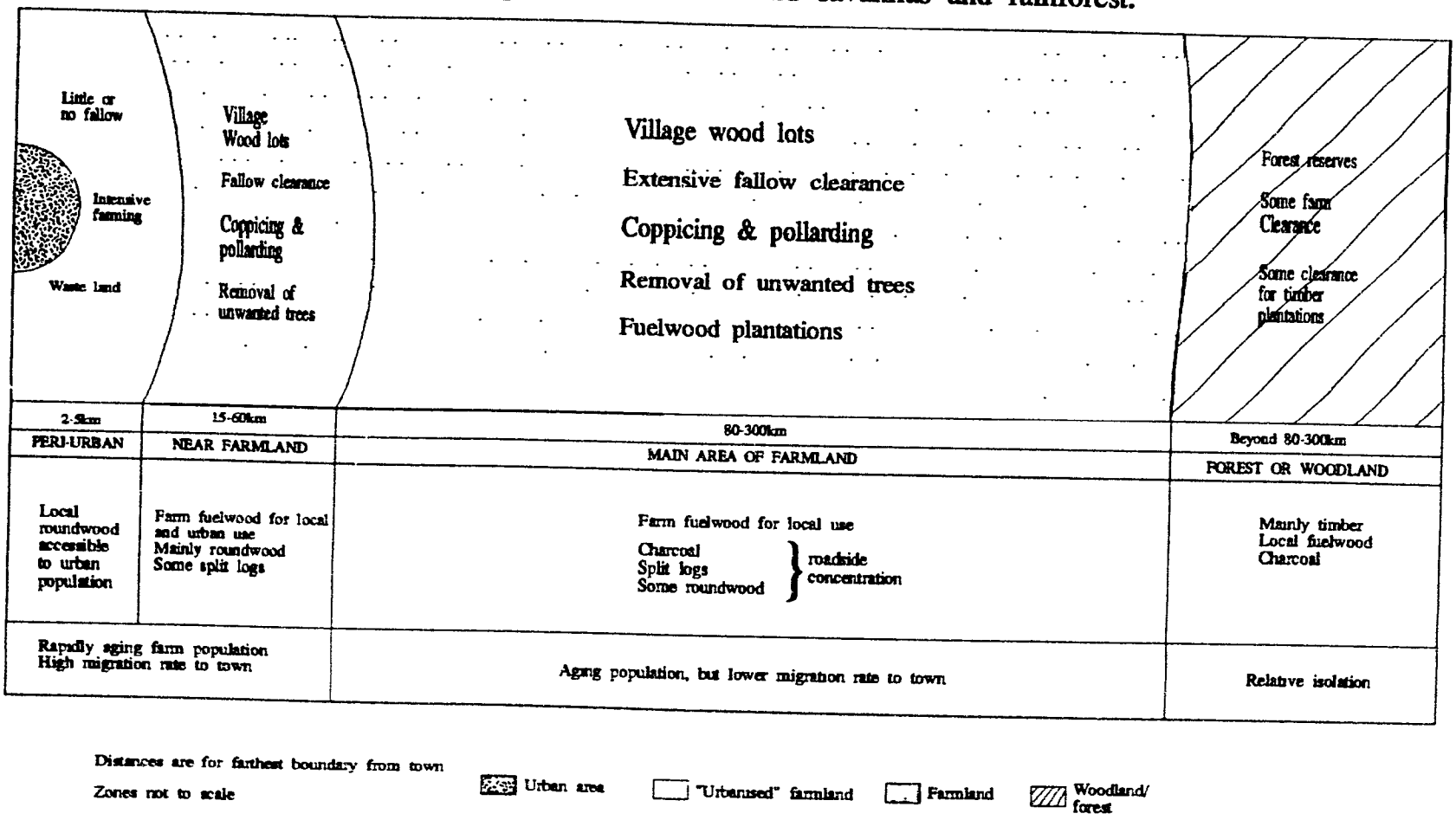
In addition, the woodfuel crisis should not be pictured only as a rural one with the images of women walking for very long distances to harvest fuelwood. The problem relates as much to urban consumers, although rural consumers are much closer to the ecological problems. In Ouagadougou (Burkina Faso), the price of fuelwood which is about 9 Pounds Sterling a month (about one-third of an average income) has forced many poor families to reduce their hot meals preparation from 2-3 times a day to once a day (Robin Sharp, 1990). Conventional fuels like kerosene, bottled gas or electricity are more readily found in towns and cities. But their accessibility is strongly related to the income levels of consumers. In Ghanaian and Nigerian towns and cities, a small segment of the high-income population use bottled gas and electricity for their domestic purposes. As a matter of fact, their per capita domestic energy consumption, is equivalent or even more than what obtains in affluent communities in the developed world. The lower middle-income populace commonly use firewood or charcoal for cooking and electricity for lighting while the upper middle-income bracket substitute kerosene or bottled gas for cooking. But for the largest group of urban poor population, their only "luxury" fuel is kerosene for lighting and firewood or charcoal for cooking.

Sometimes, Kerosene becomes cheaper than fuelwood and it is relatively more efficient but the urban poor cannot afford the initial investment of buying a new stove. A new imported kerosene

stove in Ghana costs about 3-4 times a 'coal pot' which is used as a charcoal stove and manufactured locally. Even if they can pay for electric power, the cost of an electric cooker is very prohibitive. So, the urban poor are caught in a 'poverty trap', where they are surrounded by many alternatives but have very few real choices.

Furthermore, the fuelwood used by the urban consumers comes from the rural outlying areas. As the population of the cities increases (mostly as a result of rural-urban migration), the fastest growing sector is the low-income bracket. This increases the demand for fuelwood in the cities, thereby exacerbating the problem in the peripheral rural areas. As exemplified in the study of Cline-Cole and others (1990), as demand increases, a commercial fuelwood market sector develops. Inroads are made further into the rural areas and woodfuel resources are increasingly siphoned to the cities by 'small businessmen' or suppliers. The pattern revealed by urban-rural inter-relationships of fuelwood production and consumption is extremely complex. However, the general pattern in West African countries reveals a zonation of production and consumption areas around cities. An illustration of this is made in a simple descriptive model shown in Figure 5. This pattern looks like the classical Von Thunen model and hence describes the effect of distance on the type of human activity in the different zones.

Figure 5. Suggested zonation of farmland and fuelwood production around towns of over 100,000 population in the humid savannas and rainforest.



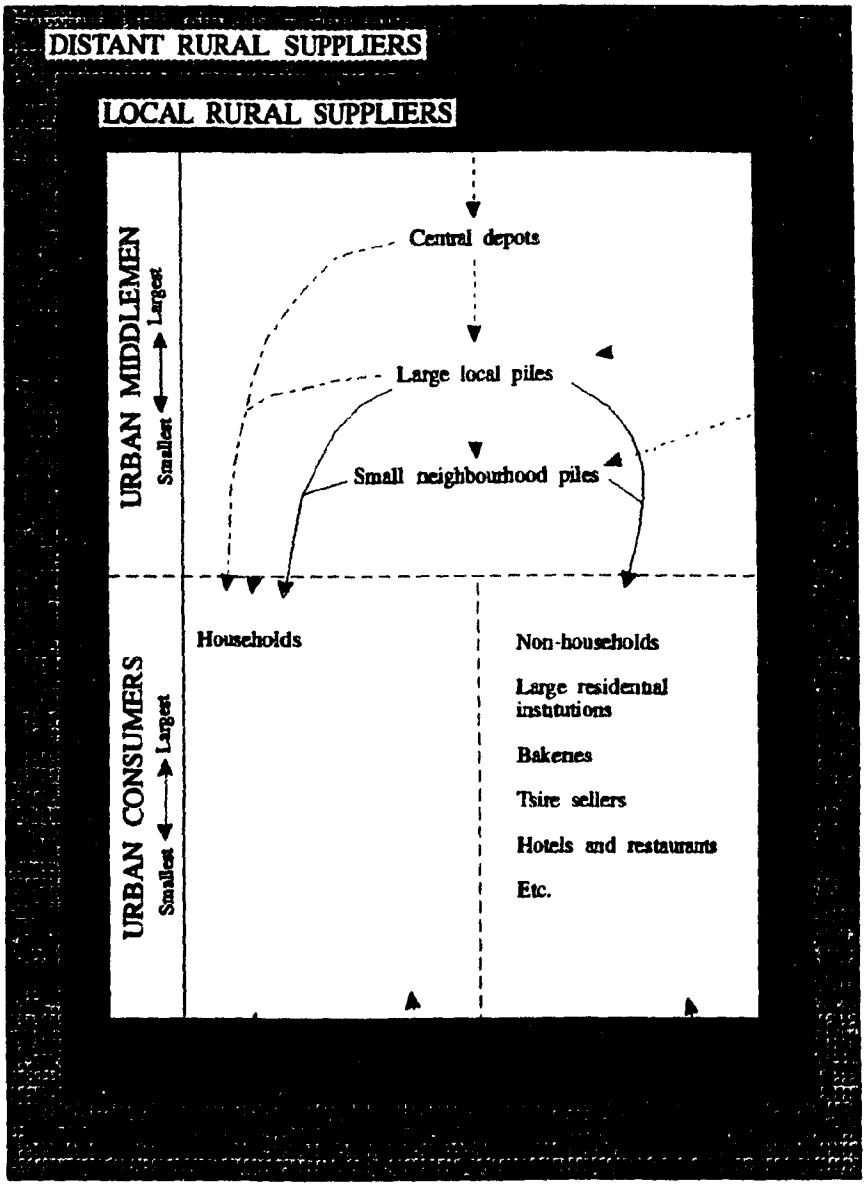

Source: Moss, R.P. and Morgan, W.B., "Fuelwood and Energy Production and Supply in the Humid Tropics", 1981.

As fuelwood is a bulky item and quite expensive to transport, the location of each zone vis a vis the city determines the form of wood transported and its accessibility to the urban population. Wood resources in Peri-Urban zones are highly accessible to urban populations and the wood transported are usually in the form of round logs. On the other hand, wood from Farmlands (Extended hinterland) are less accessible and they arrive in the urban areas in the form of split logs and charcoal.

As one might expect, the zone closest to the city will be subjected to the most demand pressure. But this situation, as some researches have shown, varies from one place to another. Evidence has shown that, for example, the burden of providing for urban demand has been effectively shifted from an inner Closed-Settled Zone to a further Kano region, but without deforestation (Cline-Cole et al, 1990).

Although wood is produced and sold for fuel in rural areas, by far the greater part of the commercial industry has resulted from demand for firewood and its derivative, charcoal, in towns. Available evidence suggests that the fuelwood trade involves varying sizes of rural suppliers, urban middlemen and urban consumers. Also, the marketing channels for fuelwood are organised in a variety of ways, but the general picture in West African countries depicts that the intra-urban distribution system is hierarchically structured, although not rigidly. This hierarchy, as presented by Cline-Cole and others (Ibid), is shown in Figure 6.

Figure 6. The Urban Distribution System for Firewood




Source: Cline-Cole et al, "Woodfuel in Kano", 1990.

As shown in the Figure, the central depots, local piles and the smaller neighbourhood piles are different levels or 'bulk-breaking' points in the urban distribution system. By-passing these channels, some urban consumers procure wood directly from rural sources. The presence and proportion of middlemen interposed between rural suppliers and urban consumers diminishes the return that commercialisation of fuelwood brings to the rural areas. This is because, the entrepreneurs who gain better access to markets are residents in urban areas. For this reason, the larger part of the profit from marketing fuelwood goes to urban areas and thereby constituting a relative drain on rural resources.

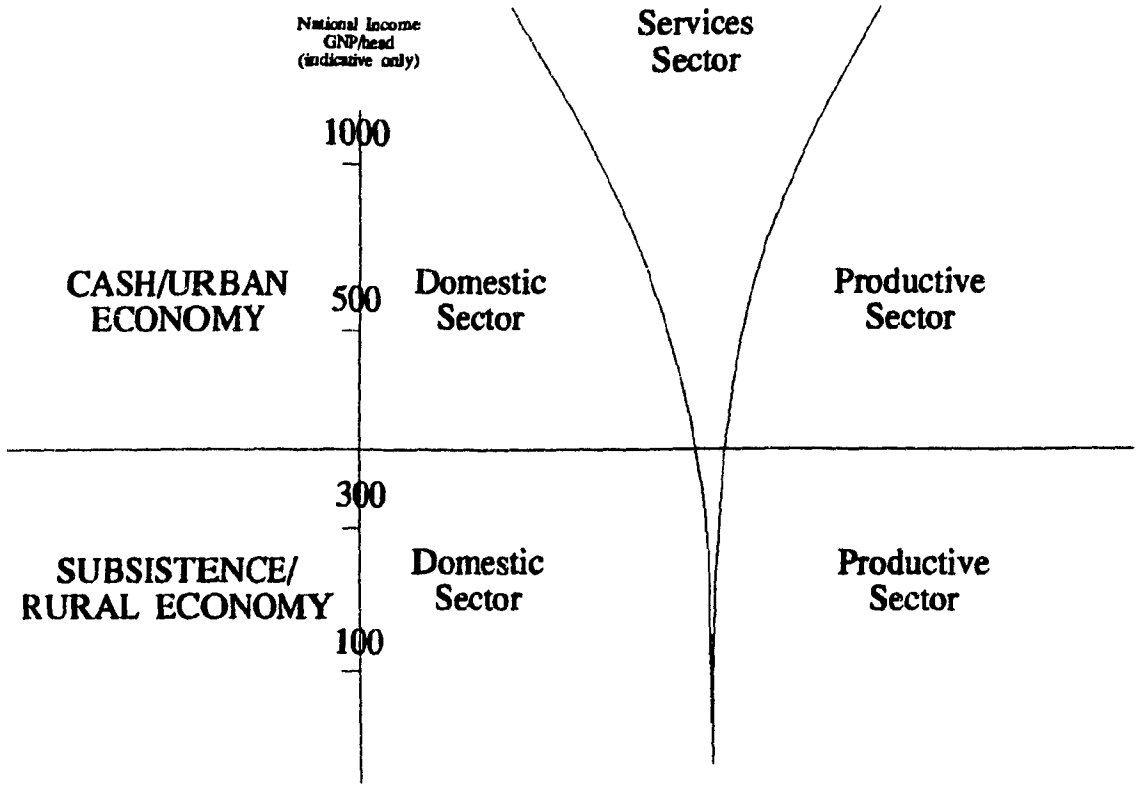
West African countries can be divided, with respect to fuelwood consumption, into Subsistence and Cash economies, representing consumption in rural and urban areas. This is shown in a schematic framework in Figure 7. A similar diagram was used by Foley (1981) in his analysis of rural energy planning in developing countries. With each of these 2 broad divisions, a further distinction can be made. The Subsistence economy can be divided into a Domestic (household) and a Productive sector. Fuelwood consumption in the domestic sector is by far the largest. Cooking alone takes an astonishingly high percentage of this use. In contrast, the productive sector takes up a tiny percentage. Agricultural activities such as tobacco curing, sugar refining and cassava drying, and handicrafts, are the kind of activities that absorb this small amount of fuelwood. Traditional agricultural tasks such as bush-clearing, crop-sewing and harvesting, are

performed virtually with human and animal power.

On the other hand, the Cash economy can also be sub-divided into 3 sectors - Domestic, Services and Productive. The domestic sector comprises poor households in the urban area who use fuelwood for cooking and heating purposes, and middle-class urban people who use fuelwood because of preference and its reliability. A distinction between formal and informal sectors of the urban economy is important in differentiating the services sector from the productive sector. While the formal sector (productive) comprise users in the public sector institutions such as schools and colleges, large hotels and restaurants, prisons and factories, the informal sector (services) comprise users such as snack and cooked food sellers and artisans. In the various sectors of the urban economy, the amount of fuelwood consumed depends on accessibility to fuelwood resources, the relative size of each sector, availability of substitute fuels and their price relativities, and other social factors.

It may be argued that the more monetised an economy is, the larger is the chance of a wide array of other competing fuels being found in the system. In that respect, the GNP per capita shown in Figure 7 is indicative of the level of monetisation of each system and hence the degree of availability of other competing fuels. It is doubtful whether a zero level of monetisation exist in any West African society at present, even in the most primitive one.

Figure 7. Schematic Representation of Woodfuel-using Sectors in West African Countries.




Source: Adapted and Modified from Foley, G., "Rural Energy Planning in Developing Countries: A Framework for Analysis", 1981.

Given this, one important observation is that, the urban economy has a wider variety of other fuels like kerosene, bottled gas and electricity for cooking, and petrol, diesel and hydro-power for motive power, than the rural economy. The degree of fuel substitutability is therefore greater in the urban economy more than the rural one generally.

Theoretically, the schematic gradation presented here shows the economic fuel-using sectors as static systems without any forms of interaction. In reality, this is not the case. Sectors interact with each other and within themselves, thus creating changes. These changes can either improve or worsen the circumstance of a sector. **Improvement** here is taken to mean a greater accessibility of a sector to a wider array of fuel while **Worsening**, is taken to mean a limited scope of accessibility to existing fuels.

Rural subsistence economies in West Africa lack the capacity to make improvement and the progress towards a worsening scenario has been the order. On the contrary, the reverse is quite true for urban economies except that the situation in some of the sectors (eg. urban services sector and rural productive sector) are sometimes comparable.

In a typical subsistence domestic sector, a worsening condition is exemplified by movement towards the use of inferior fuels such as dung or crop residues or women walking longer distances to gather wood. To avert this situation, a transition is needed into a more varied fuel-mix system, as obtains in the urban system. This can be accomplished by intervention in a variety of

ways from outside the sector itself. This is because, by itself, domestic energy consumption is not self-generative and economically-productive. Empirically, the transition can be seen taking place in some rural communities in West Africa at present, but it is negligible and the process is very slow.

Fuelwood scarcity (worsening condition) is a factor limiting the economic development of the rural productive sector as well, although not very decisively. But in as much as subsistence agriculture is not keeping pace with increases in rural populations, a fuel transition is needed in the sector too. This is required to bring equilibrium into the system. The rationale behind this is that, diversification of energy supply and increased efficiency in fuel use is a natural corollary of increased agricultural production and economic growth.

Within the domestic urban sector, there is no threat once there is a continuous flow of income from the services and productive sectors. There are several fuel options to be resorted to even if there is shortage of fuelwood. All that it takes to get substitutes (alternatives) is money. If the flow of income is curtailed, the sector begins to degenerate.

Similarly, the services and productive urban sectors are in a relatively better position. Pressure is brought to bear on the system only if the price of fuelwood together with all other competing fuels should increase at the same time.

The intervention process in the fuelwood shortage problem in West Africa has centred on improvements in fuelwood utilisation,

the creation of new wood resources and rural electrification. Research into and use of 'improved' cooking stoves have been the main focus of the first process. But as noted by Gill (1987), 'improved stove programmes have failed to displace traditional modes of cooking to any significant extent'. The reasons for the failure are many and varied. Martin (1979), proved that the promotion of 'improved' stoves in Ghana shows that these were not more efficient in heat conservation terms, nor were they always able to reduce smoke levels than the traditional ones. In Burkina Faso, Ernst (1978) realised that improved stoves were not as versatile as the traditional ones because they could not efficiently utilise a variety of cooking fuels besides firewood. Finally, Hoskin (1979) found out that villagers in Burkina Faso were concerned more with other priorities (education for their children, health care, etc.) than cooking fuel supplies.

Long-term intervention strategies, comprising tree-planting exercises at different levels of effort (individual, community, government), have been implemented in most countries in West Africa. While communal village woodlots or what has been termed in the energy literature as 'social forestry' have had little general success, large-scale plantations have generally failed. In the former case, Ki-Zerbo (1980) notes that women's associations constitute a commendable force in reforestation projects in Burkina Faso. In the latter, Moss and Morgan (1981) note that plantation developments on large scales in Nigeria have failed because of difficulties in land acquisition and technical problems. In Ghana,

agro-forestry projects are still in a youthful stage of development and the peri-urban fuelwood plantations established are yet to make any meaningful impacts on the communities they were supposed to serve.

Lastly, rural electrification was promoted as a means of solving the rural energy crisis. Electricity was perceived as a symbol of modernisation and progress, and the decision to electrify rural communities was primarily taken by engineers and bureaucrats aided by foreign experts. It was very expensive to extend transmission grids to remote areas. Experience has also shown that although the argument which motivated the promotion of the projects were interesting, in practical terms, they were not economically and socially viable. The electricity was far beyond the purchasing power of the rural poor although it was heavily subsidised. In addition, it was not a suitable form of energy for agriculture and cooking. Consequently, rural electrification programmes created a factor and social bias in rural development. It was capital intensive and it also benefited the already privileged and the rich in rural societies.

## CHAPTER 6

## THE INSTITUTIONAL FRAMEWORK FOR ENERGY DEVELOPMENT IN ECOWAS.

The overall adequacy of institutional frameworks for national energy governance largely determines the quality and pace of energy development. The dimensions and complexity of the planning and co-ordinating functions for energy sector management suggests that the need for a central co-ordinating agency cannot be under-estimated. In West African countries, this central energy co-ordinating agency is organised as the Ministry of Energy or the National Energy Commission, depending on the existing political and administrative management structures. Other public or private sector institutions (oil and gas, electric utilities, fuelwood), also form part of the institutional arrangement. The activities of these are supposed to be supervised, controlled and co-ordinated by the central Ministry/Commission.

Energy issues are also Government issues. Government involvement in the petroleum energy sector in ECOWAS has been strongly nationalistic and bureaucratic. Due to its strategic character and role, the petroleum sector, normally managed by the government-backed National Petroleum Corporation (NPC), is the most powerful. Within the context of national energy policy, the National Petroleum Corporation is responsible for the acquisition of emergency stock, dealing with Multinational Oil Companies (MNOCs), and handling oil contracts under privileged conditions. Nigeria established its NPC, the Nigerian National Oil Corporation (NNOC) in 1971 and later replaced it with the Nigerian National

Petroleum Corporation (NNPC) in 1977. The NNPC is responsible for all activities relating to the petroleum industry. As in the case of NNPC, Ghana established its National Petroleum Corporation (GNPC) in 1983 and charged it with the sole responsibility of crude imports. The Ghana-Italian Petroleum Company (GHAIP), a parastatal, performs the refining function while multinational companies like Mobil, Shell, B.P. and Total undertake the distribution and marketing function.

In effect, the three main groups of participants in the oil industry are Multinational Oil Corporations (MNOCs), Producing countries and Importing countries. In West Africa, MNOCs are able to perpetuate their monopoly control over the oil industry by maintaining joint ventures between themselves and entrenching their role as distributing agents in the producing and importing countries.

MNOCs have demonstrated their interest since the early 1970s in the Nigerian oil industry by becoming more and more interested in joint ventures with the national government. They have sold their operational and technical expertise to the Nigerian oil industry and have manoeuvred to retain access to crude oil at the lowest possible price. At the other end of the market (Ghana and Burkina Faso), MNOCs have made substantial investments in downstream activities like refining and marketing. It is quite clear that to keep the operations in the downstream moving in the importing countries, continuous access to relatively low priced oil in the producing countries must be maintained. This

demonstrates the interest of MNOCs on both sides of the market. Another key feature which has emerged about the interest of MNOCs is that of production in oil-importing countries.

The relations between International oil companies and producing countries has undergone a radical and drastic change in the past two decades. The loss of equity production (concessionary system) by foreign companies shifted the control over production and market power of oil pricing into the hands of governments of exporting countries. This shift in balance of power was achieved partly through nationalisations of oil concessions in some member states of the Organisation of Petroleum Exporting Countries (OPEC). In Nigeria, the Indigenisation Decree of 1972 placed some oil production activities under the control of the National Petroleum Corporation. Currently, NNPC holds 60% of most exploration and production ventures of Elf, Agip/Phillips, Gulf, Mobil, Texaco and Pan Ocean. It has 80% share of Shell's operation.

The control of upstream and downstream functions by producing countries and oil companies respectively, suggests that during a tight oil market, such as in 1973-1974 and 1979-1980, producing countries will be favoured whereas in times of surplus, they will be at a disadvantage. For example, Nigeria's oil production escalated from 1.53 million b/d in 1971 to 2.225 million b/d amounting to N4.2 billion (U.S. $6.4 billion) in 1974. In 1979, Nigeria produced an all time high of 2.3 million b/d, representing an income of U.S. $20 billion. On the other hand, with the onset of world oil surplus in 1980, output fell to a low of 0.84 million

b/d. Overall production in 1982 was only 1.287 million b/d and Nigeria was forced to unilaterally reduce the price of crude by U.S. $5.50 per barrel on 20th February, 1983, following a similar cut in the price of a key competitor.[5] This action was against the guidelines of OPEC but Nigeria could not act otherwise since the foreign oil companies (which no longer provide an automatic outlet for production) were unwilling to lift their equity crude at the previous price of U.S. $35.50/b. In addition, the subsequent collapse of oil prices led to the abandonment of the 1981-85 Development Plan and the launching of the 5th Development Plan has also had to be postponed for the same reason.

This institutional/organisational framework implies that, for national oil corporations such as the NNPC to move from a situation of mere control to an actual mastery of its oil resources, it has to launch some initiatives beyond its own national frontiers. The underlying reason is that the success of the 'majors' and the large European and American independents is due to the internationalisation of their activities. This manifests in their relationships with producing and consuming countries.

The NNPC for example occupies a favourable position upstream but this has to be accompanied by the development of downstream exporting activities. Investment in source-refining entails substantial costs and this may be unprofitable to the Corporation. A new form of market organisation which may reduce costs and the

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[5]Turner, Terisa. "Petroleum, Recession and the Internationalisation of Class Struggle in Nigeria". Labour, Capital and Society, Vol 18, No 1, pp. 6-42, April 1985.

negative effects of major fluctuations in the international oil market is to internationalise the Corporation's downstream activities within some member states of ECOWAS. NNPC can integrate into downstream activities of other ECOWAS countries with low or shortfalls in refining capacities. Disappointments with production operations in Ivory Coast's once highly-promising Espoir field, for example, makes room for the utilisation of the under-capacity refinery in Vridi. Similar refineries within the region can offer such opportunities.

The factor of size, technical excellence and logistic techniques are essential for the internationalisation of exploration-production activities. Only few developing producer countries have been able to integrate into foreign upstream activities. It is therefore doubtful if NNPC can do that giving the fact that the corporation is even far from controlling the whole oil industry in Nigeria. What may be possible is some form of "barter" in different fields or kinds of energy among member states of ECOWAS.

To a very great extent, the institutional dimensions of energy management and planning in ECOWAS are weak, with too much priority for the oil sector and little, if any, attention for the biomass sector. In practice, there is no central Government organisation or local administration that rationalises national woodfuel production and utilisation. The national oil corporations have also not achieved much, in spite of the power accorded them to manage the petroleum sector in this energy-intensive phase of

industrialisation of ECOWAS. The NNPC is an example for illustration.

Since oil is the most important foreign exchange earner and the main source of revenue to the Nigerian economy, the NNPC has an important role to play in the realisation of these objectives. On the contrary, some researchers have viewed the NNPC as an organisational focal point for commercial oil transaction and personal accumulation. As in many West African countries, the Nigerian political economy is dominated by a "comprador" class that is involved in commerce as opposed to production. The state becomes the site of intense competition among traders for contracts, money, position and influence.[6] The alliance between these traders, state officials and oil companies in the manipulation of the Nigerian oil industry has prevented capitalist industrialisation in the country. Oil money, in spite of the boom of the 1970s has not enabled Nigeria's political economy to move in the direction of capitalist industrialisation. Rather, it has re-organised the way in which Nigeria is incorporated into the world system, in particular by intensifying its commercial interactions on the one hand, and by fostering alliances between technocrats (aspiring state capitalists) and international oil and finance capital, on the other.[7]

Moreover, the expansion of the oil industry has led to land

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[6]Turner, T. "Multinational Corporations and the Instability of the Nigerian State". Review of African Political Economy, No 5, pp. 63-79, 1976.

[7]Ibid, op. cit. 6.

alienation of some three-quarters of Nigeria's population who are peasants. This situation coupled with the collapse of oil prices in the 1980s, the consequent fall in government revenues and the imposition of IMF Structural Adjustment Programmes in 1985, sparked off protests and riots from peasants, urban proletariat and students. Women's uprising against the Nigerian oil industry is just part of an on-going movement of resistance to the hardships brought on by the operation of big capital in the oil industry.[8] Two of such revolts were the 1984 Ogharefe women's uprising and the 1986 Ekpan women's uprising. They were staged to protest the super-imposition of the oil-based industrialisation on local political economies, which dispossessed women of access to farm land. At the end of the riots, different levels of success were achieved.

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[8]Turner, T. "Women's Uprising Against the Nigerian Oil Industry in the 1980s". Centre for International Development Studies, University of Guelph, 1991.

## CHAPTER 7

## THE DISCUSSION OF SOLUTIONS.

The main aim of this chapter is to identify some basic ways that West African countries could organise themselves to deal effectively with the problem of finding adequate supplies of low-cost energy to maintain economic growth, reduce the dependence on oil imports, minimise inequalities (rural-urban and inter-country) and protect their environment. Apparently, the issues involved are complex, but call for the formulation and implementation of an effective energy policy. In other words, the process of addressing the problems involves issues concerned with these choices (objectives) and the constraints which militate against their realisation.

In West African countries, these constraints range from domestic factors such as lack of capital, technology, policies, operational inefficiencies and lack of adequate institutional structures, to externalities such as time, changing international market conditions for energy and questions of power, of who controls the international movement of energy and capital.

In view of this unsettled background, a particular strategy can only address a limited set of objectives in the short-term. Given that the constraints can be gradually overcome, all the energy objectives of ECOWAS can be met gradually in the long-term.

Given these conditions, solutions to the ECOWAS energy crisis can be derived from the interaction among the different development theories reviewed earlier on, although Self-Reliance must be the

primary focus. The high freight transport demands and the rapidly increasing industrial and commercial energy requirements of urban West African societies appear to be inevitable to rapid economic growth. Foreign monetary and energy-related technology flows, which are powerful instruments of socio-economic transformation, are needed to sustain the urban systems. Dependency is therefore somehow essential.

However, a primarily Self-Reliant energy planning can also achieve growth and equity for ECOWAS countries. Such an approach to energy development would mean a territorial integration of these countries and a minimum dependence on the international system.

West African countries have for a long time neglected the need for a comprehensive energy planning, although in the past two decades there has been a crescendo of concern in this field. State energy corporations have been established in the various countries to be responsible for matters related to the sector. Unfortunately however, the overriding and immediate concern of these newly formed state/national energy ministries and boards is where to borrow money from to pay for the month's oil imports or how to finance a new hydroelectric project. Although these issues are important, they only form or ought to form a very minute segment of the central energy question facing ECOWAS. If a broader and sustainable development in the energy sector is to be achieved, then more meaningful policies and effective strategies have to be adopted.

There is no single solution for addressing the energy problems of all West African countries, because the context within which the

problems occur vary from one country to another. That is, solutions will depend both on the developmental goals of, and the resources available to a nation. Site and country-specific solutions are therefore needed. But as the development aspirations and the energy characteristics of member states of ECOWAS have some commonalities, certain broad policy options and strategies can be suggested.

From the previous discussions, it can be concluded that the pattern of energy use in West African countries is very much a product of their large rural populations, their growing cities, and their economic policies which lead to uneven rural/urban development. Their national energy distribution profiles have distributional asymmetries. These can be seen along spatial, sectoral and social dimensions. The spatial dimension refers to rural/urban disparities or disparities between national regions, while the sectoral dimension refers to differences in major economic activities such as industry, agriculture, etc. The social dimension involves inequalities in energy consumption among different income groups.

It is within these frameworks, that a conscious objective of any planning effort must be derived. Urbanised economic systems already have their modern infrastructures which gulp a lot of energy in place. The rich, who live in this environment, emulate energy consumption patterns of their counterparts in the industrialised countries. The rural economies, by contrast, are areas of stark or worsening poverty and the poor depend increasingly on scarce quantities of traditional biomass resources.

In practice, the energy consumption pattern in the two set-ups cannot be the same. But if "real" development means a more equitable distribution of resources to a larger number of society, and a greater autonomy in the control of these resources, then energy planning must aim at correcting this distortion. Since urban agglomerations have far more institutional power than dispersed rural settlements, they have a greater scope for improvement.

Energy demand projections[9] are usually taken as consequential premises in policy discussions. The projections usually become goals that determine the "supply-oriented" nature of most intervention strategies. Seldom is conservation a top priority for all countries. The fact that these countries use about 50% of their liquid fuel in the transportation sector is an indication of the immaturity of their infrastructures. A notable characteristic feature of the transportation systems are poor roads and an increasing number of private automobiles, a large number of which are inefficient in fuel consumption terms. There is the need to improve upon the road networks and to change the modal mix in favour of public transport since that offers higher load factors and higher energy efficiencies.

Modern industry is another voracious consumer of commercial fuel in the urbanised and formal areas of these countries. An

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[9]International Energy Agency, 'Technical Report on Energy Prospects for Developing Countries,' Paris, February 1978; U.S. Central Intelligence Agency, 'The International Energy Situation : Outlook to 1985', Document No. ER 77-102 40U, Washington, D.C., April 1977.

estimated 41% has been recorded for urban industries in Nigeria.[10] Although the amount of energy consumed depends on the type of industry, it is important to decrease, as a conservation measure, the energy intensities per industrial output and also to vary the amount of energy used for specific industrial processes. A study sponsored by the National Energy Board of Ghana and the UNDP estimated that the industrial sector consumed about 20% of total commercial energy and increasing the efficiency of energy use could result in efficiency improvements of about 5-25% of most industrial establishments.[11]

Further, mechanisms have to be set up, as have already been attempted, to develop indigenous national energy resources. Large areas of West Africa are as yet to be explored for energy resources, and the possibility that large quantities of coal, gas and oil exists, remain to be found. Renewable energy in the form of sunlight, organic mass and water can also be developed. What these require is an injection of capital, technical and entrepreneurial assistance for their development. The significant role to be played by private sector companies, international organisations and financial institutions in the industrial and developing countries cannot be underestimated.

Cooperation at the regional level can be the open sesame to

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[10]Ted Taylor Associates, 'Energy Profiles of Selected Countries', Washington, D.C., 1977 (mimeo)

[11]Sages Engineering Consultants, 'Industrial Energy Consumption and Efficiency Baseline Study 1986-1988', A Report for the National Energy Board, Accra, Ghana, November 1988.

a better future in the energy sector in ECOWAS. The countries can engage in joint hydropower projects, joint research and development, joint exploration for petroleum, technical and economic co-operation and joint security activities in energy supplies. If oil prices were to rise substantially over a short period, just as it happened in the 1970s, countries like Ghana and Burkina Faso may be put to a great hardship. A mechanism could be developed whereby Nigeria will offer oil at more concessionary terms to poorer members of the community, since OPEC's pricing agreement will not permit her to sell at a lower price. These oil purchases could be covered by short-term loans granted by Nigeria. Since oil exports by Nigeria to other ECOWAS members constitute less than 1% of her total exports, a revenue loss from this offer could be returned by a similar gesture in other fields of energy. For example, Ghana could supply electricity to Nigeria through a grid connection from Benin, a country which it is already supplying, as a sign of reciprocity. But the details and feasibility have to be worked out first. Of promising scope for regional energy are initiatives represented by the South African Development Coordination Conference (SADCC) and the Latin American Energy Organisation (OLADE) examples.

It has increasingly appeared that the barriers to effective fuelwood intervention strategies in ECOWAS lie not at the project, but the policy level. It is therefore apparent that effective fuelwood policies should go beyond the introduction of technical solutions and the planting of trees, which have formed the key

ingredients in policies of most governments and donor agencies, to building effective structures.

To start with, an important issue that has not been taken into consideration and which has led to frequent failures of fuelwood intervention processes in ECOWAS is the fact that fuelwood supply and demand are closely interwoven into broader processes of resource management in local production systems. As a result, biomass resource stress is but one of a series of resource stresses, which are not easily identified. Since fuelwood scarcity rarely occur in isolation, focussing too narrowly on woodfuel can mean that projects will fail. Experience has shown, for example, that villagers are likely to accept multi-purpose trees which provide benefits such as firewood, poles, fodder and fruits, the 'agro-forestry' solution, rather than a pure fuel driven programme. In the same manner, they may readily accept new stoves which combine improved energy efficiency, convenience and other advantages. This fact underlines the need to consider the critical human element in policy formulation. The "top-down" approach to policy designation and implementation militates against effective participation.

Most often, the identified social groups (the poor and powerless women, landless peasants in rural areas and landless labourers in urban towns of West African countries) who have no control over land management decisions are hardest hit by fuelwood scarcity. This reflects the inability of local and national governments to create necessary environment which empowers local

communities to effectively control their resource base.[12] As a matter of fact, tree-growing will not make sense to people who do not have secure land tenure and neither will "improved" cooking stoves be relevant to families who cannot afford to buy them.

Although applicable strategies must be accurately and sensitively matched to the realities of local conditions, some researchers,[13] argue that, in general, policy intervention should seek to ensure property rights, improve access to and management of local land resources, improve market functions by eliminating policy-induced distortions, internalise externalities through pricing policies and reduce uncertainties through more stable predictable policies.

A number of studies have recognised, in addition to the above, other general policy directions which address issues of improving information on the complex fuelwood system, the valuing and enforcing economic prices for biomass resources and the development of fuelwood sector strategies.[14]

Pricing has an important role to play in the transition from fuelwood to modern fuels in countries faced with ecological threat. But policy objectives must aim more at improved access to modern

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[12]Mercer, D.E. and Soussan, J., 'Fuelwood : An Analysis of Problems and Solutions for Less-Developed Countries', World Bank, Washington, D.C., U.S.A., 1991.

[13]Ibid, op. cit. 12.

[14]Leach, G. and Mearus, R., 'Beyond the Woodfuel Crisis : People, Land and Trees in Africa', Earthscan Publications. London, U.K. 1989 ; Munslow, B. et al, 'The Fuelwood Trap', Earthscan, London, U.K. 1988.

fuels and the equipment for their use rather than concentrating on pricing policies.[15] Constraints preventing fuelwood substitution can be explained by the regression analysis undertaken by Barnes on fuelwood use and energy prices in 19 countries. The outcome of his work suggests that relatively lower prices of a particular fuel does not so much facilitate a switch to it. Rather the rising income of the user has a stronger effect.[16] Given this circumstance, the failure of the heavily subsidised LPG programme in Senegal (West Africa) in 1974 to encourage a switch from charcoal, should be understood and must serve as a guiding example to other countries.[17]

The difficulty with these policies is not so much with coming up with them but translating them into workable solutions on the ground. Therefore, the need for institutional dynamism and coordination at various levels and the increased involvement of local people, energy production and consumption institutions, in planning and implementing the process is important.

Institutional arrangements differ from country to country in West Africa but they all need to be strengthened to deal with the complexity and magnitude of the problems. Methodologies should be developed for data collection and integrative analysis. The central

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[15]Leach, G., 'The Energy Transition', Energy Policy, Vol 20, No 2, February 1992.

[16]Barnes, D., 'Understanding Fuelwood Prices in Developing Nations', Internal Report, Agriculture and Rural Development, World Bank, Washington, D.C., U.S.A., 1986.

[17]UNDP/World Bank, 'Senegal : Issues and Options in the Energy Sector', World Bank, Washington, D.C., U.S.A., 1983.

co-ordinating energy agency (usually the Ministry of Energy) should device a means of co-ordinating of existing energy sector institutions (electricity, oil and gas, forestry) since these are usually resistant to changes that might erode their independence or importance. Usually, the most politically powerful agency is the petroleum corporation (eg. NNPC in Nigeria or GNPC in Ghana). The relationship between this dominant agency and foreign investment needs to be re-structured within "the rules of the game". Mutuality of interest can be arrived at through acceptable and supportive practices which enhance economic development rather than private accumulation.

## CHAPTER 8

## CONCLUSION.

The theme of this thesis has been that it is essential to seek alternative solutions to the energy problems of ECOWAS countries by examining the important issues of domestic energy resource allocation as well as sub-regional energy cooperation.

Foremost, important factors such as demographic concentration, geography, the level of G.N.P., and the structure of institutional frameworks for national energy governance all act to shape energy policies in ECOWAS countries. Secondly, while so much attention is directed towards the commercial fuel sector, the majority of the population relies on the non-commercial fuel sector. Finally, there are clear asymmetries within the energy picture of these countries. For example, urban areas consume far more energy than rural areas, industry or transportation more than agriculture or fishing, and the rich more than the poor.

It is clear from the discussions that in an attempt to solve the energy problems, member countries of ECOWAS must aim at greater distributional equity instead of just seeking solutions in technical fixes that merely expand certain energy supplies. An additional priority, and perhaps a logical first step in a long-term effort to reach a sustainable energy path, is cooperation at the regional level. Energy cooperation should not be restricted by the size of projects or by the source of energy involved. They can be large or small and they can either be from international power transmission grids or other forms of energy. Moreover, significant

results can be obtained in cooperation for energy supply, energy investments, and energy financing. Since the institutional framework already exists and because the importance of cooperation are clearly felt by all the parties involved, what is left is for Governments to develop the type of motivation needed to undertake joint projects in the energy field.

In summary, the discussions have contributed to an understanding of the energy crisis in ECOWAS. Their contribution lies in defining the energy situation and understanding the underlying processes. It goes a step further by attempting to identify alternative solutions to deal with the energy problem. In doing so, the focus has been on reducing distributional asymmetries rather than tackling the problem at the surface by considering only its more outward manifestations. This type of energy studies is necessary because it can contribute positively to improving the living standards of people in ECOWAS and elsewhere in the developing world.

## BIBLIOGRAPHY.


Alm, A.L. and Weaver, R.J. (1984) Oil Shock: Policy Response and Implementation, Cambridge, Massachusetts.

Alonso, W. (1969). "Urban and Regional Imbalances in Economic Development". Economic Development and Cultural Change, Vol 17, No 1, pp. 1-14.

Badru, P. (1983). "Oil Revenue and the Urban-rural Dichotomy in Nigeria". African Urban Studies, No 17, pp. 31-42.

Bakke, D.W. (1980) "Energy in Non-Opec Developing Countries" in Landsberg, H.H. (eds). Selected Studies on Energy. Cambridge, Massachusetts.

Biswas, M.R. and Biswas, A.K. (1984) "The Global Environment: Past, Present and Future". Resources Policy, Vol 13, No 1, March, pp. 25-42.

Barnes, D. (1986). 'Understanding Fuelwood Prices in Developing Nations'. Internal Report, Agriculture and Rural Development, World Bank, Washington, D.C., U.S.A.

Boughton, J.M. (1984). "A Review of the External Positions of the Oil-Importing Developing Countries and their Relationship to the World Oil Market". Natural Resources Forum, January, pp. 25-36.

Bundu, A. (1991). "Political Developments and the Politics of Integration". West Africa Magazine, 1-7 July, p. 1084.

Choe, B.J. (1985). "World Energy Markets and the Developing Countries". Energy Policy, Vol 13, No 3, pp. 304-309.

Cline-Cole, R.A., Falola, J.A., Main, H.A.C., Mortimore, M.J., and O'Reilly, F.D. (1990). Woodfuel in Kano. The United Nations University, Tokyo, Japan.

Cure, C. (1992). "Transport, Traffic and Mobility in Sub-Saharan African Cities". The Courier, No 131, p. 69.

Dunkerley, J., Ramsay W., Gordon L., and Cecelski E. (1981). Energy Strategies for Developing Nations. John Hopkins University, Baltimore.

Eckholm, E., Foley, G., Barnard, G., and Timberlake, L. (1984). Firewood: The Energy Crisis that won't Go Away. Earthscan, International Institute for Environment and Development, London.

Economist Intelligence Unit (1987). Quarterly Energy Review, Africa.

Ephson, B. (1990). "Fuel Prices Rise". West Africa Magazine, 17-23 September, p. 2477.

Ernst, E. "Fuel Consumption Among Rural Families in Upper Volta, West Africa". Paper (FRC/3-1) Presented to the 8th World Forestry Congress, held at Djakarta, Indonesia.

Food and Agricultural Organisation (1981). Map of the Fuelwood Situation in Developing Countries. FAO, Rome.

Food and Agricultural Organisation (1984). "State of Food and Agriculture". FAO, Rome, p.185.

Foley, G. (1981). "Rural Energy Planning in Developing Countries: A New Framework for Analysis". Stockholm Beijer Institute Lecture.

Foley, G. (1986) "Woodfuel: The Energy Crisis of the Poor". The Courier, ACP-EC, No 95, January-February.

Fried, E.R. and Schultze, L.S. eds. (1975). Higher Oil Prices and the World Economy, Washington, D.C., Brookings Institution.

Friedmann, J. and Weaver, C. (1979). Territory and Function. University of California Press, Los Angeles.

Ganapathy, R.S. (1981). Rural Energy and Development: A Strategic Planning Analysis. University of Michigan.

Gill, J. (1987). "Improved Stoves in Developing Countries: A Critique". Energy Policy, Vol 5, No 2, pp. 135-144.

Goldermberg, J., Johansson, T.B., Reddy, A.K.N., and Williams, R.H. (1987). Energy for a Sustainable World. World Resources Institute.

Hoskins, M. "Community Participation in African Fuelwood Production, Transformation and Utilisation". Discussion Paper to the Workshop on Fuelwood and other Renewable Fuels in Africa, held in Paris, November 29-30, 1979.

Hughart, D. (1979). "Prospects for Traditional and Non-Conventional Energy Sources in Developing Countries". World Bank Staff Working Paper, No 346, World Bank, Washington, D.C., U.S.A.

International Energy Agency (1978). 'Technical Report on Energy Prospects for Developing Countries', Paris, February 1978.

Iwayemi, A. (1983). "Energy in West Africa, Issues and Policy Approaches". Energy Policy, Vol 13, pp. 235-249.

Ki-Zerbo, J. (1980). "Women and the Energy Crisis in the Sahel". Unasylva, Vol 33, No 133.

Lazenby, J.B.C. and Jones, P.M.S. (1987). "Hydroelectricity in West Africa: its Future Role". Energy Policy, Vol 15, No 5, pp. 441-455.

Leach, G. (1992). "The Energy Transition", Energy Policy, Vol 20, No 2, p. 122.

Leach, G. and Mearus, R. (1988). 'Beyond the Woofuel Crisis: People, Land and Trees in Africa', Earthscan Publications, London, U.K. 1989.

Lipton, M. (1977). Why Poor People Stay Poor? A Study of Urban Bias in World Development. London, Temple Smith.

Martin, L.H. (1979). The Economics of Cooking Fuels in Ghana. M.A. Thesis Submitted to the American University.

Mercer, D.E. and Soussan, J. (1991). 'Fuelwood: An Analysis of Problems and Solutions for Less-Developed Countries', World Bank, Washington, D.C., U.S.A.

Moss, R.P. and Morgan, W.B. (1981). Fuelwood and Rural Energy Production and Supply in the Humid Tropics, United Nations University, Tycooly International, Dublin.

OPEC PAPERS (1980). 'Energy in Developing Countries- Present and Future', Vol 1, No 2, Vienna, Austria.

Pachauri, R.K. (1983). "Third World Energy Policies: the Urban-Rural Divide". Energy Policy, Vol 11, No 3, pp. 217-224.

Pearson, P. and Stevens, P. (1992) "Energy and the Third World". Energy Policy, Vol 20, No 2, p. 90.

Pindyck, R.S. and Rotemberg, J.J. (1984). "Energy Shocks and the Macroeconomy" in Alm A.L. and Weiner R.J. (eds). Oil Shock: Policy Response and Implementation. Cambridge, Massachusetts.

Robin, S. (1990). Burkina Faso: New Life for the Sahel? A Report for Oxfam.

Rostow, W.W. (1960). The Stages of Economic Growth: A Non-Communist Manifesto. University Press, Cambridge.

Sages Engineering Consultants (1988). 'Industrial Energy Consumption and Efficiency Baseline Study 1986-1988', A Report for the National Energy Board, Accra, Ghana, November 1988.

Sathaye, J., Ghirardi, A., and Schipper, L. (1987). "Energy Demand in Developing Countries: A Sectoral Analysis of Recent Trends". Annual Review of Energy, Vol 12, pp. 253-281.

Shell Briefing Service (1980). "Energy in Developing Countries".

Soja, E. (1980). "Socio-Spatial Dialectic". Annals of the Association of American Geographers, Vol 70, No 2, pp. 207-225.

Ted Taylor Associates (1977). 'Energy Profiles of Selected Countries', Washington, D.C., 1977 (mimeo).

Turkson, J.K. (1990). "Planning for the Energy Sector in Ghana: Emerging Trends and Experiences". Energy Policy, Vol 18, No 8, p. 704.

Turner, T. (1976). "Multinational Corporations and the Instability of the Nigerian State". Review of African Political Economy, No 5, pp 63-79.

Turner, T. (1985). "Petroleum, Recession and the Internationalisation of Class Struggle in Nigeria". Labour, Capital and Society", Vol 18, No 1, pp. 6-42.

Turner, T. (1991). "Women's Uprising Against the Nigerian Oil Industry in the 1980s". Centre for International Development Studies, University of Guelph.

UNCTAD (1978). Energy Supplies for Developing Countries: Issues in the Transfer and Development of Technology, Geneva. (TD/B/C.6/31).

UNCTAD (1987). Handbook of International Trade and Development Statistics. Supplement, New York.

UNCTAD (1989). Handbook of International Trade and Development Statistics, pp. 496-499.

UNDP/IBRD (1983). 'Senegal: Issues and Options in the Energy Sector', World Bank, Washington, D.C., U.S.A.

United Nations, Energy Statistics Yearbook, 1980-1989.

U.S. Central Intelligence Agency (1977). 'The International Energy Situation: Outlook to 1985', Document No. ER 77-102 40U, Washington, D.C., April 1977.

West Africa Annual, 13th Edition, John West Publications Ltd., Ikeja, Nigeria.

Williamson, J.G. (1965). "Regional Inequality and the Process of National Development: A Description of Patterns". Economic Development and Cultural Change, Vol 13, No 4, pp. 3-45.

World Bank (1980). "Developing Countries Fuelwood Supply/Demand Analysis, 1980-2000". Renewable Energy Task Force.

World Bank (1979) "Energy Options and Policy Issues in Developing Countries", Staff Working Paper No. 350 by Byer and Fallen-Bailey, Washington, D.C.

World Bank (1981) World Development Report. World Bank, Oxford University Press, New York.

## Appendix 1

| Country | Per Capita GNP, 1980 $ U.S. | Per Capita Commercial Energy Consumption (Kce) 1980 | Percentage Urban Population 1980 | Net Imports of Total Energy as a % of Total Energy Consumption 1980 |
|---|---|---|---|---|
| Liberia | 580 | 404 | 33 | 101 |
| I. Coast | 1180 | 227 | 38 | 113 |
| Mauritania | 440 | 179 | 23 | 100 |
| Cape Verde | 350 | 154 | | 76 |
| Gambia | 360 | 116 | 25 | 100 |
| Senegal | 510 | 194 | 25 | 102 |
| Ghana | 410 | 131 | 36 | 52 |
| Nigeria | 1030 | 149 | 21 | |
| Niger | 440 | 50 | 13 | 93 |
| G. Bissau | 130 | 45 | 19 | 100 |
| Togo | 420 | 72 | 20 | 125 |
| B. Faso | 240 | 33 | 9 | 100 |
| Guinea | | 78 | 18 | 98 |
| S. Leone | 320 | 79 | 25 | 113 |
| Benin | 320 | 52 | 14 | 108 |
| Mali | 240 | 29 | 20 | 95 |

Sources: Handbook of International Trade and Development Statistics, 1989, pp. 496-499; United Nations, Demographic Yearbook, 1985, 1986, and 1987; World Bank, World Tables, 1991.