

THE VOLTA RIVER PROJECT

A CASE STUDY IN POLITICS AND TECHNOLOGY

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A B S T R A C T

This thesis outlines the history of the Volta River Project indicating the origin of the initiatives behind the project and the method of implementing it in the face of opposition. A discussion of the variety of aims and expectations of those involved by the scheme indicates widely divergent interests at work. The effects of the scheme are described at length; both the main effects desired by the participants and the so-called side-effects. The extent to which each interest group managed to achieve its aims is described as an aid to assessment of the project. As a result the value of the project to Ghana is called into question, and an indication is given of fundamental criticisms of such projects in general.

DECLARATION

I declare that this thesis has been composed by myself and that the work contained within it is my own.

A NOTE ON CONVENTIONS

The title 'Ghana' has been used throughout this work. The country's former name, the Gold Coast, has only been used in quotations or in titles of publications.

Metric units have been used except in quotations where the metric equivalent if necessary has been added.

The Ghanaian new cedi (N¢), the U.S. dollar (\$) and the pound sterling (£) have all been used as units of currency, but to try and acquaint the reader with an unfamiliar unit, new cedis have been used consistently throughout Chapter One.

Exchange rates were as follows:-

<u>Period</u>	<u>Ghanaian Currency</u>	<u>Equivalent of one unit of Ghanaian currency</u>	
		\$	£
1958/July 1965	£G	2.8	1.0
July 1965/Feb 1967	¢	1.17	0.42
Feb 1967/July 1967	N¢	1.4	0.5
July 1967/Nov 1967	N¢	0.98	0.35
Nov 1967/Dec 1971	N¢	0.98	0.40
Feb 1972/Dec 1972	N¢	0.78	0.32
Dec 1972/Dec 1973	N¢	0.78	0.33
Dec 1973/May 1975	N¢	0.86	0.35

A GLOSSARY OF ABBREVIATIONS

A I D	Agency for International Development
A L C A N	Aluminium Limited of Canada
A L C O A	Aluminum Company of America
B A C O	British Aluminium Company Limited
C P P	Convention People's Party
E C G	Electricity Corporation of Ghana
F A O	Food and Agriculture Organisation
I B R D	International Bank for Reconstruction and Development (The World Bank)
I D A	International Development Association (part of the World Bank Group)
O P I C	Overseas Private Investment Corporation
U G C C	United Gold Coast Convention
U N D P	United Nations Development Programme
V A L C O	Volta Aluminium Company Limited
V L R D P	Volta Lake Research and Development Project
V L T C	Volta Lake Transport Company
V R A	Volta River Authority
V R P	Volta River Project
W A F A L	West African Aluminium Limited
W F P	World Food Programme
W H O	World Health Organisation

I N T R O D U C T I O N

This thesis is a historical, economic and political study of an industrialisation scheme in Ghana. This scheme, called the Volta River Project (VRP), involved the building of a large hydroelectric dam and an aluminium smelter. The questions that the thesis seeks to answer include the following:-

- (a) Who initiated the scheme and with what motives?
- (b) How in terms of political processes was the scheme brought to reality?
- (c) Who benefited from the scheme?
- (d) What can we learn of more general interest which might help us to understand other schemes which involve rich countries, multinational corporations and poor countries?

The VRP is generally described as a "development scheme" but the end result of this study has been a questioning of this description. The VRP seems not to have assisted Ghana's development. Even if the definition of development is restricted to a purely technical criterion such as whether industrialisation has occurred, the VRP remains open to severe criticism. If development is defined in terms of economic criteria (in terms of monetary gain or loss), the success of the VRP is even more in doubt. And when development is defined in terms of the achievement of political autonomy, the VRP looks as much a backward as a forward step.

Since the meaning of the word "development" is often left loosely-defined, it ought to be made clear what definition of

development is being used here.

The process of development does not simply involve a cultural change from a traditional to a modern society, or a materialistic change from a poor to a rich society. Neither does it involve simply a combination of cultural and materialistic change. To assume that the process is simply one of transmutation from one form (or cluster of characteristics) to another is unwise. For this assumption involves two further, hidden assumptions pertaining to the problem:

- 1) That today's "developed" nations" offer some kind of ideal archetype at which to aim,
- 2) That the present structure of the world economy is basically acceptable; all it needs is minor modification to absorb poor countries into its system.

On the contrary, a key assumption of this thesis is that the "developed nations" could not exist as they are today if we did not have the "underdeveloped nations". So to assume that the change from underdeveloped to developed can occur without changing the present picture of the world economy, is to ignore the structural nature of underdevelopment.

The problem then, of defining development may be approached by first defining underdevelopment. Typically the main characteristics of a Third World country are that it is:

A) Disarticulated:- that is, it is less of a homogeneous unit from the economic and social points of view than are the rich nations. It exhibits large differences in affluence between its regions and amongst its population.

B) Dominated:- by the rich countries, primarily economically

but also culturally and technologically.

C) Incapable of providing an adequate standard of living for the majority of its population. [Sagasti, 1973]

So on this basis, the process of development does not merely consist of achieving economic growth as measured by increasing GNP or GNP per capita or similar yardsticks. Economic growth alone will not necessarily result in an end to disarticulation or to domination or to poverty for a very large section of a country's population. Neither will the improvement of the productivity of agriculture or the encouragement of industry provide a simple one-dimensional solution to the problem. The problem is multidimensional and in consequence must be attacked on many fronts. But if a poor country is to develop it probably should obtain three things:-

- 1) A large degree of self-reliance and of self-determination (but not necessarily self-sufficiency).
- 2) A fairer distribution of income and wealth among its population.
- 3) A larger slice of the "world cake" through a fairer international distribution of wealth.

Thus development is not purely an economic or technical process, for development is more than just economic growth and it is more than just changes in the structure of an economy and it is more than just changes in the techniques of production. Development involves social and political and institutional changes. Above all, development is a subject for political analysis in terms of power structures, autonomy and control. This work is therefore a case study of how political influences have affected what might appear to be a straightforward, technical, development project.

Originality of the thesis

This thesis is original for the following three reasons:-

i) It is one of very few works which discuss the interactions between the fields of politics and technology with some depth of empirical detail [See Williams, 1971, for a general account of the field]. Two crucial political questions facing any society are:-

- a) What goals is the society to aim for?
- b) By what means is the society to achieve those goals?

The first question is usually recognised as being an essentially political decision. But the second question is sometimes regarded as being "neutral", a "merely technological" question. This is too simplistic. For the second question involves both policy decisions and the use of technology. This is a place where there is an intimate relationship between politics and technology.

ii) It is the first time that the VRP has been examined in explicitly socio-political terms, in terms of interest groups.

iii) It is the first time that the value of the VRP to Ghana's development has been thoroughly examined with a broad historical and political perspective. There are four other book-length studies of the VRP [Barnes, 1966; Moxon, 1969; Chambers, 1970; Ergas, 1972].

Barnes deals purely with the economic expectations prior to the project. Chambers deals purely with the resettlement scheme necessitated by the formation of the Volta Lake. Ergas's work is stated to be an interdisciplinary study but its contents are descriptive rather than analytic. Because of this, it has little claim to coherence, and is merely a collection of facts about the

VRP [Steel, 1972]. Moxon is probably the best general study of the VRP, but it contains chapters which are not about the VRP at all, it does not go into a great deal of detail, and it makes no attempt at analysis or assessment.

However, I draw upon these works for information, along with many other sources. The material for this thesis was obtained in both the U.K. and Ghana. Preparatory research was done in Edinburgh for 18 months before doing six months intensive work from a base in Accra. Information on the history of the project and its present state in economic and environmental terms, was carefully sifted, mainly in the Volta River Authority Library. The opinions of various people connected with or interested in the project were sought. The areas involved by the project were visited (the dam site, the aluminium smelter, the resettlement villages, the lake and its fishing villages). My warm thanks go to all who assisted me.

CHAPTER ONE

THE GHANAIAN SITUATION

A Brief History of Ghana up to 1960

The area now known as Ghana came under the influence of Europeans in the fifteenth century when the Portuguese built their castle at Elmina. The Portuguese were mainly interested in Ghana's gold but in later years the principal trade was in slaves. The British became interested in Ghana in the eighteenth century and their motivation, as with the other European powers, was gold and slaves. But the slave trade was abolished in the nineteenth century and Britain formally colonised the southern part of the country in 1874. However, the powerful Ashanti tribe, whose capital was Kumasi, was not suppressed until 1901.

The Gold Coast, as it was then called, remained under British colonial rule until 1951, and during this period supplied Britain with cocoa, gold and manganese. In February 1951 a general election was held as a result of which Kwame Nkrumah's Convention People's Party won an overwhelming victory and Nkrumah was appointed Leader of Government Business by the Governor. The coming into power of this first African-majority government in Ghana did not, however, lead to revolutionary changes. For example, just before the February election the Crown Government had launched a ten-year development plan called 'Ten-Year Plan for the Economic and Social Development of the Gold Coast, 1951'. Nkrumah's government decided that they would adopt the colonial plan, with several additions, only they would implement it in five years instead of ten. Thus the "new" plan was entitled 'The First

Five-Year Development Plan, 1951'. [Ewusi, 1973]

Formal independence for Ghana came in 1957, but it was not until the declaration of the republican constitution in 1960 that the office of Governor-General was abolished thus ending a subtle form of dual control through which the British influence was still maintained. After 1961 Ghana was avowedly a socialist state following a policy of non-alignment.

Nkrumah was a key figure in Ghana's history and also in the history of the Volta River Project (VRP), so a short account follows of his background and views. Nkrumah originally started on a career as a schoolteacher but left Ghana to study in the United States for ten years (at Lincoln University and the University of Pennsylvania) and in the United Kingdom for two years (at the London School of Economics). Explaining why he went to the U.S. for his higher education, Nkrumah states "... America came to appeal to me as a Western country which stood refreshingly untainted by territorial colonialism in Africa" [Nkrumah, 1964, 1]. In the U.S. he studied economics, sociology, theology and philosophy, and in the U.K. he studied economics, law and philosophy. This kind of education automatically made him a member of the Ghanaian intellectual elite and put him under the influence of Western intellectual models. He had Christian beliefs and a nodding acquaintance with Marxist ideas. His views on the importance of African unity (pan-Africanism) may well have been the fruit of his stay in the U.S. where being black tended to override the racial and regional differences amongst Africans [Davidson, 1973]. This is not to say that he was totally "Westernised", for he was a proponent of an African philosophy and of African socialism [Nkrumah, 1964]. But Nkrumah did tend to overlook internal divisions of class and creed within Ghana and Africa due to his belief in the

necessity of Pan-Africanism for the achievement of real independence from colonial ties. He regarded traditional African society as essentially egalitarian [Nkrumah, 1964, 68-9], and as having been transformed into a class society by the colonial administration. So Nkrumah's emphasis was on political independence first, economic independence second and egalitarianism third. Or, more explicitly, formal administrative decolonisation first, financial and technological self-reliance second and domestic reforms third.

In the period up to 1960 Nkrumah took steps to attract foreign investment into Ghana. Why? Because:-

- (1) He believed that Ghana was short of capital, and foreign capital was easiest to obtain.
- (2) He believed Ghana to be short of energy supplies (Ghana has no coal or oil to speak of) and foreign investment seemed to be the obvious way of obtaining an oil refinery and a hydro-electric scheme. [Esseks, 1967]

Paradoxically, it was only after the declaration of the Republic in 1960, when attitudes to foreign investment were becoming cooler, that significant amounts of foreign capital entered Ghana. Having achieved political independence in 1957, it was felt that greater economic independence should be obtained during the 60's. That this should coincide with an influx of foreign capital indicates merely the difficulty of characterising any country's development by simplistic stages.

Nkrumah's party, the Convention People's Party (CPP), had its base among Ghana's "youngmen" [Fitch and Oppenheimer, 1966]. These were not necessarily young, any more than the "elders", who counselled the tribal chief were necessarily old. "The youngmen" is a Ghanaian

expression denoting educated commoners without official status. They were often clerks, primary school teachers, storekeepers, etc. They were essentially a petty-bourgeois stratum.

The CPP obtained power in 1951 but had to cooperate with the colonial government after this date in order to "prove" that the country was ready for self-government. The CPP was, therefore, reformist in nature through having to compromise with the colonial government and through its middle class base of support. It was a mass party only in the sense that it had a large membership. Its policies did not originate from Ghana's grass roots: the peasants. Instead the CPP tried to exert influence from the middle down.

Ghana's Economy in the Early 1960's

Having dealt with the historical context to the VRP, it is necessary to give some idea of the economic context into which it was placed. The following section attempts to give a statistical picture of Ghana before the VRP was implemented.

According to the 1960 census Ghana had a population of 6.7 million and an annual population growth rate of 2.5 to 3.0%, thus making Ghana one of the most densely populated countries in Africa and one of the most rapidly growing countries (in terms of population) in the world.

Ghana's GDP in 1960 was approximately N¢ 950 million giving a figure of approximately N¢ 140 as the GDP/capita [Birmingham et al., 1966, 187]. This compared with a GDP/capita of about N¢ 2000 in the U.S. and N¢ 1000 in the U.K. for the same year. While the U.S. figure for GDP was N¢ 360,000 million and for the U.K. N¢ 50,000 million.

In 1962, a typical year, Ghana's GNP was made up as follows:-

Agriculture	31.0 %
Forestry	5.2
Cocoa	14.9
Fishing	1.3
Mining	4.2
Construction	8.6
Manufacturing	2.3
Fuel and electricity	0.7
Services	<u>31.8</u>
	<u>100.0 %</u>

[Bank of Ghana Annual Report, 1962]

As is typical in developing countries a large proportion, about 55%, of household income was spent on food, as compared to 25% in the U.K. [Golding, 1962]. Nevertheless the Ghanaian diet appears to be inadequate:-

	<u>Daily energy intake/capita</u>	<u>Daily protein intake/capita</u>
	(MJ)	(grams)
U.S.A.	13.4	95.6
U.K.	13.2	87.5
Recommended intake	10.5-11.8	65-70
Ghana	9.1	48.6
India	7.6	45.4

[FAO, The State of Food and Agriculture 1969-70]

In the poorer areas of Ghana the diet varies with the agricultural season, so that in June before the crops have been harvested, average body weight is much below normal:-

Average Weight of men
in U.K.

<u>Height</u>	<u>Weight</u>
165 cm	64 kg
168	65
171	68
173	70

Average weight of men in
Nangodi (Northern Ghana)

<u>Height</u>	<u>Weight</u>	
	<u>December</u>	<u>June</u>
165 cm	57 kg	54 kg
168	59	55
171	60	57
173	61	57

Average weight of women
in U.K.

<u>Height</u>	<u>Weight</u>
152 cm	55 kg
155	56
158	58
160	60

Average weight of women
in Nangodi

<u>Height</u>	<u>Weight</u>	
	<u>December</u>	<u>June</u>
152 cm	44.5 kg	43 kg
155	52	48
158	52	48.5
160	52	49

[Simons, 1972, 9]

In 1960 Ghana produced 35% of the total world production of cocoa [Ghana Economic Review, 1972-3]. Cocoa exports account for 60 - 70%, by value, of Ghana's total exports, and duties and taxes on cocoa make up about 35% of the government's revenue [Henle, 1968]. The price received for exported cocoa tends to vary inversely with the amount exported so that although production of cocoa may be increased the resultant proceeds tend to remain more or less the same (see Table One). Also, although the price of cocoa may drop, the price of chocolate usually continues to rise:-

	<u>1954</u>	<u>1964</u>	<u>1965</u>
Weight of chocolate entering U.K. domestic market (gm/head/week)	111	111	114
Chocolate wholesale price index	100	105	109
Average price paid for Ghanaian cocoa (N¢/tonne)	790	357	276

[Bing, 1968, 376]

Thus a fall in the price of cocoa is not allowed to be translated into a bigger demand for chocolate. Neither producer nor consumer benefits, only the middleman.

Ghana, being the world's largest producer of cocoa is always in danger of saturating the world market, so there appears to be little hope of gaining extra resources through increased production of cocoa. Diversification away from cocoa would seem to offer more hope, especially since cocoa is in no way related to the industrial, agricultural or nutritional needs of the country.

Ghana's total exports in 1960 were made up by percentage value as follows:-

Cocoa and cocoa products	60 %
Timber	11
Manganese	5
Diamonds	7
Gold	10
All others	7
	<hr/>
	100 %
	<hr/>

[Henle, 1968]

These five main products were all exported in unprocessed form i.e. most of the cocoa is in the form of cocoa beans rather than cocoa powder or cocoa butter, most of the timber is in the form of logs

Table One : Prices and Proceeds of Cocoa Exports 1950 - 71

	<u>Average price received</u> (N¢/tonne)	<u>Quantity</u> (000's tonnes)	<u>Proceeds</u> (N¢ million)
1950	410	267	109
51	524	230	121
52	506	212	105
53	474	237	112
54	790	214	169
55	636	206	131
56	436	234	102
57	390	260	102
58	632	197	125
59	550	250	138
60	438	303	133
61	339	405	139
62	317	421	134
63	335	404	135
64	357	382	136
65	276	495	137
66	264	391	103
67	398	330	131
68	562	330	185
69	721	301	217
70	705	358	252
71	550	339	187

[Sources : Birmingham et al., 1966, 348

Ghana Economic Review, 1972 - 3_7

rather than sawn timber, etc. Any attempts to process these products in Ghana are blocked by the tariff barriers of the industrialised world.

And Ghana's imports look like this:-

Food and beverages	19 %
Other non-durable consumer goods	21
Durable consumer goods	9
Raw and semi-finished material	24
Capital equipment	22
Fuels	5
	<hr/>
	100 %
	<hr/>

[Henle, 1968]

It may seem surprising that a country which produces more than 50% of its GNP through agriculture and forestry should have to import such a substantial amount of food. But of course about 40% of agricultural production is inedible and destined for export. This necessitated an annual food imports bill of about N£ 50 million in the early 1960's [Birmingham et al., 1966, 333].

The direction of Ghana's trade in 1960 was as follows:-

	<u>Imports</u>	<u>Exports</u>
Sterling Area	42 %	36 %
Dollar Area	9	16
EEC	26	36
Russia, East Europe and China	4	7
Others	19	5

[Sources: Henle, 1968; Birmingham et al., 1966]

Ghana displays a clearcut regional structure. The North is traditionally agricultural, the middle of Ghana accounts for forestry, cocoa production and mining, and the South concentrates

most of the construction and service industries and the modern part of the economy. Thus the Northern and Upper Regions together generated only 9% of the total value added in 1960 while accounting for 41% of the country's area and 19% of its population. And the four southern regions yielded 75% of the total value added while accounting for 34% of the country's area and 60% of its population [Henle, 1968; Birmingham et al, 1966]

In terms of income the same picture emerges, the regional distribution of income units in 1960 was:-

	<u>Income %</u>	<u>Population %</u>
Eastern	44.4	23.6
Western	20.3	9.3
Ashanti	18.1	16.5
Central	6.6	11.2
Volta	3.3	11.5
Northern	2.8	7.9
Upper	2.3	11.3
Brong-Ahafo	2.2	8.7

[Sources: Ewusi, 1971; Birmingham et al., 1966]

Turning now to the subject of employment, care must be exercised in applying this concept to an underdeveloped country. Unemployment is usually defined for use in a wage economy, it only strictly applies to wage labour. Ghana's 1960 Population Census gives the following figures:-

	<u>Labour Force</u>	<u>Unemployed</u>	<u>Percentage of labour force unemployed</u>
Male	1,682,730	109,093	6.5
Female	1,042,120	54,550	5.2
Total	2,724,850	163,643	6.0

Taking these unemployed persons as a percentage of the country's total population gives 2.5% which in itself is a rather high figure. However when we realise that the problem as defined is that of wage labour unemployment it looks much worse. The definition of an unemployed person used in the Population Census was "a person who did not work at any time during the reference month and had no fixed job....and who was

looking actively for work by visiting employment agencies, writing applications etc." [1960 Population Census, Advance Report 1962, page xvi]. Obviously the concept of unemployment in mind here is lack of a wage earning job. Looking at the figures again in terms of the wage labour force only we find:-

	<u>Total wage labour force (employed & unemployed)</u>	<u>Unemployed</u>	<u>Percentage of wage labour force unemployed</u>
Male	567,760	109,093	19.3
Female	89,910	54,550	60.3
Total	<u>657,670</u>	<u>163,643</u>	24.9

This exaggerates the extent of the problem, for some of the unemployed must have been seeking non-wage work, especially the women. But it is clear that the problem is very serious. Even more so when it is realised that to be categorised as employed, according to the census, it was sufficient that a person had worked one day in the preceding month. Clearly then these statistics are of limited use for a discussion of the degree of utilisation of labour in Ghana's economy. Rather than considering the amount of unemployment amongst the wage labour force one should consider problems such as "disguised unemployment" - when workers do jobs with low marginal productivities - and "underemployment" - when workers voluntarily or involuntarily engage in work that takes up only a part of their work potential. One should also remember that there is a high degree of fluctuation in employment, of job instability and absenteeism. The reasons appear to be deficiencies in quantity and quality of food supply, and bad health (particularly recurring illness like malaria).

Turning now to the subject of capital, the growth in Ghana's GDP and total capital investment over the years 1955 to 1961 was as follows:-

	<u>GDP</u> (N¢ million)	<u>Capital Stock</u> (N¢ million)	<u>Capital output ratio</u>
1955	710	1558	2.2
56	752	1688	2.2
57	776	1770	2.3
58	764	1880	2.5
59	866	2030	2.3
60	938	2328	2.5
61	952	2592	2.7

[Birmingham et al., 1966, 208]

Ghana's capital output ratio in 1961 (as measured by the ratio of total capital assets to the GDP) was high by African standards. During the period 1955 to 1961 it was increasing, therefore the economy was not expanding in proportion with the capital. This might indicate either that relatively unproductive capital was being acquired (such as houses, hospitals and schools rather than machinery) or that the nature of the capital investment was not suitable for the Ghanaian economy (i.e. that it was not appropriate to the available resources or labour power).

Ghana's industry in 1960 was generally small-scale and was heavily dependent on imported raw materials and spare parts [Birmingham et al., 1966, 274-293]. There was no iron and steel industry, no oil refinery and no petrochemical industry. A cement factory was being commissioned which was to carry out the final stage in the production of cement (i.e. the crushing of clinker), but the clinker was to be imported. Ghana Airways and the Black Star Line (Ghana's first airline and shipping company respectively) were also founded in 1960.

Ghana's electrical generating capacity (consisting of diesel powered generating sets) was about 85 MW which produced about 250 million kW hours/year. Most of this generating capacity (about 60% of the total) was privately owned by the mining corporations.

[Guyol, 1969, 192]

Overall consumption of fossil-fuel energy in Ghana as compared with other nations is indicated in Diagram One. Ghana is low not only on the income scale but also on the energy consumption scale.

One of Ghana's most useful resources is bauxite, the mineral ore from which aluminium is produced. Ghana's estimated reserves and annual exports of bauxite are shown in Tables Two and Three.

COMMERCIAL ENERGY CONSUMPTION

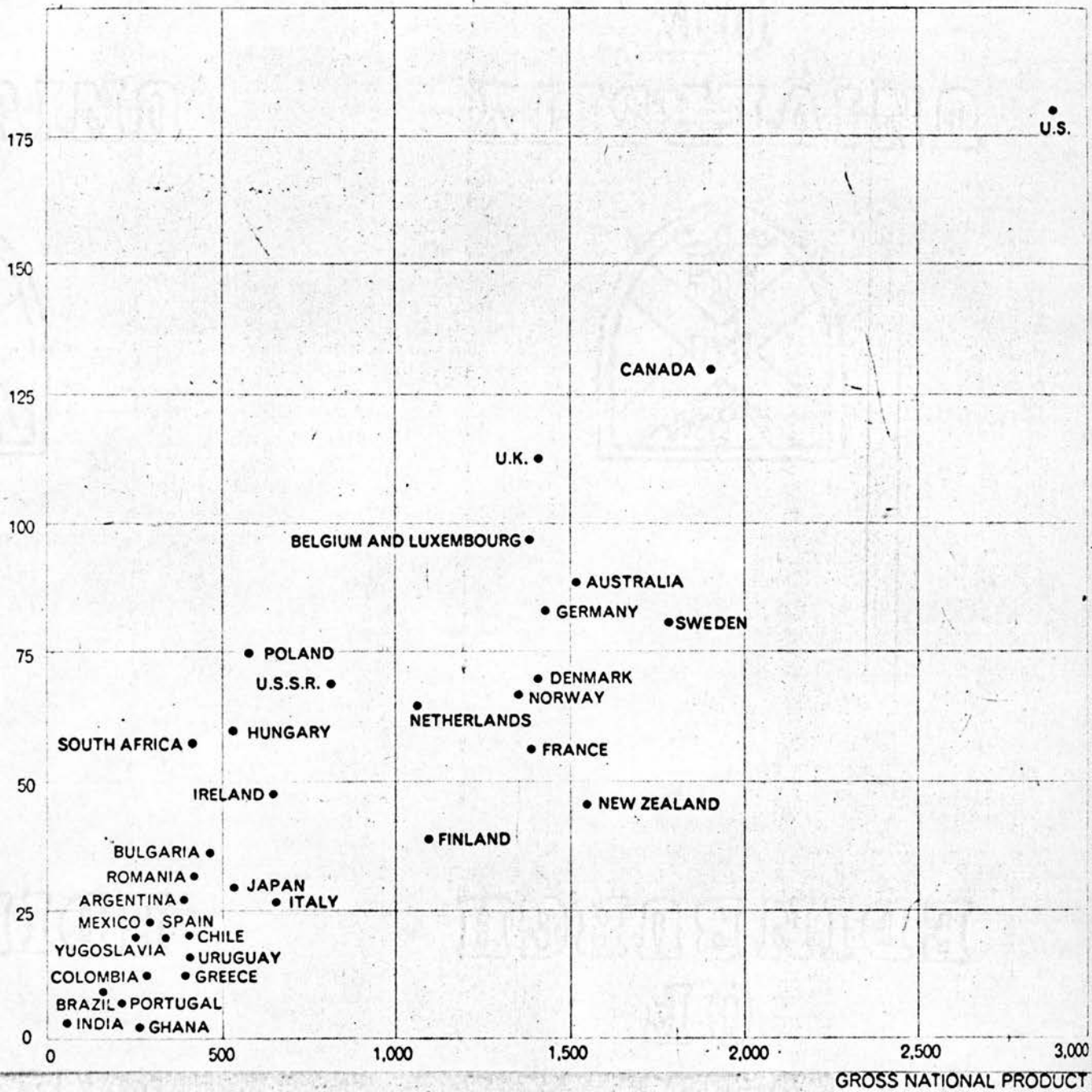


Diagram One

Commercial energy consumption (thousands of megajoules per capita per year) versus GNP (dollars per capita)

[From: Earl Cook, Scientific American; September 1971, p. 142]

Table Two : World Bauxite Reserves (millions of metric tons)

	<u>Assured</u>	<u>Probable</u>
Australia	1200	3800
Guinea	1200	2400
Jamaica	600	4000
U.S.S.R.	300	---
Ghana	290	110
Surinam	200	350
Yugoslavia	188	128
China	100	1000
Greece	84	100
Brazil	80	200
Guyana	80	250
France	70	190
French Guinea	70	100
India	70	100
Dominican Republic	60	40
Malawi	60	---
U.S.	45	300
Others	103	3400

From: Voluntary Committee on Overseas Aid and Development,
Commodity Sheet Number 7 : Aluminium, 1968 7

Table Three : Annual World Bauxite Production
(millions of metric tons)

Jamaica	9.2
Surinam	5.6
U.S.S.R.	4.8
Guyana	3.4
France	2.8
U.S.	2.2
Australia	1.9
Yugoslavia	1.8
Guinea	1.6
Hungary	1.4
Greece	1.3
Malaysia	1.0
Dominican Republic	0.8
India	0.8
Indonesia	0.7
Haiti	0.4
China	0.4
Ghana	0.35

[From: Voluntary Committee on Overseas Aid and Development,
Commodity Sheet Number 7 : Aluminium, 1968]

CHAPTER TWOTHE HISTORY OF THE VOLTA RIVER PROJECT

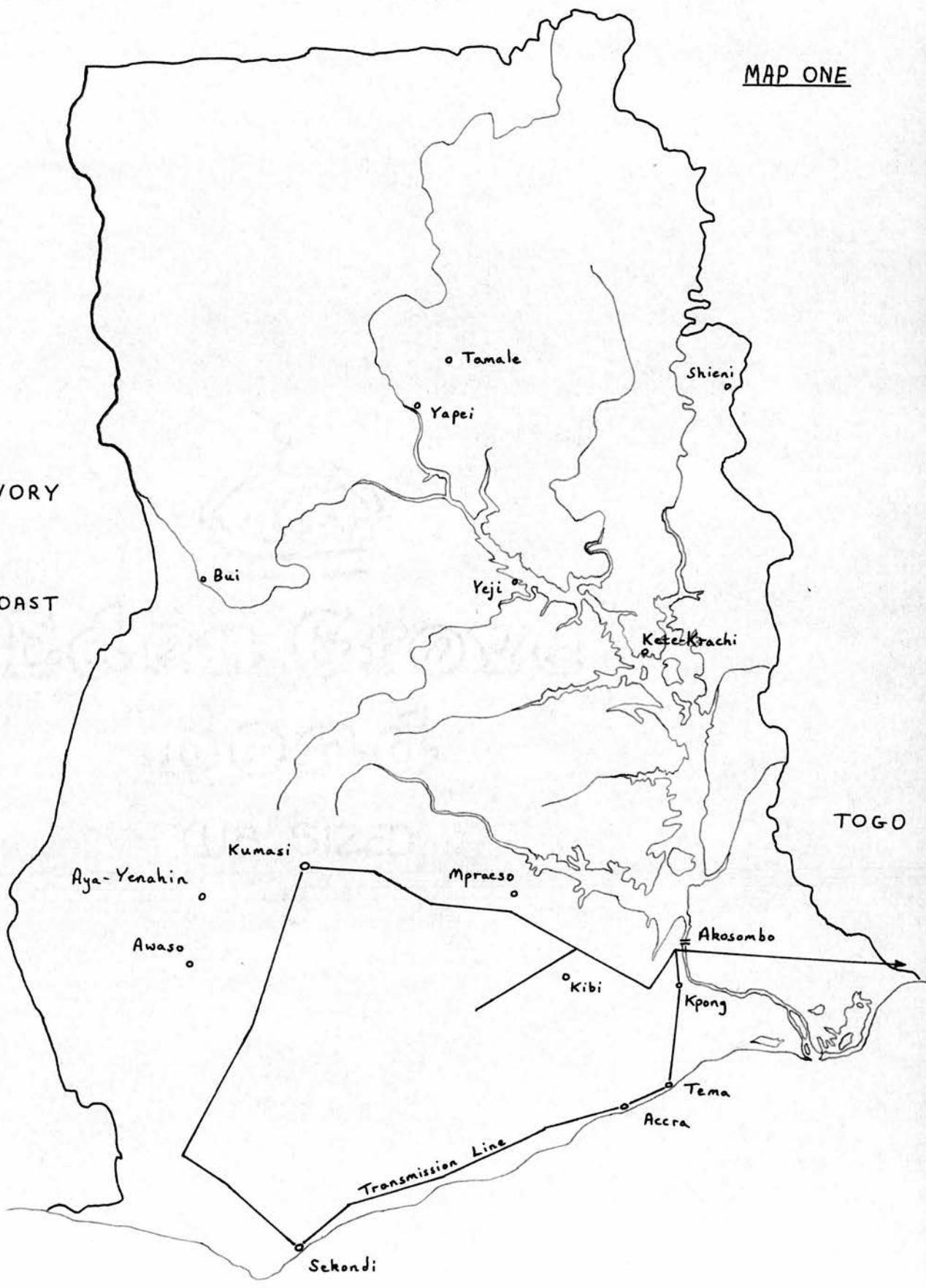
The VRP was first conceived in 1915 by Sir Albert Kitson [Moxon, 1969, 49]. Kitson was Director of the Gold Coast Geological Survey which had a permanent office in London and sent its staff to Ghana to undertake surveys lasting up to nine months at a time. Kitson was the man who first discovered bauxite in Ghana, near Mpraeso in 1914. During the following year Kitson was travelling down the Volta River and noted that the river flowed through a gorge in a long range of hills thus making the gorge an ideal site for a dam.

The two discoveries became interlinked in Kitson's mind, for he knew that to produce aluminium from alumina (which is aluminium oxide prepared by heating and purifying bauxite) a lot of electricity is needed. Therefore a dam could be built on the Volta River to supply electricity to an aluminium smelter, which would process local resources of bauxite. This concept was first made public in London in 1924, at the First World Power Conference, to which Kitson presented a paper entitled "The possible sources of power for industrial purposes in the Gold Coast, British West Africa" [Kitson, 1924]. The idea was subsequently made public in Ghana in a Bulletin of the Gold Coast Geological Survey [Kitson, 1925]. However, from these documents it appears that the development of Ghana's bauxite and Ghana's hydroelectric resources was not inextricably linked, for Kitson discusses the possibility of exporting bauxite in a crude state and also the possibility of using hydroelectricity for mines,

MAP ONE

IVORY
COAST

TOGO



GHANA

industries and electrification of the railways, independently of its use for aluminium smelting.

The kind of scheme envisaged by Kitson involved the building of a dam 15 metres high at Akosombo, which would have formed a substantial reservoir. This reservoir could then be used to transport the bauxite from Mpraeso to the dam site, where it could be processed into aluminium.

But Kitson's plans remained without detailed economic and engineering studies to back them up, until Duncan Rose, a South African engineer, read Kitson's Geological Survey Bulletin in a Johannesburg library in 1938 [Moxon, 1969, 52]. As a result Rose formed the African Aluminium Syndicate and proposed a 40 metre high dam at a cost of £2½ million to £3½ million. The following year C. St. John Bird, another South African engineer, carried out preliminary investigations for Rose and issued a reconnaissance report in July 1939. This proposed the building of a 75 metre dam at a cost of £6½ million. During the war years, Duncan Rose attempted to arouse interest in the prospects for producing aluminium in Ghana and in 1945 he was responsible for the formation of West African Aluminium Ltd. (WAFAL) of which he became the Managing Director. [Moxon, 1969, 54] Later, in March 1946, Unilever through its subsidiary the United Africa Company, acquired a financial interest in WAFAL. Between 1944 and 1949 C. St. John Bird carried out a second, exhaustive investigation into the VRP and presented his report to WAFAL in September 1949 [C. St. John Bird, 1949]. His estimate for the cost of the dam and power station was £11 million. It was also in 1949 that Aluminium Ltd. of Canada (ALCAN) and the British Aluminium Company Ltd. (BACO) took an interest in the

scheme, the former taking a 25% financial interest in WAFAL.

During World War II, due to its sudden increased need for aluminium, Britain had rapidly expanded its exploitation of Ghana's bauxite deposits. During 1941-2, 6,300 tonnes of bauxite were produced, in 1942-3, 55,000 tonnes, and in 1943-4, 147,500 tonnes [de Graft Johnson, 1955, 97].

It was about 1948-9 that the U.K. and Ghana governments began to become seriously interested in producing aluminium in Ghana. First through their involvement in bauxite during World War II, second through the representations that Rose and St. John Bird had made to them. Government interest was first publicly indicated in "The Report of the Commission of Enquiry into Disturbances in the Gold Coast" published in 1948. This Commission, known as the Watson Commission, was set up to investigate a boycott (by Ghanaians) of imported goods in protest at their high price. However the report mentioned the VRP and stated:

"To harness the waters of the Volta, for the production of electrical energy and its utilisation among other things in the manufacture of aluminium alloy on the spot, we believe is a scheme which has passed the visionary stage. The bauxite deposits which lie at hand for use in the process of manufacture of aluminium doubtless hastened practical consideration of the Scheme. Such a scheme, apart from creating a new industry, capable so far as yet seen of very great expansion, might well enable large tracts to become fertile by irrigation. At the same time the surplus electrical energy set free could be utilised to great advantage in hundreds of ways not calling for any great imagination"

[Watson Commission, 1948, paragraph 313]

In the following year the Secretary of State for the Colonies, A. Creech Jones, proposed a survey of the Volta Basin to assess the contribution the projected scheme could make to Ghana's economy. The Ghana government endorsed this proposal and informed WAFAL that

their plans would be considered in relation to the development of the Volta Basin as a whole [de Graft Johnson, 1955, 21]. Shortly after this, Sir William Halcrow & Partners (Consulting Engineers) accepted an invitation from the Ghana government to undertake the survey. Its terms of reference were to report on the economic value to Ghana of the development of the Volta Basin and to recommend the most suitable schemes for: i) hydroelectric development at Ajena or Bui, ii) irrigation in Volta Basin, iii) navigation on the river below Ajena and on the Lake, iv) provision of port facilities [Halcrow & Partners, 1951]. In October 1949, after negotiations between the Secretary of State for the Colonies, Sir William Halcrow & Partners, and WAFAL, the latter agreed to make its findings available to Halcrow & Partners [de Graft Johnson, 1955, 22].

Early in 1950 a British-Canadian Aluminium Mission was set up (with the encouragement of the U.K. government) consisting of a number of representatives of BACO and ALCAN [Government of Gold Coast, 1952, 2]. The Mission spent some time in Borneo investigating a project for the manufacture of aluminium by hydroelectric power and after some time in the U.K. visited Ghana in August and September to investigate the technical and economic aspects of the Volta River project. The Mission reported in January 1951 that both sites were suitable for aluminium production, but that Ghana was preferable because bauxite was available there and because the VRP had a greater potential for hydroelectric power [Preparatory Commission, Vol. 2, 1956, 11].

In August 1951 the final report of Halcrow & Partners was distributed to interested bodies, members of parliament, etc., but not to the general public [Government of the Gold Coast, 1952, 1].

It recommended a dam with a height of 80 metres above sea level and estimated the combined cost of dam and power house to be about £40 million.

On the 25th April 1952, the Ghanaian Legislative Assembly approved a motion for the beginning of negotiations between the interested parties [Gold Coast Legislative Assembly Debates, 1952]. In actual fact the negotiations appear to have begun at least six months earlier, for on the 29th October 1951, Mr. R.P. Armitage (Financial Secretary in the Ghanaian Civil Service), Mr. E.A. Hitchman (U.K. Ministry of Materials), Mr. Nathaniel V. Davis (President of ALCAN) and a representative from BACO, met in London to discuss the arrangements for the project [de Graft Johnson, 1955, 23-4]. Subsequent negotiations in May and June 1952, and consultations in London in September 1952, resulted in the U.K. White Paper on 'The Volta River Aluminium Scheme' [Cmd 8702 of November 1952, U.K. Government, 1952]. Meanwhile, in April 1952, the Ghana government had published 'Development of the Volta River Basin' which outlined the proposals made by Halcrow & Partners and presumably gave them a greater public airing [Government of Gold Coast, 1952].

On the 23rd February 1953 Nkrumah's government proposed in the Legislative Assembly:

"That this House in the light of the further stage reached in the negotiations on the VRP as set out in HMG's White Paper Cmd 8702, and having regard to the terms of its resolution on the development of the Volta River Basin made on the 25th April 1952, approves the continuation of the negotiations and the establishment of a Preparatory Commission with a view to arriving at a final agreement which will be in the best interests of the Gold Coast."

[Gold Coast Legislative Assembly Debates, 1953, 57C]

However, after criticism of the proposed Preparatory Commission

on the grounds that it would be a one-man show consisting essentially of a Special Commissioner who might or might not be representative, the motion was amended. The added clause was "and that the Gold Coast Government do take up with the U.K. Government the views expressed by the House on the VRP, especially that of enlarging the Preparatory Commission to include two other members nominated by the Gold Coast Legislative Assembly". This amended motion was then debated and several members of the House spoke against it, including Dr. J.B. Danquah and Dr. K.A. Busia. Mr. William Ofori-Atta reminded the House that the U.K. White Paper had never been debated *in Accra*. (Although the Gold Coast government statement of April 1952 had been debated.) Accusing the Government of failing to justify matters to the House, he said the House was in a typical situation of not being asked to approve the negotiations over the VRP, but merely to give the government the power to continue negotiations.

Several CPP members (i.e. members of the Government) spoke against the motion but voted with the Government after "a somewhat harsh application of the Whips" [Davison, 1954_7]. The motion was carried by 50 votes to 13. But the vote was not reached until the 25th February despite the fact that the debate had been due to end on the 24th. On the morning of the 25th February, the 'Gold Coast Review', a government paper, stated that Commander R.G.A. Jackson, CMG, OBE, had been appointed Special Commissioner of the Preparatory Commission. This appointment had been made on the 17th February 1953. Since at the time of the appointment and the announcement of the appointment, the Legislative Assembly had not yet approved the setting up of a Preparatory Commission, it is clear that the real decisions were being made elsewhere. The Legislative Assembly's

lack of decision-making power was made even more obvious in July 1953 when Nkrumah announced that the proposal that two members of the Preparatory Commission be appointed by the Legislative Assembly had turned out to be impractical. He explained to the House that if there were to be two members from Ghana there would also have to be two members from the U.K. and two members at least from the aluminium companies. This, he said, would make a rather unwieldy seven/nine man Preparatory Commission. Therefore he proposed that a Gold Coast National Committee on the VRP be set up with a brief to check on the work of the Preparatory Commission. This Gold Coast National Committee would consist of two government ministers plus three persons to be nominated by the Assembly.

The first meeting of the Gold Coast National Committee was held on 25th July 1953. Subsequently, in September/October 1953, it went on study tours abroad, to ALCAN's Kemano-Kitimat project in Canada, where hydroelectric power was used for aluminium smelting, and to some of BACO's installations in the U.K. But it was only in November 1953 that Nkrumah announced to the Assembly the composition of this committee. It consisted of:

Nkrumah (as Chairman)
K.C. Tours (Minister of Finance)
K.A. Gbedemah (Minister of Commerce & Industry)
Dr. J.C. de Graft Johnson
Mr. W.E.A. Ofori-Atta
Mr. C.F. Amoo-Gottfried
Mr. S.T. Flecku

It seems clear that these were government appointees rather than nominations of the Assembly. This committee was slightly altered in the following months by the addition of Dr. E.E. Kurankyi Taylor.

But in August 1954 Nkrumah proposed to the Legislative Assembly that the Gold Coast National Committee now consist of:

K.A. Gbedemah (Minister of Finance)

K. Botsio (Minister of State)

Mr. C. F. Amoo-Gottfried

Mr. S.T. Flecku

Mr. A.R. Otoo

Mr. Victor Owusu

Nana Ayerebi Acquah

Mr. Bukari Mahama

A question was put as to why Dr. J. C. de Graft Johnson and Mr. William Ofori-Atta should be dropped from the committee but no satisfactory answer was given and the motion approving the new committee was passed. This revision of the membership of the Gold Coast National Committee necessitated a second visit to the Kemano-Kitimat project which took place in September 1955. This fact was communicated to the Legislative Assembly in November 1955 and gave rise to the following question and answer (in pursuit of the information sought in August 1954):

Mr. Kusi: "Can the Hon. Minister give the reasons why the three prominent members of the first National Committee, namely Doctors de Graft Johnson and Kurankyi Taylor and Mr. William Ofori-Atta were removed from the Committee."

Mr. Inkumsah (Ministerial Secretary to the Minister of State):

"I should like the Hon. Member to understand that the Government does not appoint members to committees for life."

[Legislative Assembly Debates,

17 November 1955]

Despite requests from members of the Legislative Assembly that the report of the first National Committee on its visit to Canada and the U.K. be made public, the report continued to be

kept confidential. The first National Committee had been too critical of the proposed project for Nkrumah's liking and he had not only altered the committee to suit his views but he had prevented the Legislative Assembly and the general public from hearing the first committee's considered opinions. [Personal interview, J.C. de Graft Johnson, October 1975]

Why did Nkrumah act this way? Why was Nkrumah attacked by a conservative opposition on the same kind of grounds as a left-wing opposition might attack a conservative government? Both J.B. Danquah and K.A. Busia (opposition members) stated that the Gold Coast government should have a large or majority share in the smelter. A question was asked: "What plans have the Government to prove to the people of the Gold Coast that they will eventually own the whole Volta Project?" And the answer was: "Nationalisation of the scheme is not contemplated by this Government". [Legislative Assembly Debates, February 1953]. A statement was made which summarised the opposition's recommendations:

"The primary purpose of the VRP is the production of cheap electricity to smelt aluminium. The secondary purpose is the development of this country. The same benefits could be achieved without the Aluminium Project by

- a) building a small hydroelectric power project which could be sold to many towns and areas at a commercial rate,
- b) a small scale irrigation project at various points on the Volta,
- c) the construction of Tema Harbour. "

[Legislative Assembly Debates, February 1953]

J.B. Danquah stated "the Volta River is not for sale". Dr. A. Koi said: "The Volta Scheme itself is liked, but the project as stated is imperialist and capitalist arising out of colonialist days."

K.A. Busia told the assembly:

"It is against our interest as a nation to mortgage our entire economic future between the benevolence of the British and the restraint of the Aluminium Company."

and

"The Volta Scheme in its present form may be a return... of the old imperialism. Because, if successful, it would provide raw materials for British industry...and... the control of the plan as it stands would be in private hands."

W. Ofori-Atta laid the blame on the U.K. colonial government:

"consciously or unconsciously those who rule a dependent people would generally pay more attention to their own interest and advantages than to those of the people they rule."

[Legislative Assembly Debates, February 1953]

Why was Nkrumah, the author of "Neo-colonialism, the Last Stage of Imperialism", prepared to deny these arguments? Because of his belief in the necessity of foreign investment to build up capital-intensive technologies:-

"Right from the early 1950's, mainly as a result of the influence of Sir Arthur Lewis and Sir Robert Jackson, Nkrumah had become convinced that Ghana could be developed industrially only with the help of foreign capital, and in the first two years of independence these two men were Nkrumah's principal economic advisers. To Nkrumah, the key to Ghana's industrialisation was the VRP, a project which could never be implemented without massive foreign capital. Since 1953 therefore and especially after independence, Nkrumah's main concern was to avoid taking any measures in the economic field that would scare away foreign capital and foreign investors. It was mainly for this reason that he resisted the pressures of his followers to restrict foreign companies, to introduce exchange controls, to restrict transfer of profits or to tax profits, or to nationalise the banks or the mining companies. On the contrary, he went out of his way to introduce some incentives between 1957 and 1960. These included the reduction of company tax rate from 45% to 40% in 1958, the granting of tax reliefs to new industries, exemption of customs duties on raw and semi-processed materials for manufacturing, the provision of an infrastructure of roads and railways and finally the appointment of an English Professor of Law, Professor Gower, to draw up a new Companies Code."

[Boahen, 1975, 198-200]

J.D. Esseks tells us what kind of policies Nkrumah was willing to follow to acquire an oil refinery. An oil agreement was negotiated with ENI (the Italian State oil company) which allowed the mixed (60% private, 40% state) company to monopolise crude oil buying and distribution of refinery products. There were other privileges, tax holiday plus reductions, repatriation guarantees. Other provisions in addition meant that "in effect the Ghana state would receive (after 22 years) a refinery at no direct cost to itself except in the form of inflated fuel prices, in return for permitting ENI to charge a captive market prices high enough to assure that within 22 years it would amortize its investment and realise a level of profits justifying complete withdrawal".

[Esseks, 1967, 147] This deal was negotiated by Nkrumah, E. Ayeh-Kumi and K.A. Gbedemah. When the agreement was announced it was criticised by rival oil firms and this led to guarantees being made to them and also to a few concessions from ENI. However, the actual details of Ghana's acquisition of an oil refinery do not concern us here. What does interest us is Nkrumah's willingness to accept a harsh deal over the short term while looking for the long-term benefit. And the long-term benefit is seen to be the ownership of an expensive piece of capital equipment.

With the 1953 Legislative Assembly debate over, the Preparatory Commission set to work and eventually produced its three volume report in 1956. The Commission was in no sense a committee, it consisted essentially of a Special Commissioner who received reports and advice from specialists and directed his own team on various studies. It was he who produced the final report.

According to the Special Commissioner, Robert Jackson, the Commission was necessary in order to check the feasibility of such

an enormous project [Jackson, 1964, 146]. However the Preparatory Commission's work was not expected to last for any length of time or to incur any great expense:

"The Preparatory Commission will be appointed as soon as possible and will be instructed to proceed with its work with all practicable speed...it is not expected to cost more than £400,000...."

[U.K. Government, 1952, 7]

"He [the Special Commissioner] would be required to submit his final report and recommendations with all reasonable despatch".

[U.K. Government, 1952, 21]

In fact, although the Preparatory Commission started its work in May 1953, its report (dated 1956) was presented on 31st December, 1955 [Preparatory Commission, vol. 1, 1956]. And the Commission cost altogether £1.3 million (but it must be noted that this included £265,000 to 'buy out' WAFAL, by reimbursing them for their preliminary investigations) [Preparatory Commission, Vol. 2, 1956, 428]. The proposed scheme studied by the Preparatory Commission envisaged a partnership between the Ghana government, U.K. government, ALCAN and BACO [U.K. Government, 1952, 6]. The main works involved were the development and operation of new bauxite mines in the Aya/Yenabih area; the building of approximately 130 km of railways to transport the bauxite and ingot etc; the construction of a large dam and power station (which would create a lake covering approximately 9100 sq. km.); the development and operation of an alumina plant, and a smelter with an ultimate annual capacity of 210,000 tonnes of aluminium which would require 90% of the dam's electric power output; a new port to handle the flow of imports and exports associated with the scheme (the contract for Tema Harbour was awarded in 1954 to Parkinson Howard Limited) and new townships at the site of the bauxite mines, the dam and the smelter.

The Preparatory Commission report considered a broad range of subjects including not only technical engineering questions but also economic and social questions. On the technical side it investigated, for instance, the probable future world demand for aluminium and the probable costs of energy generated by nuclear power, as well as more immediate problems such as the expected loss of reservoir water through evaporation. On the human side, it considered whether sufficient labour would be available, the practicalities of resettling those people living in the area to be flooded by the lake, and the effects on people living downstream from the dam.

The Preparatory Commission report has been widely regarded as one of the most exhaustive preliminary investigations for such a project. For example Gilbert White says "No other reservoir study approaches the Volta investigation in concept or in detail" [Farvar and Milton, 1972, 920]. But the Preparatory Commission was primarily responsible only for the technical and economic aspects of the project which did not actually involve aluminium. As the report states while discussing the matter:

"For reasons which will be appreciated, the Commission is not in possession of estimates of cost for the internal operations of the smelter, nor of information that would enable a comparison to be established with other existing or potential schemes for aluminium production. The two governments (U.K. and Ghana) informed the Commission that in their view the best test of the commercial prospects of the smelter would be the willingness or otherwise of the companies to undertake the great capital investment involved on their part."

[Preparatory Commission, Vol. 1, 1956, 89]

The Preparatory Commission's method of analysis was, according to the report, to split the work into three stages, as follows:

- 1) to demonstrate that each component part was sound from a technical point of view,
- 2) to analyse all the economic and financial aspects of the project,
- 3) if the two earlier stages indicated that the scheme was technically sound and economically acceptable, to consider certain general factors which could exercise a decisive influence over the project as a whole [Preparatory Commission, Vol. 1, 1956, 37].

Throughout its study the Commission had a policy of making "no optimistic assumptions at any time about any aspect of the project" [Preparatory Commission, Vol. 1, 1956, 27]. It published the following table comparing its own cost estimates in 1955 with those of the U.K. White Paper of 1952 (in £ million):-

Aluminium smelter output:	80,000 tonnes		120,000 tonnes		210,000 tonnes	
	1952	1955	1952	1955	1952	1955
Power Project	45.5	60.2	49.5	64.0	54.0	67.6
Smelter & Mines	29.0	43.1	39.0	57.9	64.0	91.2
Ghana Government Public Works	26.0	59.3	26.0	63.0	26.0	72.5
Total	100.5	162.6	114.5	184.9	144.0	231.3

It then stated that in order to allow for annual rises in world prices and in local wages, an additional 45% should be added to the cost of the project, thus making the cost of the final stage £309 million.

Reaction to the Commission's report was not totally favourable. Thomas Balogh [Balogh, 1956] criticised the Preparatory Commission for failing to appreciate Ghana's point of view:

"These luxurious and luxuriant reports show little consciousness of these basic duties [to the Ghana and U.K. governments] and what is far more disturbing, of the fact that these duties might well conflict with the interests of the aluminium companies!"

"They [the Preparatory Commission] were certainly not ... discreet when discussing quite freely the far-reaching changes the Gold Coast Government needs to make in its own development plans to enable the aluminium scheme to remain profitable."

"The Preparatory Commission....adopts an extraordinary point of view. It has chosen a method of construction [minimising the labour force] which minimises the beneficial impact on the Gold Coast. Their effort is concentrated on making aluminium production as profitable as possible instead of contributing to the maximum development of the Gold Coast."

Thus he also criticised the Preparatory Commission for not broadening its enquiry to consider such questions as whether so much electricity out of the total available should be allocated to aluminium production, and whether the aluminium companies should be allowed permission to use Jamaican bauxite.

"From the point of view of the Gold Coast, the failure of the Preparatory Commission to take these possibilities into account not merely reduces the value of its work considerably but creates a situation of artificial strength for the companies in their bargaining."

[Balogh, 1956]

Balogh's criticism of the Preparatory Commission report contains a lot of truth, but omits to mention that the inflated cost estimates for the VMP would tend to make all potential participants in the project lose interest.

During 1956 the participants in the proposed scheme considered the implications of the Preparatory Commission report and it became clear that by this time the U.K. Government and the aluminium companies had lost their initial interest. For whereas in 1952 there had been a shortage of aluminium production capacity, by

1956 there was a surplus [Birmingham et al, 1966, 392]. Having lost a lot of their interest these parties were now prepared to get involved only on very favourable terms. Thus the U.K. government wanted financial support for the scheme to come from the World Bank, as well as themselves [Moxon, 1969, 85]. ALCAN wanted a very low price for electricity, 2.5 mills/kwh initially,* to be lowered in subsequent years [Moxon, 1969, 86]. And neither aluminium company was very keen to see an integrated aluminium industry set up in what was soon to become an independent African nation. They did not like the idea of approximately 7% of the world's aluminium production capacity being sited in a black socialist country [Birmingham, personal interview].† For these reasons, as well as the high cost estimates contained in the Preparatory Commission Report, the project began to look moribund.

But Nkrumah was not prepared to let it rest there; through his Minister of Finance, K.A. Gbedemah, he made contact in October 1957 with the U.S. government and President Eisenhower [Moxon, 1969, 88]. An agreement was reached between Nkrumah and Eisenhower that the Henry J. Kaiser Company of California should do a reassessment of the engineering aspects of the Preparatory Commission Report with a view to cutting down the time required for the building of the dam, and cutting down the total cost estimates [Moxon, 1969, 91]:

"The scope of the reassessment report as outlined in the original agreement entered into between the Ghana Development Commission and Henry J. Kaiser Company on August 22, 1958 was generally to make an up-to-date reassessment of certain basic factors examined in the 1956 Preparatory Commission report on the VLP. This review was to include the main dam and power plant near Ajena, an open pit bauxite mine in the Aya-Yenabin area, an aluminium smelter at Kpong, necessary connecting railroad facilities, general power transmission, and was to suggest other possible power consuming industries.....

* A mill is one-tenth of a US cent.

† Interviewed July 1975

No review was to be made of other related works which were comprehensively covered in the Preparatory Commission Report such as new town sites, lake resettlement, health and sanitation programs, new ports, roads and other public works."

[Kaiser, 1959, II-1]

Later the scope of the Reassessment Report was enlarged to include a study of the Bui dam. However, when the Report was published (February 1959), it stated:

"....this development [Bui], due to smaller river flow and the remote location, would be relatively economical only for the general public supply of electricity. The very large block of low cost power economic for electro-chemical production is not available here."

[Kaiser, 1959, VII-1]

The Report recommended a dam at Akosombo, and an alumina plant and smelter at Tema, utilising bauxite from the Kibi deposits initially. The cost estimates for the project (see Table Four) were not radically different from those of the Preparatory Commission Report except that they omitted the latter's heavy expenditure on public works. The report stated:

"There are ample reserves of acceptable quality bauxite to support a substantial aluminium industry in Ghana."

[Kaiser, 1959, I-4]

and

"Because of the massive reserves of bauxite in Ghana, in relation to the proposed aluminum plant capacity and estimated electric power availability, it is suggested that the aluminum producer should examine the feasibility of building additional alumina capacity for sale and export."

[Kaiser, 1959, XI-10]

Despite these very definite statements about the acceptability of Ghanaian bauxite, in subsequent discussions, both with Kaiser and with ALCAN, it was agreed that the smelter should, initially, use imported alumina. This agreement was made in order to cut down the

TABLE FOUR

KAISER'S V R P PROGRAM AND COST ESTIMATES

Phase	I	II	III	IV
	Akosombo 4 Generators + Transmission	Akosombo 6 Generators	Kpong	Bui
Hydroelectric capacity (MW)	512	768	896	1086
Aluminum capacity (thousand tonnes/year)	120	120	220	220
	£ Million			
Hydro	48.7	55.7	71.2	96.7
Transmission	13.3	13.3	14.5	16.1
Aluminum	56.7	56.7	97.9	97.9
Railroad	2.5	2.5	3.4	3.4

capital cost of the project by avoiding expenditure on bauxite mines and alumina plant. The details of this modified project were never published.

After publication of the Kaiser Reassessment Report in February 1959, Nkrumah made a statement to the Legislative Assembly:

"Honourable Members will be aware that after my official visit to the U.S.A. last year, President Eisenhower and his government kindly agreed to share with us the cost of a reassessment of the engineering aspects of the VRP and the power potential at Bui. That work was undertaken by a firm of proven ability and international renown - the Kaiser Corporation - which sent a team of engineers here in the latter part of 1958. I am happy to announce that I received the report of the Kaiser Corporation yesterday. Their reassessment will receive the most careful consideration by the government. I have every hope that I shall be in a position in the reasonably near future to make a detailed statement to this House on the possibilities of hydroelectric development in our country, but I wish to make this simple and basic statement forthwith, that is, that my Government is determined to develop hydroelectric potential of Ghana to its maximum."

[Legislative Assembly Reports, March 1959]

Negotiations concerning the VRP were carried out without any debate in the House over their acceptability. While bargaining over its details was in progress, Nkrumah's Government let contracts for the completion of a highway from Tema to Akosombo, for the provision of access roads to the dam site, and for the construction of a considerable amount of housing for supervisory staff and workers. In that same year, in November 1959, the Volta Aluminium Co. Ltd. (VALCO) was formed. It consisted of five major aluminium companies - Kaiser Aluminum and Chemical Corporation, ALCAN, ALCOA (Aluminum Company of America), Olin Mathieson and Reynolds Metals - convened by Edgar Kaiser to explore their joint interests in the project. Three of these companies withdrew - ALCAN in 1960, ALCOA in early

1961 and Olin Mathieson later in 1961 [Moxon, 1969, 202]. This left Kaiser with a 90% interest in VALCO and Reynolds with 10%.

By November 1960 an agreement had been reached between VALCO and the Ghana Government (represented by K.A. Gbedemah and E. Ayeh-Kumi) on the price VALCO would pay for electricity [Esseks, 1967 and Moxon, 1969, 107]. Subject to the conclusion of satisfactory financing arrangements for the project, the price was to be 2.625 mills per kwh.

In December 1960 the Legislative Assembly was informed by Mr. W.A. Wiafe (Ministerial Secretary - Volta River Project Secretariat) after a question about the financing of the VRP, that half of the necessary money would come from abroad:

"Pending formal agreements with financial agencies, the following loan negotiations are in progress:-

	<u>£G</u>
i) U.S.\$ 20 million @ $3\frac{1}{2}\%$ - 30 years Development Loan Fund	7.14 million
ii) U.S.\$ 10 million @ $5\frac{3}{4}\%$ - 25 years Export Import Bank	3.56 million
iii) £G 5 million @ 6% approximately - 25 years U.K. Government	5.00 million
iv) U.S.\$ 40 million @ $5\frac{3}{4}\%$ - 25 years I B R D	14.30 million
	<u>£G 30.00 million</u>

[Legislative Assembly Debates, December 1960]

On the 20th February 1961 the Ghana Government published a statement about the VRP. This went so far as to state:

"The Government undertakes for a period ending 30 years after the Permanent Delivery Date, not to expropriate, nationalise or intervene in.....VALCO".

[Ghana Government, 1961, 55]

And in a statement to the Legislative Assembly on the following day, Nkrumah said:

"It is desirable to mention briefly why it is necessary for an aluminium smelter to be encouraged to establish itself and to purchase power from the Volta Project. The project involves damming a very large river; the flow of the Volta River varies in the ratio of as much as 300 to 1 between flood and low water, and therefore, to obtain the maximum power from the Volta means creating a large lake which will provide a reserve of water for the low water season and will without danger absorb the large quantities of water which flow during the floods. To build a small dam and power house would be very uneconomic and would lead to considerable waste of water, because the lake area would be too small to absorb all the flood."

[Legislative Assembly Debates, 21 February 1961]

He went on to say that Akosombo dam would produce more than twenty times as much electricity as the electricity department in 1960, and since to leave so much capacity idle would be very expensive, a customer requiring large quantities of electricity was needed. In the same speech Nkrumah announced that houses, a power station, water supplies and an access road had already been provided at Akosombo ready for the contractor. This was in advance of the award of the contract for the dam to Impregilo (an Italian consortium which had previously built the Kariba Dam) which took place in the same month [Moxon, 1969, 101].

The general tone of the debate which followed Nkrumah's speech was one of uncritical praise for both Nkrumah himself and for the project. One CPP member suggested that the VRP would turn Ghana into a Utopia and Mrs. Grace Ayensu (CPP) said:

"The implementation of this project envisaged by Osagyefo the President will bring relief to all of us. Both men and women in all walks of life will be required to give their services to the huge project. It will be a feather in Ghana's cap as an independent country to have such a gigantic project. With this hydroelectric power in our country many factories will be established, and we shall be in a position to manufacture most of our commodities. The project will help to solve so many problems, such as unemployment, for men and women will get enough work to do".

[Legislative Assembly Debates, 22 February 1961]

It is clear that these comments are ill-informed since both the Preparatory Commission and the Kaiser Reassessment Report sought to minimise the labour force requirements of the project. Another CPP member from the Northern Region expressed the hope that the lake would be used to irrigate the Northern and Upper Regions - in ignorance that the lake would not extend to the Upper Region and would only just penetrate the Northern Region.

On being questioned about possible nationalisation of the VRP, Kofi Baako, Minister of State, replied:

"....the Government's view on nationalisation is that it is a means to an end, but if we can achieve an end by another method then we can use that other method [Interruption] Perhaps the Honourable Member does not understand what socialism is. Briefly, it seeks to ensure that the means of production and distribution is in the hands of the state. That is what it is, and there is nothing to fear about it. [Interruption]..."

[Legislative Assembly Debates, 22 February 1961]

Leaving aside the question of the validity of Baako's definition of socialism, this statement still leaves a lot to be desired. Having already stated that the Government is socialist, it should automatically follow that the Government would nationalise the VRP. Yet it is not being clearly explained as to why this was not government policy.

However, eventually the motion was put "this House approves the (outlined) terms of the Master Agreement for the Volta River Project" and it was passed unanimously.

The House was almost completely CPP dominated and nobody had been willing to criticise the VRP itself.

On the 19th April 1961, the Volta River Development Bill, which set up the VRA with Osagyefo^{*} as Chairman, was debated under

* i.e. Nkrumah

a Certificate of Urgency. J.E. Appiah of the United Party (the opposition party) announced:

"I just want to protest vehemently against this attitude of the Government, telling us to come here and debate a Bill brought in under a Certificate of Urgency, and then keeping the Bill away from us until five minutes to debating time. Yesterday when we closed, Mr. Speaker informed the House for the first time that this Bill was coming up to be debated under a Certificate of Urgency. To the best of my recollection, we shouted that we had not seen this and we were told that copies were in our pigeon holes. They were not there yesterday".

[Legislative Assembly Debates, 19 April 1961]

The Bill was rushed through at such a speed that there was no time for debate. The Bill was given its first and second reading, its consideration stage and its third reading, all in less than one hour.

Impregilo started work on the building of Akosombo dam in August 1961 although as yet the U.S. loans (apart from the World Bank loan) for the VRP had not been confirmed. President Kennedy took some time to agree to support the VRP. When Nkrumah visited E. Europe, Kennedy wavered [Esseks, 1967]. In an article entitled 'JFK opens purse to Volta Dam' the Engineering News-Record described what eventually happened in December 1961:

"Approval for loans to the small African nation totalling \$133 million has been given. The loans have been withheld since July, because of U.S. doubts about Ghana President Kwame Nkrumah's left-leaning neutralism and the stability of his regime. President Kennedy held back approval of the loans until a few hours before the deadline when the Ghana Government could no longer back out on a contract with the Italian consortium, Impregilo, which will build Akosombo Dam.

"Under the terms of the loans, the money will be made available in stages, so that the U.S. can still back out if the project takes a turn for the worse. The President hopes the loans will be viewed throughout Africa as proof that Washington does not attach political strings on foreign aid. It is thought that other African countries that have been holding back requests for American assistance for fear of being

called "American stooges" will now apply for aid."

[Engineering News-Record, 1961, 43]

The debate in the Ghana Legislative Assembly on the subject was of as low a standard as the debate of February 1961. The debate about the terms of the Master Agreement took place on 20th January 1962 and Mr. E.Y. Attigah (CPP) made the following obsequious statement:

"In associating myself with the compliments paid to Osagyefo in bringing this great scheme to reality, I should like to say that this great man, our Messiah and prophet, has proved himself beyond all doubt to be a wonderful man. He will continue to be great and his wonders will never end".

[Legislative Assembly Debates, 20 January, 1962]

A note of dissension was raised however and this came from a member of the government. Mr. J. Kodzo (Deputy Minister of Health) said:

"Up till now there is no substantial evidence to show that the area that is going to be inundated or flooded is being surveyed for the purpose of resettlement, and I want to bring this to the notice of the Minister".

Mr. K. Baako (Minister of Defence) replied:

"I should like to bring to the notice of the Deputy Minister of Health that in fact he is making suggestions to himself. He is part and parcel of the Government, therefore he has no right to make these suggestions here. If there is anything, he can meet the Minister in his office. It is rather odd for this thing to be brought up here."

[Legislative Assembly Debates, 20 January 1962]

Obviously Baako was not prepared to countenance anything like an open debate. So the House approved the terms of the Master Agreement, with hardly a mention of the terms themselves.

By February 1962, the legal and financial side of the VRP had been settled [Moxon, 1969, 115]. Diagram Two describes the arrangements. Afterwards Edgar Kaiser was able to say:

"Nkrumah and I achieved a good rapport, but it wasn't so much the cut of my hair he liked. He liked our money."

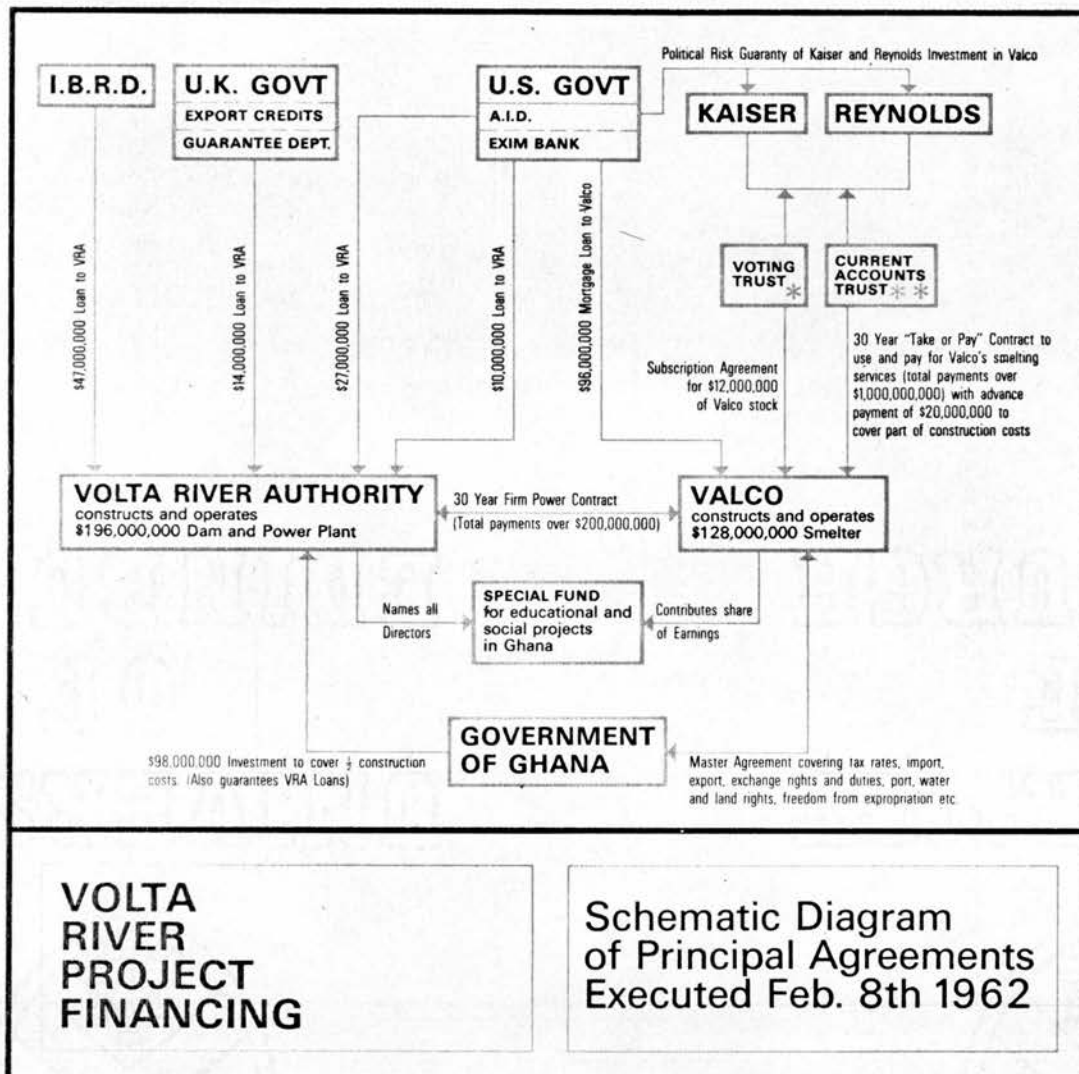
[Forbes Magazine, 1968]

By July 1963 the scheme to resettle those people living in the area affected by the lake had commenced.

In June 1964, construction of the smelter at Tema began. In September 1965 the first commercial power became available from the dam and the formal inauguration of the VRP took place in January 1966. The component parts of the dam and power station came from many countries. The turbines were supplied by Hitachi Limited of Japan. The generators came from the Canadian subsidiary of the International General Electric Company, U.S.A. The penstocks (the tubes down which the water flows to the turbines) were made by Chicago Bridge Limited, U.K. The gantry cranes (for maintenance work on the power station) were made in Austria. The substation equipment was supplied by an Italian firm.

The smelter came into operation in April 1967.

In 1969, negotiations for the sale of electricity from the Volta Dam to Togo and Dahomey were formally concluded [VRA Annual Report, 1969]. A 181 mile transmission line carrying power to Lome and Cotonou at a cost of £3.3 million was scheduled to start running by the end of 1971. The agreement provided for Togo and Dahomey to take up to 50 MW of power. This transmission line was officially opened by Colonel Acheampong in December 1972, who at the same time officially commissioned the Akosombo Expansion Project, which involved the operation of two more generating units at the Volta Dam, bringing the number up to six. A Canadian loan of \$7,580,000 provided most of the financing for both the transmission



VOLTA RIVER PROJECT FINANCING

Schematic Diagram of Principal Agreements Executed Feb. 8th 1962

* Morgan Guaranty Trust Co., Voting Trustee - - - - - if Valco fails to build smelter, voting trustee replaces management until construction completed.

* First National City Bank of New York, Trustee - - - - - Handles all payments by Kaiser and Reynolds to Valco, payment of Valco expenses and taxes, and retains balance in New York.

Diagram Two

[From R.G.A. Jackson, Progress No. 4, 1964]

line and the expansion of Akosombo hydroelectric power station. Later, in July 1975, preliminary agreements were signed in Abidjan for a link up of power between the Bandama River Project in the Ivory Coast, and Akosombo. Meanwhile, in May 1972, the smelter had been expanded by the addition of a fourth potline costing \$26 million. A further expansion (adding a fifth potline) in June 1976 brought the total cost of the smelter to \$220 million.

CHAPTER THREE

AIMS AND EXPECTATIONS

This chapter is devoted to a study of the aims of the participants in the VRP. Taking individuals and interest groups involved or affected by the project, it is possible to show that their aims and expectations differed substantially. Comparing these expectations with the subsequent realities, gives one method by which to gauge how successfully the project was implemented. That is, to what extent some aims were satisfied and others dissatisfied. The chapter is substantially based on quotes to allow, as far as possible, the participants to outline their own aims. Those passages chosen for quotation are those which express most clearly and succinctly the values and motives of the individuals and groups involved.

C. St. John Bird was the first of the pioneers to prepare substantial proposals and a detailed report. Therefore his outlook on the project is the first to be considered.

The size of the lake formed by the proposed dam was expected to be about 2000 sq. miles and was therefore the largest envisaged artificial lake in the world. Writing on the subject of "Submersion Rights", St. John Bird states:

"It will be necessary, before proceeding with the scheme, for the Company [WAFAL] to obtain the equivalent of a Private Parliamentary Bill, or what I believe is known in the Gold Coast as an "Order in Council". This is a legal matter, and the rights and powers of the Company will be safeguarded thereby. It will not only consolidate all the Company's existing rights, but will give powers to

expropriate land etc., to enable it to carry on its activities.

"Fortunately, the areas concerned are sparsely inhabited and of very small value. Moreover there are no permanent works such as railways, bridges, towns, etc., which would be costly to replace.

"I understand from the Chairman of the Company that the submersion rights on certain relatively valuable land in the Afram Valley were obtained for about 1s. per acre over an area of about 25 sq. miles. Land in the submersion area is not valuable, but in order to make some provision for expenditure on these accounts I propose to allow a provisional sum of £1,000,000 to cover legal costs and compensation.

"If the negotiations are skilfully carried out and tactfully handled, with support from the Government, I consider this provisional sum to be more than ample."

[St. John Bird, 1949, 3]

St. John Bird next goes on to deal with the housing of the labour force and technical staff at the site of the dam and aluminium works:

"Within about four miles south from the works site the ridge rises to an elevation of about 1200 feet. The prevailing breeze is from the south west and it would be possible to site the housing for the Europeans at about that elevation on this ridge to face the breeze."

[St. John Bird, 1949, 15]

From the nature of the report, it is clear that this site is intended exclusively for Europeans, because St. John Bird goes on to deal with the settlement of African labour:

"There is a suitable site within a mile of the works where the natives can be housed on the Volta River bank.

"There is a further site suitable for a township at Achiasi, where the shopping centre, post office, police station, churches, school, bioscope [cinema] etc., could be concentrated."

[St. John Bird, 1949, 16]

For the European settlement, St. John Bird recommends the following amenities:

"It is considered that in the interest of the workers a club house with sports, such as tennis courts, squash courts, swimming bath, dance hall etc. should be provided, also single quarters."

[St. John Bird, 1949, 16]

St. John Bird then goes on to consider what he terms "Native Requirements" as follows:

"The compound system for housing natives is almost universally adopted here, but there are signs that there will be a gradual breaking away from it by the providing of married quarters for selected employees."

[St. John Bird, 1949, 16]

"Where large numbers of natives are employed, the mines find it advantageous to feed their employees, to ensure that they get a properly balanced diet".

[St. John Bird, 1949, 16]

"It would be as well, at this stage, to realise that it is essential to examine every native medically on applying for work, whether on construction or for employment on the production of aluminium."

[St. John Bird, 1949, 17]

On the subject of temporary housing for those Africans constructing the dam, St. John Bird suggests that aluminium houses originally designed for 'natives' in South America by ALCAN could be imported. These, he states, would prove "palatial in comparison with the local product". [St. John Bird, 1949, 18]

The St. John Bird Report makes no provision for the employment of Africans on skilled work. Where skilled workers are indicated he makes a definite point of inserting the word 'whites'. Only white people are to be employed on supervisory duties and skilled work. Africans are to be labourers and a few are to become semi-skilled workers. Basing his calculations on 1948-9 rates of wages in the Gold Coast, he indicates that African labourers are to be

paid £4 a month, African semi-skilled workers are to be paid £7 10s a month, while a European is to receive £100 a month [St. John Bird, 1949, 18_7].

That St. John Bird's proposals are basically 'apartheid' in nature is only partly due to his South African background. Such proposals fit into typical colonial policy very easily and have not been completely jettisoned even in the years of independence. The Preparatory Commission report was later to advocate a more refined system of apartheid, not based on colour but on technical expertise and culture. (This will be dealt with later in this chapter.) And, as we shall see, this form of apartheid has been implemented at Akosombo, even under an African 'socialist' government.

The St. John Bird report proposed the use of river transport up the Lower Volta to the dam site and attendant works [St. John Bird, 1949, 8_7]. It also considered railway transportation as an alternative but rejected this on the grounds that "The rapids at Senchi and Kpong would remain and the resources of the river would not therefore be fully developed, thus taking much away from the benefits which the scheme would bring to the Colony." [St. John Bird, 1949, 9_7].

It seems probable then that St. John Bird sincerely believed that his proposals were definitely going to be beneficial to Ghana. However it is not too difficult to find instances when St. John Bird's proposals are more closely aligned to the practical requirements of his project than to the needs of other people. For example, he considered clearing the lake area of trees before flooding in order to protect the turbines from the resultant debris. He rejected this on the ground that the small number of trees which would float to

the dam could be trapped and hauled out [St. John Bird, 1949, 67]. He failed to consider other reasons for clearing the lake, for instance that it would allow fishermen to use mobile nets rather than hanging or floating nets and that it would allow easier use of the lake for transportation.

St. John Bird's aim, then, was to set up a commercial venture which, partly due to its technical sophistication and partly due to St. John Bird's own prejudices required the implementation of a modified system of apartheid.

Why did the U.K. government become involved in the VRP? This becomes very clear on reading the White Paper Cmd 8702 of November 1952. Even the title of this document - The Volta River Aluminium Scheme - gives one a strong clue. The paper commences with an account of the U.K.'s requirements of aluminium and forecasts that these requirements would increase at about 5% a year. The U.K.'s consumption in 1951 was about 203,000 tonnes of virgin aluminium. Of this, 27,000 tonnes were produced in the U.K. and 176,000 tonnes were imported. Canada supplied 172,000 tonnes of these imports at a cost in dollars of over £18 million. The White Paper therefore stated: "it is important that additional supplies should come as far as possible from the Sterling Area".

The White Paper then went on to explain:

"There is no danger that the expansion of aluminium production will be restricted because of shortage of bauxite. Known reserves of bauxite of good quality in countries of the free world are estimated to be of the order of 1,500 million tons (350 million tons metal content) and they are widely distributed. Nor is there any reason to think that shortages of other raw materials will be a handicap to expansion.

"The chief difficulty is the heavy demand on electric power which the extraction processes make. Unless cheap

power is already available in large quantities, any major new development of aluminium producing capacity involves at the same time the large scale development of power - normally, as things are, hydroelectric power. This means in practice that large-scale expansion of aluminium production under present processes can only take place in connection with major power developments."

[U.K. Government, 1952, 11]

Thus the reason for the U.K.'s interest in the VRP was not so much Ghana's bauxite, as her hydroelectric potential. The scheme envisaged by the U.K. involved the production of 564 MW of electric power from the dam, of which 514 MW would go to the smelter and only 50 MW to other users in Ghana.

As for the production from the aluminium smelter:

"The U.K. would be the natural market for most of the Gold Coast metal, but the smelter company would be under an obligation for 30 years from initial production to offer buyers in the U.K. not less than 75% of the metal produced. The option would be in terms of ensuring that in normal circumstances the price would not compare unfavourably with North American prices. As a result of the scheme U.K. consumers should be able to count on at least 60,000 tons a year of additional Sterling Area aluminium in the early days of the smelter and on a minimum of 157,500 tons a year when the full capacity of 210,000 tons is being worked."

[U.K. Government, 1952, 6]

So, the White Paper concluded:

"Her Majesty's Government in the U.K. are favourable in principle to participation in the scheme, which would further their policy of encouraging the development of the resources of the Commonwealth as well as contributing to the raw material needs of the U.K. They believe, on the basis of the information so far available, that it is soundly conceived and that its successful completion would bring substantial benefits to the two countries."

[U.K. Government, 1952, 6]

However, the White Paper failed to mention what benefits Ghana would receive. And it really is unclear from the White Paper whether Ghana actually could benefit from the scheme as proposed.

The White Paper discussed an outline of a Power Contract to

be agreed between the Volta Electricity Board (which would administrate the power undertaking) and the companies running the aluminium smelter.

"The supply of power for the smelter would be governed by a contract to make power available to the smelter up to an amount necessary for the production of aluminium at the rate of 210,000 tons a year for 60 years from the date at which power was first available. The contract would recognise that other users in the Gold Coast would require up to 50 MW of the power which would be available. The Gold Coast Government, ALCAN and BACO would share, in the ratio of their respective holdings in the equity of the smelter company, an obligation to secure that the Volta Electricity Board would receive payments amounting each year to its out of pocket or operating costs (including interest) in respect of the power contracted for by, and made available to, the smelter company, plus the calculated amount needed in the year to cover a) the appropriate contributions to a renewal fund and b) amortisation of the capital expenditure over 80 years. In the initial stages these payments would be abated by the amount of sales to consumers other than the smelter company".

[U.K. Government, 1952, 16]

So the aluminium smelter was to be supplied with electricity at cost price, and, moreover, a cost price that would involve the deduction of any profits made by supplying electricity to other consumers.

With this arrangement in force the Ghana Government could not hope to derive any revenue from its expenditure on the power project for 60 years.

And what of the aluminium side of the venture? To quote the White Paper again:

"The Gold Coast Government, as trustees of the people of the Gold Coast, would have the right to provide 10% of the equity capital as it was issued from time to time. After the smelter company had been in production 25 years and upon the request of the Gold Coast Government, the smelter company would in addition undertake to offer for sale at a reasonable price to private Gold Coast investors equity stock in an amount equal to the amount of equity stock previously transferred to private Gold Coast investors from the Gold Coast Government's original holdings."

[U.K. Government, 1952, 15]

Ghana was therefore to be limited to holding 10% of the equity capital for the first 25 years, and 20% thereafter, despite the fact that she was expected to provide 27 to 31% of the final capital cost of the whole project, and 36% of the capital cost of the first stage.

It is clear from this White Paper that the U.K. was only interested in acquiring supplies of aluminium from a non-dollar source. No concern is expressed for developing Ghana's bauxite or hydroelectric potential as such. No mention is made of the possible deleterious side effects of the scheme. The proposed arrangements are rather one-sided, yet the White Paper is able to claim:

"The Gold Coast Government have stated that they would be ready, whenever the occasion arose, to defer or rephase other parts of their development programme which seemed likely to conflict with the scheme in the demands on the resources available of men, transport and materials."

[U.K. Government, 1952, 6]

It is instructive to compare the U.K. Government White Paper with the contemporaneous Ghana Government publication of May 1952 - 'Development of the Volta River Basin'. [Government of the Gold Coast, 1952]. Although the latter is not as lengthy a statement as the former, and is not very detailed, it is nevertheless much more comprehensive. The Ghana publication deals with the substantial public works needed to service the scheme, such as a new port, railways and roads. It considers the possibility of using the new lake for irrigation and transportation, and the possibility of supplying Ghana's major towns and mines with electricity through a grid. It also notes that there would be health problems associated with the scheme and problems of land acquisition, compensation and

resettlement associated with the lake.

'Development of the Volta River Basin' in contrast to 'The Volta River Aluminium Scheme' expresses the hope that the project "would be a great source of wealth to the country [the Gold Coast] and assist generally in the raising of the standard of living of the inhabitants." [Government of Gold Coast, 1952, 27]

But to understand more clearly the Nkrumah Government's interest in the VRP, a more extended account must be given of the statements of Nkrumah and the CPP. The VRP was a key item in the CPP election manifesto of 1951. This manifesto, entitled 'Towards the Goal', set out in simple terms the following aims:-

- " 1) Constitutional. The Coussey Committee let the Country down by prolonging white imperialism. The CPP will fight for self-government NOW.
- 2) Political. An upper house of the Legislature, known as the Senate, shall be created for the Chiefs. Universal suffrage at the age of 21. Direct elections with no property or residential qualifications for candidates...
- 3) Economic. A five year Economic Plan...
 - i) Immediate materialisation of the Volta hydro-electric scheme
 - ii) Railway lines to be doubled and extended
 - iii) Roads to be modernised and extended
 - iv) Canals to join rivers
 - v) Progressive mechanisation of agriculture
 - vi) Special attention will be given to the swollen shoot disease; farmers will be given control of the Cocoa Industry Board funds.....
 - ix) Industrialisation will be carried out with all energy.
- 4) Social. Education:
 - i) A unified system of free compulsory elementary secondary and technical education up to 16 years of age.
 - ii) The University College to be brought up to University status.
 - iii) A planned campaign to abolish illiteracy.

Family Assistance:

- A free national health service
- A high standard housing programme....
- A piped-water supply in all parts of the country....
- A national insurance scheme. "

[Austin, 1964, 130]

Of the economic and social aims only the VRP and the raising of the University College of the Gold Coast to University status can be said to have been fully implemented as at 1976. Because the VRP came so high up on the CPP's list of aims and because it was implemented (in contrast to the other stated aims) it would appear that it was a high priority to Nkrumah's Government. Nkrumah himself said:

"Greatest of all our development projects was the Volta dam.... [It] permitted not only a large aluminium plant at Tema, processing the country's rich bauxite deposits, but a broad range of other industrial projects."

[Nkrumah, 1968, 82-3]

The accuracy of the second sentence will be questioned later but the first sentence makes Nkrumah's sentiments clear. Why was the VRP so important? Nkrumah stated that the VRP was "designed to provide the electrical power for our great social agricultural and industrialisation programme" [Nkrumah, 1968, 77]. The importance Nkrumah attached to the role of electric power in a developing country may be gauged from the following quotes:

"I have always been convinced that an abundance of cheap electric power is the soundest base for the expansion of industry in a country such as ours."

[Legislative Assembly Reports, March 1959]

"My Government is determined to develop the hydroelectric potential of Ghana to its maximum".

[Legislative Assembly Reports, March 1959]

"All industries of any major economic significance require, as a basic facility, a large and reliable source of power. In fact, the industrialisation of Europe, of America, of Canada, of

Russia and of other countries, emerged as a result of the invention of sources of power of hitherto undreamt of size. Newer nations such as ours, which are determined by every possible means to catch up in industrial strength, must have electricity in abundance before they can expect any large-scale industrial advance. Electricity is the basis for industrialisation. That, basically, is the justification for the Volta River Project".

[Legislative Assembly Reports, 21st February 1961]

Thus the rationale behind the VRP was that it would provide abundant supplies of electricity. This electricity was seen as a necessary requisite for industrialisation. The Nkrumah Government did not see the aluminium side of the venture as the primary aspect of the project, it was the uses to which the electricity could be put that attracted them.

But in order to get the project going, Ghana needed foreign money and foreign expertise. It is paradoxical that Nkrumah, the author of 'Neocolonialism', should have been so keen on welcoming foreign money and foreign expertise into Ghana. For instance, during the heated debate on the VRP in the Legislative Assembly in February 1953, Nkrumah intervened to state:

"....since most of the participants are British companies the arguments should be so carefully worded that we would not in any way prejudice those who are going to be participants; but the whole of the speech [by William Ofori-Atta] was a diatribe against the British government. As far as I am concerned when the national movement started in this country, I was one of the principal soldiers against imperialism....Go through the whole history of the UGCC and you will see that my government has always been against imperialism. Yet you say here that Kwame Nkrumah is selling out to imperialists.....We are not boys! Do you think I am a fool to enter into a project like that blindly? If I were a fool do you think I could have been able to organise the country to this stage? I am not so damned silly as to put my nose into something that is detrimental to the interests of this country."

[Gold Coast Legislative Assembly Debates, February 1953]

Much later he described the Kaiser Company as "enlightened foreign private enterprise" [Ghana Government, 1962], and as "a firm of

proven ability and international renown" [Legislative Assembly Reports, March 1959]. And at the VRP inauguration ceremony which occurred shortly after the publication of 'Neocolonialism' he stated "like Britain in the heyday of her imperial power, the U.S. is, and rightly so, adopting a conception of a dual mandate in its relations with the developing world". This could, he said, "enable the U.S. to increase its own prosperity and at the same time assist in the increasing prosperity of the developing world" [West Africa, Vol.50, 1966, 118/9]. Obviously, Nkrumah and the CPP thought that they could handle such outside influences successfully and arrange that the aims of all the participants in the project would be fulfilled. This will be called into doubt later.

Having dealt with the differing expectations of the U.K. and Ghana Governments, we now turn to an analysis of those aspects of the VRP on which there was substantial agreement between the participants. The Preparatory Commission report will form the basis for this analysis, since this report is nearest to being a consensus of opinion between the U.K. and Ghana Governments and ALCAN and BACO. This is not to say that the Preparatory Commission Report is unbiassed, merely that it is the official publication which arose out of the closest collaboration yet of the four participants. It is reasonable to take the Preparatory Commission report as indicating some areas of consensus because:

- 1) R.G.A. Jackson, the Special Commissioner, was an Australian who was advised by independent experts from all over the world (such as Arthur Morgan of the Tennessee Valley Authority and Professor W.A. Lewis,

the West Indian economist). These people had no affiliations with any of the participants, so their conclusions were not obviously biased toward one or other of the participants.

2) Nevertheless, all the participants had a substantial amount of access to the Preparatory Commission. The cost of the Commission was borne equally by the U.K. and Ghana Governments. All the work of the Commission was done in Ghana and in close touch with Prime Minister Nkrumah and the two Government ministers with special responsibilities for the project. Yet the final report was published by HMSO, London [Preparatory Commission, 1956]. The Special Commissioner had meetings with representatives of BACO (in London) and ALCAN (in Montreal) in February and March 1953 to discuss the procedures the Preparatory Commission should follow when it began work in April [Preparatory Commission, Vol. 2, 1956, 24]. Throughout the life of the Commission ALCAN and the U.K. Government received monthly reports giving a full account of the Commission's activities, and BACO received regular reports of a similar nature. And, as the Preparatory Commission states,

"The appointment of Dr. R. Grimes-Graeme in July 1953 as resident representative in the Gold Coast of ALCAN, provided a further opportunity for ensuring that the aluminium companies were kept fully informed of the work of the Preparatory Commission, and also enabled the Commission itself to obtain information from ALCAN quickly and conveniently. Throughout the work of the Commission an effective and harmonious relationship was preserved with the representative of ALCAN and the Commission wishes to record its appreciation for all his assistance."

[Preparatory Commission, Vol. 2,
1956, 26-7]

So, what were the points on which these four participants agreed? The Preparatory Commission report says: "The VRP would accelerate the trend from rural towards industrial communities"

[Preparatory Commission, Vol. 1, 1956, 29]. It also states:

"The sociological objective of the permanent community at Ajena [the dam site] would be the establishment of a small and contented group of reliable and efficient men whose primary responsibility would be the operation and maintenance of the dam and power installation, the regulation of the water and the administration of certain health measures. This settlement would thus be entirely different in character from the rural communities in the neighbourhood and in view of the special responsibilities of the workers who would live there, it is desirable that it should remain so. It should not be merged with a village settlement of normal character".

[Preparatory Commission, Vol. 1, 1956, 41]

The emphasis is therefore on industrial development as opposed to rural development, to the extent of creating a 'civilised' enclave amidst 'primitive' society. The results of thinking along these lines were as follows: a) The Preparatory Commission stressed the necessity of keeping the labour forces to a minimum: "The two Governments, the aluminium companies and the consulting engineers have all supported the Commission's policy of keeping the labour forces to a minimum" [Preparatory Commission, Vol. 1, 1956, 27]; b) There was to be a much greater outlay on the development of the industrial community than on the resettlement of the rural communities which had to be moved. The labour force on the dam would reach an estimated peak of 5,000 by the fourth year of construction. The cost of temporary housing for this work force, inclusive of hospitals, schools, community centres and other amenities, of roads and other services and of the supply of water and electric power would be about £4½ million. Allowing for contingencies, however, the cost of



servicing this community was put at £7 million, i.e. £1,400 per capita [Preparatory Commission, Vol. 1, 1956, 13]. In contrast the Preparatory Commission estimated that there were almost 62,500 people living in the area to be submerged by the new lake and put the cost of their compensation and resettlement at £4 million or £64 per capita [Preparatory Commission, Vol. 1, 1956, 46]

c) Over 65% of the capital investment in the project would have to be external in character, representing imported equipment and materials.

Thus the immediate benefits of the project were to be restricted to a small sector of the Ghanaian population which received housing and employment, and to the overseas suppliers of capital equipment. The project was not to involve the people of Ghana as participants in any significant way; there was a deliberate policy of minimising their involvement.

Why did the U.S. Government decide to involve itself in the VRP? R.G.A. Jackson stated that political factors were paramount [Jackson, 1964]. Ghana represented the first of the new independent African states and the U.S. was anxious to gain influence in Africa. Here was the ideal opportunity. The desire to achieve greater standing in Africa was heightened by memories of recent events in the United Arab Republic where the Suez crisis had led to withdrawal of British and American funds from the proposed Aswan High dam. As a result, Russian financial backing had been used for that project.

In a statement before the U.S. Committee on Foreign Affairs, G. Mennen Williams (U.S. Assistant Secretary of State for African Affairs) explained, in response to a question as to why the U.S. gave so much assistance to Nkrumah's Government:

"...it is our estimate that in the long run there are favorable factors that...will prevail. This is an area where the British developed a very soundly based civil service, a well trained military.... The middle class is a sizable one, and the amount of free enterprise is considerable. Their most important crop is cocoa. These are all middle class, independent farmers. I think when you put the thing in balance that over the long run we could hope for a government which would at least be non-aligned."

[Allen & Johnson, 1970, 263]

But the Cold War and questions of political alignment were not the only factors to be taken into account. There were economic reasons for involvement too. Eugene R. Black occupied the posts of executive director, president and chairman of the World Bank between 1947 and 1962, i.e. over the whole of the period of negotiations over the VRP. Black stated that

"our foreign aid programs constitute a distinct benefit to American business. The three major benefits are:

- 1) Foreign aid provides a substantial and immediate market for U.S. goods and services
- 2) Foreign aid stimulates the development of new overseas markets for U.S. companies
- 3) Foreign aid orients national economics toward a free enterprise system in which U.S. firms can prosper"

[Magdoff, 1969, 176]

The extent to which the U.S. government agencies were prepared to back Kaiser and Reynolds' involvement in the Tema aluminium smelter indicates how highly they regarded the potential political and economic benefits. The U.S. Export-Import Bank provided a \$96 million loan and the remainder of the necessary investment (\$32 million) was provided by Kaiser and Reynolds but was fully guaranteed by the U.S. government. Thus there was very little investment exposure on the part of the Kaiser Corporation. The U.S. government was prepared to provide 75% of the necessary loans for the smelter but only 43% (including the IBRD loan) of the funds for the dam and power system.

That the VALCO investment paid off is indicated by the fact that the Overseas Private Investment Corporation (OPIC) gave VALCO the first annual OPIC Development Award. (OPIC is a U.S. government agency which insures and helps to finance American private investment in about 80 developing countries; it insures companies against risk of expropriation, currency inconvertibility and war and revolution.) The award was presented by Daniel Parker in a ceremony in the U.S. Capitol building. Parker is not only Chairman of OPIC's board of directors but also Administrator of the Agency for International Development. In OPIC's own terms VALCO had been a model of private investment in a developing country and had also been a useful instrument of U.S. government policy [Burks, 1975].

However, the VRP was not a complete push-over for the Americans; at one point they had to resort to using a threat. R.G.A. Jackson indiscreetly states:

"Recently, Mr. Averell Harriman, the U.S. Under-Secretary of State, made the profound observation to President Nkrumah that success or failure in this joint enterprise could probably do more than anything else to determine the support, or otherwise, of future U.S. administrations towards the development of that cooperation between African states in which President Nkrumah so fervently believes."

[Jackson, 1964]

The impression given up to now of the Kaiser Corporation has been partial. The Kaiser Corporation is not just an aluminium company and its subsidiary, Kaiser Engineers, is not just involved in the design of hydroelectric schemes. The Kaiser Corporation was founded 60 years ago by Henry J. Kaiser. [Sources used in this description of Kaiser Corporation are Forbes Magazine, 1968, Fortune Magazine, May 1969, December 1969, June 1970, December 1973, May/June 1975 and Kaiser Corporation reports.] He died in 1967

aged 85, having handed over the business to his son Edgar F. Kaiser, who is the present chairman of the board. It is expected that Edgar F. Kaiser will be succeeded by one of his sons, Edgar F. Kaiser Jr., as head of the company. [Loving, 1975] The Kaiser Corporation, like Reynolds Metals and Harvey Aluminum (also amongst the big four aluminium companies in the U.S.), is a family concern. Edgar F. Kaiser is chairman of all the major Kaiser companies and his family still controls more than 40% of Kaiser Industries' common shares. But although the Kaiser Corporation is patriarchal and patrilineal it is not parochial. The Kaiser Corporation has a major interest in steel, it mines iron ore and coking coal (as well as coal for use in power stations) and it produces and fabricates steel. Other basic resources which Kaiser produces are cement, gypsum, sand, gravel, zinc, lead, glass fibre, refractories, agricultural chemicals (including fertilizers), and industrial chemicals. Using these basic resources the Kaiser Corporation is able to construct such items as offshore oil production platforms and exploratory drilling rigs, ships, nuclear power stations, canals and ports. The aerospace and electronics division produces sophisticated mechanical and electronic devices for military aircraft and missiles. The Kaiser broadcasting company owns and operates television stations covering Chicago, Detroit, Philadelphia, Boston and San Francisco. Kaiser also owns a real estate company and a dredging operation. It also owns and operates its own shipping fleet consisting of five vessels engaged in bulk transportation. It has several Gulfstream executive jets. And the Kaiser Trading Company deals in worldwide marketing of all Kaiser's products as well as such extras as fuel oil and forest products. In the past the Kaiser Corporation also manufactured cars and jeeps, but it sold its Jeep

Corporation to American Motors in 1970. And during the Second World War it mass produced the famous Liberty ships at the rate of one a day.

Due to a combination of vertical integration (i.e. depth of interest in a particular product from basic resources to marketing), and diversification (i.e. breadth of interest in a wide range of products), Kaiser possesses a great deal of security, and control over its affairs. Since the steel it uses to construct power stations is produced from the iron ore which Kaiser mines, the price and quality of this input to the engineering operation can be rigorously controlled. In fact the extent to which the Kaiser Corporation could make its operations totally self-reliant is truly astounding. For instance, the iron ore which Kaiser mines can be made into steel using the coking coal (which Kaiser mines) and the refractories which Kaiser produces. This steel might then be used to build the ships which Kaiser uses to transport such things as iron ore, coal, etc. In its aluminium ventures as well as steel, the Kaiser Corporation has control over the operation from first to last. It mines its own bauxite and produces its own alumina and aluminium using chemical catalysts it has itself manufactured. It then fabricates the aluminium into products (such as aluminium foil, sheet and cable) which it markets through its own trading company.

Kaiser not only has a broad range of interests in commodities, but also a worldwide area of operations. Outside the U.S., some of its facilities include:-

Canada : Iron ore, coal, asbestos and gypsum mines
copper, steel and ferro-alloy plants,
Aluminium fabricating plant.

Australia	:	Bauxite and iron ore mines Alumina plant, aluminium smelter and aluminium fabricating plant Nickel plant
Wales	:	Aluminium smelter
England	:	Aluminium fabricating plants
Belgium	:	Aluminium fabricating plants
France	:	Refractories plant
Sweden	:	Refractories plant
Germany	:	Aluminium smelter and aluminium fabricating plant
Switzerland	:	Aluminium fabricating plant
Italy	:	Printing and packaging plant
Turkey	:	Aluminium fabricating plant
Sardinia	:	Alumina plant
Mexico	:	Gypsum quarry and steel plant
Jamaica	:	Bauxite mines and alumina plant
Puerto Rico	:	Real estate
Peru	:	Phosphate mines
Argentina	:	Aluminium fabricating plant and refractories plant
Brazil	:	Aluminium fabricating plant
South Africa	:	Aluminium fabricating plant
India	:	Bauxite mines, alumina plant, aluminium smelter, aluminium fabricating plant, and pig iron facilities
Thailand	:	Cement plant and aluminium fabricating plant
Hong Kong	:	Aluminium fabricating plant

Okinawa	: Cement plant
Guam	: Real estate, cement plant
Bahrain	: Aluminium smelter
Indonesia	: Aluminium fabricating plant
New Zealand	: Aluminium smelter, aluminium fabricating plant.

Kaiser has been involved as well in canal engineering in Panama, and in many hydroelectric schemes such as the Guri dam in Venezuela, the Salto Santiago and Salto Osorio projects in Brazil, the Bandama River project in the Ivory Coast (Kossou and Taabo dams), the Snowy Mountains Project in Australia, and the Hoover, Bonneville and Grand Coulee Dams in the U.S.A.

With total assets of about \$3,500 million, the Kaiser Empire ranks as number thirty in the list of largest U.S. manufacturing industries. This is not a well-known fact since the various parts of the Kaiser Empire are usually treated separately. For instance, Fortune Magazine publishes an annual list of the United States' largest industries in which Kaiser Aluminum and Chemical Corporation appear separately from Kaiser Industries and Kaiser Cement and Gypsum [Fortune Magazine, 1975].* However, since the whole of the Kaiser Empire is answerable ultimately to one man, Edgar F. Kaiser, this separation is unwarranted and misleading.

In 1973, the total revenues from Kaiser's operations amounted to about \$2,500 million, a figure which it is interesting to compare to Ghana's GNP. In 1972, this latter amounted to N¢ 2,624 million, i.e. about \$ 2,570 million, so it seems that the Kaiser Corporation and Ghana may, in terms of economic power, be roughly equal.

Kaiser Aluminum and Chemical Corporation is the biggest division of the Kaiser Corporation in terms of sales, assets, and employees.

* May and June issues

It is the fourth biggest producer of aluminium in the world after ALCOA, ALCAN and Reynolds Metals, all North American firms. Kaiser Aluminum and Chemical Corporation presently produces about 8% of the world's total production of aluminium. The Kaiser Aluminum and Chemical Corporation was formed as late as 1946, and, as Forbes Magazine put it:-

"Kaiser was not long in the aluminum business...before it was realised that it needed to control large supplies of bauxite, the raw material from which alumina and in turn aluminum, are made. Where could the company find bauxite? Overseas. So in 1947, Henry Kaiser accepted the inevitable and purchased bauxite properties in Jamaica. His resolution never to go overseas was doomed the moment he decided to enter the aluminum business".

[Forbes, 1968]

ALCOA's control of bauxite deposits and hydroelectric resources in the U.S. forced Kaiser to take its operations overseas [Girvan, 1970]. In fact there has been a steady trend for all the big four aluminium companies to move abroad in search of new supplies of bauxite. ALCOA and ALCAN got supplies from Guyana and Surinam between the 1920's and the 1940's. Reynolds and Kaiser moved into the Dominican Republic and Jamaica after the Second World War. Interest is increasingly shifting to Australia and Africa during the 1960's and 1970's, not only to find supplies of bauxite, however, but also sources of hydroelectric power.

Henry Kaiser once said:

"There is an overriding secret to our success. That secret is to fill human needs. Every undertaking we've ever tackled was entered upon because we saw unfulfilled needs of people. There is an almost irresistible force in giving ourselves for the needs of others."

[Moxon, 1969, 93]

This is a piece of humbug. The Kaiser Corporation had specific aims to fulfil when it got involved in the VWP and it did not sacrifice

those aims, or itself, for the benefit of the people of Ghana. The Kaiser Corporation was called in initially for advice on the VRP. It was not long before it became involved in actual operation of the scheme. Kaisers were contracted to design the dam and supervise its building, and to build and operate the aluminium smelter. They were paid a substantial sum for the former task, they did not do it for nothing. And in operating the aluminium smelter this concern was not a broad one of filling human needs but a narrow one of producing cheap aluminium. By involving itself in the VRP, the Kaiser Corporation was able to gain access to cheap hydroelectricity, and was able to place itself in a strategic position to obtain some of Ghana's large supplies of bauxite.

That Kaiser was not particularly interested in Ghana's desire for development is indicated by the way in which they rejected the proposed Bui scheme as an alternative to the VRP. The Kaiser Reassessment Report stated:

"....this development [Bui], due to smaller river flow and the remote location, would be relatively economical only for the general public supply of electricity. The very large block of low cost power economic for electro-chemical production is not available here."

[Kaiser, 1959, VII-1]

The emphasis here is on Kaiser's interest in aluminium production rather than Ghana's desire for electricity. However, this is not to say that the multinational corporation is totally unamenable to bargaining and compromise:

"Edgar Kaiser has always held that it is better to create an atmosphere of mutual trust than it is to try to clean all the chips off the table. This way the partners are willing to come back and deal again".

[Loving, 1975]

The main participants in the project have been dealt with. But what of the others, those affected by the scheme? The VRP did not arise out of Ghanaian initiative so that most Ghanaians did not have any aims to fulfil through implementation of the project. Instead they had received from others or acquired for themselves a set of expectations as to what the project would mean to them and to Ghana. Some expected the project to be beneficial, some thought otherwise. A Ghanaian Professor of Economics stated that the scheme was "fraught with many socio-economic problems, such as the displacement of people from the land, the diversion of labour from agriculture and other fields of economic activity including the mining of other minerals, the possible increase in the incidence of river blindness, and the further disintegration of existing social units". [de Graft Johnson, 1955, 30_7]

Another West African economist stated:

"Some persons tend to regard the scheme as one of the first fruits of the country's recent successful political tournament. Nothing could be further from the truth. The scheme cannot be expected to make any substantial contribution to the secondary industrialisation of the country in the sense of a shift of resources away from agricultural and mining activity to manufacturing industry. In essence it is just another of those enterprises which have characterised and continue to characterise the economy of West Africa as a raw materials economy. It is a plan for winning aluminium, in most part by private enterprise, and exporting it to other countries which will use it in the manufacture of useful articles."

[Carney, 1952, 4-5_7]

And George Padmore (author and ardent Pan-Africanist) wrote:

"..All in all, while it is clear that the scheme will provide the U.K. with a source of aluminium outside the hard currency area and the smelting company with profits from an assured market, the benefits which would accrue to the Gold Coast are not discernible, beyond the incidental ones of an artificial lake and possible provision of some electric power for the development

of other industries once the smelting company's needs have been met...It may come as a shock to the Gold Coast people to find that they have perhaps given away rights to work yet another rich natural resource of their country for little or nothing.

[Padmore, 1953, 238-9]

And even the U.K.'s Watson Commission, after the riots of 1948, felt obliged to make the following warning:

"We are very much concerned to see that in the exploitation of the natural resources of the Gold Coast the indigenous population shares to the fullest extent the advantages. We realise that in so far as the execution of the VRP depends on the manufacture of aluminium, it is a commercial venture the success of which may well depend on world prices being maintained. If the view held by those in the trade and maintained in high places in Britain immediately after the late war is any criterion, any prediction of this nature is no sure guide. It would not be right therefore in our view, unless the scheme held prospects of paying its way independently of aluminium manufacture, for the Government of the Gold Coast to embark upon it as a national venture. On the other hand, while capital is entitled to a fair return measured by risk it may be proper to observe that views may differ on what is a fair return. It would be equally improper in our view to permit without adequate safeguards the investment of foreign capital. These should include a share of profits and provision for the national use of surplus water and surplus electrical energy, together with the adoption of ultimate national ownership. Accordingly we recommend that, assuming the Government upon consideration, for the reasons given or other good and sufficient reason, decides not to embark on the scheme as a national enterprise, then in permitting private enterprise to carry out the scheme, such permission should be conditional upon agreement on the following broad lines:

- 1) The nominal share capital of the company formed to carry out the scheme should be small and the Government entitled to subscribe up to 49% thereof,
- 2) The bulk of the working capital should be provided by way of loan capital at a fixed rate of interest including a rate for amortisation in 50-75 years, the interest to be a first charge on the company's revenues but not otherwise secured.
- 3) Upon redemption of the loan capital the Government to have an option to acquire the balance of the 51% share capital at a price to be fixed, failing agreement, by arbitration.

"We appreciate that this recommendation in this form may be quite unacceptable to foreign capital. Our intention is not

to tie the hands of the Government to any fixed formulae but to indicate the kind of arrangement which in our view should be aimed at and which we think the people of the Gold Coast are entitled to expect from the exploitation of their natural heritage."

[Watson Commission, 1948, paragraphs 310-320]

What of those who, even more than most Ghanaians, were decidedly affected by the VRP, those people living in the area to be flooded by the new lake? We are told that:

"...residents well up-river from the dam site were incredulous that their own villages would actually be flooded. Indeed, some suspicions were voiced that the move was merely a Government device to get them out of the way so that their land could be utilised in a different way."

[Lowe-McConnell, 1966, 102]

In other words, they thought their land was being stolen. And, as we shall see later, this view is, at the present time of writing, roughly correct.

CHAPTER FOUR

EFFECTS OF THE PROJECT UPON INDUSTRY AND THE MACROECONOMY

By 1974, the fixed assets held by the VRA had entailed a total expenditure of N¢ 199.5 million. The foreign component of this expenditure had amounted to N¢ 144.8 million, i.e. about 75% [Personal interview, Chief Accountant, VRA].* The bulk of this foreign expenditure had been incurred during the construction period 1962-66 and amounted to N¢ 93 million or N¢ 18.6 million per annum [VRA Annual Reports 1962-66]. Comparing this annual expenditure to Ghana's balance of payments situation (see Table Five), it can be seen that it is not an insignificant factor, though it is by no means the only cause of an adverse balance of payments. (It must be remembered that the price of cocoa on international markets is the overriding factor, this being the explanation for the particularly large deficit in 1965. However it is possible to state that the VRP, and similar projects requiring foreign expenditure, aggravated the existing balance of payments problem.)

The loans originally agreed for the project in February 1962 amounted to (in terms of dollars):

<u>IBRD</u>	\$47 million for a period of 25 years @ 5 $\frac{3}{4}$ % p.a. interest
<u>AID</u>	\$27 million for a period of 30 years @ 3 $\frac{1}{2}$ % p.a. interest
<u>Export-Import Bank</u>	\$10 million for a period of 25 years @ 5 $\frac{3}{4}$ % interest
<u>U.K. Export Credits Guarantee Dept:</u>	\$14 million for a period of 25 years 6% interest

* Interviewed August 1975

TABLE FIVE : Ghana's Balance of Payments (Current Account)

(Millions of N¢)

<u>1950</u>	<u>1951</u>	<u>1952</u>	<u>1953</u>	<u>1954</u>
+ 56	+ 54	+ 32	+ 15	+114
<u>1955</u>	<u>1956</u>	<u>1957</u>	<u>1958</u>	<u>1959</u>
+ 5	- 37	- 40	+ 30	- 32
<u>1960</u>	<u>1961</u>	<u>1962</u>	<u>1963</u>	<u>1964</u>
- 94	-147	- 80	-128	- 99
<u>1965</u>	<u>1966</u>	<u>1967</u>	<u>1968</u>	<u>1969</u>
-220	-129	- 87	- 52	- 70
<u>1970</u>	<u>1971</u>	<u>1972</u>	<u>1973</u>	
- 93	-202	+143	+147	

[Sources: Birmingham et al, 1966; Bank of Ghana, Annual Reports, 1960-74; Central Bureau of Statistics, Statistical Yearbooks (passim)]

The Government of Ghana provided the rest of the cost of the project through an investment valued at \$98 million, most of this actually being in Ghanaian cedis.

The VRA Annual Report for the year 1962 states:

"A number of procedural matters had to be negotiated and settled with the four lending agencies before funds could be withdrawn from their loans for financing expenditures. The first step was to allocate the proceeds of the loans as between various contracts in a Master List of Goods and to secure the approval of this list by the four lending agencies. While the loan agreements were signed and executed on February 8, 1962, the scrutiny and approval of the Master List of Goods took several months and were finalised in January 1963. In general, the loan proceeds of AID and Export-Import Bank are available to finance the procurement of necessary goods and services in the United States and those of the UK loan in the United Kingdom. The proceeds of the World Bank loan are available to finance expenditures in other currencies".

[VRA, Annual Report, 1962, 19]

In other words, the loans were tied to the purchase of goods either from the donor country or from acceptable member countries of the World Bank. It was due to the advice of the World Bank that the loans agreed on were not entirely tied to the purchase of goods, for the World Bank proposed that some contracts be put out to international tender [Moxon, 1969, 104]. Under the original loan arrangements all the debts except that to AID were due to be paid off by 1987. The AID loan was to have been repaid by 1993. Most of the U.K. Loan was not taken up (it had the highest interest rate) and other loans were obtained. The IBRD has lent a further \$6 million, the Canadian Government has lent just over \$9 million and the Ghanaian Government has lent nearly N¢ 2 million [VRA Annual Report, 1974]. As a result the total drawings on the loan facilities available amounted to \$98 million, about the same as anticipated in 1962. But by 1974, instead of the expected total borrowings

remaining to be paid of \$60 to \$65 million, the VRA had still to repay \$82 million [VRA Annual Report, 1974]. And instead of having paid about \$33 million in interest charges, they had paid \$51 million [VRA Annual Reports 1962-74]. This was due to a lower profitability than expected on the part of the VRA, and thus a reduced ability to pay off the loans. Since the interest rate on the loans is applied to that amount still outstanding, the interest charges were therefore also higher than expected. In fact year by year the VRA is merely managing to pay the interest charges on loans received but is not managing to repay significant amounts of the loans themselves. In 1974, the VRA paid back only \$1.2 million of loan facility because \$4 million had to be paid in interest charges.

The total interest charges to be paid on the original loans would have amounted to \$56 million. As has been noted the VRA has already paid out \$51 million in interest yet there is still interest to pay on the outstanding part of the loan, currently \$82 million, until this is totally repaid. It is anticipated that repayment at the present rate will take more than 50 years so that the grand total of interest paid will amount to more than \$150 million. That is, the VRA's original borrowing of \$98 million may necessitate a total repayment of about \$250 million.

Examining Ghana's trade with her present-day major trading partners, the U.S. and the U.K. (see Table Six), it can be seen that:

- (a) there has been a tendency for both import and export trade with the U.K. to decline,
- (b) exports to the U.S. have remained steady,
- (c) imports from the U.S. have increased considerably.

Thus the U.S., previously a minor trading partner, has become of major importance to Ghana. This is not, of course, solely due

TABLE SIX : Ghana's Trade with U.S. and U.K. as percentage
of World Total Ghanaian Trade

<u>Year</u>	<u>Imports</u>		<u>Exports</u>	
	<u>U.K./</u> <u>(Sterling Area)</u>	<u>U.S./</u> <u>(Dollar Area)</u>	<u>U.K./</u> <u>(Sterling Area)</u>	<u>U.S./</u> <u>(Dollar Area)</u>
1957	n.a.(45.1%)	n.a.(5.6%)	n.a.(40.7%)	n.a.(16.8%)
1958	n.a.(46.3)	n.a.(7.9)	n.a.(41.4)	n.a.(19.8)
1959	n.a.(45.8)	n.a.(8.9)	n.a.(34.8)	n.a.(19.8)
1960	n.a.(41.6)	n.a.(8.3)	n.a.(36.7)	n.a.(15.9)
1961	n.a.(40.6)	n.a.(11.0)	n.a.(32.8)	n.a.(24.6)
1962	n.a.(38.5)	n.a.(11.1)	31.5(n.a.)	18.2(19.6)
1963	32.8(37.6)	6.4(8.8)	28.2(31.9)	15.6(16.9)
1964	27.4(35.4)	8.9(11.6)	23.0(26.4)	21.0(22.9)
1965	n.a.(28.9)	n.a.(n.a.)	n.a.(23.8)	n.a.(n.a.)
1966	28.8(32.7)	16.8(17.9)	25.0(29.7)	14.5(17.2)
1967	30.3(35.5)	16.8(19.6)	27.7(31.8)	18.6(23.0)
1968	27.6(32.4)	19.1(21.6)	27.1(32.1)	17.7(21.4)
1969	26.8(33.2)	18.4(20.4)	28.5(33.5)	19.0(20.6)
1970	23.6(28.7)	18.1(21.3)	23.4(29.3)	18.0(19.2)
1971	25.0(30.9)	15.1(16.6)	24.2(28.7)	22.6(24.0)
1972	15.6(24.2)	17.5(20.5)	18.5(23.4)	13.2(15.4)
1973	16.8(28.4)	15.5(17.2)	17.0(21.7)	13.2(14.8)

n.a. = not available

[Source: Bank of Ghana Annual Reports, dates as specified]

to the implementation of the VRP, but it does indicate that the VRP was part of a general tendency toward involvement with the U.S.

Has the VRP helped Ghana to broaden her range of export earnings? Only in a limited way. Aluminium was first exported in 1967 and, soon after, was making a substantial contribution to the total value of exports. But, apart from this, there does not appear to have been any change in the structure of Ghana's export earnings, as can be seen from the adjusted figures omitting aluminium from the list of exports (see Table Seven). This indicates that the VRP's provision of electricity has, up to now, made no difference to the nature of Ghana's export economy.

Moreover, to consider the value of exported aluminium as a simple addition to the credit side of the national accounts would be false. The average value of annual aluminium exports in the period 1968-73 was N£ 46 million. But the average annual cost of imported alumina was N£ 25 million, and the cost of imported cryolite, pitch, coke and other chemical supplies necessary for aluminium production was about N£ 9 million per year. So the maximum possible credit to Ghana's accounts would be N£ 14 million per year; however, this figure fails to allow for the cost of imported machinery and other items. The Preparatory Commission Report was of the opinion that:

"In broad terms the amount of exports at full scale production of the smelter (over 200,000 tonnes) would be very close to the quantity of imports needed for production."

[Preparatory Commission, Vol. 1, 1956, 20]

This statement was based on the assumption that alumina for the smelter would be produced in Ghana. Production from the smelter has been running at 150,000 tonnes per year and imported chemical supplies (apart from alumina) at about 100,000 tonnes per year.

TABLE SEVEN : Diversification of Ghana's Exports

Percentage contribution of cocoa, timber, gold, diamonds and manganese:-

<u>YEAR</u>	<u>to the total value of all exports:</u>	<u>to the total value of all exports excepting aluminium:</u>
1959	95.9 %	-
1960	94.5	-
1961	97.1	-
1962	96.0	-
1963	93.3	-
1964	91.5	-
1965	n.a.	-
1966	92.6	-
1967	91.1	94.0 %
1968	87.6	95.1
1969	84.5	95.0
1970	89.0	95.5
1971	84.7	92.4
1972	83.8	92.9
1973	84.6	90.2

[Bank of Ghana, Annual Reports]

If the statement of the Preparatory Commission is correct about 50,000 tonnes of imports remains unaccounted for.

The percentage of the total labour force which was officially unemployed in Ghana in 1970 remained the same as in 1960 (i.e. 6%) [Population Censuses, 1960 and 1970]. It must be remembered that this unemployment rate is not easily comparable to the rates measured in developed countries. But since the rate remained the same it would appear unlikely that the VRP had any appreciable beneficial effect upon the unemployment rate in Ghana.

The labour force at the VALCO smelter numbers about 2000, while the combined labour forces of the VRA and the Electricity Corporation of Ghana (ECG) amount to 7200 [VALCO information, VRA Annual Report 1974, ECG Annual Report 1973]. By early 1975, the fixed capital assets of VALCO were worth about \$150 million so that the cost of each work-place was of the order of \$75,000. The combined capital assets of the VRA and ECG were worth about \$270 million so that the cost per work-place was about \$37,000. These figures merit comparison with the situation in the U.S. where an average of about \$18,000 of capital is required for each worker in industry. Only in the more highly mechanised and automated industries does the investment per worker reach \$80,000 [E. Paul De Garmo & John R. Canada 'Engineering Economy' 5th Edition, 1973, Macmillan, N.Y.]. The VRP's cost per work-place was, therefore, not only high for a developing country but also for a developed country.

The effects of the project upon Ghana's regional structure have merely been to accentuate it. Electricity has only been supplied to the Eastern, Western, Central and Ashanti regions, which were already the richest areas of Ghana. The smelter is situated in the richest

region of all, the Eastern Region. The project thus cannot possibly have any beneficial effect upon Ghana's maldistribution of income amongst its regions.

The decision to locate the smelter at Tema was one of doubtful wisdom. Positioning the smelter close to Tema port was clearly of advantage to the Kaiser Corporation once it was decided that all the smelter's inputs would be imported and all its outputs would be exported. But, conversely, this location was inconvenient to the Ghana Government for it meant that both electricity and water supplies had to be transmitted a much greater distance (about 65 kilometres). It also meant that, contrary to earlier plans, Tema was to become a dual-purpose settlement (i.e. both a port and an aluminium town) thus leading to a serious housing problem. This problem has not yet been solved, for Tema has spawned a shanty town, Ashiaman, which is still without proper supplies of piped water and electricity.

The project has also created a shanty town at Akosombo where the workers' 'temporary' township, built for the labourers on the dam, is still in existence. This houses about 5000 people living in dilapidated dwellings made mostly of corrugated sheeting. The supervisors' township (housing about 3000 people in substantial, air-conditioned buildings) is officially part of the same town - Akosombo - and yet is entirely separate. Each township has its own school, store, market and other facilities. The official reason for separating the two townships is lack of flat land for building space, but is it then entirely coincidental that the two townships were laid out according to St. John Bird's original recommendations? The supervisors' township was built on the slope of a hill to catch the breeze and the workers' camp was placed in a valley bottom. The

supervisors' township has been provided with tennis courts and a swimming pool but leisure facilities are not a feature of the workers' camp.

The Aluminium Side of the Venture

As a result of the VRP, Ghana, is now tied into the world aluminium industry in a most unsatisfactory manner. Ghana exports bauxite, imports alumina, exports primary aluminium, and imports rolled aluminium to be fabricated into aluminium products. This situation is economically and politically expedient for the aluminium companies but is technically inefficient in terms of energy usage (due to the needless transportation of heavy materials over long distances) and is certainly not in the economic interests of Ghana.

Over the last 20 years the British Aluminium Company has taken more than five million tonnes of bauxite from their mine at Awaso (see Table Eight). About 80% of this has gone to the U.K. to be processed into alumina. The implementation of the VRP has in no way affected this trade in one of Ghana's most useful resources. Exports of bauxite have remained at a high level since 1967.

In order to feed the VALCO smelter between 250,000 and 300,000 tonnes of alumina has to be imported each year [VALCO Information]. This alumina originates from bauxite mined by Kaisers in Jamaica which has then been shipped to Kaiser plants in Louisiana for processing into alumina before being shipped across the Atlantic Ocean to Ghana.

The primary aluminium produced by the VALCO smelter is all exported. It leaves the factory in several forms: 'pigs' to be used for casting, rolling ingots for producing sheet metal, extrusion billets for extruding aluminium sections, and 'sows' which are large ingots of

TABLE EIGHT : Ghana's Bauxite Production - 1955-1974

<u>Year</u>	<u>Total Exports</u> (000 tonnes)	<u>Exports to U.K.</u> (000 tonnes)	<u>Total Proceeds</u> (N¢ million)
1955	120		
1956	143		0.93
1957	192		1.27
1958	213		1.4
1959	150		1.0
1960	194		1.5
1961	204		1.3
1962	243		1.9
1963	314		1.4
1964	250	213	1.8
1965	309	278	
1966	353	323	2.8
1967	350	272	2.7
1968	285	210	2.0
1969	246	213	1.9
1970	342	269	1.7
1971	328	300	3.1
1972	296	220	2.6
1973	324	225	2.6
1974	375	223	-

Sources: Bank of Ghana Annual Reports, Central Bureau of Statistics Economic Surveys, Metallgesellschaft Aktiengesellschaft. 7

raw aluminium on which further processing or alloying is to be done.

A large proportion of the production of the Tema smelter goes to the U.S. For instance, in 1974, 51,000 tonnes out of a total production of 157,000 tonnes went to that destination [Metallgesellschaft Aktiengesellschaft, 1975]. Other major markets for the aluminium are Japan, the U.K., West Germany and Sweden.

Ghana's own requirements for aluminium products are met by importing rolled aluminium sheet which can then be fabricated in Ghanaian factories. The largest of these is run by Ghana Aluminium Products Limited (GHANAL) which makes aluminium roofing sheets, grain storage bins, chicken coops, fish freezing trays, and van bodies. GHANAL is a joint venture between the Ghana Government and ALCAN. It began operations in 1959 solely to produce roofing sheets, and became one of the world's largest producers of roofing sheets with a peak output of more than 7000 tonnes per year [Ghana Economic Review, 1972-3, 131].

Due to the nature of her involvement in aluminium, Ghana lacks control over all aspects of her aluminium industry. There are ample world supplies of bauxite to meet present demand so that the price obtained per tonne of bauxite exported is fairly low. If Ghana were to process aluminium from her own bauxite the value added would be significant. Nevertheless, primary aluminium is still no more than a basic resource; the production of aluminium in Ghana could not, by any stretch of the imagination, be regarded as a move away from a raw materials economy. However, if Ghana were to stop exporting bauxite and process it instead into aluminium for export, she would at least avoid this fragmentary use of her resources, and would have

greater opportunity of control over a single venture rather than her present weak position in respect to the multiple ventures in the aluminium industry. As it is, Ghana merely serves the world aluminium industry as a source of cheap bauxite on the one hand and as a source of cheap electricity for aluminium production on the other. If Ghana, through negotiation, achieves better prices for either resource, then the aluminium companies concerned will find their ventures less profitable. But the options open to the aluminium companies are much greater, since they can, if necessary, phase out their operations and move to another part of the world.

It is not merely the mode of external linkage into the world aluminium industry which must be criticised, however, because the way in which the VRP has been structured has been detrimental to Ghana's internal affairs. The aluminium sector of the project almost seems to have been designed to minimise the internal linkage effects which might have benefited Ghana. As it is, the decision to import alumina and all necessary raw materials for the smelter meant that the scheme would have no encouraging effect upon industries that could supply inputs: that is, the scheme would have no backward linkage effects into the general Ghanaian economy. Similarly, the fact that all the primary aluminium produced by the smelter is exported means that the aluminium scheme has no forward linkage effects for it supplies no inputs to other industries.

Not only must the general arrangements of the aluminium sector of the VRP be criticised but also the particular terms of agreement. The Master Agreement, signed by Kwame Nkrumah on behalf of the Government of Ghana and Edgar Kaiser on behalf of VALCO, makes the following concessions:-

- (a) VALCO to pay no import duty on alumina, or other materials

to be used in the construction or operation of the smelter, until 25 April 1980.

(b) No restriction or taxation of VALCO's aluminium exports

(c) VALCO to pay no company tax until 25 October 1978. From that date until 1997, tax will be levied at the rate in force on 2nd January 1961.

(d) VALCO's dividends to be free of tax until 25 April 1980

[Personal communication, Director of Finance, VRA]

These are very generous terms and they would appear to ensure that VALCO recoups its investment in a fairly short space of time. As well as these arrangements for tax concessions and exemption from import and export duties, two further points about the agreement have been criticised in the past. The first is the low price obtained for the electricity sold to the smelter and the second is the failure to insist on a commitment from VALCO to build at some time in the future an alumina plant in Ghana.

The original price for electricity sold to the smelter as agreed in the Power Contract was 2.625 mills per kwh (a mill is one-tenth of a U.S. cent). We may compare this price with the average cost of industrial power used for primary metal production in the U.S. which is 7 mills per kwh [Guyol, 1969, 62]. This price of 2.625 mills was to have remained in force for 30 years but since the financial performance of the VRA did not come up to expectations a firm of consulting engineers (Preece, Cardew and Rider, based in Brighton, England) was appointed in 1970 to review the electricity rates charged by the VRA. The Preece, Cardew & Rider report recommended that a 5-6% increase in the VALCO rate be sought [Preece, Cardew & Rider, 1970]. As a result, the rate charged to VALCO was altered by agreement to 2.75 mills per kwh,

effective from 25th October 1972 [VRA Annual Report, 1972]. But this was merely an interim rate to be used until a final rate was established, and following discussions in February 1973, a further interim rate was negotiated of 3.125 mills per kwh [VRA Annual Report, 1973]. Discussion has continued since then, the VRA's case for a further rise being put by Preece, Cardew & Rider, VALCO's case for a continuation of the present rate being put by Haskins & Sells (a firm of accountants based in New York). Since agreement was difficult to reach, a fifth party, Messrs. Shawmont Limited (business consultants based in Montreal) was appointed jointly by the VRA and VALCO to review the power rate. Their report is being used in the negotiations to determine a new tariff level [Personal Interview, Chief Accountant, VRA].

That the rate charged for electricity supplied to VALCO is very low may be indicated by a brief calculation. By 1974 the total value of the VRA's fixed assets was N¢ 200 million. Assuming the project to have a life of 50 years (the figure used in the Kaiser Reassessment Report) the distributed annual capital cost of the project is N¢ 4 million p.a. The interest charges for 1974 amounted to N¢ 4.5 million and the running costs for the year amounted to N¢ 5.4 million. Thus the total cost of electricity supply for the year 1974 (omitting extraneous items such as resettlement and compensation) was N¢ 13.9 million.

Now it is possible to apportion the costs of supplying electricity to the various consumers on the basis of their maximum demand for power (in Mw) and their total energy use (in kwh). The cost of generating supply is usually taken as 50% demand-related and 50% energy use related. The cost of transmission is usually

taken as 100% demand related but we may ignore this factor since its costs are small compared to the rest of the scheme.

In 1974 VALCO accounted for 59% of the maximum demand on the VRA's system and 69% of the energy used. Since these must be taken equally into consideration we may average these figures and state that the cost of supplying electricity to VALCO is 64% of the total cost of supplying electricity. So that the cost of supplying VALCO equals 64% of N¢ 13.9 million, which equals N¢ 8.9 million.

Yet the revenue obtained from sales to VALCO was only N¢ 8.6 million, so that on these terms the electricity is not even being sold at cost price. We must note that the electricity revenue for 1974 does not include the extra payment due to VRA on the basis of the further interim price of 3.125 mills per kwh (a sum of N¢ 1.2 million) since this was placed under deposit account until finalisation of the tariff negotiations. But it is still clear that, even including payment for the further interim rate, the returns to the VRA remain very low. Calculations for previous years bear out this finding, indicating that revenues from sale of electricity to VALCO do not meet the cost of supply.

The Electricity Side of the Venture

The VRA's Akosombo Dam produces by far the largest proportion of electricity generated in Ghana. The Electricity Corporation of Ghana (ECG) produces the rest of the public supply from diesel generating sets. However, the VRA sells a substantial amount of electricity to the ECG each year which the ECG then distributes. The VRA also sells electricity directly to the larger consumers; VALCO, the Communauté Electrique du Benin, some of the mining

corporations and also Akosombo township and Akosombo Textiles Limited.

It will be clear to the reader that in practice the aluminium and electricity sides of the VRP are inextricably linked. But since the two aspects of the project were of differing importance to the various participants (i.e. to the Ghanaian Government the electricity derived from the project was of more importance than the aluminium produced) it will be of interest to know which, if any, of the two aspects has proved the more successful. To this end, the two sides of the project must be examined as distinct ventures, as far as possible.

Having said that, one must nevertheless contrast the rate that VALCO pays for electricity with the rate applied to other consumers. As has been noted VALCO has paid 2.75 mills/kwh since 1972 as the further interim rate of 3.125 mills/kwh has not yet been ratified. The average rate paid by customers of the ECG in 1973 was 22 mills/kwh [ECG Annual Report 1973]. Of the electricity sold by the ECG, 25% goes to commercial enterprises (for lighting and power), and to street lighting, 25% goes to private residences and 50% goes to Special Load industrial consumers who buy their power at a cheaper rate than other Ghanaian customers [ECG Annual Report 1973]. Thus the Special Load consumers paid 13 mills/kwh while the rate for commercial lighting was 83 mills/kwh, and for domestic supply the rate was 22 mills/kwh. None of these rates are favourable when compared to the VALCO rate.

It is instructive also to compare these electricity rates to those used in the U.K. where the average rate for industrial consumers in 1973 was 0.74 pence/kwh (18 mills/kwh) (at the then current exchange rate of \$2.4 to £1), the rate for commercial supplies was

1.1 pence/kwh (26 mills/kwh) and the rate for domestic supply was 0.97 pence/kwh (23 mills/kwh) [Electricity Council, 1975, 67].

The average revenue from power sales in the U.K. was 0.90 pence/kwh or 22 mills/kwh, that is, exactly the same as the ECG's revenue/kwh.

What can be learnt from these figures? Given that the aims of the Ghana Government have been to encourage industrialisation, one can say that the ECG's tariff structure is a sensible one. The growth in demand (from all of VRA's customers except VALCO) over the last ten years has averaged out at 17% per year [VRA Annual Report, 1974] so it seems that the electricity is not over-priced. The rate for VALCO however is very much lower than that for the other consumers. One would expect it to be lower since VALCO, as a base-load consumer, takes a uniform quantity of power 24 hours a day, 365 days a year. But should it be so much lower? As was calculated previously, VALCO is paying less than cost price for electricity. Since VALCO takes such a large proportion of the VRA's electricity and pays such a low price, the average revenue the VRA receives is very low, as can be seen from the IBRD's International Electric Power Data for 1969 (see Table Nine) [IBRD, 1972].

Despite the very large amount of electricity made available by the VRP, electricity is still a minor factor in Ghana's energy supply. In 1969 (the latest year for which comprehensive figures on energy supplies are available), the total generation of electricity from private and public sources in Ghana amounted to some 2,700 million kwh [VRA Annual Report, 1969]. In the same year, coal consumption in Ghana amounted to about 35,000 tonnes (all imported), and about 615,000 cubic metres of petroleum products were also imported for use as fuel [Quarterly Digest of Statistics, March 1972]. Thus Ghana's non-traditional energy supplies were made up approximately

TABLE NINE : International Electric Power Data (1969)

<u>Country</u>	<u>Population</u> (000s)	<u>Installed MWs</u>	<u>Consumers</u>	<u>Average revenue</u> <u>per kwh sold</u> (US mills)
Argentina	23,983	3,965	4,000,000	24.4
Australia	12,296	12,153	4,000,000	n.a.
Brazil	90,840	7,455	n.a.	n.a.
Ceylon	12,240	247	n.a.	26.2
Colombia	20,463	1,870	n.a.	n.a.
Costa Rica	1,695	213	150,400	17.3
El Salvador	3,390	166	9,200	14.2
Ethiopia	24,769	180	94,100	37.1
France	50,330	25,696	15,300,000	n.a.
Ghana	8,600	675	94,500	6.2
India	536,983	14,503	n.a.	22.5
Indonesia	116,000	651	n.a.	n.a.
Italy	53,170	21,702	n.a.	n.a.
Kenya	10,506	157	100,900	32.9
Malaysia	10,583	664	398,600	21.0
Mexico	48,933	4,904	4,170,000	20.8
New Zealand	2,901	3,023	n.a.	n.a.
Nigeria	63,870	n.a.	n.a.	n.a.
Pakistan	126,353	1,873	728,000	24.3
Singapore	2,017	524	245,000	20.7
Sweden	7,978	13,731	n.a.	n.a.
Switzerland	6,230	9,500	n.a.	n.a.
Taiwan	13,800	2,245	2,100,000	13.5
Tanzania	12,926	102	46,100	33.2
Uganda	8,340	170	59,700	17.5
U.K.	55,534	55,681	19,964,000	17.2
U.S.	203,216	309,348	55,847,000	15.0

Source: IBRD, 1972_7

as follows:

Oil	-	-	-	65%
Hydro electricity	-			32%
Coal	-	-	-	3%

(we neglect such items as firewood and charcoal only because they are extremely difficult to assess)

Since 1969 the amount of electricity generated has risen by about 50% so it may be that oil and hydroelectricity are more nearly comparable in importance (although oil demand has probably risen also). However, it must be remembered that a large proportion of the electricity generated is taken up by VALCO so that the amount of energy available to Ghanaian consumers is much smaller than indicated. VALCO absorbed 2,000 million kwh of electricity in 1969. We might therefore say that the true measure of energy supplies available to Ghanaian consumers in 1969 was:

Oil	-	-	-	85%
Hydro electricity	-			11%
Coal	-	-	-	4%

Obviously then, Ghana is quite highly dependent on oil, more so than the U.K. where the primary fuel input was made up as follows:-

Oil	-	-	-	42%
Coal	-	-	-	37%
Natural gas	-	-		17%
Nuclear electricity				3.4%
Hydro electricity	-			0.6%

Where does the electricity from the Akosombo dam go to? In 1973 it was used as follows:-

	<u>million kwh</u>	<u>£</u>
VALCO	2625	69.7
Accra/Tema area	552	14.7
Mines	243	6.4
Togo & Dahomey	99	2.6
Kumasi	89	2.4
Takoradi	69	1.8
Akosombo Township & Textile Factory	34	0.9
Others	58	1.5

[VRA and ECG Annual Reports, 1973]

The greatest quantity of electricity was therefore used in the Accra/Tema area either by VALCO or by domestic, commercial, or industrial customers of the ECG. The next largest amount was consumed by the mining companies in their gold, diamond and manganese operations which are spread over the central and southern part of the country. After the mines the Communauté Electrique du Benin (i.e. Togo and Dahomey) was the next largest consumer, followed by the Ghanaian cities of Kumasi and Takoradi.

One of the effects of the availability of electricity has been to discourage the mines from generating their own electricity from diesel generating sets. They have become major customers of the VRA. But, important though a change from one source of power to another can be, it would be much more interesting to know what novel effects the availability of electricity has created.

On this question one may usefully cite Hans Amann's study of development and electricity in East Africa [Amann, 1969]. Amann's study of Kenya, Uganda and Tanzania sought to ask what effects the East African power supply industry had on the development of these

three countries. Their situation is similar to Ghana's; all three being without indigenous sources of mineral fuel and therefore dependent on petroleum imports or the development of hydro electricity.

Amann states:-

"As a rule the percentage of electricity costs in the total industrial costs is very low, 1% would be a useful approximation for industries in East Africa. Therefore, little scope exists for the public utilities and the state to stimulate industrialisation through forward linkage effects by particularly low electricity prices".

[Amann, 1969, 142]

This is not due to electricity prices in East Africa being very low in comparison with other countries, for they are about average. It is, rather, due to the fact that electricity costs are, in general, a minor factor in the total costs of any industry.

Amann notes that Uganda is the most electrified East African country. 98% of its electricity is generated at the 150 MW hydro-electric power station at Owen Falls, built in 1954. Hydro-electricity accounts for about 6% of total energy consumption in Tanzania, 6% in Kenya and 17% in Uganda. Nevertheless, Amann says of Uganda:-

"A relatively high per capita consumption (of electricity), an impressive length of transmission lines etc. must be balanced against an almost disastrous state of financial affairs".

[Amann, 1969, 29]

"During these post-war years, electricity enjoyed magical esteem as an agent in industrialisation. The assumption underlying the Owen Falls project was that cheap electricity would almost automatically cause various industries to start operation."

[Amann, 1969, 154]

But,

"The advent of cheap electricity from the Owen Falls hydro-power station did not entail rapid industrialisation as had

been anticipated. However, outlets for electricity were badly needed to obtain minimum revenue in order to at least cover running costs and provide a contribution to the very heavy financial commitments. Thus, pressures from an infrastructural overhead situation committed Uganda to a programme of 'rural electrification' that is quite outstanding by African standards. Furthermore, with the bulk supply to Kenya, another stop-gap of the overhead situation was achieved as well as a step towards international integration within the East African Community. Finally, efforts towards industrialisation were emphasised (cheap electricity did not cause industrialisation but industries had to be created which, by their increased consumption, made electricity cheaper!)."

[Amann, 1969, 32]

Amann also found no evidence that electrification had "ignited" industrialisation in Tanzania and Kenya [Amann, 1969, 90]. But we may note, while on the subject of Amann's study, that although he dismisses the idea that electricity has a development stimulating effect through forward linkages, he does suggest that hydro projects could have important developmental effects through backward linkages. The extensive civil works entailed may require large inputs of construction materials and unskilled labour giving hydro projects an advantage over thermal power stations for which the equipment has to be imported. Whether this will be true or not will depend on the extent to which the particular hydroproject relies on indigenous or imported resources. For the Akosombo Dam the latter was the case.

Amann's study then, must make us doubt the possibility that the building of the Akosombo Dam and the resulting electrification has caused, or will cause, any radical changes in the Ghanaian economy. A note of caution must be added, however, for in studying this question, we are hampered by a serious lack of statistics. Since the advent of the military regime in 1973, the Central Bureau of statistics and other sources of statistical information, have

ceased publication of their statistical handbooks. This means that the latest available information was published in 1972 or 1973 and relates only up to the years 1969 or 1970. Having only a set of statistics for the first five years of the project puts a severe limit on the kind of assessment that can be carried out. However, from our statistical review of the effects of the project as a whole upon the macroeconomy, it is clear that no great changes had occurred by the early 1970's.

This preliminary assessment therefore indicates a zero or negligible influence from the VRP on Ghana's industrialisation. Undoubtedly the production and distribution of electricity is efficiently carried out by the VRA and the ECG. But we have had to look beyond the provision of electricity to ask what was to be achieved through it. The Ghana Government's aim in setting up the project was to achieve a significant measure of industrialisation; this does not seem to have occurred.

To lend further support to this critical view of the scheme, it is instructive to perform a simple cost-benefit analysis on the electricity side of the scheme for its projected lifespan of 50 years. (See Tables at end of chapter) Using the data for electricity revenues from 1965 to 1974, we may 'project' the returns to the scheme into the future. To allow for the economic effect of interest rates, we 'discount' these future benefits by a discount factor. To obtain a discounted future benefit, we multiply by $\frac{1}{(1+r)^n}$ where r is the interest rate and n is the number of years from the base date 1965. These annual benefits are then added to give the total benefits to the scheme. A similar procedure is followed for costs, both capital and running costs and interest charges.

In projecting the benefits into the future we shall assume that the fifth VALCO pot-line is fully operational by 1977. The maximum power demand from all consumers other than the VALCO smelter had grown at an average of 12% p.a. over the period 1966-74. This growth rate seems to have fallen steadily over the years, however, so it seems reasonable to assume an 8% growth in maximum demand thereafter. (The growth rate for 1973-4 was more than 8%). Anyway, the exact figure chosen for the growth rate is not too important since the system very soon reaches its maximum capacity. At an 8% growth rate this occurs in 1977, so thereafter we assume a constant revenue from all electricity sold. Between 1974 and 1977 we assume that the total electricity revenues from consumers other than VALCO will grow at 6%. (Over the 1966-74 period they had grown at 12% p.a. and for 1973-74 at nearly 10%.) Again the model is not very sensitive to changes in the value of this growth rate since the limits of the system's capacity are reached so early.

Having totalled the benefits over the period 1965-2014, we find they amount to \$281.5 million and the costs in the same period amount to \$306.5 million (at constant prices referred to 1974), thus giving a benefit to cost ratio of 0.92. This ratio is not very sensitive to changes in the growth rate of electricity demand, so we may be confident in asserting that the cost-benefit ratio of the project is very low.

The calculations have been performed on the basis of the first interim power rate to VALCO, i.e. 2.75 mills/kwh. If the cost benefit ratio is to equal one, then the total benefits must add up to \$306.5 million, that is, there must be additional discounted revenues of \$25 million. This could be achieved by raising the

actual revenue for the years 1975 to 2014 by \$2.25 million p.a. This represents a 30% increase on present rates (while the further interim rate represents an increase of 13.6%). It can be seen therefore that the VRA ought to ask for a price increase for electricity sold to VALCO of substantially more than 30% otherwise the project will do no more than pay its way.

Epilogue : The U.K. Experience

What did the U.K. do about its supplies of aluminium, having failed to establish a Sterling Area source in Ghana? Eventually, in 1967, the Board of Trade invited proposals from aluminium companies for the establishment of aluminium smelters in "development areas" of the U.K. In that year the U.K.'s supplies of primary aluminium were made up as follows:

U.K. production	39,000	tonnes
Imports	303,000	"
supplied from:		
Canada	121,000	"
Norway	104,000	"
U.S.	18,000	"

The Government's proposals concerning electricity supplies and financial arrangements favourable to the aluminium companies were set out in a White Paper, "Industrial Investment. The Production of Primary Aluminium" [U.K. Government, 1968]

After negotiations, three projects were agreed (for more details on the negotiations, see Warren, 1973, chapter 9):

(a) An ALCAN plant of 120,000 tonnes ultimate capacity at Lynemouth, Northumberland, with electricity to be provided by a new coal-fired station owned by ALCAN and powered by coal

supplied by the National Coal Board under a long-term contract.

(b) A BACO plant of 100,000 tonnes initial capacity at Invergordon, Ross & Cromarty, supplied with hydro-electricity by the North of Scotland Hydroelectric Board.

(c) A plant of 100,000 tonnes initial capacity at Holyhead operated by Anglesey Aluminium Limited (jointly owned by Rio Tinto Zinc (43%), Kaiser Aluminum (30%) and British Insulated Callender Cables (27%)) and supplied with electricity by the Central Electricity Generating Board from Wylfa nuclear power station. [Electricity Council, 1973_7]

All three projects have now been in productive operation for more than five years, making the U.K. virtually self-sufficient in primary aluminium. It was estimated that the projects approved would save £55 million of foreign exchange annually [Warren, 1973, 205_7]. The cost of the whole scheme was about £200 million, including the capital cost of the smelters, which was £150 million. The U.K. government loaned £62 million and gave investment grants of about £60 million toward the scheme making a very large total government commitment. In return, BACO and Anglesey Aluminium Limited invested money in two new nuclear power stations, Dungeness 'B' and Hunterston 'B', which only nominally supplied the smelters with power but which was part of a 'deal' by which the smelters got their electricity at a low price. This "development scheme" has not been without its problems. An article in the Daily Telegraph explained:

"A fresh approach is to be made by the electricity industry to the Government for compensation to cover heavy and still rising losses on a "cheap" power deal. The Electricity Council yesterday agreed to back the claim from the Central Electricity Generating Board to recover some of the estimated £200 million deficit on the deal to supply power to the

Anglesey aluminium smelter of Kaiser Aluminum and Rio Tinto Zinc. It wants parity of treatment with the North of Scotland Hydroelectric Board which will receive compensation under a Bill now going through Parliament for its £200 million losses on a similar contract to provide low-priced power to BACO's smelter at Invergordon."

[Daily Telegraph, 10 June 1976]

It is evident that not only Third World countries get their fingers burnt in such deals, since the U.K. developed similar financial problems to Ghana. The power of the aluminium companies, and especially the multinational companies, is sufficiently great to present a challenge to both developed and less developed nations. However, as yet it is unclear whether the U.K.'s scheme has been quite so disastrous as the VRP in cost-benefit terms. It may in fact be of overwhelming benefit due to import savings.

COST - BENEFIT ANALYSIS

Costs (\$ million, converted at the going exchange rate), $r = 5\%$

Four generators at Akosombo plus the transmission system:

<u>Year</u>	<u>Capital cost</u>	<u>Discounted capital cost</u>	<u>Operating costs</u>	<u>Interest on loans</u>	<u>Discounted running costs</u>
1965	145	145	5.0	6.2	11.2
1966	-	-	5.0	9.9	14.2
1967	-	-	1.9	4.0	5.4
1968	-	-	1.9	4.0	5.1
1969	-	-	2.0	3.9	4.8
1970	-	-	2.7	3.8	5.1
1971	-	-	2.4	3.1	4.1

Two more generators at Akosombo plus the transmission line to Togo:

1972	33	23	3.0	3.4	4.5
1973	-	-	3.7	4.1	5.3
1974	-	-	4.7	4.0	5.7
1975	-	-	4.0	3.9	4.8
1976	-	-	4.0	3.8	4.5
1977	-	-	4.0	3.7	4.3
1978	-	-	4.0	3.6	4.0
1979	-	-	4.0	3.5	3.8
1980	-	-	4.0	3.4	3.6
1981	-	-	4.0	3.3	3.4
1982	-	-	4.0	3.2	3.2
1983	-	-	4.0	3.1	3.0
1984	-	-	"	3.0	2.8
1985	-	-	"	2.9	2.6
1986	-	-	"	2.8	2.5
1987	-	-	"	2.7	2.3
1988	-	-	"	2.6	2.2
1989	-	-	"	2.5	2.0
1990	-	-	"	2.4	1.9
1991	-	-	"	2.3	1.8
1992	-	-	"	2.2	1.7
1993	-	-	"	2.1	1.6

COST-BENEFIT ANALYSIS (continued)

<u>Year</u>	<u>Capital cost</u>	<u>Discounted capital cost</u>	<u>Operating costs</u>	<u>Interest on loans</u>	<u>Discounted running costs</u>
1994	-	-	4.0	2.0	1.5
1995	-	-	"	1.9	1.4
1996	-	-	"	1.8	1.3
1997	-	-	"	1.7	1.2
1998	-	-	"	1.6	1.1
1999	-	-	"	1.5	1.0
2000	-	-	"	1.4	1.0
2001	-	-	"	1.3	0.9
2002	-	-	"	1.2	0.8
2003	-	-	"	1.1	0.8
2004	-	-	"	1.0	0.8
2005	-	-	"	0.9	0.7
2006	-	-	"	0.8	0.7
2007	-	-	"	0.7	0.6
2008	-	-	"	0.6	0.6
2009	-	-	"	0.5	0.5
2010	-	-	"	0.4	0.5
2011	-	-	"	0.3	0.5
2012	-	-	"	0.2	0.4
2013	-	-	"	0.1	0.4
2014	-	-	"	0	0.4

COST-BENEFIT ANALYSIS (continued)

Benefits (\$ million) , $r = 5\%$

<u>Year</u>	<u>Smelter</u>				<u>Other Consumers</u>			
	<u>Maximum demand</u> (MW)	<u>Energy use</u> (million kwh)	<u>Revenue</u>	<u>Dis-counted revenue</u>	<u>Maximum demand</u> (MW)	<u>Energy use</u> (million kwh)	<u>Revenue</u>	<u>Dis-counted revenue</u>
1965							0.99	0.99
1966	5	14	0.1	0.1	86	431	4.2	4.0
1967	220	923	1.7	1.6	102	531	4.3	3.9
1968	220	1866	4.9	4.2	106	608	4.4	3.8
1969	245	1972	5.2	4.3	130	701	5.3	4.4
1970	250	2012	5.3	4.1	145	794	6.1	4.8
1971	244	1919	4.1	3.1	160	916	5.6	4.2
1972	295	2264	6.0	4.3	171	973	6.0	4.3
1973	300	2626	7.3	5.0	199	1145	8.1	5.5
1974	310	2735	7.5	4.9	216	1255	8.9	5.8
1975	320	2800	7.7	4.7	233	1380	9.4	5.7
1976	320	2800	7.7	4.5	252	1519	10.0	5.8
1977	400	3300	9.0	5.0	272	1670	10.6	5.9
1978	400	3300	9.0	4.8	272	1670	10.6	5.6
1979	"	"	"	4.6	"	"	"	5.4
1980	"	"	"	4.3	"	"	"	5.1
1981	"	"	"	4.1	"	"	"	4.9
1982	"	"	"	4.0	"	"	"	4.7
1983	"	"	"	3.8	"	"	"	4.5
1984	"	"	"	3.6	"	"	"	4.2
1985	"	"	"	3.4	"	"	"	4.0
1986	"	"	"	3.2	"	"	"	3.8
1987	"	"	"	3.1	"	"	"	3.6
1988	"	"	"	3.0	"	"	"	3.5
				(etc.)				(etc.)

COST-BENEFIT ANALYSIS (continued)

Sum of discounted benefits from smelter = \$ 125.6 million

Sum of discounted benefits from other consumers = \$ 155.9 million

Total benefits = \$ 281.5 million

Sum of discounted capital costs = \$ 168 million

Sum of discounted operating costs = \$ 138.5 million

Total costs = \$ 306.5 million

$$\frac{\text{Benefit}}{\text{Cost}} \text{ ratio} = 0.92$$

This benefit-cost ratio is calculated on the basis of the first interim rate, that is 2.75 mills/kwh. If the benefit-cost ratio is to equal one, then the total benefit must equal \$ 306.5 million, that is \$ 25 million must be added to the revenue.

Let x = the increase in revenue for each of the years 1975 to 2014, then

$$x(0.61 + 0.58 + \dots + 0.1) = \$ 25 \text{ million}$$

$$\therefore x = \$ 2.25 \text{ million p.a.}$$

This represents a 30% increase on present rates.

CHAPTER FIVE"SIDE-EFFECTS"

Having covered the main aspects of the VRP, the aluminium production and hydroelectricity generation, we turn now to what may be called the "side-effects" of the scheme. That is, they are side-effects only if one's main aim is to produce aluminium or electricity. For those who are not involved in the primary functions of the VRP, the side-effects may be, overwhelmingly, the major aspects of the scheme, whether they are beneficial or deleterious. Obviously, a person's perception of the importance of these side-effects depends upon how deeply that person is involved with them.

E.A.K. Kalitsi (formerly Chief Resettlement Officer and now Director of Finance for the VRA) has said:

"The Volta Project is the most adventurous event in the life of Ghana. Its construction was the boldest step taken by Ghana to diversify her economy and underpin the newly independent country's industrial development. It was conceived to develop the total resources of a river which runs into the heart of a small country for the benefit not only of its riverine dwellers but the entire population.

"Nevertheless, implementation concentrated on power as the direct economic objective and important work to achieve socio-economic objectives and ensure desirable biological conditions were left in abeyance resulting in problems more difficult to solve than would have been the case."

[Kalitsi, 1971]

Resettlement

Akosombo Dam created a hugelake covering about 8,500 sq. kilometres; the largest man-made lake in the world in area. In more commonplace terms the Volta Lake could cover the area of the

counties of Kent, Surrey and Sussex, or, if superimposed on a map of England, would stretch from London to Exeter. The area now covered by the lake was formerly inhabited by 80,000 people living in 739 villages and comprising more than 1% of Ghana's population. These people were mostly subsistence farmers although some of them grew cocoa (about 2,400 hectares of cocoa were lost under the lake) and some were river fishermen. In general their standard of living was low. The typical farmer had 2.5 to 4 hectares of land under his control in three or four plots which he would use in turn in successive years [Lawson, 1968]7. Only about 6% of the land area now covered by the lake was used productively. The rest of the land was either unsuitable for agriculture or unoccupied [Preparatory Commission Report Vol. 1, 1956, 87]7.

The Preparatory Commission Report recommended that the people to be moved be compensated in cash and expected to resettle themselves. It argued that expecting the inhabitants to resettle themselves would have the advantage of retaining communal initiative and encouraging people to help themselves, instead of looking to government for assistance in all matters. Thus, if these people were to be resettled, the report expected that no matter what plans for resettlement might be made in the initial stages, constant pressure would inevitably be directed towards increasing the scope of operations, with consequent increased spending [Preparatory Commission, Vol. 1, 1956, 52]7.

However, this recommendation was rejected, partly, it seems, after the experience of the Damodar Valley Project in India where 91% of the people to be resettled chose cash compensation in preference to accepting land for land and house for house. The

result was a mass migration to the Indian cities and later efforts to recolonise the people from the streets of the cities on to farmlands had little success [Jopp, 1965, 43].

Further reasons for the rejection of a self-help scheme were the large numbers of people involved and the lack of time to mobilise them. It was found much easier to bring in building workers to erect resettlement houses and to use machinery for land clearing [Chambers, 1970, 40-2]. So, instead of imposing some kind of self-help scheme upon the victims of the lake, the villagers were encouraged to participate in the government's resettlement scheme, although those who did not wish to participate were given cash compensation and were allowed to resettle themselves. The latter became known as the "Gone Elsewhere" villagers. The original estimate was that 69,249 people in 12,799 households chose to be resettled, while 9,036 people in 1,858 households chose to resettle themselves. [Chambers, 1970, 48]. In fact, about 67,500 people were actually placed in 52 resettlement villages by the VRA.

The organisation of resettlement first got under way in 1961 when an Administrative Officer and an Agricultural Officer were assigned to work full-time on resettlement. No definite plans had been made by May 1962, when dam building had been in progress for nine months, so a working party was established to plan and coordinate the resettlement scheme. This working party consisted of representatives from several government departments: the Ministry of Agriculture, Ministry of Works, Ministry of Health, Ministry of Education, the Lands Department, the Survey Department, the Department of Social Welfare and Community Development and the Department of Town and Country Planning, as well as from the VRA, the University of Science

and Technology at Kumasi and the Soil and Land Use Survey Division of the Ghana Academy of Sciences. The rationale for the involvement of so many bodies was not only that they had the expertise and physical resources which the VRA lacked, but also that the VRA's spending on resettlement was limited to £3.5 million. Any expenditure above that figure was to be borne by the Ghana Government and the VRA felt therefore, according to E.A.K. Kalitsi, "that as many agencies of government as possible should be associated with the resettlement programme, since the size of the government contribution would depend on the extent to which these agencies could be persuaded to spend on the programme." [Chambers, 1970, 38_7]

At its first meeting in May 1962, the working party was faced with a two-year period in which to arrange the resettlement scheme, for the lake was due to start filling in May 1964. The planning and execution of the resettlement scheme were therefore carried out in something of a hurry. Evacuation of the people living in the lake basin was started on 20th November 1963. Kalitsi informs us that the working party adopted three guiding principles:

"First that resettlement should be used as an opportunity to enhance the social, economic and physical conditions of the people.

"Second, that the agricultural system should be improved to enable the people to move from a subsistence to a cash economy.

"Third, that the resettlements should be planned and located in a rational manner, so that the flood victims as well as others in the area of impact could derive maximum benefits from the changes involved."

[Chambers, 1970, 39_7]

Let us examine each of these three principles in turn. The first guiding principle may be related mainly to two aspects of resettlement, namely housing provision and monetary compensation.

Housing and Compensation

The type of house built for the people resettled was called a "core" or "nuclear" house. It consisted of a concrete floor, landcrete block walls and a corrugated aluminium roof. (Landcrete is concrete made with soil as the principal constituent.) It was called a 'core house' because although sufficient floor space was provided for two rooms and two porches, only one room was to be actually constructed before the settlers moved in. The rest of the house was to be completed by the settlers themselves.

According to Kalitsi, 11,199 core houses had been built by the end of 1964 [Chambers, 1970, 52] and according to the latest reliable estimate available there were 11,985 core houses built by 1970 [VRA Annual Report 1970]. Some 800 households that had chosen to be resettled did not obtain a core house; we are not told what happened to them, but presumably they went elsewhere. Of these 11,985 houses, 6,282 had been completed by 1970; of the rest, 2,877 houses were reckoned to be 75% complete, and 2,826 remained at the "nuclear" stage.

Why did so many houses remain uncompleted? Firstly, because they were quite difficult to complete. Planning restrictions were enforced quite vigorously compared to the normal Ghanaian attitude of "laissez-faire", so that houses had to be completed in approved materials which were difficult to obtain. (In theory the settlers were to have been given the materials necessary for house extension but in practice this did not occur.) The cost of obtaining items like cement and bitumen was prohibitive in terms of attainable family incomes.

Secondly, and probably more importantly, large numbers of

settlers found their position in the resettlement villages untenable. Even the completed "nuclear" house was a small dwelling and was difficult to extend further because of the expense of building extra concrete flooring. The smallness of the resettlement dwellings was also compounded by the fact that many of the families were polygamous, the wives traditionally living in separate rooms or houses [Chambers, 1970, 89]. There was definitely a problem of overcrowding in the resettlement villages for the average number of persons per room in 1968 was 2.2 compared with 1.4 in the flooded villages. And this despite the fact that the total population of the villages was down to 43,500 due to migration [FAO/UNDP 1971].

Although outwardly the resettlement houses appear to be far superior to the traditional mud and thatch dwelling, in some respects they have been found to be inferior. A comparison of the thermal characteristics of the two types of house indicated that the traditional house possessed a greater thermal inertia; that is, the mud and thatch house tended to be cooler than the ambient temperature during the day and warmer than ambient at night. [Chambers, 1970, 174]. Complaints were often expressed to the investigating teams of physical discomfort due to cold at night in the resettlement houses. [Chambers, 1970, 174]. The provision of a properly designed ceiling under the roof would provide the necessary insulation.

It was not only dissatisfaction with their housing that led to large numbers of settlers moving out of their new villages, but also serious problems connected with the viability of farmland around the settlements. This topic will be dealt with later. Anyway, for many reasons there was a steady drift of settlers out of the resettlement villages. The FAO survey of 1968 indicated that of the 67,500 people

who were installed in the resettlement villages only 25,900 remained. The rest of the 43,500 people actually living in settlement houses were either children of settlers born since 1964 or people who had moved in from outside. Thus something like 40,000 of the original settlers, or well over half the initial numbers, moved within a period of four years. This is too high a figure to be accounted for by the normal social movements observed in Ghana.

Having dealt with the housing provided for the settlers, we turn now to the question of compensation. A very clear and definite policy on this issue does not seem to have been formulated. The Government's Deputy Chief Lands Officer, K. Amanfo Sagoe, outlined the clearest statement [Chambers, 1970, 58-77]. According to this, those who resettled themselves were to be compensated in full in cash for their buildings and for their crops. Compensation for crops destroyed was to be paid out on annual crops which could not be harvested before evacuation, and on the future value of perennial crops. Those who were resettled by the VRA were to receive compensation for their crops and buildings only if their value should exceed the stated value of a resettlement house which was £330. Since the value put on traditional houses was very low, this happened but rarely. D.A.P. Butcher, a sociologist who was closely connected with the resettlement scheme, gave a different version of compensation policy when he stated (in 1967 or later):

"A deduction of N¢ 780 was made from the compensation for flooded crops of each settler to pay for his house. This was not in keeping with declared policy of compensating for crops in full and replacing flooded houses in kind."

[Butcher, undated]

During the one period of civilian rule in Ghana after the deposing of Nkrumah, questions were asked in the House about compensation

payments in connection with the resettlement scheme. The questioners were told as little as possible:

"Mr. E.R.T. Madjitey (written question) asked when the compensation in respect of

- a) crops destroyed
- b) lands submerged
- c) lands acquired for resettlement

as a result of the creation of the Volta Dam and Lake will be paid to those affected.

Mr. B.K. Adama (Minister of State for Parliamentary Affairs):

- a) Payment of compensation for crops destroyed started in 1965 and is still in progress. To date, N¢ 1,111,404.22 has been paid to 13,460 claimants.
- b) Compensation for land submerged has not yet been paid. A provisional description of the 3,400 sq. miles of lakefill area or roughly two million acres of submerged land [800,000 hectares], has been completed and is awaiting publication of the necessary executive instrument to enable interested parties to submit their claims.
- c) It is estimated that a total of 450,000 acres of land [172,000 hectares] will be required for resettlement townships and agriculture. Executive instruments in respect of 140,050 acres of land [56,020 hectares] affecting 23 settlement sites have been published and claims have started coming in for processing.

It is expected that payment for land in b) and c) above will commence after negotiations with the land owners have been completed, most probably during the next financial year. [This turned out to be a wildly optimistic estimate, see Chapter Five.]

Mr. Madjitey: In view of the fact that considerable hardship is being caused to those affected by this exercise, will the Prime Minister assure the House that everything possible will be done to ensure the expeditious completion of the exercise?

Mr. Adama: The Prime Minister is anxious to see that everything possible is done to bring amicable settlement to all persons concerned.

Mr. I.E. Osei-Bonsu: The House has learnt today that some two million acres of land have been submerged under the Volta Lake. We would like to know from the Prime Minister how much compensation is the Government going to pay for an acre of land.

Mr. Adama: I need notice of this question.

Mr. I.E. Osei-Bonsu: How many acres of land have so far been acquired for resettlement townships?

Mr. Adama: Since the Honourable Member is asking for a specific number, I need notice of this question.

Mr. Osei-Bonsu: We want to know from the Prime Minister how much compensation has so far been paid to the owners of land on which these resettlement townships have been built.

Mr. Adama: I have already given the answer, and that is N¢ 1,111,404.20 [This is of course totally incorrect, see Adama's first statement.]

Mr. Osei-Bonsu: May I know from the Prime Minister how much one resettlement house costs?

Mr. Adama: I need notice of that.

[Parliamentary Debates, 12 March 1970]

The total amount of compensation for crops and buildings paid out by the end of 1974 was N¢ 2,250,673 [VRA Annual Report, 1974]. Since most of this was paid to those who resettled themselves, who numbered in excess of 10,000, the average amount paid per individual was something over N¢ 200. E.K. Afriyie, who was intimately connected with the VRA's resettlement scheme, said of the "Gone Elsewhere" villagers: "These people either received no compensation or a derisory amount for crops and buildings destroyed, thus making it difficult for them to establish themselves" [Afriyie, 1969]. Some of them were paid as little as N¢ 2 for their old houses. Most of the compensation payments were heavily delayed; only N¢ 1 million had been paid out by the end of 1969 [VRA Annual Report 1969] and payment is still continuing 12 years after these peoples' displacement. That the great bulk of compensation was only paid out more than five years after the move, and therefore too late to assist the "Gone Elsewhere" villagers to resettle themselves, is something of a scandal.

If compensation payments for crops and buildings have been unsatisfactory, compensation for land flooded by the Volta Lake and for land acquired for resettlement villages and farms has been atrocious.

The VRA's policy on land compensation has been unclear. Sagoe tends to avoid the issue while also stating that "The actual value of the land, in any event, is not very considerable" [Chambers, 1970, 69]. It is true that the land is of much lower value than land elsewhere in Ghana; however the massive area involved ($3\frac{1}{2}\%$ of Ghana's total land area) and the importance of compensation payments to those dispossessed, make the issue a vital one. The VRA policy as outlined by Sagoe seemed to be that those being resettled would be compensated in kind by receiving land for land. Sagoe's statement on this point is apologetic however: "Lands under perennial crops, it is submitted, are being compensated for in kind in the sites being provided in the new agricultural settlements. The reduced acreages being made available in the settlements need not result in a falling-off of the level of incomes." [Chambers, 1970, 69]. The land area to be acquired for resettlement agriculture was put at 104,000 acres or 41,600 hectares [Chambers, 1970, 60] compared to approximately 128,000 acres [51,200 hectares] which had been used productively in the flooded lake basin [Preparatory Commission, Vol. 1, 1956, 87]

Sagoe also states however, "With perennial crops....the valuation of the crops can be taken to include the value of the land." [Chambers, 1970, 70], which seems to imply that "Gone Elsewhere" villagers would be compensated only by payment for their crops, if they had grown predominantly perennial crops.

Anyway, whatever policy the VRA had it does not seem to have been carried out. It was only on the 28th August 1974 that the Government by Executive Instrument No. E.I.98 acquired the land area inundated by the Volta Lake [VRA Annual Report, 1974], so that even by the end of 1975 no compensation had been paid at all to

any of those whose land had been flooded. Since the resettlement scheme has been so disastrous, it now seems possible (though not certain) that the Government will compensate both the "Gone Elsewhere" villagers and those resettled, for the land they lost.

The matter of compensation for the land acquired for the resettlement villages and associated farm land must also be mentioned. Payments to the previous owners properly began only in 1973, and the total paid out by the end of 1974 amounted to N£ 510,000 [VRA Annual Report 1974]. Since under the revised agricultural scheme for the resettlement areas 438,000 acres [175,000 hectares] are to be acquired (see next section on agriculture) there remains a lot of compensation to pay.

Just how long it will take to pay all compensation monies due is a matter of speculation. The VRA (who handled the problem initially) took about 7 years to pay out N£ 1.6 million. The Lands Department which has handled compensation payments since 1973, has paid out about N£ 1.4 million. It appears that compensation payments for crops and buildings destroyed by the lake are almost complete. Estimates of the amount of compensation necessary for the loss of flooded land range from £1.5 million or N£ 4.3 million [Wilbrandt, 1967] to a figure approaching N£ 10 million [Chief Lands Officer, personal interview]. Compensation for land acquired for houses and farms for the resettlement villages should, logically, come to almost the same figure. It therefore appears reasonable to estimate that between N£ 8 million and N£ 18 million remains to be paid. It seems unlikely that this task will be completed in less than 10 years, in fact it seems possible that the task will never be finished. The Lands Department, whose task this is, was the subject of a paragraph by

Wendy Asiama in the Ghanaian newspaper, the Daily Graphic, of 25 November 1975. Under the headline "Improve Department's Image" was the following short article:

"Lt.-Col. T.T. Kutin, Commissioner for Lands and Mineral Resources has expressed dissatisfaction with the performance of the Lands Department and called for an immediate improvement of its tarnished reputation. He said he would like the department to be classified as one of the efficient government organisations staffed with competent people. Lt.-Col. Kutin made these remarks when he visited the Lands Department yesterday on a familiarisation tour of organisations under his Ministry. The Commissioner asked the Chief Lands Officer to ensure proper supervision of the staff and prevent the image of the department from being associated with all kinds of vices."

Since the housing provision and compensation payment associated with the resettlement scheme have proved so unsatisfactory, it seems one must conclude that the resettlement scheme has not been "used as an opportunity to enhance the social, economic and physical conditions of the people" [Chambers, 1970, 39].

Agriculture

What of the second of the working party's guiding principles?

This stated that "the agricultural system should be improved to enable the people to move from a subsistence to a cash economy".

Was the agricultural system "improved"?

At the planning stage it was envisaged that the amount of land needed for agricultural purposes for the resettlement villages was 41,600 hectares [Chambers, 1970, 60]. This was to be allocated in several small plots (totalling about 5 hectares) to individual farmers but mechanised cultivation was to be used across several plots; thus, it was said, giving the small farmer the advantages of modern farming methods while allowing him personal control and ownership of his own land. This system was described as cooperative farming, but that title

is somewhat misleading since the extent of 'cooperation' or mutual support between farmers was to be very limited. A more appropriate description would have been 'group farming', the farmers merely being responsible for weeding and harvesting their strips of the field with the costs of the use of mechanised equipment being shared on an acreage basis [Lawson, March 1968]. The VRA was to own the tractors, distribute and sell fertilisers and buy a significant quantity of the agricultural produce. In fact, it is easier to see the resettled farmers as agricultural labourers for the VRA than as individual farmers acting in mutual cooperation. In fact their position was probably worse than that of an agricultural labourer for the latter is not responsible for the success of the crop. The subordinate position of the resettled farmers is further confirmed when we realise that farmers were to be 'assigned' to certain types of agriculture by the VRA. About 40% were to be arable farmers, 40% tree crop farmers, 15% livestock farmers and 5% pastoral farmers [Chambers, 1970, 210].

Some of the livestock farmers were allocated a broiler house or a pig sty, with the appropriate stock, to a total value of about £2,000. The output of the livestock enterprise was all sold by the VRA through its central office in Accra, the Authority's costs were deducted and the surplus paid to the farmer a month or so after delivery of the product. Poultry farmers obtained about 8% of the selling price of chickens, representing payment for their labour. It was hoped that the farmer would have paid back the debt on the original capital after two to three years [Wetham, 1968].

By 1967 it was becoming obvious that the agricultural scheme had failed. The VRA had cleared only 3,040 hectares of land for

farming purposes, only 2,400 of these hectares were cropped, and only 1000 of these 2,400 hectares were cultivated mechanically. The VRA's financial inputs totalled about N¢ 800,000 during 1967 but the value of the harvest was only N¢ 294,000 for all 52 settlements [Afriyie & Butcher, 1969]. Of the 9,600 adult male farmers in the settlements, only 52% were actually able to farm at all in 1968 [FAO/UNDP, 1971]. Since 1964 the settlers had had to be given free food relief in the form of maize, wheat flour, milk, butter, canned fish and meat, vegetable oil, egg powder and sugar under the UN/FAO World Food Programme (WFP) Project 70. Most of this food originated from America [West Africa 50, 1966, 140].

It was therefore decided that a new scheme should be implemented: the VRA stopped clearing land, and sold most of its mechanical clearing equipment to a private firm in Ghana. The new approach was to offer payment to the settlers in the form of food (under WFP Project 356) for manual clearing work, the aim being to clear about two hectares of land for each farmer for use as a subsistence holding up to a grand total of about 42,000 hectares. It was hoped that it would then be possible to clear an extra 152,000 hectares of land, by both manual and mechanical methods, to be used for commercial farming [Wilbrandt, 1967].

However, by the end of August 1972 the amount of land cleared for agriculture was still only 6680 hectares [Sub-Committee of the Low-Cost Housing Committee, 1972]. At most of the resettlement sites sufficient land could only be found for a maximum allocation per farmer of just over one hectare [FAO/UNDP, 1971] which is insufficient for the settlers' subsistence using either traditional or modern techniques.

Between 1964 and 1970 the WFP, under Project 70 and Project 356, had supplied the resettlement programme with \$ 7 million worth of foodstuffs [Johnson, 1970_7]. And yet even now the agricultural scheme cannot claim to have made any progress. It can hardly be termed a success.

Planning and Development

What of the third of the resettlement working party's guiding principles? That is, that the settlements should be planned so that the flood victims and their 'hosts' (i.e. those living permanently in the area now occupied by settlement villages) could derive maximum benefits from the changes involved. Unfortunately, this principle too seems to have remained unfulfilled. Since the Government has not properly compensated the 'host' farmers for their lost land they consider that they have not yet sold, and so the resettlement sites have been the venue for constant wrangles over who owns what area of land.

The Preparatory Commission report estimated the cost of compensation and resettlement would be about £4 million and recommended that a further £500,000 be accepted as a prospective liability for deleterious effects on communities downstream of the dam (i.e. for destruction of dam and creek fishing and agricultural production downstream). [Preparatory Commission Vol. 1, 1956, 46_7].

The portion of the Volta dam construction funds earmarked for resettlement (i.e. VRA funds) was limited to £3.5 million, expenditure above that amount was to be borne by the Government of Ghana [Chambers, 1970, 37-8_7]. In fact the total expenditure on the resettlement

programme up to June 1968 amounted to N¢ 26.2 million. Subsequent payment of compensation up to the end of 1974 amounted to N¢ 2.75 million, with an estimated N¢ 8 million to N¢ 18 million remaining to be paid. Contributions to WFP 356 were estimated to be of the order of N¢ 4 million [Wilbrandt, 1967] and continuing costs (both capital and running costs) of resettlement came to N¢ 7 million [VRA Annual Reports, 1968 to 1974].

Thus by the end of 1974 the total costs of the resettlement programme (including compensation both paid and outstanding) could be estimated as N¢ 40 million to N¢ 58 million. Despite the actual expenditure of N¢ 40 million then, the resettlement programme does not seem to have been a success. In the words of E.A.K. Kalitsi, "The spectre of a ghost town hangs over every settlement we have built" [Chambers, 1970, 225].

It appears unlikely that this situation will be fundamentally altered in the near future since the VRA has been in the process of shedding its responsibilities onto various other bodies, which makes it unlikely that a coordinated rehabilitation scheme will be carried out. The VRA no longer has any responsibility for resettlement agriculture, this being entirely under the Ministry of Agriculture since July 1972. The maintenance of settlement townships has been the duty of local authorities since January 1966. In respect of maintenance of water supplies the VRA Resettlement Department had until February 1972 maintained a mobile water maintenance team which repaired pumps, storage vessels, etc. but this has now been abandoned and as a result the resettlement villagers are again carrying water from nearby streams or from the Volta Lake. As for the general welfare of the settlers, the Department of Social Welfare and Community

Development has responsibility, but its field workers have no special mandate for the resettlement villages, the villages are merely included in their areas of jurisdiction.

This shedding of responsibilities has occurred despite the recommendation of a Government committee's report, which, incidentally, contains a veiled criticism of the VRA:

"It is our opinion that to derive full benefits from an integrated development programme, the administration and execution of the entire programme should be centralised and entrusted to a new and autonomous agency. In this respect, we would like to state that if such centralised function were entrusted to an existing government institution which is, obviously, already saddled with its own goals and priorities, there would be the tendency for such an institution to relegate the Resettlement Programme to the background, and no appreciable positive results would be achieved."

[Sub-Committee of the Low Cost Housing
Committee, 1972]

Why was the resettlement scheme so lacking in success? Chambers raises the question of the settlers attitudes and whether these were conducive to success or not [Chambers, 1970, 254-5]. But there are at least two reasons for believing that the situation in which the settlers found themselves was more a determinant of success or failure than any supposed apathy of the settlers.

(a) The first reason is that there are marked regional differences amongst the resettlement villages. A survey of the agricultural production from the villages [Joughin, 1976] indicates that the further north the village lies, the better off it is. That this might be correlated with the attitude of the villagers seems unlikely. A more plausible explanation is that land is, in general, easier to obtain in the north of Ghana. The same survey indicates that the number of absentees from the villages (those who have left

permanently) is higher toward the south.

(b) The second reason is that there appears to have been no essential difference between the experiences of Nkwakubew (a resettlement site selected by its prospective tenants and subsequently accepted by the VRA as being viable) and Apeguso (a site selected by the VRA and imposed upon reluctant settlers). [Riverson, 1973]. Both villages lie in the southern area of resettlement villages, within a few miles of each other. Since Nkwakubew was the first settlement site to be built [Chambers, 1970, 52] and since it was decided to make it a "show town" for mechanisation schemes and livestock breeding [Riverson, 1973] one might have expected Apeguso to have fared much worse due to apathy on the part of its tenants. However, Riverson points out that the Nkwakubew experiment failed and that there was no real difference in economic or social situation between the two villages. In both cases the settlers were heavily dependent on the VRA, having too little land to sustain themselves, and in both cases there was a serious problem of overcrowding.

In the opinion of the writer, the resettlement scheme was a failure because it was not sufficiently well catered for. The necessary inputs of time, money and effort were just not available in sufficient quantities. This situation arose, in part, from the statement of Nkrumah that the settlers should be "no worse off than before" [Preparatory Commission, Vol. 1, 1956, 45] which was far too passive a recommendation.

Fisheries

In contrast to the resettlement scheme, the development of a fishing industry on the Volta Lake has been quite a success story.

This has developed as a result of essentially individual initiative. It was only in 1971 that the Ghana Government began a scheme at Kpandu to provide facilities (a concrete landing area, storage and processing facilities, a supply house etc.) for the fishermen. It seems that expectations of the potential of the Volta Lake for fishing were fairly low; a figure of 18,000 tonnes catch per year was quoted [Preparatory Commission, Vol. 1, 1956, 66]. In fact production from the lake reached a peak of 60,000 tonnes in 1969 before settling down to a level of 38,000 tonnes in subsequent years when the lake had become ecologically more stable. This annual catch (of 38,000 tonnes) may be compared to an estimated figure of 10,000 tonnes for the annual take from the Volta Basin before the Akosombo Dam was built [Denyoh, 1971]. Previously there had been about 2000 fishermen operating in the Volta Basin, but now there are estimated to be about 12,000 fishermen working on the lake. [Kumi, 1973]. They and their families make up fishing communities, numbering about 60,000, living in approximately 1000 villages scattered around the lake.

Fish caught from the lake sell for an average price of about 15 pesewas/kilogram (this is the price the fisherman receives) so that the value of a year's catch is about N¢ 5.7 million. We may infer then, that this is quite a significant 'side-effect', since the value of fish caught compares with a figure of N¢ 19 million total revenue obtained from Akosombo-produced electricity [VRA Annual Report 1974].

The Volta Lake's production of fish is also quite significant when compared to Ghana's other sources. Ghana's total marine catch (by the State Fishing Corporation and all other fishing organisations and fishermen) was estimated as 119,000 tonnes in 1969. And the

country imported 18,700 tonnes of fish valued at £ 5.8 million in the same year [Kalitsi, 1971]. Thus in 1969 Ghana's total fish consumption was 197,700 tonnes.

The catch from the Volta Lake therefore satisfies approximately 20% of the country's demand for fish. Most of the fishermen working the Volta Lake operated as fishermen elsewhere in Ghana before the Lake was created. A large proportion of them were engaged in clam and creek fishing [See Lowe-McConnell, 1966, 29] on the lower Volta. As a result of the dam being built the creek fisheries were destroyed and the clam fishery severely truncated. The Preparatory Commission Report estimated that the creek fisheries were worth about £65,000 a year and the clam fishing as worth no less than £25,000 a year. [Preparatory Commission, Vol. 1, 1956, 56]. At 1955 prices the loss would therefore have been about £ 160,000 or at 1974 prices about N¢ 640,000 [Birmingham et al., 1966, 29; Bank of Ghana Annual Report, 1974].

Health

A serious problem associated with the Volta Lake has been that of health hazards. Two diseases of major incidence must be mentioned, those of schistosomiasis (or bilharzia) and onchocerciasis (or river blindness).

Schistosomiasis

Schistosomiasis [Cowper, 1971; WHO, 1959; Ansari, 1973] is a world-wide disease which can be classified into three different types caused by three similar carriers. *Schistosoma mansoni* and *Schistosoma Japonicum* have as a focal point of infection the intestines; *Schistosoma*

haematobium (which is the variety of schistosomiasis being spread by the Volta Lake) particularly affects the urinary system. Man is infected with schistosoma haematobium from water in which swim larval forms (called cercariae) of the parasitic schistosome worm. The cercariae penetrate the skin and get into the blood circulation where they feed. They can then make their way to the liver, lungs, heart or main lymphatics where they mature and pair. The schistosome worms then proceed to the network of veins around the bladder, where the females lay their eggs. Some of the eggs are discharged in the urine (as little as two months after the initial exposure to cercariae) and hatch on contact with water, producing miracidia, which enter certain species of water snail (in the Volta Lake these are *Bulinus truncatus rohlfsi* and *Bulinus (Physopsis) globosus*). Having entered the snail the miracidia pass through further life-stages and emerge and enter the Lake waters as cercariae to complete the life cycle. Since the miracidia and the cercariae have limited life-spans (the cercariae live for up to 48 hours) they must soon find their respective hosts, or die. Thus the transmission of *s. haematobium* depends on fairly frequent contact of human beings with water in which *Bulinus* snails are living..

The first symptoms of *s. haematobium* are usually skin complaints, fever, inflammation and coughing; in the later acute stages there is blood in the urine. The disease usually only makes itself evident through haematuria after five years or more. Schistosomiasis is a cumulative and debilitating illness. Although the schistosome worm may live and produce eggs for up to 20 years, it is not common to fall prey to the illness after only one infection. Weakness and death usually only follow repeated infections, after which the

existence of dead worms and eggs in the body cause many different kinds of complication. Eventual death may occur through cardiac failure, fibrosis of the lungs, an enlarged spleen, secondary bacterial infection of the urinary tract and other complications.

Before formation of the Volta Lake, infection rates in the area had been 1% to 5%, that is, a maximum of five out of 100 people had shown symptoms of the disease [Paperna, 1970]. Elsewhere, however, infection rates were higher. On the lower Volta, around the delta, infection rates had been 80-90%, and upstream from the present Lake infection rates were 40-50% [Paperna, 1970]. The formation of the lake created excellent living conditions for the *Bulinus* snail which likes still or slow-moving water. This, coupled with the fact that many infected fishermen from the lower Volta settled close by the shores of the lake, led to a massive increase in the disease.

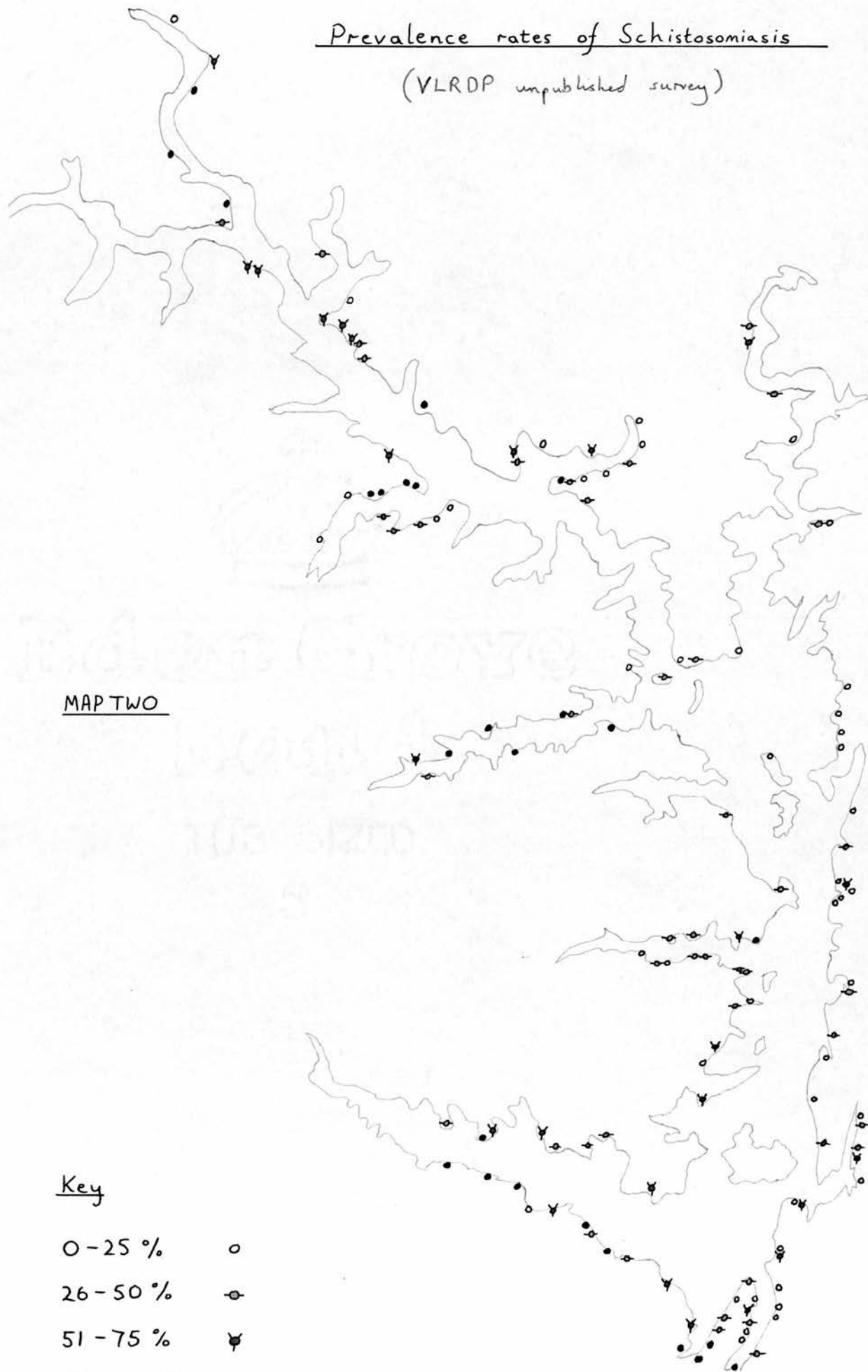
The usual method of studying the progress of the disease is to survey schoolchildren since at their age the symptoms of the disease become more pronounced and it is usually easier to estimate their length of exposure to the disease than it is for older people. A survey of 1584 schoolchildren aged between four years and 16 years, living in six villages around the lake (four of them resettlement villages) showed that the average infection rate was 80% in February 1968. In particular villages this rate rose as high as 100%.

[Paperna, 1970].

A later survey carried out by the Volta Lake Research and Development Project (which is the UNDP-financed section of the VIRA that studies the lake's fishing prospects and health hazards) indicated that by January 1970, these rates had fallen slightly (see map 2).

Prevalence rates of Schistosomiasis

(VLRDP unpublished survey)



Key

- | | |
|----------|---|
| 0-25 % | ○ |
| 26-50 % | ◐ |
| 51-75 % | ◑ |
| 76-100 % | ● |

However, this comprehensive survey of 140 villages was never published by the VRA. In fact no systematic surveys have been published of the extent of schistosomiasis around the Volta Lake.

There are several possible approaches to the control of schistosomiasis. One can kill the water snail directly with chemical molluscicides or one can remove the water snails' habitat, waterweeds, with herbicides or mechanical clearing. One can also use biological control; the puffer fish is a predator of snails, so are waterfowl; manatees (which are present in Volta Lake in small numbers) consume water weeds in large quantities; even crocodiles could be useful in keeping people out of the water! Much research has yet to be done into the natural enemies of snails, cercariae and miracidia [Smithsonian Institution, no date].

Other approaches concentrate on the human reservoir of infection. Treatment with drugs is long and dangerous, and even if the adult worms are killed, the patient is still liable to be reinfected. Another method is to encourage people to stay away from the water; this can be done most effectively by providing a clean, piped-water supply and latrines, so that people have no need to collect water for drinking and washing and no need to use the lake as a toilet.

The VRA is concentrating upon the human reservoir of infection in its approach to the disease. Previously the VRA tried weed control by manual raking and did decrease the snail population, but decided to discontinue the programme after six months. Molluscicides were also used over small areas but these, unfortunately, kill off all snails so that as soon as application is stopped, the *Bulinus* snails have an equal opportunity with all other snails to renew their numbers. The World Health Organisation have nevertheless been spraying the

northern areas of the lake in the hope that this will have some beneficial effect.

Onchocerciasis

Onchocerciasis [Waddy, 1969] is caused by the filarial worm *Onchocerca volvulus* which is transmitted from man to man by the bites of a small black-fly, *simulium damnosum*. The adult hairlike worms (the female grows up to 40 cm. long) live in human subcutaneous connective tissue. The females produce microfilariae which are ingested by the black-fly when it bites an infected person. These microfilariae develop through two stages while living in the insect and eventually move to the fly's mouthparts. From there they enter the body of a human host when the fly takes a blood meal.

Infection usually does not become evident until several months have elapsed, that is, until the microfilariae have reached adult form and reproduced. The symptoms of onchocerciasis are chronic dermatitis, skin tumours or nodules, and eventually ocular changes that lead to blindness after exposure for 20 years or so, though sometimes much shorter exposures may be sufficient.

Treatment involves chemotherapeutic drugs, and also surgical removal of nodules which relieves the symptoms and acts as a control measure, since the nodule is infested with the adult filarial worms. Chemotherapeutic treatment, however, does not prevent reinfection. The disease could be prevented if it were possible to deplete the *simulium damnosum* population. *S. damnosum* generally lays its eggs in turbulent fast-moving water and one method of control is to dose fast-moving streams with a chemical to kill the larvae.

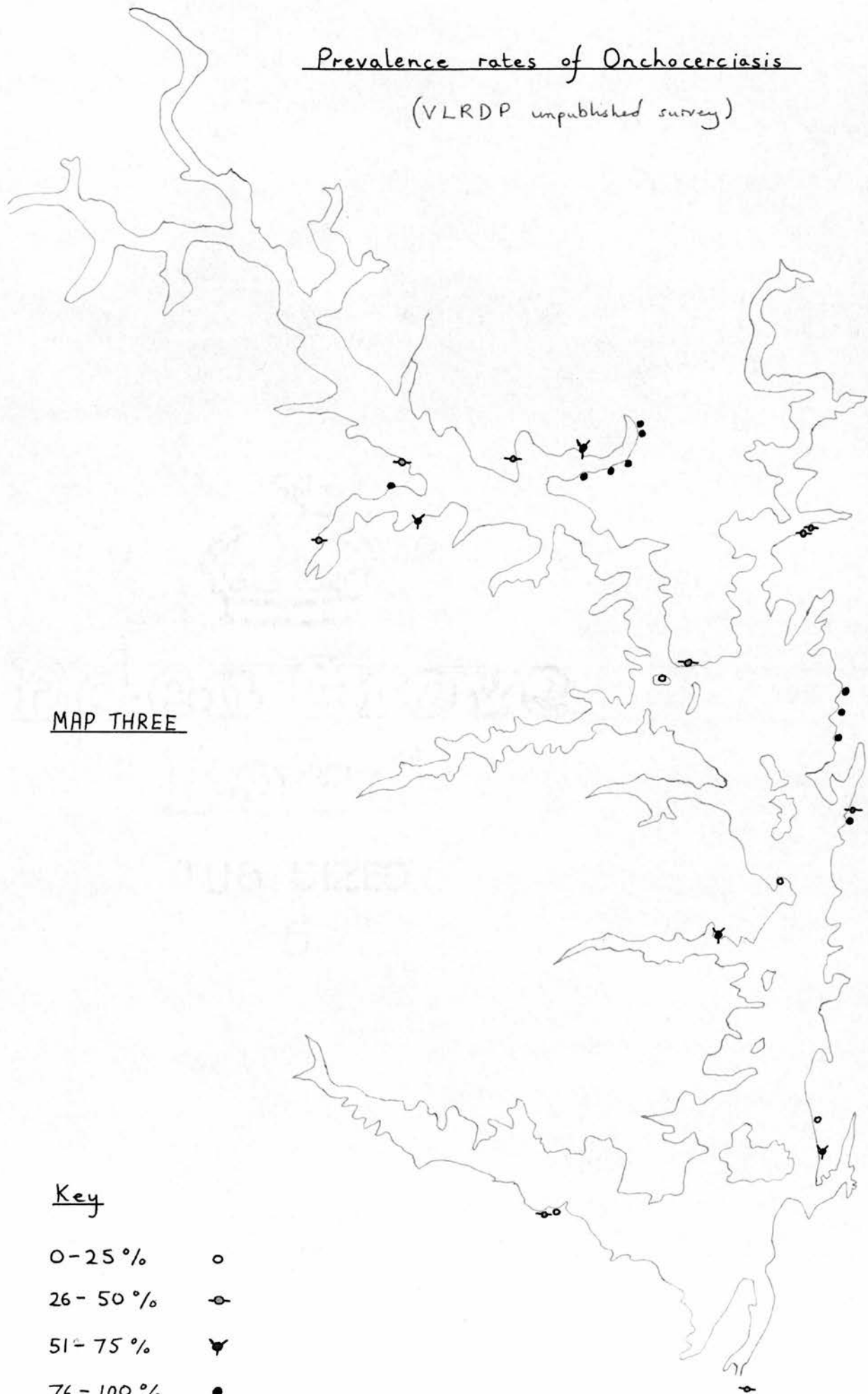
Since the disease normally takes such a long time to develop it is usual to survey the population over the age of 15 years in order to discover its prevalence. The VRA survey carried out in January 1970 (see map 3) indicated that there were areas where the disease was particularly serious along the east side of the Volta Lake where the tributaries feed into the lake. The prevalence rate around Asukawkaw for instance was 90% [Kalitsi, 1971]. The FAO give the same prevalence figure and note that infection has been found in children as young as two-and-a-half years and nodules in children as young as four years [FAO/UNDP, 1971]. Now that the Akosombo dam has created a fairly constant river flow down the Lower Volta, the rapids at Senchi and Kpong (previously established as breeding centres) have become intensive simulium breeding grounds. The FAO's epidemiological survey indicated the prevalence rate around the Senchi-Kpong area to be about 75% [FAO/UNDP, 1971].

The VRA has tried to control the worsening situation around Akosombo, Senchi and Kpong by dosing with DDT, releasing surplus water from the dam to fluctuate the river level (but this cannot be done very often), and lately by dosing with Abate 200 E. The latter was used four times at weekly intervals at a dosage rate of 0.1 ppm; this appeared to kill all the larvae and kept a low fly density in the immediate area, but the breeding area was rapidly reinfected by flies from surrounding areas when dosage was stopped [VLRDP Quarterly Progress Report, January-March 1975].

It has been difficult to find figures on the spending devoted to combatting these diseases. However, the health programme has been a part of the Volta Lake Research and Development Project, initiated in January 1968, which is a joint operation carried out by the UNDP/FAO

Prevalence rates of Onchocerciasis

(VLRDP unpublished survey)



MAP THREE

Key

- | | |
|---------|---|
| 0-25% | ○ |
| 26-50% | ◐ |
| 51-75% | ▼ |
| 76-100% | ● |

and the VRA/Ghana Government. The main aims of the project were:

- 1) to help develop fisheries on the lake,
- 2) to research into the use of the drawdown area for agriculture (the drawdown area is that area uncovered and covered by the lake according to the season),
- 3) to carry out socio-economic surveys of the resettlement villages,
- 4) to carry out studies on the public health aspects of the Volta Lake.

The possibility of involving the UN in funding this Research Project was first raised in a draft request by the Ghana Government in 1962. A second request was submitted by the Government in 1965 and a UNDP mission visited Ghana in 1966. Following this mission the Government submitted a third request in December 1966. This last request was approved by the Governing Council of the UNDP in June 1967 and the FAO was designated as the executing agency [FAO/UNDP, 1971].

The research project was originally scheduled to last for a limited period but was extended in 1973. Between January 1968 and December 1974 the VRA spent N~~1~~ 1,190,000 or \$ 928,000 on the project [VRA Annual Reports, 1968-74]. During the same period the UNDP/FAO spent \$ 1,336,000 and the Ghana Government contributed about \$ 700,000. [Freeman, 1974]. Thus total spending on the VLRDP amounted to \$ 2.9 million [Waddy, 1975]. Considering the importance of the topics covered by the VLRDP this is a very small amount of money. As we have seen the number of people dependent on the fishing industry is about 60,000. The actual number of people living around the margins of the lake is somewhat higher than that. Most of the 80,000 people who were resettled must be included. We may estimate therefore that

total spending on the VLRDP amounts to substantially less than \$ 7 per person per year. Contrast this with the expenses involved in servicing Akosombo Township (excluding the cost of Akosombo Hospital). The VRA spent N¢ 2.7 million or \$ 2.1 million on Akosombo between January 1968 and December 1974 and the Ghana Government gave subvention in the same period amounting to N¢ 1.2 million or \$ 0.9 million [VRA Annual Reports, 1968-74]. Thus total spending on Akosombo Township amounted to \$ 3 million or \$ 54 per person per year. Nevertheless, most of Akosombo remains in a state of dilapidation; the costs of servicing the 'modern' community are high.

What has the effect of these diseases been in terms of lost productivity? Very little literature has been produced on the subject of onchocerciasis; moreover, few reliable statistics are available on the prevalence of onchocerciasis in Ghana. We shall therefore have to assume that the Akosombo dam has caused no overall change in the number of people affected by onchocerciasis and that it has merely altered its geographical distribution.

More work has been done on the subject of schistosomiasis, both in Ghana and internationally. Several attempts have been made to estimate the costs of schistosomiasis in terms of lost productivity. A study in the Philippines [Farooq, 1963] divided the infected population into categories:-

<u>Category</u>	<u>Loss of working capacity</u>	<u>Proportion</u>
1) No manifest symptoms	0%	61.5%
2) Mild symptoms, no absence from work	25%	22%
3) Moderate symptoms, reduced capacity for work	50%	15%
4) Severe symptoms, frequent absence from work	75%	} 1.5%
5) Very severe symptoms, total absence from work	100%	

Wright's analysis of the problem in Egypt [Wright, 1968] used a similar approach assuming that 2.1% of infected persons were totally disabled, and 30.5% had a lowered working capacity of 10%. A study of workers on a sugar estate in Tanzania [Foster, 1967] found a statistically significant increase in absence from work (of 30%) attributable to schistosomiasis. These workers were not under treatment for such were excluded from the study; they therefore correspond to Farooq's categories 2 and 3. One of the most recent studies, in St. Lucia, came to the tentative conclusion that schistosomiasis reduces productive capacity by approximately 30% [Weisbrod et al., 1973, 77]. For this study the sample size was only 45 working males; however, along with the other analyses it does seem to support Farooq's approach.

Taking a low estimate of the number of people living around the Volta Lake at 100,000, and using the average infection rate of 80% we may deduce that 80,000 people are infected. Thus

22%	or	17,600	have	their	working	capacity	reduced	by	25%
15%	or	12,000	"	"	"	"	"	"	50%
1.5%	or	1,200	"	"	"	"	"	"	87.5%

Ghana's GNP per capita in 1973 was \$ 300 [IBRD Annual Report 1975]. The value of lost productivity per year was therefore
 $\$ 300 \times (0.25 \times 17,600 + 0.5 \times 12,000 + 0.875 \times 1,200) = \$3,435,000$

Lake Transportation

In comparison to its immediate neighbours, Ghana has a very good transportation network. This network is particularly well developed in the south of the country, less so in the north. There are 800 miles of railway linking Accra, Kumasi and Takoradi, 9,200

miles of tarmac road and 11,000 miles of dirt road passable to vehicles [Henle, 1968].

The formation of the Volta Lake had a disruptive effect on road communications. Major roads connecting Kumasi with Tamale and with Yendi were severed. As a result the supply of basic agricultural produce in Kumasi, such as yams and groundnuts, from the areas around Yendi, Salaga, Kete Krachi and Bimbila has virtually dried up. Farmers do not find it worthwhile to send their foodstuffs by the new circuitous routes around the east and west banks of the lake to Kumasi and Accra. Only a small amount can be carried across the lake by the ferry at Yeji [Gould, 1967].

The two detour roads which have been built round either side of the lake are recognised to be only partial substitutes for the former road system since they increase the road distance between major centres considerably and have not yet been sealed with tarmac over their full length. The Ghana Government has therefore commissioned several studies of the feasibility of setting up a lake transportation system for the carriage of north-south traffic. The first of these studies was undertaken by Kaiser Engineers and was published in 1961 [Kaiser, 1961]. It addressed itself mainly to the question of whether it was feasible to ship iron ore from Shieni (near the river Oti, tributary to the lake) to Tema for export or processing. However it came to the conclusion that the ore was of too low a grade for this to be economic. The next report, also produced by Kaiser Engineers, came out in 1964 and this examined general cargo and passenger transportation. For cargo, it recommended the use of a "road-train" between Accra and Akosombo:-

"consisting of a 220 hp tractor hauling 2 trailers. As many

as 90 of these units would travel daily between Accra/Tema and Port Akosombo. The road train would be 56 feet long and would weigh 34 tons, with an 8 ton maximum axle loading. While this meets U.K. and U.S. vehicle standards, both the total length and the axle loading are in excess of present Ghana road standards, these standards would restrict payload to 12 tons and substantially increase vehicle tare weight and cost by requiring extra axles. It is recommended that road traffic regulations be changed to permit use of more economic road hauling units."

[Kaiser, 1964]

This Kaiser report estimated an annual through-traffic transport volume of 700,000 tons of goods and 160,000 passengers by 1970. The total cost of the recommended road/lake/road system was to be £9.3 million.

The report illustrates a common failing of these transportation studies; they fail to take account of Ghana's needs and capabilities. Estimates of transport requirements and the cost of satisfying them are consistently too high, and there is an obvious desire to follow standard American methods rather than techniques which might be more appropriate to a Third World country.

The later transportation studies do not differ essentially from the Kaiser report. The 'Volta Inland Transport Project Report' produced in 1965 by C.E.K.O.P., Foreign Trade Enterprise, Warsaw, proposed a £5 million scheme which covered the actual lake transportation only. The 'Volta Lake Transport System' report produced in 1969 by Ostenfeld and Jønson/Kampsax of Copenhagen proposed spending N¢ 11.4 million, again purely on lake transport. (This study was financed through a loan from the Danish Government to the Government of Ghana.)

The views of Peter Gould, transport consultant to USAID, are enlightening on this matter [Gould, 1967]. He states:

"The initial solution to the transportation problem was a vast road, rail and lake steamer complex with a price

tag ranging from £6 to £9 million - depending upon which lushly-produced report was consulted. In my opinion the traffic estimates in those reports were so over-sanguine as to border the absurd. From past work on transportation in Ghana I am intimately acquainted with the data resources used in the estimates. In most cases they are completely inadequate for making investment decisions of this magnitude. I do not judge the assumptions underlying the estimations, even when they can be found, to be plausible. One example, from many, will suffice: to assume that 70% of all southward flowing trade will be siphoned down the Volta "funnel" to the Accra area is ludicrous in view of the traditional strength of the Kumasi market and its role as a sorting and transshipment point to the south-west and Takoradi. Finally, it is necessary to point out that Ghana simply does not have such funds available at the present time for such a scheme".

[Gould, 1967, 38-9]

Gould goes on to say that, nevertheless, a cheap and efficient solution to Ghana's transport problems, costing little in foreign exchange, was available. He suggests the use of 30 foot boats powered by simple diesel engines of 35 hp which were already being built and used at Takoradi. These boats would be used in a similar fashion to the 'tro-tro' or 'mammy-wagons' of the road, i.e. run by individual operators they would quickly "smell out" the traffic potential. The total cost of setting up a scheme using five boats and five barges would be of the order of £30,000 initially and running costs would be about £20,000 per year. Having set such a scheme in motion, a firm data base for making decisions about future transport requirements would become available.

Similar assessments to Gould's were outlined by the IBRD in two reports [IBRD, 1966, 15-16; IBRD, 1970, 37-9]. They called the Kaiser traffic estimates "a completely unrealistic forecast" and announced "the mission is highly skeptical of the findings and recommendations of the 1969 Lake Transport Study".

What have the actual developments in lake transportation been? In 1967 the VRA started operating a pilot transportation system on a very small scale. In 1970 this scheme was taken over by the Volta Lake Transport Company (VLTC), whose share capital was owned 51% by the VRA, and the rest was held equally by two private European firms, Elder Dempster Lines and Scanlake S.A. By 1971 very rudimentary ports at Akosombo and Kete Krachi had been completed, and in the same year the VLTC commissioned its first sizeable vessel, the 250 tonne 'Yapei Queen' built by Dorman Long (Ghana) Limited and costing £ 153,000. In the following year the 'Akosombo Queen', a passenger vessel donated by the Dutch Government was launched, and these two boats started a regular service between Akosombo and Yapei (Tamale Port).

Altogether the VLTC was said to have a cargo vessel carrying capacity of 50,000 tons [VRA Annual Report, 1973, 26_7]; most of this capacity must have been provided by very small boats. The actual traffic developed as follows:-

	<u>1970</u>	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>
Passengers	6500	6900	13900	12600	24200
Cargo (tonnes)	3100	4900	17950	28250	24350

[VRA Annual Report, 1974, 26_7]

The reasons given for the decrease in tonnage carried in 1974 were, not so much lack of cargo, but inadequate craft, lack of spare parts and equipment to service existing craft and the low water level in the lake which interrupted some services and restricted carrying capacities on others [VRA Annual Report, 1974, 26_7]. This appears to be in conflict with the story of an apparently entirely adequate capacity of 50,000 tons mentioned above.

Despite this rather unclear situation, the VLTC and the VRA believe themselves to be following the outlines of the Ostenfeld & Jónson/Kampsax Scheme of 1969. This scheme envisaged the carrying of 150,000 tonnes of merchandise by 1975, 260,000 tonnes by 1980 and 426,000 tonnes by 1985. These figures look very dubious in comparison with the actual traffic and observed rates of growth of traffic.

Irrigation

Ghana has long been interested in the potential of the Volta Lake for irrigation [e.g. Government of Gold Coast, 1952]. A report on this topic was requested, again from Kaiser Engineers. This report, the 'Accra Plains Irrigation Feasibility Study' was published in May 1965 [Kaiser, 1965a]. It considered delivering irrigation water, by gravity from Volta Lake and by pumping from the Volta River, to 440,000 acres of the Accra Plains south of the dam site. Large-scale mechanised agricultural methods were to be used on plots which were all to be above a minimum size. In the case of rice-growing, this size was set at 2,500 acres and for sugar cane, 10,000 acres. Fertilisers and pesticides were to be liberally used, costing £7.6 million per year in foreign exchange. A computer study was carried out to determine the optimum sequence of development of individual land tracts which would "yield the highest profitability" [Kaiser, 1965b, 10]. The optimum point of initial development was said to be in the extreme south-west of the Plains, near to Accra itself.

The cost of the scheme was worked out in terms of a maximum debt. By the tenth year after the start of construction work the accumulated debt of capital cost, interest charges and operating costs were to amount to more than £28 million. But it was estimated that

this would be paid off after a further seven years.

This method of considering the cost of the scheme is a good one, but the actual figure involved is extremely large. In fact the scheme as a whole appears to be even more inappropriate than the resettlement agricultural scheme. It is entirely unsuited to Ghanaian conditions being far too large and far too costly to relate to Ghana's internal economic climate. No moves have been made to implement this scheme so that the idea of irrigating the Accra Plains remains in abeyance.

Summary

To help give a better perspective on the 'side-effects' of the VRP here is a summary of the main costs and benefits:

Capital costs

Cost of resettlement scheme	\$ 35 million
Compensation remaining to be paid	\$ 7 to 16 million

Annual costs

VLRDP	\$ 0.4 million
Loss of productivity through schistosomiasis	\$ 3.4 million
Value of fish lost from Lower Volta	\$ 0.6 million

Annual benefits

Value of fish from Volta Lake	\$ 5.0 million
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There appears to be a small overall annual benefit due to the value of the fish caught from the Volta Lake, but this gain is nowhere near sufficient to recoup the initial capital cost of the resettlement scheme within the project's lifespan of 50 years. If we were to improve and combine this rough cost-benefit analysis of the side-effects with the cost-benefit analysis on electricity sales in Chapter Four, we would find that the project was even more of an economic loss.

CONCLUSIONS

Is the Volta Scheme Unusual?

Is the VRP unique by virtue of the extent of conflict of interest over the scheme? The writer's contention is that it is not. To indicate that this is so, I shall describe three other projects involving the building of large hydroelectric dams in poor countries; one from Africa, one from Asia and one from South America. The number of outline examples of conflict could be extended, but as yet we have only a shallow understanding of the political nature of such schemes.

The Cabora Bassa Dam built in the Tete province of Mozambique when it was under Portuguese colonial rule, provides a massive amount of electricity, more than twice as much as the Volta Dam. Such a quantity of electricity is of no immediate use to a poor country like Mozambique; clearly the dam was built to provide for the power needs of South Africa. The Vorster Government committed £117 million to the scheme and also four battalions of South African troops to guard it from the forces of FRELIMO (The Front for the Liberation of Mozambique) [Adamson, 1971]. The Portuguese built a "triple defensive system of fortification and fencing for miles around" [Jones, 1972] for the same purpose. Why was Cabora Bassa the object of attack? Basil Davidson explains:

"Cabora Bassa appears as another instalment of colonial-type development - of the development of colonial-type exploitation - along the lines of every previous and parallel extension of the South African-Portuguese-Rhodesian system. If it has met with powerful condemnation from the African side, this has not been merely out of a sense of solidarity with the nationalists of FRELIMO in Mozambique. And if these nationalists of Mozambique have sworn to delay and obstruct the building of the dam and its

ancillary structures - and are now doing so with guerilla warfare in the Tete District - this is not because they are opposed to the development of their country. They, like their neighbours in nearby countries, oppose the project because the project aims at the development of the system which victimises and oppresses them. In their view Cabora Bassa can only mean a reinforcement of the economic power of their oppressors; it could mean something different only if this power were to be displaced by African self-rule."

[Davidson, 1972]

Turning to Peru and the district of Huaylas, 3,000 metres up in the Andes, we find another example of conflict, this time between the urban-industrial lifestyle and the rural-agricultural lifestyle. To describe the project we shall quote from Paul L. Doughty's account

[Doughty, 1972]:

"Peru, like many countries in the Third World, is characterised by extreme centralisation and a consuming focus upon large urban centres, particularly Lima, the capital created on the central coast."

[Doughty, 1972, 112]

"This situation tends to thwart modernisation processes in rural areas particularly. Rurality is associated with the lower-class peasantry and the Indian under-class, so that up until now, these people (perhaps 40% of the national population) have not been the targets for developmental efforts on any appreciable scale."

[Doughty, 1972, 112]

It was merely the dramatic geography of the Huaylas district with its spectacular canyon that made it the site for a hydroelectric dam. The project was:

".....designed to provide power for the industrial development planned for the region near the mouth of the Santa River in the best natural harbour on the Peruvian Coast. Here the tranquil fishing town of Chimbote, with a 1940 population of less than 5000, was to be converted into an industrial center featuring that most desired of all developmental "holy of holies", a steel mill".

[Doughty, 1972, 115]

The project was finished in 1957 at a cost of over \$ 68 million. The

dam produces 50 MW of electricity and the mill produces 66,000 tonnes of steel annually.

"After the great men had been praised by their peers and the technicians and engineers lauded for their ingenuity, few words were left for the others, the 14,000 who had actually performed the work... Fewer voices still drew attention to the actual and future impact upon these men and their families.... the input and output terminology of the national planners left a great deal to the imagination, despite implicit assumptions that jobs and 'development' would occur.... Given the nature of the Peruvian social structure at the time, particularly with regard to the high lands, it is understandable that those in power at the national level were not particularly concerned... with the impact upon the peasantry."

[Doughty, 1972, 115-7]

The third example comes from Bangladesh where the Chakmas, a Buddhist tribe, were dispossessed by a dam built at Kaptai in 1957. Nearly 100,000 of them had to abandon the valleys and take to the less fertile hills. Adam Curle recounts his experience with the East Pakistan Planning Commission:

"Clearly the construction of the dam would continue: millions had already been spent and enormous contracts signed. All we could do was to stir up concern about the fate of the Chakmas in the hope that steps would be taken to minimise the effects of the catastrophe." [Curle, 1971, 105]

The Planning Commission recommended that sites be prepared for Chakma settlements accessible by new roads and large enough and sufficiently close to each other to preserve the social structure. It also recommended stocking the lakes formed by the dam with fish, cultivating the lakeshore in the dry season, the growing of cash crops, terrace cultivation of the hillsides - similar recommendations to those of the VRA.

"Previously, living in a benevolent environment, the people had been well served by the old ways. Now they would need the skills of the twentieth century". [Curle, 1971, 106]

But the Chakmas were, apparently, unable to obtain the skills and riches of modern life:

"There is a general impression (no statistics are available) that the Chakmas are poorer than they were.....The Chakma

social system seems to have suffered just as much as we feared it would..... The immense lake makes it more difficult to have rapid, convenient and easy communication between separate groups. In general there is a lessened sense of community".

[Curle, 1971, 107-8]

"It is pertinent to ask for whom the Chakmas were immolated. It was not...for the farmers who lived below the dam [for although the dam was supposed to control downstream flooding, it has in fact contributed to it]. Was it for the many poor Bengalis who lived elsewhere in the area? Possibly; for although they would not themselves use much electricity, they might benefit from the industrial development facilitated by power. There might be more and better jobs available to them, and they might be helped indirectly by increased productivity and wealth in their area. On the other hand the ripple effect is not inevitable: everything depends on the longer political and economic framework. Would the already rich industrialists profit from the power produced by the dam? Undoubtedly. Would the foreign interests associated with them also profit? Undoubtedly. It depends upon one's point of view whether one considers the anguish and destruction of the Chakma people to have been justified."

[Curle, 1971, 108-9]

Agreement and Conflict

An account was given in Chapter Three of the differing aims of the interest groups involved in the VRP. Nkrumah and his government wanted electricity for industrialisation. The U.K. government wanted a supply of aluminium from the sterling area but eventually lost interest and dropped out of the scheme. The Kaiser Corporation wanted electricity to produce cheap aluminium so as to reap an adequate financial return. The U.S. government was not particularly interested in augmenting its aluminium supplies but did wish to expand its exports to overseas markets and also wanted to gain political influence in the newly emergent black African nations.

These differing expectations were played off and compromised within a political framework. Some aims were better satisfied than

others. Basically, those with more political power, economic might and technical expertise inevitably did better than those with less. The Ghana Government, for instance, only achieved its aim of providing hydroelectricity supplies for Ghana at heavy cost to itself. In fact, as Geoffrey Bing, Nkrumah's adviser stated:

".....in so far as any of Nkrumah's development projects were of a neo-colonialist nature, the Volta Hydro-Electric Scheme best fitted this pattern."

[Bing, 1968, 392]

The story is not totally one of conflict of interest, however. If it had been, the Volta dam would never have been built. Let us further elucidate the conflicts and conjunctions of interest. The three principal participants in the final project were the U.S. Government, the Ghana Government and the Kaiser Corporation. The U.S. Government and the Kaiser Corporation held general economic interests in common; any moves which brought Ghana into the sphere of economic influence of the U.S. were to be welcomed. Yet there was a slight difference in emphasis, in that the U.S. government was wary of the arguments put forward by purely business interests. For instance the U.S.-dominated IBRD criticised (correctly as it turned out) Kaiser's 'Electric Power Load Growth Report' of 1960 for overestimating future demand, and also criticised Kaiser's initial choice of 165 kV for the transmission line voltage, on the grounds that the choice of a more standard operating voltage would offer opportunity for wider competition in the tendering for high voltage equipment [IBRD, 1960]. The IBRD was thus taking a more diplomatic line in order not to alienate the Ghanaian interests.

The differences between institutions like the IBRD and the Kaiser Corporation should not be glossed over. However in this

particular case the conjunction of interest was paramount. This may be exemplified by the case of George D. Woods who was a director of Kaiser Steel Corporation from 1952 to 1963, was President and Chairman of Executive Directors of the IBRD and the IDA from 1963 to 1968 and was then Chairman of the Henry J. Kaiser Family Foundation after 1968 [Loving, 1975]. If leading personnel can move quite freely between the organisations one might guess that the aims and purposes of the organisations are not too dissimilar.

The Ghana Government and Kaiser Corporation were essentially economic rivals, since they had to bargain with each other over the price of electricity for the smelter. However the Ghana Government needed (or was persuaded to believe that it needed) Kaiser's technical expertise. As Moxon states, Edgar Kaiser had acted "in two vastly different capacities - as engineer, adviser and consultant on the Government's own power project - and both as prime mover and hard-headed business adversary in the VALCO smelter negotiations."

[Moxon, 1969, 108-9].

As for the relationship between the Ghanaian and U.S. governments, the Ghana Government was avowedly trying to follow a policy of non-alignment. It did not want to be swamped by the attentions of either power bloc, but neither did it want to estrange either of them. As it turned out, this was a difficult game to play.

The provision of electricity in Ghana has, unfortunately, led neither to the expected beneficial industrialisation, nor to a "Utopia". That members of the CPP government could talk of the project as Utopian indicates the extent of their alienation from the mass of

the people. It is this kind of alienation that goes toward explaining the lack of popular resistance to the military coup that ousted Nkrumah.

We have noted that the VRP did not arise out of the desire of the people of Ghana, or, initially, of their political representatives. This is fundamental in explaining its lack of success. The VRP was conceived originally as a means of fulfilling the aims of non-Ghanaian interest groups. To many Ghanaians it seems to be almost an irrelevancy; to the 9,000 Ghanaians employed by the VRA, the ECG and VALCO, it may appear to be a blessing, but to the 80,000 people displaced by the Volta Lake the project has been a man-made disaster. These people, despite their numbers, had little political influence and so were unable to combat a project that was not in their interests.

We may surmise that Nkrumah's reaction to the project as it now stands would, if he were alive, have been one of disappointment. His expectations of industrialisation and diversification in Ghana as a result of the VRP have not been borne out. On the other hand, the Kaiser Corporation appears to have had no problems in the running of its new smelter. In fact the smelter ran at full capacity during the 1974-5 recession in the world aluminium market in contrast to many smelters elsewhere, including the U.S., where whole pot-lines were temporarily shut down. The U.S. also appeared to achieve its objectives of gaining an economic, and to some extent political, foothold in Africa.

Those people who held bad expectations of the project, the resettlement villagers and their involuntary "hosts", the progressive Ghanaian academics, were without political power. In the "debate" over the VRP they were barely heard and they could do very little to stop

or alter the project to meet their own desires or convictions.

Broadly speaking, then, most of the expectations of the VRP, both good and bad, were borne out. For instance, it was no surprise that the Volta Lake led to a virtual epidemic of bilharzia. As early as 1950 an entomologist, Dr. Berner, was appointed by the Government of Ghana to investigate the potential health problems in the Volta River Basin. His report covered malaria, onchocerciasis, trypanosomiasis, and schistosomiasis [Government of the Gold Coast, 1952]. Since the VRP offered few surprises, since there were no 'mistakes', the failure of the VRP, as far as Ghana was concerned, must be put down to political causes.

The VRP appears as a combined political and technological 'steam roller'. It reflects the political structure in which it was implemented and effectively embodies that power structure in rock, concrete and steel. In turn, the existence of the finalised project helps to confirm a modified power structure for the scheme's technical sophistication requires an educated elite to run it, so that Ghana has acquired a body of bureaucratic planners [Tiger, 1967].

The introduction of a project of the sheer size of the VRP into the existing political frameworks has thus led to severe problems. It has exacerbated the conflict between centralised, elitist planning and democratic control by its reliance on the former, and it has forced Ghana to seek foreign financing for the scheme, making her more vulnerable to extraneous political pressures. It is for practical reasons that I am saying that the size of the VRP was inappropriate to the Ghanaian situation at the time of its construction. It is not purely or inherently a question of size, but a question of political relations and organisation.

Would Ghana have been better off without the VRP? To answer this question is to enter the realms of speculation, but in view of the present situation one may feel entitled to suggest alternatives that might have been less problematic. One such possibility that might have represented a better compromise between the aims of the Ghana Government and its people would have been a smaller hydro-electric scheme to provide solely for the power needs of Ghanaian consumers. An aluminium smelter might possibly have been built much later when Ghana's demand for aluminium warranted it.

But we have already noted in Chapter Three that the possibility of using a dam at Bui (amongst other places) to provide hydroelectricity for Ghana's industrialisation was brushed aside by the Kaiser Corporation. Studies of Bui had been included, at the request of the Ghana Government, in the Halcrow Report of 1951 and in the Preparatory Commission Report also. To no avail. The Bui scheme was of no interest to non-Ghanaians; it was the VRP that whetted their appetites.

Why did Nkrumah desire the VRP so wholeheartedly? We can identify three reasons:-

- 1) He believed that the conflicting Ghanaian and non-Ghanaian interests could be brought to a satisfactory compromise.
- 2) He was misled by the technological imperative into believing that this was the only way to proceed.
- 3) He thought that as well as providing electricity the VRP would found the essential basis of an aluminium industry and lead to widespread industrialisation in Ghana - on this point he was disappointed.

Throughout the history of the VRP there has been a failure to

consider seriously any of the various alternatives available. At any point in time there is a range of technical options open to a society. The decision to go for one particular option rather than another is invariably made on political grounds. In the case of the VRP it has been established that the project as originally conceived was perfectly feasible and that Ghana's bauxite was of a completely acceptable quality, and yet, in the end, a different version of the project which did not utilise Ghana's bauxite, was implemented. That this occurred indicates that strong political forces were at work, altering the project to fulfil a different set of aims from those conceived by the originators of the project. The American aluminium companies that set up the Tema smelter did not need bauxite as much as they needed electricity.

This is not to say that the VRP is purely a matter of intentional exploitation. There may be an element of conscious self-interest at work, but generally the participants seemed to be unaware of their fundamental conflicts of interest. Sometimes a pious desire for 'development' was avowed, but this appears to be more of a protective ideology than anything else. A genuine concern for the welfare of the other participants in the project (and the non-participants who were innocently affected) did not seem to exist.

However, although I have tended to describe the project in terms of pure conflict, this description must be modified somewhat to fully portray the reality. No party to the VRP was able to gain complete power and advantage over all the others. Even the most powerful participants had to induce cooperation from the others, and in doing so had to negotiate with them, thus submitting their own policies to some degree of external pressure. In this way elements of compromise became evident in the VRP. To give two examples of this, firstly,

Nkrumah's statement on behalf of the Government of Ghana about resettlement was to the effect that the resettled should be no worse off than before; a rather passive recommendation. On the other hand the VRA resettlement division which was in closer contact with the settlers was more positive about the whole affair, they avowedly wanted to "offer the people of Ghana a better way of living" [Jopp, 1965, 45]. To gain cooperation from the settlers the VRA was forced to partially accept their point of view. However in reality the VRA was unable to put its words into practice for lack of funding and resources, because it was answerable to the Government and not to the settlers.

The second example of compromise has been in the matter of electricity rates to VALCO. Despite the fixed rate set by the Master Agreement, the VRA has been able to increase the price for electricity. VALCO cannot afford to take too hard a line on this point or it runs the risk of having its expensive smelter expropriated before it has managed to recoup its investment through profits. Admittedly, this is a slight risk since Ghana would find it hard to use the smelter having no alumina plant to supply it or rolling mill to absorb its output, but it is a risk nevertheless.

It is often said about such hydroelectric projects as the VRP that a few people may have to suffer for the good of the majority. But in this case one might say that the already underprivileged have suffered for the sake of the privileged. That this is not a case of 'development' is clear. Since Ghana was, at the time of the implementation of the VRP, not a particularly undemocratic country, it seems justifiable to infer that there are processes of general importance at work here.

Geoffrey Bing makes a very perceptive metaphorical statement on the situation in which Third World countries find themselves:

"The story of Ghana's nine tumultuous years from 1957 to 1966 is interesting, just because it is the case history of the barriers and antagonisms which prevent [a reorganisation of resource deployment]. It is not the broad design that provokes hostility. It is the fact that any particular attempt to implement it runs counter to some vested interest. Colonialism has never consisted merely in rule by an alien power. It brings in its train a series of commercial, financial, military and social relationships which do not disappear at the end of imperial rule and have often, from long usage, come to be regarded as part of the natural order of things. Thus the old colonial system cannot be set aside by some broad sweep of policy. The bonds which bind down a poor colonial territory come to independence, are not of solid weave. They are composed of a 1000 separate strands often not even intertwined. Indeed many, at first sight appear to be individual strings pulling the new state forward rather than holding it back."

[Bing, 1968, 24]

What have we learnt from the Volta Scheme?

In what ways does this particular case study go toward confirming or contradicting current theories about the dependency of Third World countries and about their relations with multinational corporations?

Development and Dependency

In Chapter One the extent of Ghana's poor economic position was outlined. In general this description gave confirmation to Bettelheim's inverted description of a Third World country:

"The industrial countries today are not countries which are economically dependent. Their production structure does not consist of a few hypertrophied sectors narrowly tied to foreign markets and strongly penetrated by capital which is also foreign. These economies do not develop or stagnate according to the movements of the world market of this or that mineral or agricultural raw material. They do not support the cost of heavy external obligations. Their infant industries do not have to face competition with

powerful industries already well established and dominated by the same big capital which has already dominated their own natural resources. These economies do not depend for their increased productivity on imports of equipment coming from abroad. Even when they were not highly industrialised these economies were not distorted and disequilibriated but, on the contrary, integrated and internally-oriented."

[Bettelheim, 1964, 28]

In Chapter Two the history behind the VRP was recounted. It indicated that the project had arisen out of the interests of the U.K. but had been taken over by the U.S. Arrighi states that the "decolonisation" of Africa simply meant that the colonial preserves of European imperialism were opened up to American capitalism and the oligopolistic corporation. He describes the emergence of a new pattern of foreign investment in which financing and merchanting interests and small-scale capital declined in importance relative to large-scale ventures in mining, primary products processing for the export market, and import substitution of consumer goods.

[Arrighi, 1967] This trend appears to be confirmed. Despite the fact that Nkrumah made the first approach to the U.S., he soon lost the initiative and became less a political representative of Ghana and more an intermediary for international finance.

In this process of American intervention in Africa the World Bank can, at best, be seen as meekly following the dictates of the U.S. or, at worst, as being the active medium through which a 'neo-colonialist' system was organised [Magdoff, 1969, 41].

In Chapter Three the differing aims of the groups involved in the VRP were explained. In particular Hayter's thesis that aid is intended to serve the interests of the governments providing it received plenty of confirmation. [Hayter, 1971, 15]. The VRP received aid because it had a large foreign exchange cost which helped to increase

exports from the donor countries which acted through the World Bank, and because it set up a primary product processing facility providing a material valuable to the industrialised world. In giving a detailed description of the results of the VRP (Chapters Four and Five), it was shown that exports arriving from the U.S. have increased since the inception of the project and that most of the aluminium produced by the Tema smelter has been used by the rich countries of the world.

We might describe the VRP as an example of an inappropriate scheme for a Third World country. Cooper asks why such inappropriate capital-intensive technologies get transferred [Cooper, 1972], and gives two reasons:

- (a) Distortions in relative factor prices (i.e. a wage rate which is too high relative to the price of capital given the relative availabilities of labour and capital) result in the use of capital-intensive techniques in order to maximise profits.
- (b) Technological innovation in the industrialised countries is generally labour-saving, so the technologies which are transferred to poor countries are inevitably capital-intensive.

Both reasons, the first economic, the second technological, are quite correct, but the whole account tends to gloss over the political reasons for applying the label "inappropriate". In talking about inappropriate technology, the usual definition of the word "inappropriate" is a broad social, cultural, economic one. But it is necessary to point out that in this particular case (the VRP) and probably in many others, the word inappropriate should be used because the scheme is, essentially, inappropriate for political reasons. Chaszar asks whether it is science and technology which alienate people from the political system, or whether it is politics that alienates people from science and

technology [Chaszar, 1969, 55]. In this particular case of the VRP, we have no reason to think that the production of electricity and aluminium is inherently "alienating" to the people of Ghana. Both of these artifacts were used before the advent of the VRP. The fact that they were produced in such quantity was perhaps "inappropriate" but we have laid that down to political causes.

Multinationals

There have been a number of major studies in recent years on the subject of multinational corporations. Particular firms have been scrutinised [West, 1972; Sampson, 1973; Cronje, 1976] and the general problem area has been described [Kindelberger, 1970; Dunning, 1971; Tugendhat, 1971; Turner, 1973; Vernon, 1973; Barnett and Muller, 1975; Radice, 1975].

Following Vernon we shall ask three questions about multinational corporations:

- a) Do they undermine a host nation's work for the welfare of its people?
- b) Are they used by the country in which their headquarters lie (in particular does the U.S. use its multinationals for its own ends)?
- c) Do they have excessive power?

[Vernon, 1973, 15]

The conflict between nation states and multinationals has been pointed out by other writers of diverse political views:-

"Industrial development - especially by the multinational corporations - far exceeds the scale of operation of industry a generation ago, and the power of these new companies, not to mention their rate of growth, now exceeds that of many nation states. Governments of even quite

advanced societies can no longer, therefore, claim to be wholly effective in safeguarding the interests of their citizens against possibly harmful decisions taken by these firms."

[Benn, 1971]

"The time has come for governments everywhere to decide what to do about the great multinational companies that have grown up in the last 25 years. Their emergence is one of the most dramatic developments of the period, and of more than just economic and industrial significance. Their position profoundly affects the role of governments in the exercise of their responsibilities...."

[Tugendhat, 1971, 19]

There is clearly a loss of national autonomy when a multinational invests in a foreign country since some of that nation's economic actors become responsible to stockholders who are citizens of other countries. Is this loss of autonomy exchanged for a gain, through transfer of capital and technological know-how? [Evans, 1971]. The reply given in Evans's excellently reasoned article is "no". Capital flow is in the reverse direction and the transfer of technical skills is useless because it is not allowed to spark off any major changes - toward industrialisation, for example. The VWP is an excellent illustration of Evans's analysis; Ghana fared very badly in its dealings with the multinationals.

What of the relationship between a multinational and its country of residence? We are told:

".....it is wrong to think of the companies in conventional national terms. The overriding aim of each one of them is to pursue its own corporate interest which is separate and distinct from that of every government, including the government of its country of origin. There is, of course, an overlap between a company's interests and those of the governments of the countries where it is involved, and in most cases that overlap is greatest with its own home government".

[Tugendhat, 1971, 22]

The first part of this statement does not conflict with the experience gained from this study of the VRP, however the last sentence merits criticism. We have already discovered that there is very little overlap between the interests of a multinational and its host country. Rather, the relationship is characterised by conflict. Further, our study has shown that there is considerable overlap between the aluminium companies involved in the VRP and the U.S. government. The aluminium companies and their parent state did not have an identical set of interests, but there was very little conflict.

Vernon has stated:

".....when U.S. - controlled enterprises have felt foreign governments breathing down their necks, the disposition has been to find some formula to relieve the pressure locally without inviting the U.S. government into the fray. Strategies that involve intergovernmental threat or collaboration have taken a very low place in the list of possible responses."

[Vernon, 1973, 251]

However, we have noted a counter-example to this, in Averell Harriman's none too veiled threat to Nkrumah. Vernon goes on to question whether U.S. -controlled investments should really be regarded as American, since he says, measured by equity ownership they are typically 90% American but by source of funds 25% American, by identity of employees less than 1% American, and by the identity of the governments that receive their taxes, practically 100% foreign. [Vernon, 1973, 253]. These percentages are a long way off the mark in the case of the Tema smelter. Equity ownership is 100% American, funds are 100% American, the employees are 2% American and the foreign taxes paid amount to zero.

Since we also know that U.S. companies investing abroad are generally entitled to write off foreign failures as a tax loss

[Vernon, 1973, 55] we seem entitled to deduce from all this that the multinational company and its home government have considerable interests in common.

What of our third question? Is the power of the multinationals excessive? Evans says that the nation state is the only organisation with sufficient leverage to bargain with a multinational [Evans, 1971]. That may be so, but in Ghana's case that leverage seemed insufficient to apply much force. It is perhaps the capability of multinationals to exercise flexibility that is oppressive, combined with a forced competition among both rich and poor countries for the favours of the technologically dominant multinational.

How can the nation state cope more adequately with the multinational corporation? More specifically, how can the Third World country achieve a more equal bargaining position with respect to the multinational? Should the multinationals, as Tugendhat suggests, provide more information about themselves to their host governments, while the governments in turn devote more effort to accumulating knowledge about the international corporation? This would, no doubt, ameliorate the situation, but it does not amount to a final solution since, as we have seen, the host government is easily duped.

The Aluminium Companies

Our attention has been concentrated upon the Kaiser Corporation as the main participant in the Tema smelter; only brief mention has been made of Reynolds Metals. How typical is the Kaiser Aluminum and Chemical Company of the world's aluminium companies?

It has already been noted that Reynolds Metals and Harvey Aluminum are similar to the Kaiser Corporation in being family concerns. It is not only the family concerns that are centralised, however, for

ALCAN too has a single head office (in Montreal) with a president in total charge of affairs. Nathanael V. Davis, President of ALCAN carries "ultimate responsibility for all group activities" and "takes the final decisions involved in selecting that combination of investments in raw material, smelting and fabricating capacity that will earn the greatest return on the group's capital and managerial resources" [Tugendhat, 1971, 130]. It may be assumed then that the structure of the Kaiser Corporation is not atypical.

Are the international aluminium companies typical of multinationals? Perhaps not entirely. But they are prime examples of the more powerful multinational. They have achieved this power for two reasons. Firstly, the world possesses a fairly ample supply of high quality bauxite and it is distributed quite widely over the world. Therefore the companies do not find it difficult to obtain supplies. Yet also refining costs for the processing of bauxite into alumina and aluminium are very high. The costs of refining aluminium represent about 60% of production costs compared to 6 or 7% for oil and 15% for copper [Vernon, 1973, 51]. This makes the aluminium companies aim for large economies of scale and makes their operations very capital intensive. It is difficult therefore for new firms (or countries) to enter the industry.

We have seen how the Kaiser Corporation sought, and found, cheap supplies of electricity in Ghana. There appears to be something of a trend amongst the aluminium companies to enter the Third World countries for electricity supplies. In 1966 only India, Taiwan and Cameroon produced any aluminium [Voluntary Committee on Overseas Aid and Development, 1968] but now Ghana, Jamaica, and Bahrain also have smelters.

We have seen that in our case the country concerned, Ghana, did

not appear to benefit from this incursion. Norman Girvan states that because the facilities set up in agreements between companies and countries tend to remain in the exclusive use of the former, the companies succeed in transforming a change which is progressive in form into one that is retrogressive in content. The Third World country tends to be restricted to some form of terminal activity: either to primary production and crude processing or, at the other extreme, to assembly. In either case, elaboration is left to the rich countries and with that the lion's share of the value added [Girvan, 1971]. The aluminium smelter in the Third World generally remains an enclave.

How can Ghana improve upon the Volta Scheme?

It will be an uphill struggle for Ghana to improve her position with respect to the VRP. It will be just as much of an uphill struggle for Ghanaians to get their government to mitigate the decisive and deleterious effects of the project. However, as the dam, lake and smelter now exist, what can be done? First of all the VRA could press for a better price for the electricity sold to VALCO. Secondly, the terms of the Master Agreement could be altered so that VALCO would be subject to the normal company tax. The money obtained from these altered financial arrangements could be spent on alleviating the disruption caused by the resettlement scheme, on improved health care for the people around the shores of the lake, on improving transport around and across the lake. Whether it is spent in this way will depend upon Ghana's internal political situation. These moves would of course be resisted by VALCO but they ought to be carried out, for at the very most they are reformist measures designed to lighten the burdens of the VRP.

As for more far-reaching policies one such would be to consider linking Ghana's aluminium industry with that of Guinea, about 1500 km along the coast. There the Konkouré-Fria Project had been designed to produce aluminium from Guinea's bauxite, utilising bauxite mines at Fria and a hydroelectric dam on the River Konkouré [Futa, 1960]. But only the first stage of the project was implemented so that now Guinea exports 700,000 tonnes of alumina per year for processing elsewhere into aluminium. The scheme was set up in the 1950's and operated by an international consortium of aluminium companies including American, French and German firms. In 1973, however, the Government of Guinea took 49% of the shares in the project and now the building of Konkouré Dam and an associated aluminium smelter is envisaged for the 1980's [Warren, 1973, 89].

The Guinea bauxite mines and alumina plant represent a missing section of the Volta Scheme. In technical terms it would be quite easy to integrate the two processes notwithstanding their distance apart. The fundamental obstacles to this arrangement lie in the realm of political economy and the interests of the aluminium companies. Two problems arise, first, what to do with the surplus capacity of the Guinea alumina plant since it produces nearly twice as much as the requirements of the Tema smelter. Second, how to market the resulting aluminium, since the aluminium companies would no doubt boycott it. The answer to the first problem might simply be to run the alumina plant at half capacity since the economic benefits of this joint scheme might outweigh any economic disadvantage entailed. On the other hand, it might be feasible to have extra aluminium production capacity at Tema smelter. The answer to the second problem might be for the new Economic Community of West African States (ECOWAS) consisting of all

15 West African nations (i.e. including Ghana and Guinea) to jointly finance an aluminium rolling mill so as to supply all aluminium fabricators within the community. Such a scheme would meet with opposition from the aluminium companies but such opposition might not be so forceful if approval were gained from the International Bauxite Association, the cartel of bauxite producers set up in 1974. Jamaica is playing a leading part in this Association and is gaining greater control of her bauxite/alumina industries by purchasing an interest in the ALCOA, Reynolds and Kaiser operations [Guardian, 8 October 1976]. This bodes well for Ghana since it means Kaiser's control and bargaining power will be more limited than in the past.

However, at present it appears unlikely that Ghana will attempt to carry out this kind of ambitious, progressive project. Effort at the moment is being concentrated on the Kpong scheme (downstream of Akosombo), where a dam is to be built to produce more hydroelectricity. The proposed project [Canadian International Development Agency, 1975] consists of a dam 20 metres high with associated dikes six kilometres in length to hold back a lake of almost 4000 hectares. From this area 5500 people will have to be resettled. Total cost of the project is estimated at N¢ 149 million, and the power output should be 144 MW or more. The Kpong scheme is designed to satisfy Ghana's future demands for electrical power, but whether it will be used to supply indigenous consumers or further aluminium smelting capacity in Ghana is, as yet, unclear.

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