

Commodification of Ghana's Volta River: An Example of Ellul's Autonomy of Technique

Lawrence Aghemabiese

United National Environment Programme

John Byrne

Center for Energy and Environmental Policy, University of Delaware

Jacques Ellul argued that modernity's nearly exclusive reliance on science and technology to design society would threaten human freedom. Of particular concern for Ellul was the prospect of the technical milieu overwhelming culture. The commodification of the Volta River in order to modernize Ghana illustrates the Ellulian dilemma of the autonomy of technique. Displacing a commons way of life, the Volta River Project has imposed an energy commodity regime and a technocratic management scheme to rule the basin, which now includes modern aluminum manufacturing. But after 50 years of modernization, there is little evidence of poverty alleviation or an advance of freedom.

Keywords: *political economy; ecological justice; African energy policy; Volta River Project*

The majority of Ghanaians have not realized the levels of wealth and prosperity promised by the nationalists who led the country to independence in 1957. On the contrary, the attainment of independence was accompanied by worsening poverty and a growing crisis in society-biosphere relations. Many aspects of these anomalous consequences can be attributed to the pursuit of multisector modernization programs that, rather than solving problems, have mostly exacerbated them.

Ghana's development projects share one thing in common: They are based on a neocolonial knowledge infrastructure. The building of this infrastructure begins with the use of analysis to define problems.

This step in neocolonial contexts often identifies problems that were not known or not considered serious prior to the arrival of colonial powers. In this regard, the first phase of neocolonial knowledge building can create problems that society must address, even if it had not previously determined the phenomena to warrant collective action. Then, attempting to solve created problems, the neocolonial knowledge infrastructure enlists technical and economic thinking to define technologies, devices, or services to mitigate undesired effects, a process of reverse engineering in which society is asked to organize itself in a manner that would be rational according to scientists, engineers, economists, planners, and managers (Vanderburg, 2002).

This article illustrates the structure and workings of this knowledge infrastructure as it evolved in the context of the Volta River Project (VRP), which one commentator has called a "tragedy in one act" (Maloney, 2000). Ghanaians are today living—and suffering—from the fact that the magnitude and complexity of problems created by the VRP and similar modernist projects tend to exceed the capacity of its specialists to solve. It will be extremely difficult, if not impossible, to achieve real poverty reduction and sustainable development unless policy makers adopt and institutionalize more preventive approaches (Vanderburg, 2001) in efforts to address contemporary crises in technology, environment, and society relations. In this respect, Ghana's energy fiasco, unfortunately, illustrates in alarming detail the Ellulian problem of *autonomous technique* (Ellul, 1964, pp. 133-146).

Energy and Development Theory in Practice: The VRP

The drive to modernize Ghana's energy sector as part of the postindependence agenda of its first government is well known. Kwame Nkrumah, the first president, regarded development as the key to economic independence (Chazan, 1982) and saw industrialization as comparable to making Ghana modern.

Nkrumah embraced the Western industrial model at the same time that he espoused liberation of Ghana and, indeed, Africa from the clutches of Western colonialism. The apparent conflict was resolved in his mind by regarding industrialization as, potentially, a scientific project, while colonialism could be treated as a rank form of power politics in support of capitalist greed (Agbemabiese, 2002). The basic rationale underpinning Nkrumah's strategy was that the accumulation of surplus energy capacity for production is a precondition for setting off a progressive increase in per capita incomes through mutually reinforcing cycles of economic growth and further expansions in generating capacity. These expectations are consistent with the two-sector model of development put forward by Sir Arthur Lewis (Todaro, 1997), which Nkrumah studied while in college in the United Kingdom (Agbemabiese, 2002).

According to this theory, a developing country such as Ghana is essentially made up of two sectors—the traditional and the modern. The traditional sector, which is confined to rural agricultural subsistence production, has a high amount of surplus labor. A relatively small, largely urban modern sector must attract some of this surplus labor to build itself up, to have its capital be reinvested, and to hence achieve economic growth—that is, to develop (Maloney, 2000). It is the creation of employment opportunities in the modern sector that enables the rural-urban flow, and thus the process of accumulation to happen. Furthermore, the theory holds that an ever-growing and prospering modern sector will then reach out and, in turn, modernize the traditional sector until the whole nation is developed by having been entirely brought into the industrialized, capitalized modern sector (Maloney, 2000). From this standpoint, constructing a dam across Ghana's principal river was the ideal instrument for bridging the two sectors: building an ultra-modern power-generating facility along with a capital-intensive aluminum smelter in one of the most rural areas of the country would urbanize and industrialize the country's backward sector. Lacking its own fossil

fuel resources, this energy strategy for development had the additional merit of reducing cash outflows that would otherwise occur if Ghana industrialized based on other countries' energy resources.

During the early 1950s, Nkrumah expended considerable personal energy and national resources toward the planning and implementation of the VRP. Even before the achievement of self-government in 1951, he had announced that this project would be the one instance of a colonial initiative that would be pursued in post-colonial Ghana (Agbemabiese, 2002). He made the successful implementation of the VRP a priority and was very clear about why he wanted it: "Electricity is the basis of industrialization. That, basically, is the justification for the Volta River Project" (quoted in Killick, 1978, p. 45). This assertion was backed by awareness of several highly visible international exemplars: Large-scale hydroelectric dams had been created for similar purposes in the advanced countries and were at the forefront of development efforts in other parts of Africa. The VRP offered Ghana an opportunity to replicate these models. It would provide the cheap electricity needed to drive the machinery of the modern state-owned (and eventually Ghanaian privately owned) factories that Nkrumah envisioned to modernize the country. The dam was a key building block of industrial production for Nkrumah's modern Ghana (Killick, 1978), which would emerge from a traditional, agricultural economy (Maloney, 2000).

Nkrumah voiced strong criticism toward any opposition to this argument. For example, he remarked: "Anyone who is against this scheme is crazy. We have no other sources of power. How can we develop the country without power?" (quoted in Apter, 1963, p. 122). To oppose the VRP was, in Nkrumah's mind, to oppose development itself, to oppose the noble goal of eliminating poverty and securing a better life for all in Ghana.

Undesired Consequences

Whether the VRP achieved the results expected by Nkrumah and others has been the subject of considerable research. In a comprehensive study of the VRP, Moxon (1988) described

[N]ightmare proportions of the new lake's capacity for spreading disease and death at a speed that was almost as fast as the lake flow itself. . . . Between 1960 and 1964 bilharzia (uri-

nary schistosomiasis) spread from a mere 5 per cent incidence in riparian children to an outrageous 90 per cent amongst lakeside children who live in communities along the 4000-mile shoreline of the lake. Where natural conditions permit, river blindness (onchocerciasis), the other major disease affecting lakeside communities, has been equally devastating. Here again, the infection in some of these areas is more than 90 per cent in children over fifteen years old. (p. 276)

The government responded to this environmental health crisis by applying dichloro-diphenyl-trichloroethane (DDT) and other pesticides that, in the end, did not hinder the spread of disease but instead negatively affected the water supplies of inhabitants (Maloney, 2000). Thus, disease further accelerated emigration from the lake and halted the anticipated growth of any semblance of a modern sector around (Maloney, 2000). The supply of electrical power to meet the needs of an urban elite group and foreign companies was achieved only by damaging the rural energy commons and ways of life (Agbemabiese, 2002).

Apart from its direct negative effects, the national economy recorded no modernist takeoff because of the VRP. If anything, it appears that the VRP needed industrialization to keep it out of red ink. Maloney (2000) noted "The dam was built, electricity was generated, but the cost was too high to have it really be of any substantive worth in the long run" (p. 2). Although a majority of Ghanaians escaped the direct health and psychological stresses and costs caused by the lake's creation, they have not escaped the heavy economic costs of the VRP, Ghana's largest postcolonial capital project.

Understanding the Failure of the VRP

The failure of the VRP reflects the fundamental flaw in the knowledge infrastructure that forms the basis for the design and implementation of Ghana's development strategy.

In February 1962, the Ghanaian government completed negotiations for loans from the International Bank for Reconstruction and Development (IBRD), the government of the United States of America (through two of its agencies—the Export-Import Bank and the Agency for International Development), and the Export Credits Guarantee Department of the United Kingdom. Even with multi- and bilateral loan

support, the government had to provide from its own resources an equity investment of up to 50% of the cost of the project. Simultaneously, the two aluminum companies interested in establishing a smelter completed their negotiations for financing from the United States government to supplement their own equity investment.

With financing for the project established, a master agreement was prepared and approved by the first Parliament of the Republic of Ghana. Signed by Nkrumah for the government, and Edgar Kaiser (for the Volta Aluminum Company, or VALCO, a joint holding of the U.S. Kaiser Company and the Ghanaian government), it was projected by the nationalists as a stage setter for the realization of three national development objectives: hydroelectric power supply, industrial development, and wider socioeconomic development of the newly independent nation.

However, the VRP left several questions unresolved. In the evolution and implementation of the project, there was the obvious political contradiction inherent in the collaboration with so-called imperialist forces. Yet the nationalist community accepted the technocratic energy paradigm because of the promises it offered for rapid development. Their adoption of this paradigm was not based on a history of actual solutions in Ghana. It was taken for granted that solutions that had worked elsewhere could work in Ghana. This was particularly the case in the choice of the institutional model for power generation and distribution: It was assumed at the outset that a centralized power complex was the best option. The subsequent history of power sector development exemplifies the preoccupation of the nationalist community with the maintenance and extension of the system from a central core.

The Volta River: Commons or Commodity?

Beneath the ideological drive for energy supply and rapid industrial and socioeconomic development, the pursuit of the VRP actually posed a fundamental question concerning the transformation of commonly shared wealth and prosperity—the Volta River and surrounding lands, flora, and fauna—into a modernist expression of economic value that, by its physical and economic nature, cannot be shared by all.

Previously in Ghana, prosperity among its rural communities had been predicated on the treatment of agricultural land, forests and rivers collectively as a commons rather than as commodities accessible only

to those able to pay. The lands and forests to be affected by the project had been farmed and harvested for biomass, animals, medicinal herbs, and so on for at least 2,000 years. In this respect, the area represented a major commons that embodies the ecological and social history of many communities. In pursuing the VRP as a preferred choice, the new government was prepared to end the commons relation of society and the river. It effectively reduced the issue of whether to build the VRP to a simple choice between development or its absence. So strong was the urge for development, that the government was willing to collaborate with imperialist forces to realize its goals. Yet the real question was whether Ghanaian society would ultimately be better off by displacing a commons relation with one based on a commodity idea of society-nature relations (Byrne, Glover, & Martinez, 2002). It is regrettable to note, Nkrumah and the nationalist camp failed to ask this question.

The decision to inundate 850,000 hectares meant that the lands—and the communities dependent on the lands—would be utterly transformed. Inescapably, the VRP, even as a socialist project, would commodify the lands and bring to an end a social and ecological history that had prevailed for thousands of years. In so doing, the communities that received this legacy and had stewarded the natural common wealth of the region into a modern era would lose altogether their social and ecological way of life.

Often, this issue is treated as a classic one of economic efficiency on one hand versus equity on the other. *Economic efficiency* refers to how much wealth a given resource base can generate, while *equity* involves how that wealth is to be shared in society. Mainstream researchers tend to regard the pursuit of equity as impairing efficiency, while the implementation of efficiency measures often occurs at reduced levels of distributional equity (Todaro, 1997).

Confronted with this dilemma during the negotiations leading up to the implementation of the VRP, the socialist government of Nkrumah approached the matter as an exercise in optimization. This involved following conventional techno-economic strategy as a first step to create the greatest possible economic value from the project. Then, the government would commit to the equitable distribution of electricity as the final goal. The ultimate aim was to achieve a viable trade-off between the state and the market for allocation and distribution of costs and benefits of the project.

However, there was more to the VRP than the attainment of an economic efficiency versus equity

trade-off. Indeed, efficiency and equity have dramatically different meanings depending on whether one adopts a commons or a commodity view (see, e.g., Lummis, 1999; Robert, 1999; Shiva, 1999). Therefore, the critical issue that should have been raised was the value of the commons of lands and communities versus the value of the commodity system. This question is paradigmatic in character: commons and commodity cannot coexist; it is a choice, as Kuhn (1970) argued, among “incommensurables” (p. 195). Specifically, the redefinition of the Volta River as a commodity necessarily results in the destruction of the Volta communities and watershed as a commons.

Nkrumah and his advisers did not seriously contemplate the value of the region of the Volta River as an ecological or social commons. All assumed that the question of its use was essentially about commodity—agricultural commodity versus industrial commodity. Their socialism informed them that the latter was superior to the former. Thus, as far as the real conditions for sustainable livelihoods and prosperity of the majority of Ghanaians were concerned, they answered the wrong questions. They were preoccupied with the technical and economic details of building a chain of transformations and transfers between the moment when an energy source is extracted from a locality and offered on the market somewhere else.

NeoColonial Knowledge Infrastructure

The knowledge community overseeing energy development in postcolonial Ghana comprised two closely interacting groups—engineering-finance professionals on one hand, and political economists on the other—distinguished largely by their roles in the emerging energy economy. The urban politicians and economists considered themselves as the most qualified agents for mobilization of domestic capital, political resources, as well as the negotiation and canalization of foreign capital to finance the transfer of advanced Western energy technology. Technical professionals saw their role as the execution of technical operations that needed to be done following the politicians’ success in securing funds so that the installation of the VRP yielded sufficiently large surpluses in electrical generating capacity.

The Role of Politicians and Economists

Initially, the community of politicians and economists comprised those who were actively involved in

the independence struggle and in the preparation of initial and subsequent development plans designed to promote industrialization. Among the politicians in the group, Nkrumah easily stands out. As leader of the nationalist movement, he announced in 1949 that his government would “transform the Gold Coast into a paradise in ten years” (Killick, 1978, p. 34) and was the chief advocate of industrialization of the country with the VRP as the fuel source. Komla Gbedemah, Nkrumah’s close associate in the independence struggle and finance minister in the first self-governing cabinet, is another politician of note. Gbedemah was a prominent member of the high-powered Ghanaian team that negotiated foreign assistance during various stages of development of the VRP. Another close associate of Nkrumah was Tawia Adamafio who became minister of presidential affairs in 1961 and was one of the leaders of the anticolonial movement, often spoken of as Nkrumah’s heir (McFarland, 1985). Finally, there was K. A. Busia who supported Ghana’s independence drive and became a leader in the Legislative Assembly. He and Nkrumah would disagree on the political structure for an independent Ghana, with Busia preferring a federation of locally autonomous governments to the centralist model embraced by Nkrumah.

Busia initially questioned the amount of electric power that would be available for social use after the smelter’s demand had been met, and the use to which any leftover might be put. Recognizing that the largest manmade lake in the world was contemplated, and that this would inundate tribal areas along the Volta, Nkrumah argued that “the sociological implications” of the scheme must “be looked into,” indicating that “the breakdown of traditional sanctions, the movements of populations, the submergence of old towns on the Volta, the creation of a great lake, all these are things at which we ought to take a second look” (quoted in Apter, 1963, p. 87).

Busia did not, however, pursue this line of argument to its logical conclusion, stating only that

We are accepting the principle that the government has laid down, but our anxiety is that we should look at it carefully, because we are inexperienced in dealing with experienced people and I think it is quite fair to assume that they will try to get out of us the most they can, and our responsibility to our own country is to make the most we can; and I do not think we are in any way

delaying or obstructing when we ask for this kind of second look. (quoted in Apter, 1963, p. 88)

Of the professional economists in the paradigmatic community, two of the most prominent were J. H. Mensah and E. N. Omaboe, both of whom were Western trained. Both were instrumental in designing the 7-year plan released in 1961. A product of regular consultation with foreign development economists, the plan sought to take Ghana into a new “period of economic reconstruction and development aimed at creating a . . . society in which the individual Ghanaian will be able to enjoy a modern standard of living in his home supplemented by an advanced level of public services outside” (Killick, 1978, p. 40). Omaboe emphatically stated that the plan would “catapult the nation to the threshold of the take-off stage” (quoted in Killick, 1978, p. 52).

All except Gbedemah, were educated in the United Kingdom or United States, or both, and in their thinking displayed an urban-industrial outlook. The successors of Nkrumah and the founding members of the knowledge community of the postindependence period have borne similarities in ideas and training to their forebears. The leading positions in the ministries of energy, finance, and economic planning, and associated institutions, have been led by urban-industrial thinkers with a decidedly modernist view of the purposes of development policy and planning.

The Role of Engineers and Financial Experts

The majority of Ghana’s community of engineers and financial experts were mainly staff of the Volta River Authority (VRA; created in 1961), and the erstwhile Electricity Corporation. Where the politico-economic group described above had been more directly a product of the nationalist drive for independence, the technical and financial experts were expected to design and build the technological systems in Ghana.

The basic tension between a nationalism of independence and a modernization of Ghana’s technological infrastructure was recognized by the movement’s leaders. However, it was not treated as a contradiction. The main reason for this was that nationalism was essentially a call for national mobilization—a so-called big push—that would take the country out of backwardness into a status equal to that attained by Western nations. Western standards of life were seen as an objective state achievable by all human beings, and the historical fact that Western societies had

already reached that state meant, to the nationalists, that Western methods (of which energy technologies were among the most basic) were exemplars worthy of emulation with all possible speed. Every instance of non-Western indigenous energy technology or practice was interpreted as a failure when measured against the Western standard.

The technological commitments embraced by the political economists of the leadership circle in Ghana resulted in the creation of staffing requirements that emphasized engineering, financing, and accounting skills. The result has been a persistent technocratic orientation in the primary energy institutions that were set up literally to fuel development.

The technocratic ideology is evident in the specification of staffing needs when an Act of Parliament (Act 64) implemented the VRP following the creation of the VRA in 1961. The first chief executive of the VRA, Frank J. Dobson, a Canadian engineer, had an impressive list of major hydroelectric schemes to his credit, including the Chenaux and the Sir Adam Beck No. 2 (Niagara) Power Projects (Moxon, 1988). In fact, it was while holding a position as officer in charge of construction of Toronto's vast Lakeview thermal plant that he accepted the Ghanaian government's invitation to take up the appointment at VRA.

Dobson's appointment was followed by the deployment of other technical specialists: N. G. Abhyankar, an Indian United Nations economist, as chief finance officer; and J. H. Rogers and L. P. Larsen, seconded under the Canadian technical aid program as chief engineer and chief accountant, respectively; and H. Winful, a 45-year-old Ghanaian engineer and former member of the VRP (who had headed the Housing Corporation in the pre-Independence British Administrative Service) was appointed secretary to the VRA and head of administration (Moxon, 1988).

The technical core of the VRA enjoyed a powerful influence relative to other development sectors. Members of this elite (and the consultants working under their direct supervision) consistently supplied the analyses and normative criteria governing tariff definitions, choice of investments, financing modalities, and appointment of managers for the monopolistic operation of the power complex. Even though falling ostensibly under the so-called supervision of the state, the VRA was (and is) governed by the technical core who have enjoyed special autonomy from the state in the matter of technological choices for more than 40 years.

Techno-Economic Structure of the Power Sector

The total installed generation capacity in Ghana is currently estimated at about 1,122 megawatt (MW), of which 95% is from the Akosombo (912 MW) and Kpong (160 MW) hydropower plants on the Volta River. The total storage capacity of the Akosombo dam is 148,000 million cubic meters, and the surface area is almost 8,500 square kilometers.

Despite a steady increase in total electricity consumption throughout the years, there is evidence that this is largely a function of population as per capita electricity consumption within this structure has remained at less than 200 kilowatt-hours (kWh). Although its share of total consumption has declined from 59% in 1991 to less than 40% currently, VALCO continues to be the largest consumer of electricity in the country. On the whole, VALCO, the mines, and other industrial consumers are the largest category of consumers in Ghana, taking up about two thirds of the total consumption, while the residential sector accounts for 26%. The commercial sector (offices, shops, institutions, and hotels) takes up another 5% to 6% of total consumption (Turkson & Amadu, 1999).

To date, substantial ground remains to be covered before the promise of universal access to electricity can be realized. After 50 years as practically the sole focus of capital and knowledge investment in Ghana's energy sector, the VRA supplies less than 20% of the country's household energy needs. Most Ghanaians self-harvest energy from locally available sources such as biomass (Agbemabiese, 2002, pp. 20-21). Yet their knowledge, techniques, and outlooks are ignored by the institutional order. Only the urban elite receive electricity for residential needs.

Even though VRA's services remain practically irrelevant to the daily energy needs of the majority of the population, the power sector, relative to other sectors of the economy, has accumulated some of the most qualified technical know-how—the best-trained engineers, economists, and finance and other technical experts. This is largely because “[s]alaries and social advantages of power sector employees are often greater than those in other industries; their social policies figure as the most advanced in every country; their managers occupy the highest functions in the social hierarchy” (Girod & Percebois, 1998, p. 23).

As with power complexes in other countries, on which VRA's design was based, the electricity supply

industry is at the forefront among other industrial companies in terms of volume of investments and sophistication of staff. From its earliest days, for instance, the VRA has consistently stood out favorably in the eyes of domestic and international observers of the political economy. Several reasons account for the superior technical and financial record of the electricity supply industry. In the case of the VRA, an important reason is that its implementation was preceded by exhaustive investigations and preparations directed at a single paradigmatically defined objective: to supply power reliably and on “sound commercial lines” and “to fix its power rates so as to earn profits” (Killick, 1978, p. 250). Furthermore, the VRA was not plagued by the political interference “from which so many other state concerns suffered” (Killick, 1978, p. 250). This political hands-off behavior of the government was necessitated by the foreign financing arrangement without which the project could not have been successfully implemented.

This points to an important consequence of the modern energy paradigm: by directing its advocates to select technologies that demand major foreign financing, it legitimizes the integration of the energy economy into the global political economy. At the same time, there is a noticeable and ironic shift of control from the nationalists who built the project to the controllers of the international capital and know-how from which they ostensibly sought economic freedom. The fact that the VRP has still not delivered on its promises stands in stark contrast to this consequence. There is very little evidence to date that the promise will ever be fulfilled.

Energy Commons Versus Energy Commodity

Can the commodity regime of the energy sector be justified by its generated value compared to those of the prior commons regime? An analysis by Agbemabiese (2002) suggested that land inundated by the VRP could generate, under an equity principle of access to these lands, the equivalent of 550 kWh/household/year. One can reasonably ask whether the displaced communities, comprising some 80,000 people, would have traded their commons for such a level of services? From an efficiency perspective, at least, the aggregate value added of the VRP should exceed the value of the commons regime for Ghanaian society. Thus, if the VRP is to meet its efficiency objective,

it must at least be able to compensate the communities who lost their ways of life because of the project. Predictably, these communities were never asked if 550 kWh per household was sufficient to undo a commons regime. Instead, they were simply driven off the land.

Studies of these communities in the aftermath of transformation certainly suggest that electricity service would never have been regarded as adequate to voluntarily surrender the land (see, e.g., Diaw & Schmidt-Kallert, 1990; Maloney, 2000; Moxon, 1988; Obosu-Mensah, 1996). Indeed, from the point of view of the displaced people, the local social costs far outweighed any benefits in the long run. Obosu-Mensah (1996) reported that several people who were forced to resettle died from stress as a result of losing their ancestral lands. Moxon (1988) described the case of an oracle who refused to leave his cave until “the bitter end” (Maloney, 2000, p. 8). It is an indication of how much the displaced rural communities valued land as the basis of livelihoods that, when the government offered those to be displaced a choice between “either financial remuneration or a house in a resettlement township and a nearby semi-collective plot of land; overwhelmingly, people chose the latter for they believed it offered them a chance at a higher standard of living” (Maloney, 2000, p. 8).

The hopes of local people for retrieval of a commons-based prosperity were dashed, however, as standards of living actually declined for these resettlers (Maloney, 2000):

The result of the resettlement scheme was a huge stress on these 80,000 people. . . . Development of the modern sector around the lake was simply not occurring because it had been forced onto a traditional-sector population who had no positive incentive to join the modern sector at first. . . . [T]he townships forced an incentive on the inhabitants to become part of the modern sector because there was no life in these settlements. Now part of the modern sector, wages elsewhere lured people away and to the cities—the heart of the modern sector. Thus, growth of the modern sector resulted in an increased urbanization trend that would flood the modern sector with now too much labor; the displaced traditional sector labor could not be absorbed so quickly by the modern. In this regard, the industrialization hoped to be gained from the VRP was actually now creating an exacerbating hindrance to it. (p. 8)

Some have argued that the VRP did produce benefits for the displaced, pointing, for example, to the fact that fishing in Lake Volta has now become a mainstay for many people. They argue that where previously fishing was a minor industry on the Volta River, it is now a major source of livelihood for those who live in the Volta Basin. Of Ghana's fish, 20% come from the lake; and hence a domestic import-substitution industry has been created (Maloney, 2000). These claims, however, do not reflect the reality at the microlevel, as Obosu-Mensah (1996) convincingly showed. Prior to the dam, there were 2,000 fishermen who caught 10,000 tons in aggregate, or 5 tons per fisherman; after the VRP, the lure of fishing prospects brought the number of fishermen to 20,615 who caught a total of 42,945 tons on average, or roughly 2 tons per fisherman. These results demonstrate that, for the individual fisherman's livelihood, living conditions, in fact, worsened after the VRP even though the aggregate amount of fishing has increased. As Maloney (2000) noted

[O]ne has to make a judgment call between higher fish production and decreasing living standards as indicators of development, but . . . if people are hurting more as a result, then nothing has developed. Economic growth does not necessarily equal economic development, and it was the latter which Nkrumah was hoping for. So again, in the fishing respect, the VRP can be said to have failed. (p. 19)

If the modern energy sector failed to add significant value, from the perspective of the inhabitants of the Volta commons, one may still consider if it added net social value, by improving the lives of noninhabitants, or the society more generally. Again, though, the evidence is ambiguous. The modern sector continues as an economic enclave with little positive influence on the majority of Ghanaians. Its economic performance is volatile, due (surely) to poor policies and corruption. However, this only raises doubt about the unvarnished so-called progressivism preached by its advocates. If the modern sector, with all the power and most of the resources of the country, cannot produce a politically viable order, then it would not seem to deserve the hope that scientists and economists accord it.

Although this ex-post analysis has obvious limits, it is useful in underscoring the centrality of the commons question. Neither the British colonials, Nkrumah, nor his successors understood this implication or consid-

ered it worth the effort of further consideration when defining energy conditions and options. On equity and efficiency grounds, Ghana's commons regimes appear to be more valuable than their commodity-based replacements. This is readily evident if one moves outside the narrow range of quantifiable economic factors that have traditionally dominated contemporary assessments of the value of energy regimes. Only then, in a manner akin to a "gestalt switch," may one comprehend the large tragedy lurking behind the standard success indicators of the energy commodity regime.

Conclusion

The pursuit of modern energy solutions was promoted as a means to improve the quality of Ghanaian life. The society would make a transition from the so-called inferior technologies normally associated with the commons-based energy regime, to the superior solutions offered by the technocratic regime of energy commodities. Paradoxically, however, the production of energy commodities has benefited the few at the direct expense of the many and, through growing impacts on the ecological resource base, at a growing risk to the prospects for survival of the rural majority. In sum, the supply of electrical power to meet the needs of an urban elite group and foreign companies could only be achieved by damaging the rural energy commons.

In this respect, the VRP is a case in point of the collapse of nontechnical culture that Ellul described when the modern paradigm invades a society (see Ellul, 1964, chap. 2). The nationalist movement succeeded in overthrowing a colonial regime; however, it quickly succumbed to the ideals of modernity and restored the technical and economic artifices underpinning Western (and, now, global) political economy. Although Ghana's liberation from British colonial control was real, it is harder to judge the success of efforts to liberate the cultural direction of the society. The knowledge infrastructure authorized to plot Ghana's future has little to do with Ghana's history and institutions and, indeed, has so far ignored the wisdom and practices of the commons institutions that served the society for so long.

The paradigmatic underpinnings of the postcolonial energy system share major generalizations, beliefs, values, and exemplars from the technocratic orientation spread across the modern era. In effect, the normal activities of a technocratic paradigmatic com-

munity have continued, despite the collapse of colonial structures, and even the challenge of Nkrumah's socialist alternative. Energy is conceived as a supply question, best handled through a centralized system of generation and service delivery. As experts operating within a close-knit network of energy institutions, the paradigm's guardians are predisposed to view energy in terms of large-scale converters controlled by a private sector–state alliance, as the engine of economic development.

The fact that the majority of the population still lacks access to electricity is now understood by the knowledge community of modern Ghana as having been caused by an inappropriate socialist intrusion. The technocratic consensus is that the more correct application of the same paradigm demands substantive private sector participation, based on a liberalized energy market. It is expected that within the new atmosphere of privatization and liberalization, there will eventually be universal coverage, accompanied by industrialization and rapid economic growth as originally promised.

This hope in still more modernization to fix the problems of Ghana's commitment to modernity seems hollow. Yet as Ellul warned, there is and can be no technically sound alternative to the syndrome. Thus, ending the "tragedy in one act" is unlikely to emanate from its urban-industrial origin; and the burden for rural Ghanaians to rid the society of the autonomy of technique is daunting.

It is ironic to note, only VRP's technical and economic folly has apparently stood in the way of the assimilation of Ghanaian cultures into the technical milieu. This is hardly an inspiring result from one of Africa's most important independence struggles.

References

- Agbemabiese, L. (2002). *Toward a political economy of sustainable energy in Ghana: A paradigm analysis of energy-development relations from the 11th century to the present*. Unpublished doctoral dissertation, University of Delaware, Newark.
- Apter, D. E. (1963). *Ghana in transition*. New York: Atheneum.
- Byrne, J., Glover, L., & Martinez, C. (2002). The production of unequal nature. In J. Byrne, L. Glover, & C. Martinez (Eds.), *Environmental justice: Discourses in international political economy* (pp. 261-291). New Brunswick, NJ, London: Transaction Publishers.
- Chazan, N. (1982). *An anatomy of Ghanaian politics: Managing political recession, 1969-1982*. Boulder, CO: Westview.
- Diaw, K., & Schmidt-Kallert, E. (1990). *Effects of Volta Lake Resettlement in Ghana: A reappraisal after 25 years*. Hamburg, Germany: Institut für Afrika-Kunde.
- Ellul, J. (1964). *Technological society*. New York: Vintage.
- Girod, J., & Percebois, J. (1998). Reforms in Sub-Saharan Africa's power industries. *Energy Policy*, 26(1), 21-32.
- Killick, T. (1978). *Development economics in action: A study of economic policies in Ghana*. New York: St. Martin's.
- Kuhn, T. (1970). Incommensurability and paradigms. In I. Lakatos & A. Musgrave (Eds.), *Criticism and the growth of knowledge* (pp. 194-206). London: Cambridge University Press.
- Lummis, C. D. (1999). Equality. In W. Sachs (Ed.), *The development dictionary* (pp. 38-52). London: Zed Books.
- Maloney, C. (2000). *Development deferred. The Volta River project*. Retrieved December 18, 2002, from www.stanford.edu/~cmaloney/volta/
- McFarland, D. M. (1985). *Historical dictionary of Ghana*. Metuchen, NJ: Scarecrow Press.
- Moxon, J. (1988). *Volta: Man's greatest lake*. New York: Praeger.
- Obosu-Mensah, K. (1996). *Ghana's Volta Resettlement scheme*. San Francisco: International Scholar's Publications.
- Robert, J. (1999). Production. In W. Sachs (Ed.), *The development dictionary* (pp. 177-191). London: Zed Books.
- Shiva, S. (1999). Resources. In W. Sachs (Ed.), *The development dictionary* (pp. 206-218). London: Zed Books.
- Todaro, M. P. (1997). *Economic development*. Paris: Addison-Wesley.
- Turkson, J. K., & Amadu, M. B. (1999). *Environmental protection implications of the electric power restructuring in Ghana*. Roskilde, Denmark: Risø National Laboratory.
- Vanderburg, W. H. (2001). *The labyrinth of technology*. Toronto, Canada: University of Toronto Press.
- Vanderburg, W. H. (2002). *Johannesburg, Kyoto, and the need for knowledge infrastructure renewal*. Retrieved July 17, 2004, from www.nuc.berkeley.edu/research/ethics/ethics/Bios/VanderburgEditorial.pdf

Lawrence Agbemabiese studied at the Center for Energy and Environmental Policy, University of Delaware, earning his Ph.D. in 2002. He accepted a position in that year with the United National Environment Programme where his focus is on rural energy sustainability. Among his efforts is the establishment of the acclaimed African Rural Energy Enterprise Development (AREED) initiative, which now links communities, local entrepreneurs, and researchers throughout Ghana, Mali, Senegal, Tanzania, and Zambia. He can be reached at e-mail: lagbemabiese@unep.fr

John Byrne is director and distinguished professor of public policy of the Center for Energy and Environmental Policy at the University of Delaware. He serves as coexecutive director of the Joint Institute for Sustainable Energy and Environmental Future, headquartered in Seoul, Korea. He has worked on rural energy development issues for 15 years. He has published 12 books and more than 150 articles on energy and environmental policy. He can be reached at e-mail: jbyrne@udel.edu