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THE QUESTION OF DEVELOPMENT: A CASE STUDY OF THE BUI HYDROPOWER PROJECT

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THE QUESTION OF DEVELOPMENT:
A CASE STUDY OF THE BUI HYDROPOWER PROJECT

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Abstract

“Development” is one of the most misunderstood words in the English language.

Typically, non-academics of the West view development as a series of projects to provide clean water to some faraway group of poor people in an arid climate, deliver old textbooks to orphans of HIV/AIDS, give free shoes to shoeless children everywhere or provide electricity to a country that wants to industrialize. These projects span the globe; their combined scope is immeasurable.

If the non-academic definition of development is vague, the academic one is even harder to pinpoint. No definition of development has come about in a vacuum, and each is dependent upon its creative theory. In the most general sense, one could define development as a change in a person’s state of being for good, often in reference to quality of life. Therefore, the popular “development projects” described above are meant to improve the lives of some group of people, often through material means.

However, with every bit of good these projects do, they may be undoing pre-existing good. This is especially true in the case of the Bui Hydropower Project in Ghana. The Ghanaian government has believed that industrialization is the way to bring its people out of poverty, and into a more prosperous future.¹ The Bui dam is supposed to provide electricity to meet Ghana’s growing demand.² Still, the dam will also bring about a plethora of negative consequences, especially for the rural and poor.

Postmodernism challenges preexisting conceptions about development, as well as the assumptions that underlie these conceptions. In his article, “What Causes Poverty?: A Postmodern View,” Lakshman Yapa uses the concept of the nexus of production relations to

¹ Kofi Buenor Hadjor, *Nkrumah and Ghana: The Dilemma of Post-Colonial Power*. (London and New York: Kegan Paul International, 1988), 76.

² Environmental Resources Management and SGS Environment, *Environmental and Social Impact Assessment of the Bui Hydropower Project: Final Report* (Ghana: Ministry of Energy/Bui Development Committee, 2007), i-ii, accessed February 19, 2012, <http://library.mampam.com/Final%20ESIA%20-%20Bui%20HEP.pdf>.

deconstruct poverty. By doing so, he shows some of the reasons why development has such a high failure rate.³

The main hypothesis of this article is that the nexus of production relations can also be applied to planned development projects to see where they fall short. I will first outline a brief history of development theory, starting with the idea of modernity, and ending with an introduction to postmodern questions about development and poverty. The second part of the paper is an introduction to Ghanaian development and the Bui Hydropower Project. Next, I use the nexus of production relations to look at how the Bui Hydropower Project will have unintended consequences for the health of Ghanaian people. Finally, I will sum up my findings on the application of the nexus to the Bui Hydropower Project.

Introduction to Development Theory

Modernization Theory, though many would not recognize its name or origins, still colors contemporary conceptions of development. The theory has its roots in the Enlightenment, a philosophical movement of the mid-1700s among men (and some women) like Voltaire, David Hume, the Baron de Montesquieu and Adam Ferguson.⁴ According to Peter Hamilton, the basic “*philosophe*” of the Enlightenment would endorse the following attitudes as the correct way in which man may understand the world: individualism, universalism, toleration, empiricism, reason, science, progress, freedom, secularism and uniformity of human nature.⁵ The Enlightenment was largely a challenge against Christianity (or the Church’s) power to interpret

³ Lakshman Yapa, “What Causes Poverty?: A Postmodern View,” *Annals of the Association of American Geographers* 86, no. 4 (1996): 707-728, December 23, 2011, <http://www.jstor.org/stable/2564348>.

⁴ Peter Hamilton, “The Enlightenment and the Birth of Social Science,” in *Modernity: An Introduction to Modern Society*, ed. Stuart Hall et al. (Oxford and Malden: Blackwell Publishers Inc., 1997), 20.

⁵ *Ibid.*, 23-24.

the world.⁶ For Comte, the evolution of society, from its lowest form to the highest, modernity, came in three steps. As humans embraced modern ideals, their societies would become more “enlightened” and reasonable.⁷

The notions of modernity and progress gained importance again after World War II, the time of decolonization and the creation of new countries. People sought answers as to why certain countries fared better than others. They concluded that those that fared well were “modern”, and those that had not were “backward.” Eventually, these countries would eventually make their way to modernity. This time, however, the criteria for modernity had changed.⁸

*As the “backward nations” advanced, in this optic, a “modern” form of life encompassing a whole package of elements—including such things as industrial economy, scientific technology, liberal democratic politics, nuclear families, and secular world views—would become universalized. In the process, poor countries would overcome their poverty, share in the prosperity of the “developed” world, and take their place as equals in a worldwide family of nations.*⁹

Modernization also connotes a type of economic status. Rostow wrote about the “stages-of-growth”.¹⁰ He believed that all societies fit into one of the following economic stages: “the traditional society, the preconditions for take-off, the take-off, the drive to maturity, and the age of high-mass consumption.”¹¹ This 1960 publication was an appeal for democracy and free-market economies, and against the spread of communism.¹²

⁶ Ibid., 30.

⁷ Ibid., 49-50.

⁸ James Ferguson, *Global Shadows: Africa in the Neoliberal World Order* (Durham and London: Duke University Press, 2006), 177.

⁹ Ibid.

¹⁰ W.W. Rostow, *The Stages of Economic Growth: A Non-Communist Manifesto* (London and New York: Cambridge University Press, 1960), 2.

¹¹ Ibid., 4.

¹² Ibid., 162-167.



Rostow's Stages of Economic Growth¹³

Marx, of course wrote that modern history is constituted by class struggles. His idea of development did not stop at the mass consumerism; he believed that the free market model is what helped bring about class inequalities. For Marx, development meant equality in resources. If the free-market were the epitome of modernization, large portions of humanity would be doomed to lives of slavery to the markets. What is important to note is that Marx did not question whether or not modernization or development is teleological; he questioned what the telos is and should be. He did not question many of the underlying suppositions that modernization had the ability, if used correctly, to bring about a better, more equal world.¹⁴ Ironically, Rostow's theory was quite similar in its assumption of a telos.¹⁵ For Marx and Rostow, modernity itself was not the enemy, but the opposing view of how it should be achieved and managed was.¹⁶

¹³ Ibid., 5, 8, 9, 10, 19.

¹⁴ Karl Marx and Friedrich Engels, *Manifesto of the Communist Party*, accessed April 10, 2012, <http://www.gutenberg.org/cache/epub/61/pg61.html>;
Rostow, *Stages of Economic Growth*, 145.

¹⁵ Rostow, *Stages of Economic Growth*, 10-11.

¹⁶ Ibid., 11, 145, 164.; Marx and Engels, *Manifesto*.

In the 1960s, John Friedmann's core-periphery model gained popularity in the study of the spread of development. This model suggested that areas with a consistently growing economy gain an economic momentum that enables them to usurp power from their neighbors. Pre-colonial areas would begin as self-sufficient entities, and would continue as such until colonizers began seizing the property of their neighbors. They would establish urban hubs for commerce, thus creating an imbalance of trade and power. The "core", in this case, the colonizers, would benefit from the exploitation of the "periphery." At some point, the periphery would gain more power and include hubs of its own, though not as strong as that of the core. Finally, the center and multiple periphery centers would all be connected in a large system of commerce.¹⁷

Friedmann's model demonstrated the historical exploitation of underdeveloped areas in the first two steps of his model. However, many academics disfavored the view because it idealized what should happen afterward. At the time, and at present, many colonized areas remain undeveloped and exploited by the "core."¹⁸

Dependency Theory, which is similar to the core-periphery model, emerged from Latin American and Caribbean intellectuals. This theory applied Marx and Engels' writings to the experience of underdevelopment in Latin America and the Caribbean. Ironically, one of Dependency Theory's noted proponents, Andre Gunder Frank, was German, and received his PhD from the University of Chicago. In the 1960s, Frank wrote that the development of economically successful countries was brought about on the backs of the underdeveloped. For one country to prosper, it had to deprive another of the ability to do so itself. Colonizers

¹⁷ Robert B. Potter et al., *Geographies of Development: An Introduction to Development Studies* (Harlow, England: Pearson Education Limited, 2008), 97-98.

¹⁸ Ibid., 98-99.

benefitted from an imbalance of trade and resource sharing with their colonies. Even after the era, of colonization, these unfair global relations persisted.¹⁹

Despite its insight, Dependency Theory continues the myopic tradition of equating economic issues with development. Proponents of the theory argued for a withdrawal from the world economy in order to establish true independence. However, this proved to be ineffective in the face of globalization, economic and otherwise.²⁰

What if modernity, and all of its consumption, was the enemy? What if economic approaches should not have been used in the first place? Could it be that the desire to obtain material goods is not a universal, but relative to culture? If so, what are the implications of this desire? Sahlins suggested that peoples who lived in “unmodern” hunting and gathering societies were not poor due to a lack of material goods. He pointed out that an individual in one of these societies actually prospers by having only the bare necessities so that he or she could move from a place of nutritional insufficiency to plenty. This raises the questions: Is poverty, then, a matter of perspective and relative to culture? Could it be that in unmodern and modern cultures alike, when the greed for material objects exists, it dominates their owners, thus making the objective of “development” ridiculous? Sahlins seems to answer in the affirmative.²¹

Similarly, the postmodern approach to poverty and development questions the nature of each term, and what they mean. Who decided the criteria for poverty and development? When did this happen? What assumptions were made in this process? How might these ideas fail to be comprehensive? Why have so many development schemes failed? Who was labeled poor and by whom?²²

¹⁹ Ibid., 108-112.

²⁰ Ibid., 112.

²¹ Marshall Sahlins, *Stone Age Economics* (Chicago: Aldine-Atherton, 1972), 1-40.

²² Yapa, “What Causes Poverty?,” 707, 720.;

Postmodern theorists claim that poverty and development are part of a hegemonic discourse. Development models tend to be created under the assumption that Western labels of who is poor, and what constitutes poverty, as well as how society can move from “lower” to “higher” states of development are correct. These labels and models were based on modern, Enlightenment ideals about individuality, universalism and liberty; as good as these ideals sound, their labels created an “other” out of people and societies that did not fit into the European conception of what society should be. This is not to say that all “undeveloped” societies did not have any of these Enlightenment ideals. It is to say that whether or not they did, these societies were not perceived as adequate, because they did not mirror the idealized European processes of modernization.²³

Escobar asked whether or not alternative methods of development should be pursued in light of the failures of modernity. He concludes that no matter the method of development, the scheme will fail in some form because “development” itself is flawed. “Development” is the discursive strategy used to dominate the world by forcing the “undeveloped” to become like oneself.²⁴ Furthermore, the sciences which the West has created to understand the world heavily imply that the Enlightenment provides the best way to understand all issues, even those outside of the West. What Escobar advocates for is looking at the ways a society defines itself and its components, rather than relying on one’s own cultural position with all of its biases.²⁵

Like Escobar, Yapa believes that social practices and social science are constructed. According to him, social theory dictates the data we receive, along with several other

Arturo Escobar, “Imagining a Post-Development Era?: Critical Thought, Development and Social Movements,” *Social Text* no. 31/32 (1992): 22-25, accessed April 10, 2012, <http://www.jstor.org/stable/466217>.

²³ Escobar, “Imagining a Post-Development Era?,” 24-26.

²⁴ *Ibid.*, 25-28.

²⁵ *Ibid.*, 34-35.

propositions for adjusting the way we think about and use social science.²⁶ He views poverty as “socially constructed scarcity” that exists physically and discursively. Yapa argues that by deconstructing poverty, one can see the multiple discursive relations that go into making its materiality. Furthermore, the postmodern approach sheds light on paths of action that may be taken to eradicate poverty.²⁷

The specific framework that Yapa uses to deconstruct poverty is the nexus of production relations. A derivative of Marx’s concept of production relations, the nexus shows how “[p]roduction is conducted within a network of discursive and non discursive relations.”²⁸ However, unlike Marx, Yapa shows how something like class can play into the creation of poverty, but is not poverty’s *only* explanation. Yapa insists that the fluctuating dynamics of the nexus allow for aspects of poverty to belong to more than one node of the nexus at once. No one part has greater importance. The existence of discourse about the material, and the material itself, in the nexus, comprise “discursive materialism.”²⁹

As promising as the postmodern approach sounds, not all scholars agree that it is the appropriate approach to addressing development and poverty. Shrestha stated a number of problems he had with postmodernism in general and Yapa’s article in particular. He claims that Yapa’s article “...denies the historical integrity of the social reality...”³⁰ Shrestha quoted Sivanandan in his argument that postmodernism disconnected poverty from its proper context, and perpetuated self-indulgence via its self-centeredness. More specifically, he argued that postmodernism is not able to move beyond its elite rhetoric of deconstruction in order to find the

²⁶ Yapa, “What Causes Poverty?,” 708.

²⁷ Ibid., 707.

²⁸ Ibid., 709.

²⁹ Ibid., 710.

³⁰ Nanda R. Shrestha, “On ‘What Causes Poverty?: A Postmodern View’ A Postmodern View or Denial of Historical Integrity? The Poverty of Yapa’s View of Poverty,” *Annals of the Association of American Geographers* 87, no. 4 (1997): 710, accessed April 1, 2012, <http://www.jstor.org/stable/2564408>.

truth and suggest solutions to social problems. He goes on to argue, following Marx, that class relations are the only viable way of explaining inequalities in the world throughout time and history.³¹

The postmodern response to this, of course, is that Shrestha misunderstood the core of what Yapa and other postmodernists were trying to suggest. Development has failed in the past because social scientists have tried to pigeon-hole poverty into just economics, class relations or other factors. Yapa goes on to show how each of Shrestha's concerns are only a small element of the whole, and that postmodernism allows for the understanding of how each of these elements interacts with the others. According to Yapa, postmodernism allows for action because it looks beyond the Enlightenment ideal of universalism and admits there is not one development panacea that will cure the whole world of poverty.³²

Ghanaian Development Overview

Ghana is committed to development. The University of Ghana offers classes in areas such as theatre, political science and geography, with special emphasis on development.³³ The government has a strong agenda concerning the development of resources and people in the

³¹ Ibid., 712.

³² Lakshman Yapa, "Reply: Why Discourse Matters, Materially," *Annals of the Association of American Geographers* 87, no. 4 (1997): 717-722, accessed April 3, 2012, <http://www.jstor.org/stable/2564409>.

³³ "Department of Geography and Resource Development: Courses and Course Briefs," University of Ghana, accessed December 9, 2011, <http://www.ug.edu.gh/index1.php?linkid=614>.
<http://www.ug.edu.gh/index1.php?linkid=637>.

"Department of Theatre Arts: Courses," University of Ghana, accessed December 9, 2011, <http://www.ug.edu.gh/index1.php?linkid=854>.

"Department of Political Science: Courses and Course Briefs," University of Ghana, accessed December 9, 2011, <http://www.ug.edu.gh/index1.php?linkid=637>.

country. Ghana's Growth and Poverty Reduction Strategy II clearly states that the goal of the country's development projects is to become a middle-income economy.³⁴

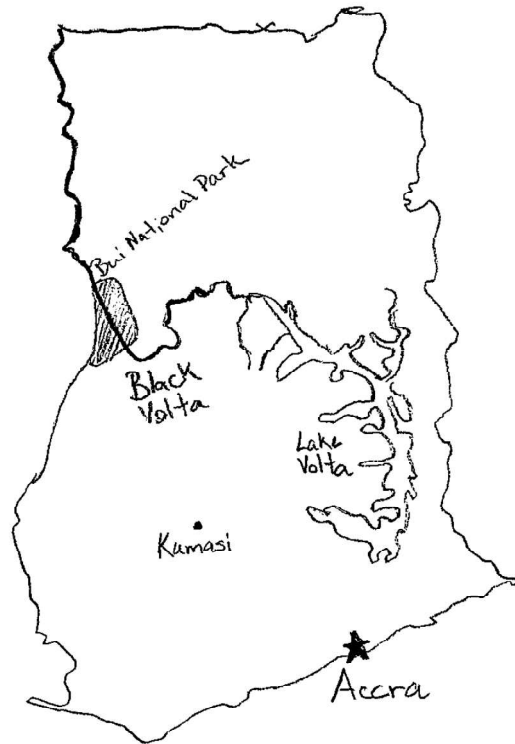
The CIA World Factbook estimates that Ghana's GDP per capita (PPP) was \$3,100 in 2011, and that the country as a whole had a GDP of \$74.77 billion (PPP). It estimated that in 2007, 28.5% of Ghana's population was living below the poverty line. If this proportion has held constant, then about 7,193,969 of Ghana's estimated 25,241,998 people (by July 2012) still live under the poverty line.³⁵



Map of Africa, With Emphasis on Ghana

³⁴ National Development Planning Committee, *Growth and Poverty Reduction Strategy (GPRS II) (2006-2009)* (Republic of Ghana, 2005), accessed December 9, 2011, http://siteresources.worldbank.org/INTPRS1/Resources/GhanaCostingofGPRS_2%28Nov-2005%29.pdf.

³⁵ "CIA: The World Factbook: Ghana," Central Intelligence Agency, accessed April 2, 2012, <https://www.cia.gov/library/publications/the-world-factbook/geos/gh.html>.



Map of Ghana, With Emphasis on Important Landmarks Such As the Black Volta River and Lake Volta

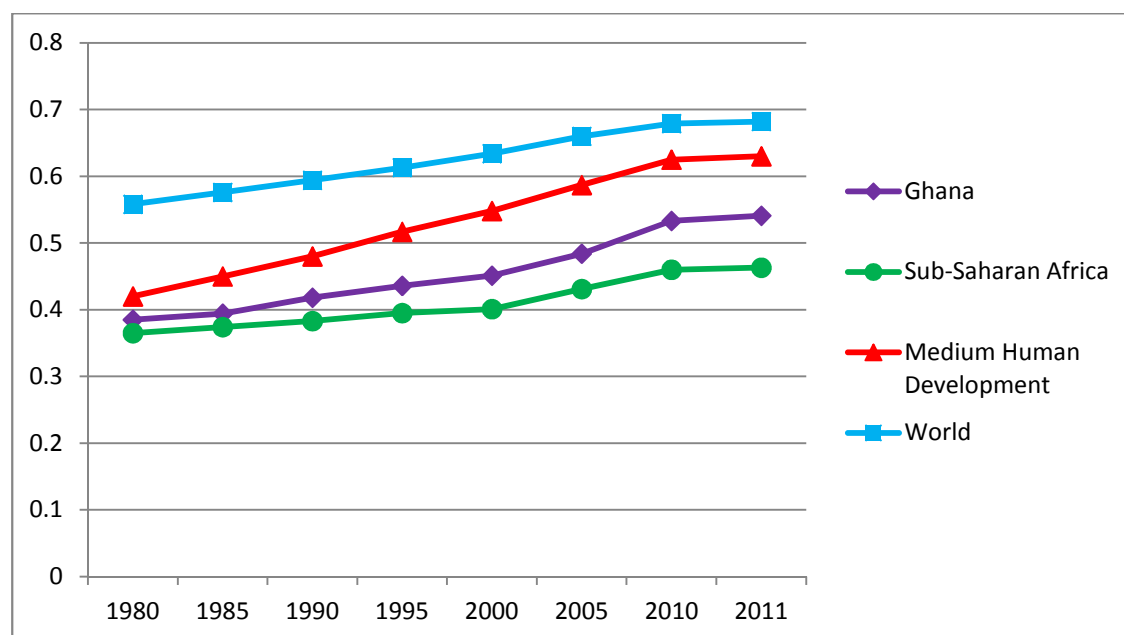
The Human Development Index is one response to the problem of trying to understand the whole picture of development. Made for the 1990 Human Development Report and released by the United Nations, “[t]he HDI was created to emphasize that people and their capabilities should be the ultimate criteria for assessing the development of a country, not economic growth alone.”³⁶ “It is a summary composite index that measures a country's average achievements in three basic aspects of human development (according to the United Nations Development Program): health, knowledge, and income.”³⁷ The United Nations also admits that the HDI single-handedly cannot tell how developed a country really is.³⁸ However, the index is widely

³⁶ “Frequently Asked Questions (FAQs) about the Human Development Index (HDI),” United Nations Development Programme, accessed March 15, 2012, http://hdr.undp.org/en/media/FAQs_2011_HDI.pdf.

³⁷ Ibid.

³⁸ Ibid.

accepted and used as one of the best tools available for describing and comparing human development, and is still used by the United Nations in their Human Development Reports.³⁹



HDI Comparisons, 1980-2011⁴⁰

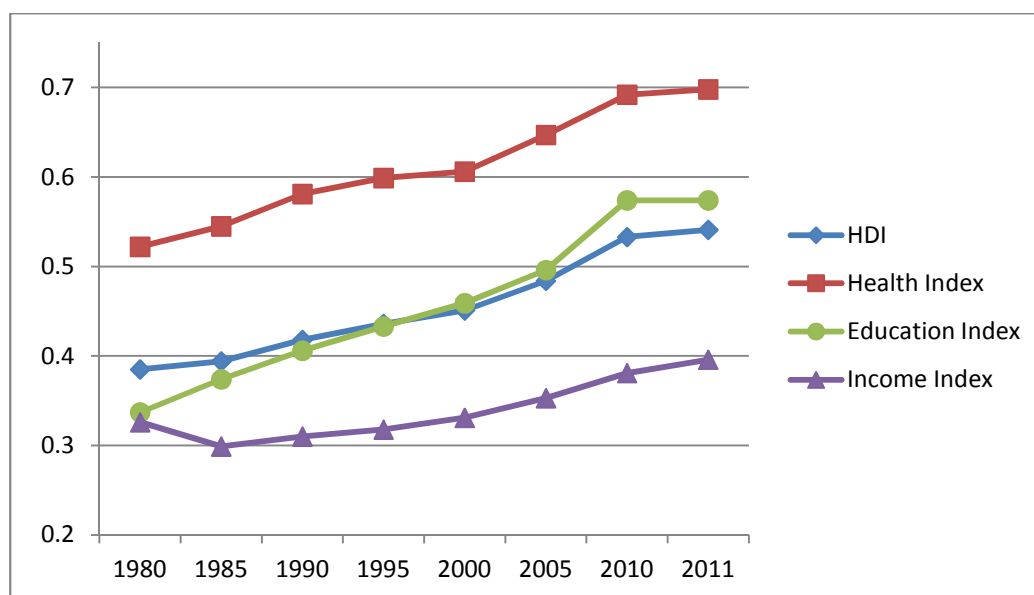
According to the statistics in the graph above, which have been supplied by the UNDP, Ghana's HDI has been steadily increasing since 1985. Its 2011 HDI is 0.541. Ghana is more "developed" with an HDI that is 0.078 points higher than the average Sub-Saharan African country whose average is 0.463. However, both are lower than what the UNDP calls "[m]edium human development": 0.630. Furthermore, there is a 0.141 difference between Ghana's HDI and the 0.682 world average. Nevertheless, according to the HDI, Ghana is becoming more "developed."⁴¹

³⁹ "Reports (1990-2011) | About the Reports," United Nations Development Programme, accessed March 15, 2012, <http://hdr.undp.org/en/reports/about/>.

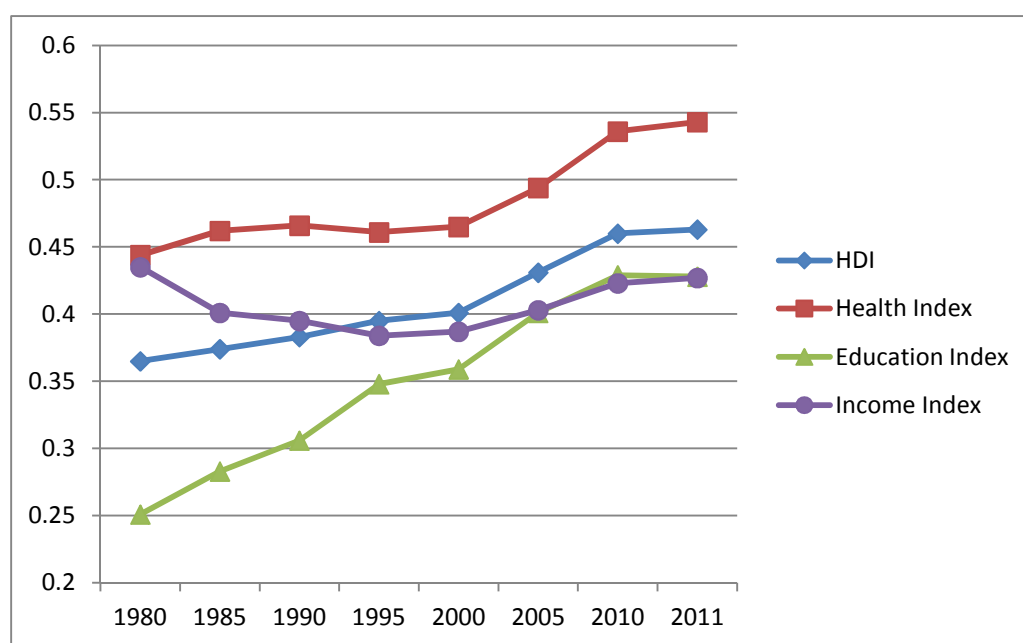
⁴⁰ "Ghana Country Profile: Human Development Indicators," United Nations Development Programme, accessed February 18, 2012, <http://hdrstats.undp.org/en/countries/profiles/GHA.html>.

⁴¹ Ibid.

The following graphs are a more detailed breakdown of the same information that comprises the graph above.



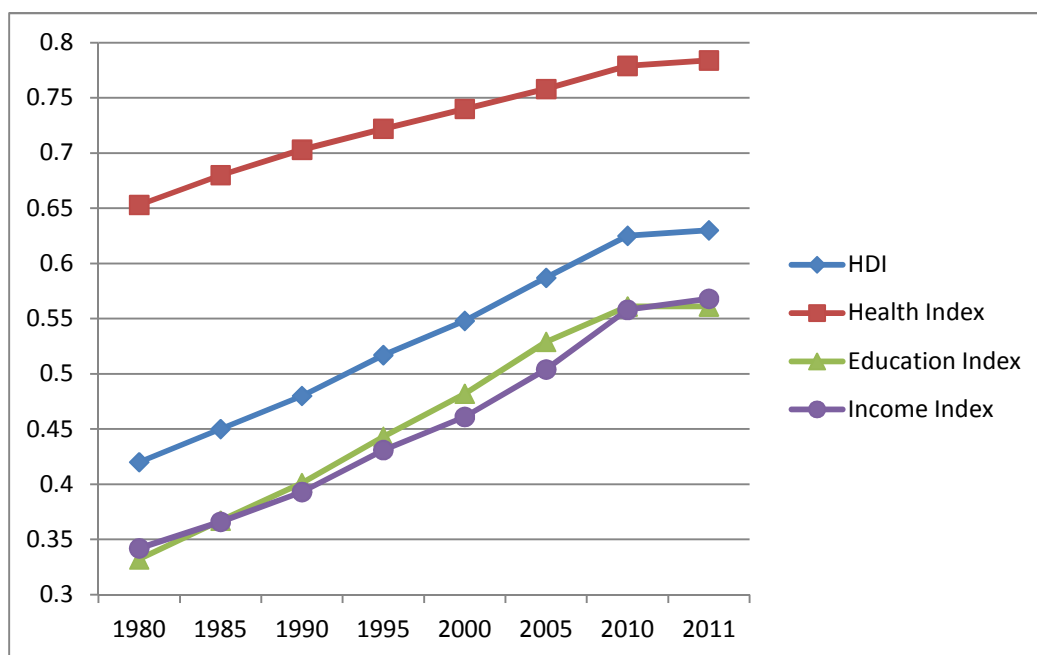
Ghanaian HDI, 1980-2011⁴²



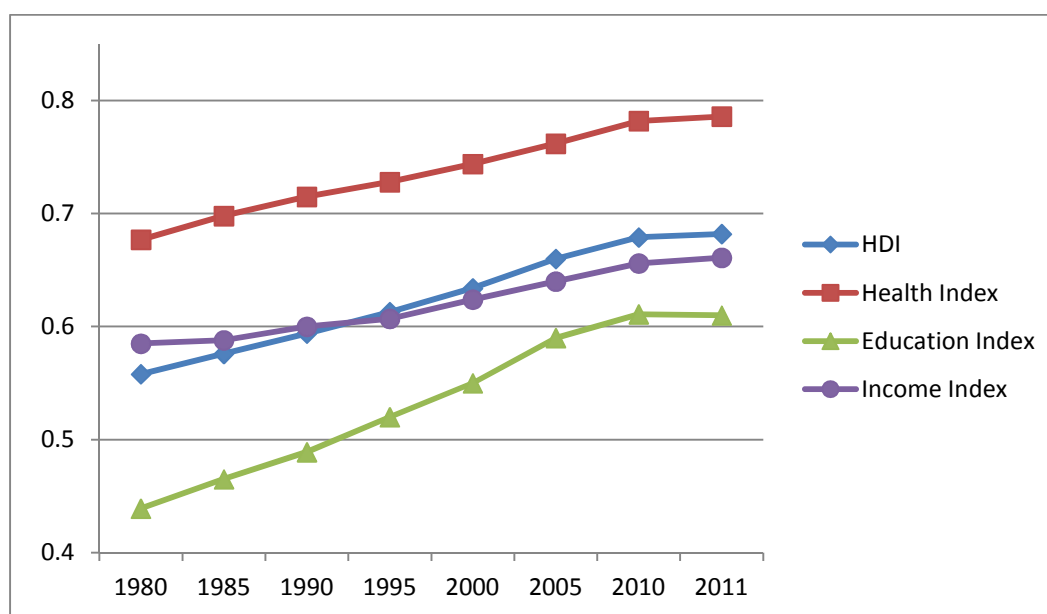
Sub-Saharan African HDI, 1980-2011⁴³

⁴² "International Human Development Indicators: Do It Yourself Data Tables," United Nations Development Programme, accessed April 19, 2012, <http://hdrstats.undp.org/en/tables/>.

⁴³ Ibid.



Medium Human Development HDI, 1980-2011⁴⁴



World Average HDI, 1980-2011⁴⁵

⁴⁴ Ibid.

⁴⁵ Ibid.

During my limited time in Ghana, it appeared to me that Modernization Theory still had many adherents. There was much talk about development, improvement and progress; in my classes, instructors told stories of their trips to Europe or North America with emphasis on the material plenty they experienced. I believe that for many Ghanaians development is primarily about improving access to higher quality, and a greater quantity of, goods and services. The focus is not necessarily on selfish consumption, though this is possible, but on improving quality and length of life.

Nexus of Production Relations, the Bui Hydropower Project and Health

Yapa said that the postmodernist concerned with epistemology (what he addresses) brings up “important questions about the nature of signs, representation, language, power, and policy. Their relevance does not depend on the empirical status of postmodernity as condition.”⁴⁶ I do not espouse postmodernism as ontology, but I do think that the nexus of production relations can be helpful. In this thesis, I will not use the framework to deconstruct poverty as it already exists in Ghana. Instead, I claim that the nexus of production relations has an alternate utility of looking into the future. This framework can be used when planning development projects to build awareness of the unintended consequences a project may have.

Introduction to the Bui Hydropower Project

The *Environmental and Social Impact Assessment of the Bui Hydropower Project* states that in 2006, 67% of Ghana’s installed electrical generation capacity was from the Akosomobo and Kpong Hydro Plants, and 33% came from the Aboadze Thermal Plant and the Tema Diesel Plant. Its total generation capacity was 1,760 megawatts. However, in 2002 it was estimated that

⁴⁶ Yapa, “What Causes Poverty?,” 708.

only 43% of Ghanaians had electricity, and the majority of Ghanaian-produced electricity was utilized in urban areas. Furthermore, Ghana depended (in 2007) upon electricity from Côte d'Ivoire when demand exceeded generation.⁴⁷

At the time of the ESIA's publication, it was estimated that the country would demand 100 megawatts more generation capacity "every two years".⁴⁸ Therefore, the government of Ghana decided that it would be appropriate to expand its hydropower sector with the construction of the Bui Hydropower Project, another hydroelectric dam. This dam would generate, at maximum, 400 megawatts. The power is to be shared among the north and south of Ghana; however, the majority will go to the north, and as northern demand grows, less will be directed to the south.⁴⁹

The sod cutting ceremony for the Bui Hydroelectric Project was held on August 24, 2007. At the ceremony, President John Agyekum Kufour cited the need for more electricity to change the country and industrialize.⁵⁰ On December 2, 2008, the President also attended the River Closure Ceremony. Also in attendance were Senior Management Members from the contracting company, SinoHydro Corporation of China.⁵¹ Originally, the dam was expected to cost about US\$622 million, with US\$60 million from the Government of Ghana, and the rest on loan from the EXIM Bank of China.⁵² Since construction has started, Ghana estimates that it needs US\$168 million more to finish the project on time.⁵³

⁴⁷ ERM and SGS Environment, *ESIA*, 5.

⁴⁸ *Ibid.*, 6.

⁴⁹ *Ibid.*

⁵⁰ "Bui Project Sod Cutting Event," last modified 2010, http://www.buipowerauthority.com/sod_cutting_news.htm.

⁵¹ "Bui Project-River Closure Ceremony," last modified 2010, http://www.buipowerauthority.com/river_closure.htm

⁵² "Frequently Asked Questions," accessed April 12, 2012, <http://www.buipowerauthority.com/faq.htm>.

⁵³ "Press Release," last modified 2012, http://www.buipowerauthority.com/press_release_funding.htm.

The chosen site for the Bui Project is along the Black Volta River, where the two preceding hydroelectric projects have already been constructed and put into operation. The site lies at the boundary of the Northern and Brong-Ahafo Regions. Part of it is in the Bui National Park. This site was “particularly suitable for a hydroelectric project because of the relatively deep gorge where the Black Volta River flows through the Banda Hills.”⁵⁴

The (previous) Volta River Project was the political and economic child of Kwame Nkrumah, the first president of the Republic of Ghana. He envisioned a socialist, industrial Ghana, and saw large scale electricity generation as integral to that dream. Nkrumah was clearly influenced in some way by Modernization Theory, which was in vogue at the time of his rule. However, he believed that industrialization was only a way of solving the larger problem of economic and social inequalities brought on by a continuing history of Western imperialism. If Ghana could become competitive on a global scale, or at least self-sufficient, it could make its own policy decisions without the intrusion of foreign powers.⁵⁵

The Volta River Project became a reality for Ghana. The project, “provided the foundation for an industrial complex for the future....The state invested in oil and sugar refineries, meat-canning, soap- and paint-making factories, and a vehicle assembly plant” as well as other industries. From 1960 to 1965, the real GDP skyrocketed by 24.5 percent. However, Nkrumah’s success came with bitter opposition from Western, anti-communist forces like the USA. These forces decreased the price of cocoa enough to bring Ghana to its knees, as well as made conditions for borrowing quite unfavorable.⁵⁶

The Republic of Ghana’s *Growth and Poverty Reduction Strategy II*, which was published in 2005, shows that Nkrumah’s dream of industrialization is still alive. Throughout the

⁵⁴ ERM and SGS, *ESIA*, 6.

⁵⁵ Hajor, *Nkrumah and Ghana: The Dilemma of Post-Colonial Power*, 59, 68, 76, 78, 80-82.

⁵⁶ *Ibid.*, 81-83.

document, there is mention of the general belief that economic growth will lead to poverty reduction. “The central goal of the new policy is to accelerate the growth of the economy so that Ghana can achieve middle-income status within a measurable planning period.”⁵⁷ In the *GPRS II*, poverty reduction and development are equated with each other.

However, there are indications that the state-endorsed development strategy is not a pure form of Modernization Theory. The focus on economics is combined with the desire to meet the Millennium Development Goals (MDGs). While Yapa did not mention the MDGs in his article, “What Causes Poverty?: A Postmodern View”, they are not all primarily economic in nature (even if it is popularly believed that their achievement must be through economic growth). This statement from the introduction of the *GPRS II* sums this sentiment up well: “The nation must now aim for strategic objectives beyond the minimal goals of poverty reduction as envisaged under GPRS I, even though faster growth and structural diversification will themselves provide the resources to more than meet the MDG objectives of GPRS I.”⁵⁸

Ghana’s *Growth and Poverty Reduction Strategy II* was in effect at roughly the same time the Bui Hydropower Project began to materialize. It is not hard, therefore, to imagine that the dam symbolizes Ghana’s ongoing commitment to industrialize, and, arguably, “modernize”. However, broadly speaking, as development theory changes, so do policies. The fact that the government of the Republic of Ghana was concerned about achieving MDGs⁵⁹, and that the *ESIA* is a mandatory part of the Bui Project⁶⁰ demonstrates that it has moved on from pure Modernization Theory, to a certain extent. Nevertheless, the basis for the project appears to remain modernization.

⁵⁷ National Development Planning Commission, *Growth and Poverty Reduction Strategy*, I.

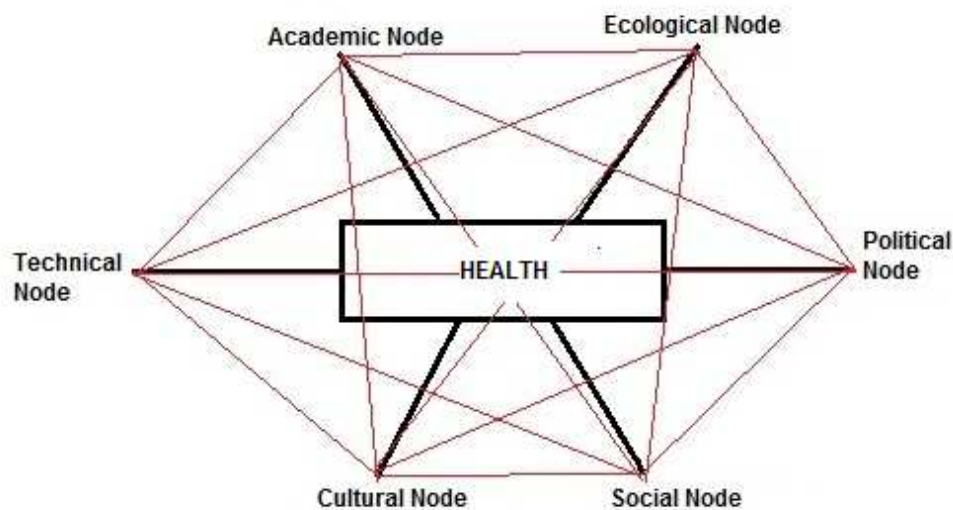
⁵⁸ *Ibid.*, II-III.

⁵⁹ *Ibid.*, li-iii.

⁶⁰ ERM and SGS, *ESIA*, 3.

The Bui Hydropower Project and the Nexus of Production Relations

The construction of the Bui Hydropower Project involves the same basic components as Yapa's nexus of production relations: the technical, academic, ecological, political, social and cultural nodes. The figure below is very similar to the one in his article. The major change is that the focus is on the health as it is related to the Bui Hydropower Project, instead of the construction of poverty as a whole.⁶¹



Nexus of Production Relations of the Bui Hydropower Project

Technical Node

The technical node of the Bui Hydropower Project is perhaps best understood as the technical aspects that go into, and are the result of, the actual construction of the dam. One of the most immediate ways construction will affect health is through the creation of additional hazards to local people. The *ESIA* predicted that situations such as a passer-by's falling into a pit would be very likely, and that this would have a "moderate impact".⁶² In addition, the influx of traffic

⁶¹ Yapa, "What Causes Poverty?," 709.

⁶² ERM and SGS, *ESIA*, 129.

around the dam was also predicted to cause an upsurge in the number of Ghanaians “Killed or Seriously Injured (KSI)”.⁶³

Other health effects from construction are found in the *ESIA*’s chapter 8.6.4 which predicted that the increased amounts of dust in the air from construction activities would cause a rise in respiratory and eye infections. The writers also predicted that noise “may cause hearing impairment, sleep disturbance, behavioural change or anxiety.”⁶⁴ Construction would entail the creation of ditches and holes. If water is allowed to accumulate, local populations should expect malaria rates to rise because water is a mosquito breeding-ground. Malaria is already the leading cause of death in many villages around the construction site.⁶⁵

The separation between the technical and other nodes is not straight-forward. For example, the technical aspects of production rely greatly on the academic pursuits that shaped construction plans. The writers of the *ESIA* referenced previous engineering studies when researching and compiling their results and suggestions. These studies span from the 1976 study done by the Snowy Mountains Engineering Corporation to the 2006 Bui Hydroelectric Power Project Feasibility Study Update and a hydrological analysis by Unihydro Limited.⁶⁶ This is not to mention the massive amount of actual planning for the dam’s construction by trained professionals.

Despite the fact that the Ghanaian government did not receive funding from the World Bank for the construction of the Bui dam, the writers of the *ESIA* still decided to conform to

⁶³ Ibid.

⁶⁴ Ibid., 128.

⁶⁵ Ibid., 129.

⁶⁶ ERM and SGS, *ESIA*, 2;

Environmental Resources Management and SGS Environment, eds., *Environmental and Social Impact Assessment of the Bui Hydropower Project: Final Report-Annex Volume* (Ghana: Ministry of Energy/Bui Development Committee, 2007), E1, accessed February 20, 2012, <http://library.mampam.com/Final%20ESIA%20-%20Bui%20HEP.pdf>.

“international best practice...in accordance with the policies, safeguard procedures, and guidance of the World Bank Group.”⁶⁷ The academics working within the World Bank have had an impact even where they personally may have had no connection. Why Ghana/Environmental Resources Management chose to comply with the World Bank’s international best practice also raises questions about the political and cultural linkages to this technical-academic connection.

The technical meets the ecological in the creation and inundation of a reservoir for the dam. Inundation was predicted by the *ESIA* to have significant effects on local health. The Black Volta was predicted to lose 40 kilometers, with a large lake in its place. According to the *ESIA*, the lake (reservoir) is about 440 square kilometers, and has up to about 500 kilometers of shoreline.⁶⁸ Ecologically, this meant a shift from riverine to lacustrine habitat,⁶⁹ which the *ESIA* predicted would cause a dramatic change in the number of cases of certain communicable diseases.⁷⁰ These diseases include bilharzia (schistosomiasis), guinea worms, intestinal worms, and trypanosomiasis (sleeping sickness). The impacts of each were judged to be “major,” and possibly “permanent.”⁷¹ As noted earlier, malaria cases may temporarily increase with construction; however, the *ESIA* failed to mention why they would go back to previous levels during the dam’s operation, especially in light of the reservoir that could act as a “breeding site.”⁷² On a more positive note, the ecosystem change from riverine to lacustrine is expected to somewhat diminish the local cases of onchocerciasis (river blindness).⁷³ Finally, the loss of land to the dam could decrease the availability of medicinal plants,⁷⁴ which the poor tend to rely on

⁶⁷ ERM and SGS, *ESIA*, 4.

⁶⁸ *Ibid.*, 79.

⁶⁹ *Ibid.*, 99.

⁷⁰ *Ibid.*, 125.

⁷¹ *Ibid.*, 126.

⁷² *Ibid.*, 129.

⁷³ *Ibid.*, 126-127.

⁷⁴ *Ibid.*, 122.

when they cannot afford to seek treatment at a conventionally modern (i.e. Western) health care facility.⁷⁵

As a part of its social assessment, the *ESIA* recommended that communities (probably the resettled ones, but it does not specify) be provided with electricity.⁷⁶ Several portions of the *ESIA* suggest that electrical supply to locals could be beneficial in the long run. For example, “cottage industries” could be multiplied in villages with the implied expectation of economic “development” and increased opportunities for locals.⁷⁷ More directly related to health, many of the villagers interviewed during the consultation process believed that they could receive better health care if facilities were electrified.⁷⁸

During consultation procedures, residents of Banda Nkwanta were concerned with whether or not locals would be able to find gainful employment with the project.⁷⁹ In Chapter 8.7, the *ESIA* states that construction jobs would probably be given to migrants who are better educated than locals. This influx of relatively wealthier workers is expected to cause local inflation and “additional hardship for the local people who are unable to benefit....”⁸⁰ Though this is expected to be “major,” it is also expected to improve after construction workers have moved out of the area. In the meantime, the wealthier workers are also expected to stimulate local economies, to the benefit of local quality of life (for those who benefit from the increased trade). However, when the workers leave, the local economy is expected to shrink. This may

⁷⁵ Ibid., 68.

⁷⁶ Ibid., 133.

⁷⁷ Ibid., 70, 155.

⁷⁸ Ibid., 70

⁷⁹ ERM and SGS, *ESIA Annex*, Annex N, pg. 18 of Appendix 2.

⁸⁰ ERM and SGS, *ESIA*, 129.

represent a drastic decrease in the quality of life for many villagers, including health opportunities.⁸¹

One must be wary of the implications of the preceding statements about economic boom, however. It is likely that improved socio-economic conditions would better the overall health of the area. It is not only the ability to buy “better” things or seek better medical care that would increase health. Money can have a significant impact in this way, but by assuming that money is the answer, we overlook the material ways in which health can be improved (even without much personal accumulation), such as through access to potable water.

Academic Node

It can be said that for the outsider looking in, the political and academic are inextricably linked.⁸² Similar difficulties arise when one tries to analyze the linkages between the World Bank and the best practice guidelines as set out by the World Bank.⁸³ As a neoliberal economic institution, it is a bit surprising that the World Bank procedures would include many aspects of “embedded liberalism,”⁸⁴ or at the very least, concerns of what would stereotypically be environmental or socialist groups.

Several simple, but nevertheless, helpful, views emerge. The first is that as an institution, the World Bank may be responding to the political outcry against its strict neoliberal (and, in the past, Rostowian policies). The structural adjustments of the 1980s and 1990s around the world enlarged the wealth gap between the poor and the rich.⁸⁵

⁸¹ Ibid., 130.

⁸² David Harvey, *A Brief History of Neoliberalism* (Oxford and New York: Oxford University Press, 2005), 22, 41, 44.

⁸³ ERM and SGS, *ESIA*, 4.

⁸⁴ Harvey, *A Brief History of Neoliberalism*, 10-11.

⁸⁵ Ibid., 16-19.

The second view is that neoliberalism has begun to fall out of vogue with academics, and Modernization Theory has been replaced by other theories several times over. Ideas about the nature of development and the roles of international agencies may slowly be making their way from the academic realm to the world of official policy-makers in institutions like the World Bank.

The third view is that perhaps academics heard the outcries against World Bank policies, and popularized their critiques. In this case, the political influenced the academic, which has continued to affect the political. Most probably, what occurred on a global scale was some combination of these three scenarios. What Yapa's model shows is not a cause per se, as in the case of the chicken or the egg, but that there is a relationship between nodes. We could say that for this model the origin is not the bottom line; the existence of a relationship is.⁸⁶

Similarly, whether by political or academic persuasion, the ESIA for the Bui Hydropower Project was developed with these guidelines in mind, despite the fact that the project was not funded by the World Bank itself.⁸⁷ The question, "From where did the influence to do this or that come?" could be applied to all of the research and planning surrounding the Bui Hydropower Project. For example, why did the Ghanaian government decide to hire Environmental Resources Management instead of another firm or independent researcher to conduct the ESIA?⁸⁸ The political and academic relationship described above would undoubtedly have an important role in answering all of these questions.

The *ESIA*, its *Annexes* and all similar documents are crucial to understanding how the project could impact the health of Ghanaians. Therefore, the cultural norms, ideas and ideologies

⁸⁶ Yapa, "What Causes Poverty?," 718.

⁸⁷ ERM and SGA, *ESIA*, 4.

⁸⁸ "Bui National Park Survey in Ghana," IUCN/SSC Hippo Specialist SubGroup, accessed November 21, 2011, <http://www.ml.duke.edu/projects/hippos/BuiPark.html>.

which inform these documents are crucial to contextualizing and understanding what they state and suggest.

For example, Annex I of the *ESIA* appears to ask some very important questions concerning the conditions of local people. However, the success of the survey depends to a large degree on the level of cultural literacy the writers of the survey have, as well as the cultural literacy of the surveyors. In other words, the methods of collection and conclusion must be culturally relevant for the results to be correct. Consider the following examples as illustrative of this idea (rather than indicative of what took place during the consultations).

In the first scenario, the village interviewed generally held very restrictive views about women's expression. When the delegates representing the women in the village were brought forth for interview, they mostly remained silent in response to the male surveyor's questions. These women's culturally accepted norms of expression varied greatly from the surveyor's, and, therefore survey methods skewed the results.

Another scenario for consideration: Suppose in the village of Tainaboi, the facilitator of the interview, Kofi, well understood the situation of Kwame Samabia. Suppose that Kofi could relate to Kwame's struggles and concerns due to similar life experiences, but that the recorder, Mac-Donald, did not understand Kwame in the same way Kofi did. Mac-Donald's experiences and education will influence how he determines which points discussed are the most important to the survey. The tone and emphases of the raw qualitative data will reflect this.⁸⁹

While these scenarios are probably exaggerated, they do illustrate the concept of cultural and social competency and their bearings on the social survey results. It is unlikely that quantitative information such as the number of boreholes from which locals may get potable water was misunderstood; however certain nuanced, qualitative information related to health

⁸⁹ ERM and SGS, *ESIA Annex*, J1.

may be lacking or skewed. In such a case, the intersections of the academic, social and cultural nodes are critical to accurate data collection, analysis and conclusions.

The academic, ecological, cultural and social also connect via the surveys and suggested mitigation measures. When trying to measure the overall effects of building the Bui Project, all aspects of life must be considered. This includes a cultural sensitivity to the fact that not all Ghanaians want, see the need for, and/or can afford Western-style medical care. Many Ghanaians still use medicinal plants to treat illnesses. If surveyors are not aware that the poor may rely on medicinal plants, then they will not be as careful to mark where they grow, and how much the project will affect their availability. Assuming that these plants have qualities that are beneficial to the local population, a decrease would have very negative effects on health.⁹⁰

Ecological Node

Building any large structure, such as a dam, profoundly impacts the immediate environment in palpable ways. Several of these instances I discussed above; I would like to use the ecological node to expound upon the many ways seemingly “ecological” effects actually do affect health.

Most of the people within the study area of the *ESIA* rely upon their natural environment for survival. They are fishers, hunters, farmers, livestock herders, charcoal makers and gatherers. Trading is also an important economic activity. Ninety-three percent of Ghanaian adults are informally employed, and the amount of formal employment in the study area is comparable to the national average.⁹¹

⁹⁰ ERM and SGS, *ESIA*, 67-68, 127.

⁹¹ *Ibid.*, 59.

The villages Bator, Bui, Brewohodi, Lucene/Loga, Dokokyina, Agbegikrom and those people living at the dam site have been chosen for relocation because their assets and livelihoods will be completely destroyed by the Project. (Dokokyina is an exception, but the only land connection it would have would be to Côte d'Ivoire.)⁹² However, other villages that were not chosen for relocation were also projected to suffer the loss of natural resources, as well as land.⁹³

Some of the land loss in these cases will be temporary; however, most will be permanent.⁹⁴ For farmers, this means that not only will current crops be lost, but the land necessary for growing future crops will be greatly reduced. The Ghanaian government provides no compensation for potential income from fallow land, only for “standing crops.” This is significant because a large portion of farms in the affected area use the fallow system. There will be a significant effect on the nutritional status of people in these villages.⁹⁵

In addition to the loss of farmlands, all of the communities within the immediate impact zone will suffer losses of forest produce like shea nuts, timber, dawadawa and medicinal plants, as well as a decrease in bush meat. For the average household, up to 20% of the income can come from these sources, and more than 60% for those that mainly hunt. The *ESIA* states, “This loss of forest products will have a disproportionately larger impact on the poorer sectors of the community who [sic] do not farm large areas of farmland and therefore are more reliant on forest products.”⁹⁶

Similarly, the dam will make downstream waters “sediment hungry.”⁹⁷ The implications from a lack of sediment include decreasing productiveness of downstream soils that rely on silt

⁹² Ibid., 119.

⁹³ Ibid., 121.

⁹⁴ Ibid.

⁹⁵ Ibid., 122.

⁹⁶ Ibid., 122-123.

⁹⁷ ERM and SGS, *ESIA Annex*, L7.

replenishment each year. Downstream fisheries will also deteriorate until fishing is no longer a suitable subsistence activity.⁹⁸

The *ESIA* claims that these negative impacts will be on household income.⁹⁹ However, income could be read as “health” or “nutritional status,” as well. Whether income from the activities I described above are products used that are used within their household of origin, or sold to others so that food and other needs can be purchased, these activities are crucial to subsistence. When livelihoods are ruined, or at least diminished, the ability to provide for health needs will decrease correspondingly.

The dam’s construction impacts water, as well as land resources. Beside the disruptions in fishing and farming, water availability and quality will be negatively affected. Even before the dam’s construction, several villages had problems procuring enough water for crops and personal use, especially during the yearly dry season. Nevertheless, the dam could have temporarily lowered downstream water tables, creating a water crisis. It is also known that the reservoir’s filling would have the same effect, and might even require the downstream flow to stop altogether. Of course, this would be disastrous for local populations. The water that does reach downstream runs the risk of being of a lower quality than the water pre-dam. The writers of the *ESIA* appear to believe these are temporary effects.¹⁰⁰ However, one permanent impact will be the strain on resources like potable water by workers who will not move out once construction is finished.¹⁰¹

Throughout the *ESIA*, Environmental Resources Management makes suggestions as to how the negative implications of the dam can be mitigated. However, it is up to the various

⁹⁸ ERM and SGS, *ESIA*, 123.

⁹⁹ *Ibid.*, 122-123.

¹⁰⁰ *Ibid.*, 123-124.

¹⁰¹ *Ibid.*, 125.

sections of the government of Ghana to coordinate and make sure steps to protect its people are being taken on time. Local populations must depend on government officials to be honest and thorough in all of their dealings.

These ecological impacts are also tied into the social and cultural lives of Ghanaians. Activities like farming, fishing and hunting for a living require extensive knowledge about the local environment. The ethnoecology, ethnoentemology and so on, of these local populations may be endangered along with their livelihoods. When the world loses information such as the usage of certain plants or habits of certain insects, it makes the job of working and living within an environment much harder. If local people must resort to non-land/water-based subsistence methods, such indigenous knowledge may no longer be shared by the older generations. Inexpensive medicinal plants or efficient ways of growing food may take hundreds of years to rediscover.¹⁰²

Political Node

Due to the dialectic nature of the nexus of production relations, many political components relevant to this investigation have already been discussed. However, one important, but less documented concern must be addressed: the fact that the Volta River is an international body of water.

Ghana shares the Volta with Burkina Faso and Côte d'Ivoire.¹⁰³ Throughout the life of the dam, Ghana must remain diligent, not only in protecting its own people from the negative impacts of this giant project, but also protecting its relations with neighboring countries. The Watershed Management Plan in the *Environment and Social Management Plan for the Bui*

¹⁰² "About IK," United Nations Environment Programme, accessed April 20, 2012, <http://www.unep.org/ik/Pages.asp?id=About%20IK>.

¹⁰³ ERM and SGS, *ESIA*, 6.

Hydropower Project addresses these concerns with a monitoring program and “[p]romotion of integrated watershed management via the Water Authorities Commission for Ghana and Burkina Faso.”¹⁰⁴ The monitoring program includes discipline for breaches in proper environmental safety for the parties deemed responsible,¹⁰⁵ while the role of the Water Authorities Commission is vaguely described as “[o]ngoing negotiations by Ghanaian members of Water Authorities Commission with Burkina Faso and Cote D’Ivoire colleagues in order to monitor and if necessary manage upper watershed....”¹⁰⁶

Even though the wording is quite vague, the role of politics in the nexus is enormous. It is up to government officials and representatives to ensure the enforcement of protection laws, as well as provide legal protection for vulnerable, underrepresented populations within its own country. Furthermore, governments must be able to work together in honesty about the effects of the dam and compensation for losses up or downstream. Water is one of the most precious resources on earth; it is certainly not unfathomable that arms may be taken up in extreme situations of resource deprivation. However, institutions like the Water Authorities Commission are in place to keep problems from escalating to such a large scale.

Social Node

The social and technical nodes converge on more health considerations, not only for local populations, but also for workers. The *ESIA* fails to take into much account the health and wellbeing of the workers who physically construct the dam. Unfortunately, reports out of Ghana

¹⁰⁴Environmental Resources Management and SGS Environment, *Environmental and Social Management Plan (ESMP) for the Bui Hydropower Project* (Ghana: Ministry of Energy/Bui Development Committee, 2007), 61, accessed February 26, 2012,

http://www.dialoguebarrages.org/dialoguebarrages/index2.php?option=com_docman.

¹⁰⁵ *Ibid.*, 64.

¹⁰⁶ *Ibid.*, 62.

suggest that these people have slipped through the cracks of governmental protection. Several sources have reported that the living and working conditions of the average Ghanaian are below par, and that there have even been instances of physical and sexual abuse by SinoHydro superiors. When SinoHydro was asked about why its Ghanaian workers did not have safety equipment like hard hats and gloves and why they lived in such miserable conditions, it responded shockingly. SinoHydro stated that it was not the firm's job to provide protective equipment, but that it would supply some in the future. It also excused the deplorable living conditions by saying that they were better than what many locals had.¹⁰⁷

What the ESIA does address in somewhat more depth is the stress put on local natural resources and social infrastructure by the migrant workers, which could have numbered more than 2,000.¹⁰⁸ Most immediately, it appears that migrant workers will strain already poor infrastructure.¹⁰⁹

Most people surveyed in the project area felt that their villages were underdeveloped in terms of social amenities and infrastructure. Roads in the area are in poor condition and transport links are poorly developed. Schools and health facilities are insufficient, poorly staffed and poorly equipped. Water supply to the area is inadequate and is largely unsafe to drink. Only Banda

¹⁰⁷ Seth Opoku Agyeman, 2005, "Bui Dam Workers Lock Horns With Chinese Employers" *Crusading Guide*, <http://www.ghanaweb.com/CrusadingGuide/article.php?ID=10736>.
 Ian Motley, "Bui Dam Workers Up Against Chinese Employers," *Modern Ghana*, Last modified May 26, 2008, <http://www.modernghana.com/news/167059/1/bui-dam-workers-up-against-chinese-employers.html>.
 "Ghanaians working on Bui Dam clash with employers," *Myjoyonline.com*, Last updated September 14, 2011 <http://edition.myjoyonline.com/pages/news/200805/16659.php>.

"We Are Like Slaves: Bui Dam Workers," *Peace FM Online*, Last updated November 16, 2009, <http://news.peacefmonline.com/social/200911/31793.php>.

¹⁰⁸ ERM and SGS Environment, *ESIA*, 124.

¹⁰⁹ *Ibid.*, 125.

Ahenkro is served by electricity and there is no telecommunication network to the area.¹¹⁰

The *ESIA* predicted that under these conditions, locals will see their standard of living deteriorate further as friction between new and old residents rises. The Paramount Chief of Banda was concerned especially about the caring capacity of local health care facilities. It would be disastrous to bring in a large, new population, and not make healthcare provisions.¹¹¹

Supposing that the workers were given their own clinic, questions of equality in health care arise. Would the local or migrants' clinic be better? Would migrants want to go to a clinic that is worse than the local one? If the migrants' clinic were better, would the migrants' clinic refuse service to locals in need? What role do the economic disparities between informally employed local populations and relatively well-off dam workers play in the appropriation of health services?¹¹²

Construction sites are stereotypically associated with disease. However, in the case of the Bui Hydropower Project, this stereotype may be a reality for workers and local populations. The writers of the *ESIA* expected that HIV/AIDS, tuberculosis and acute respiratory infections would spread, with mixed results. If ARIs are diagnosed promptly, and the patients receive good health care, the effect of the disease will be small. However, HIV/AIDS and tuberculosis require more medical oversight and care. The *ESIA* expected their effects to be "major".¹¹³

Other communicable diseases like cholera are also likely to be spread among migrants who did not get jobs, due to crowding, lack of wastewater infrastructure and lack of potable water. Unlike the wealthier workers, these migrants will not have the means to provide more

¹¹⁰ Ibid.

¹¹¹ Ibid.

¹¹² Ibid., 59, 124-125.

¹¹³ Ibid., 127.

suitable living conditions for themselves or seek health care in the already crowded health care infrastructure.¹¹⁴

Cultural Node

In addition to the previously discussed cultural effects, certain historical and cultural sites would be destroyed by the Project.¹¹⁵ There does not seem to be an immediate concern that sites' destruction would have a significant impact on health. As the *ESIA* stated, "The importance of cemeteries is linked to the local belief that the deceased play an active role in the lives of the living. Some locals may be extremely anxious or angry at the idea of the Project's destroying their ancestors' graves. Ancestors are therefore honored and venerated, and a lack of respect towards cemeteries denotes a lack of respect to ancestors."¹¹⁶ The authors of the Assessment claim that the level of reverence toward ancestors is not uniform across the study areas. For example, they wrote that it appears that in Bungase and Banda Ahenkro, "the sacredness of public cemeteries is relatively low or non-existent...."¹¹⁷ However, there may be a pro-dam agenda behind this report. Great care should be taken to understand and respect the wishes of local inhabitants, in order to decrease, as much as possible, their anxiety or anger.

Conclusion

Over time, the approaches to poverty and development have changed in academia. However, it is not so clear that these changes have translated as well into international development practice. The Bui Hydropower Project appears to originate from Modernization

¹¹⁴ Ibid., 128.

¹¹⁵ Ibid., 77.

¹¹⁶ Ibid., 73.

¹¹⁷ Ibid., 137.

Theory, despite the fact that a portion of its plans do take into account mitigation measures against some of the negative consequences of the dam's implementation.

This paper argues for an alternate use of Yapa's deconstruction framework. Rather than focusing on poverty as it already exists, the nexus of production relations is helpful in the dissection of development projects and how they could contribute to poverty overall, or even to a symptom of poverty like ill-health. Thus, the gap between academic advances in understanding poverty and development, and the worldwide practices of development can shrink as the theoretical becomes more accessible.

In the particular case of the Bui Hydropower Project, the nexus of production relations serves as an invaluable tool for scrutinizing the many facets of the dam. An examination of the technical node serves as an introduction to how the immediate, concrete aspects of the Bui Hydropower Project can affect health. The academic node aids in the examination of theory presupposed by researchers and planners. The ecological node connects ways in which changes to the environment by the project are directly related to components of health such as nutritional status. The political node illustrates the orchestration of the project by the government, and how governmental consideration of the nodes is important to protecting Ghanaian health. The social node is critical to the examination of the dam as a project that is supposed to improve quality of life. Finally, the cultural node takes into account details of Ghanaian culture in its examination of the project's impacts. These details about life in affected areas are crucial to understanding the dam's effects, not just on paper, but on living human beings.

Many of the topics I discussed under the rubric of the nexus could fit under multiple nodes. For example, the provision of electricity to relocated families could be said to belong to

each of the nodes: technical, academic, ecological, political, social and cultural.¹¹⁸ Technical means of electricity generation and transmission would have ecological effects, while the oversight of the project falls into the political realm. The electricity would change social and cultural relations of those who receive it, and all of this would be planned and studied under one academic framework or another. Such is the dialectical nature of the nexus. It is precisely this multi-dimensional perspective that is needed in development projects.

¹¹⁸ Ibid., 70, 133, 155.

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