

Globalization and the Environment: Implications for Human Migration

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Abstract

Migration is quickly becoming a salient feature of the globalization of trade, investment, and production. One relatively unexplored way of examining the relationship between globalization and migration is to include the natural environment as a proximate explanation of migration within a global political-economic context. An analytical framework of the relationship between globalization, the environment, and migration is developed by synthesizing concepts derived from the literatures related to the population-environment and globalization-environment nexuses. This framework is then applied to a case study of mineral production in Ghana, which is used to demonstrate the utility of key components of the analytical framework.

Keywords: globalization, migration, environment, Ghana

Introduction

Migration is quickly becoming a salient feature of the globalization of trade, investment, and production. International migrants numbered 191 million in 2005 (UN 2006), a number equivalent to the sixth-most populous country in the world (Martin et al. 2006). Indeed, there are more humans living outside their countries of birth today than at any other point in human history (UN 2004).

Two out of every three migrants originate in less-developed countries (UN 2006), and globalization is increasingly posited as an explanation of such movements. The close relationship between globalization and migration was noted by Kofi Annan (the now-former Secretary-General of the United Nations): "Over the past decade globalization has increased the number of people with the desire and capacity to move to other places" (Annan 2006, 963).

One relatively unexplored way of examining the relationship between globalization and migration is to include the natural environment as a proximate explanation of migration within a global political-economic context. In what follows, an analytical framework of the relationship between global-

ization, the environment, and migration is developed. This framework is then applied to a case study of mineral production in Ghana, which is used to demonstrate the utility of key components of the analytical framework.

The Environment and Migration

Much of the research into the population-environment nexus has focused on the environment as an outcome of human population-induced changes, the so-called "P-E" studies (Lutz et al. 2002a; Lutz et al. 2002b). While they have generated significant insights into the relationship between humans and the environment, P-E studies have generally neglected the reciprocal impact of the environment on the population (E-P) (Suhrke 1994). Yet, the natural environment is often an important factor that affects populations through demographic changes in growth rates (cf. Dasgupta 2000) and in age and sex structures (cf. Darkoh and Mbaiwa 2002; Godfrey 1990; Heinonen 2006; Kitula 2006; Lonergan and Parnwell 1998).

The process linking the natural environment to migration (E-P) is complex because the condition of the natural environment is part of a general context in which migration decisions are made by individuals. As a result, the relationship between the environment and migration is rarely direct or causal, but is instead often indirect or contextual in nature (Lonergan and Parnwell 1998). The indirect form of the relationship is reflected in current disputes over whether people who move as a result of environmental degradation are "environmental migrants" or "environmental refugees" (Bates 2002; Hugo 1996; Kibreab 1994; O'Lear 1997; Ramlogan 1996; Suhrke 1994; Westing 1992).

Although the relationship is complex and often indirect, it can be unraveled by examining the possible paths through which the environment is related to migration. Two potential paths will be briefly reviewed: land inequality and concentration, and income or subsistence risk. It should be noted, however, that it is often difficult to determine the direction of causality among these relationships (Marquette and Bilborrow 1998). For example, environmental degradation may cause risks to income or subsistence, which may beget out-

migration, which can beget further environmental degradation in a “cascade effect” or self-perpetuating cycle (Charnley 1997). Alternatively, risks to income or subsistence may cause environmental degradation, which in turn generates out-migration and further environmental degradation in other locales (Marquette and Bilsborrow 1998). Thus, rather than attempting to attribute causality in one particular direction, the purpose here is to describe the sorts of generalized social contexts that may make migration more likely.

Social contexts characterized by pronounced inequalities in the distributions of land often experience various forms of environmental degradation (Boyce 1994). Highly concentrated land holdings reduce the amount of arable or productive land available for subsistence production, compelling landless inhabitants to work more marginal lands (Bilsborrow 2002). Once on more marginal land, a vicious circle begins, as inhabitants quickly degrade these areas, subjecting them again to decreased subsistence or income levels, and compelling them to move on again in search of less-degraded land (Tole 2004). As landholdings become increasingly concentrated, the cycle encompasses larger segments of the dispossessed population (de Janvry et al. 1989).

Environmental deterioration may therefore increase the risk to subsistence and income at either or both the household and community levels (Bilsborrow 1992). At the household level, deforestation and soil erosion decrease the amount and quality of land available for production, generating the need to migrate to maintain the household’s standard of living (Bilsborrow 2002). At the community level, environmental degradation can promote migration through a decrease in the demand for labor in agricultural production (Bilsborrow 2002; Lonergan and Parnwell 1998). As in the case of land inequality and degradation, migration becomes associated in a positive feedback loop with environmental degradation and increased risk to either income or subsistence, as people move from place to place in search of more reliable forms of subsistence or income.

The process through which environmental deterioration can generate migration often unfolds over time in a cumulative, gradual manner (Suhrke 1994). This is particularly the case when environmental deterioration is caused by anthropogenic over-exploitation of natural resources (Bates 2002). The time lag involved between environmental degradation and the initiation of out-migration is a complicating factor in the relationship between the environment and population (Lonergan and Parnwell 1998). For example, it may be years before deforestation leads to soil deterioration to the extent that it can no longer be used to support inhabitants. During this time span, a number of important mediating factors can enter the relationship, including land concentration, income and subsistence risk, and conflict.

Despite the time lag, gradual environmental deterioration has very real consequences for those living in its midst: “Deforestation is a visible process that impresses itself upon the local people in very concrete terms. Every year they experience diminishing returns: There is a longer walk to the forests edge, and less wood to collect” (Suhrke 1994, 485). Thus, a long-term perspective is often necessary in order for the impact of the natural environment on population to become manifest.

Globalization, the Environment, and Migration: An Analytical Framework

The relationship between the natural environment and human population exists within a global political-economic context that is characterized by uneven development across regions or zones of an international division of labor (Chase-Dunn 1998; Wallerstein 1974). The globalization of trade, production, and investment has been central both in creating and in maintaining the macro-structures of the global political-economic context (Arrighi 1994; Chase-Dunn et al. 2000).

This larger global social context “sets the rules of the game for household responses to population pressures and environmental degradation” to the extent that “household behavior regarding migration and environmental degradation must be linked to larger forces such as markets” (Bilsborrow 2002, 80,83). Yet, the impacts of the global political-economic context on the environment-population nexus have not been thoroughly investigated:

The international dimensions of this relationship (between environment and population movements) have been neglected...this dimension is of increasing scale and significance in concert with the accelerating pace of globalization processes... In a context where global environmental stress and degradation have accelerated and unprecedented numbers of the world’s population are seeing migration as an option, the need for research in this area is considerable (Hugo 1996, 105).

A growing literature, however, examines the effects of globalization on the natural environment. Many LDCs have acquired large amounts of foreign debt in an attempt to facilitate economic development and raise living standards. In order to generate the foreign exchange necessary to retire the debt, these LDCs have attracted foreign direct investment (FDI) in large-scale, resource-extractive industries such as mining and export agriculture. Large influxes of FDI often provide the scale of operations necessary to expand economic production and trade and therefore generate significant

amounts of foreign exchange. However, the scale of these operations has also exacerbated environmental degradation in many LDCs. Indeed, a number of cross-national, quantitative studies have found that the globalization of trade, investment, and production contributes to various forms of environmental degradation in LDCs, including deforestation (Burns et al. 1994; Inman 1993; Jorgenson 2006c; Kick et al. 1996), greenhouse gas emissions (Burns et al. 1997; Grimes and Kentor 2003; Jorgenson 2006a; Kentor and Grimes 2006; Roberts et al. 2006; York and Rosa 2006), and organic water pollution (Jorgenson 2004; Jorgenson 2006b).

Similar research has investigated the exogenous effects of globalization and the environment on various aspects of population in LDCs, including the prevalence of infant mortality (Burns et al. 2003; Jorgenson 2004; Jorgenson and Burns 2004; Wimberley 1990), and over-urbanization through rural-urban migration (Shandra et al. 2003). Dependence on foreign trade and foreign capital is argued to siphon away to foreign countries the resources that could otherwise be used to improve human development in LDCs (Wimberley 1990; 1991; Wimberley and Bello 1992). The effects of globalization and environmental degradation on population outcomes are often mediated by domestic or internal factors, particularly the level of economic development (Burns et al. 2003), which has been shown to be partially the result of a country's position in the international division of labor (Kentor 2000).

While cross-national research has examined the effects of globalization on the environment, and on various population-related outcomes, research into the relationship between globalization and migration is much more scarce (Portes 1997). However, there has been some theorization of the processes through which globalization and migration are associated. Sassen (1988; 1998; 2001) contends that the increase in the penetration of FDI from developed countries into LDCs is associated with the consistent increase in the emigration from LDCs. FDI in export agriculture and export manufacturing in LDCs creates a generalized context whereby migration becomes more likely over time. This context consists of two related processes: the mobilization of subsistence workers into wage laborers and the disruption of traditional work structures (Sassen 1988).

The mobilization of the population can occur both directly through the incorporation of inhabitants as wage laborers on export agriculture farms or in export manufacturing plants, and indirectly by generating rural-urban migration where migrants either find employment or become part of the urban surplus population (Sassen 1988). International migrants are often self-selected from among the more upwardly mobile segments of the population in LDCs (Massey et al. 2005). The employment generated by FDI, at least initially,

often includes wages above the average level (Sauvant et al. 1993) and can increase skill levels, both of which may facilitate future migrations by increasing human capital levels and providing the means with which mobility can occur (UNCTAD 1996).

Mobilization may contribute to the disruption of traditional household work structures to the extent that male migrants are compelled to leave the household in search of work for longer durations, or females are incorporated as wage laborers (Sassen 1988). In the former case, women are left to tend to the household, the animals, and the land for increasingly long spans of time (Bilsborrow 1992). Over time, this arrangement can become untenable, particularly given the lack of wage work necessary to support the household in rural areas of less-developed countries (Sassen-Koob 1984). In the latter case, women migrate to urban areas in search of work in export manufacturing plants, the informal sector, as domestic workers, or as sex workers (Ehrenreich and Hochschild 2004). Regardless of the type of work taken, however, this "feminization of the work force" has a disruptive effect on traditional household work structures through the incorporation of new segments of the population into wage work (Sassen 1988, 107).

The generalized context involving mobilization and disruption is "highly mediated," but the role of globalization in generating international migration is clear: "In an 'isolated' country, that is one lacking extensive direct foreign investment, emigration would be quite unlikely to emerge as an option" (Sassen 1988, 20).

As was discussed earlier, however, globalization can also impact the other end of the population-environment nexus through its effects on the natural environment. The role of environmental degradation in generating population movements can be viewed as a significant mobilizing and disrupting factor behind migration in LDCs. By supplementing the analytical framework linking globalization and migration with insights into the relationship between globalization and the environment, a more comprehensive, macro-structural explanation is offered of migration in LDCs.

This analytical synthesis of globalization, the environment, and migration is used to examine the development of mineral production in Ghana between 1983 and 2000. Ghana is examined as a case study because it is widely considered an exemplar of the sorts of structural economic and political changes desired by the World Bank and IMF as part of structural adjustment, or austerity, programs (Leechor 1994). Thus, examining Ghana is a relatively conservative application of the analytical framework to an historical case. If globalization is associated with environmental degradation and population movements in Ghana, where structural adjustment is contended to have produced the desired economic out-

comes, then it is likely related to similar changes elsewhere in less-prosperous countries in the developing world. It should be noted, however, that no attempt is made to generalize from the discussion of Ghana to other countries.

Mineral Production in Ghana, 1983-2000

Globalization and the Environment in Ghana

Ghana is a country of approximately 20 million people located on the West coast of Africa along the Gulf of Guinea. The population lives within a bounded land area that is roughly equivalent to the size of the state of Oregon. The climate is tropical, but annual rainfall decreases in the northern latitudes, where dense forest cover and mountainous terrain yields to drier open savannahs (FAO 2001).

Originally founded as the "Gold Coast," Ghana achieved formal independence from Britain in 1957. The history of Ghana is in many senses a history of integration into the macro-structures of the global political-economic context (Donkor 2005). Economic, political, environmental, and social conditions in post-independence Ghana have been characterized by the vagaries of this integration.

These conditions were exacerbated with the implementation of a structural adjustment program (SAP), known as the Economic Recovery Program (ERP), supported by the International Monetary Fund (IMF) and World Bank in 1983. After continuous declines in output across almost all sectors of the economy, decreases in gross capital formation, public saving, government revenue, and real wages throughout the 1960s and 1970s (Addy 1998), the ERP was designed primarily to increase economic output through privatization of state-controlled industries, which involved creating an attractive business environment for FDI (Hilson 2004).

Given the extent of relatively unexploited mineral reserves (Afriyie 1998), the mining sector of the economy was targeted as the centerpiece of these reforms (Aryee 2001). Since 1983, growth in FDI in the mining sector has been rapid and sustained, totaling an estimated \$4 billion as of 1999 (Aryee 2001). By 1996, four firms—Ashanti Goldfield, Teberebie Goldfields, Ghana Australian Goldfields, and Gencor—controlled approximately 80% of mineral production in Ghana (Hilson 2004). The influx of foreign capital spurred economic growth, which averaged between 5 and 6% per annum between 1984 and 1992, and has averaged between 2 and 4% per annum since 1992 (Konadu-Agyemang 2000). Economic growth has allowed mineral production to surpass cocoa production as the nation's largest source of foreign exchange, which is significant in light of the debt incurred by the state as a result of the SAP (Awudi 2002; Boocock 2002). The "success" of the ERP has prompted the World Bank to label Ghana the "star pupil" of structural adjustment pro-

grams (Grant and Nijman 2004).

Through the ERP, globalization has entailed the integration of Ghana into global circuits of finance, trade, and production. While economic growth has ensued, globalization has had deleterious effects on both the environment and on the population of Ghana (Hilson and Yakovleva 2007). Migration has been a common outcome associated with increased land concentration and increased income and subsistence risk.

While mineral production occurs in areas throughout Ghana, it is concentrated primarily in the Wassa West and Ashanti districts in the southwestern portion of the country. The influx of FDI into the mining sector has substantially increased the production of minerals, particularly gold, in the region (Akabzaa 2000). The expansion of gold production has been directly and indirectly associated with a variety of forms of ecological degradation in the area (Hilson and Yakovleva 2007).

Many of the large-scale, foreign-financed firms in the region employ an open-pit method of mining that is used in combination with cyanide heap-leach processing to extract ore from rock (Akabzaa 2000). Open-pit, or surface mining, involves clearing the land of all surface vegetation in order to access ore located close to the surface (UNEP 2000). The extracted rock-ore amalgam is then processed using cyanide, a highly toxic chemical, to separate or "leach" the ore from the rock (UNEP 2000). This method of mineral production combined with the expanded scale of production operations allowed by FDI has led directly to deforestation, soil erosion, groundwater contamination, and siltation and sedimentation of waterways in large portions of the Western region of Ghana (Hens and Boon 1999; Hilson and Yakovleva 2007).

The expansion of large-scale mineral production has also contributed to environmental degradation indirectly by increasing the prevalence of small-scale, informal, artisanal mining. Land appropriations for large-scale mining have concentrated land holdings, effectively removing the means of subsistence and income for many rural households and increasing the risk to subsistence and income. Approximately 70% of the land in Western Ghana (Britwum et al. 2001), and 13% of the entire country (Hilson et al. 2007), has been conceded, or leased, to foreign-owned operations. Between 1990 and 1998 alone, land appropriations for surface mining displaced an estimated 30,000 persons from 14 communities in the Western region of Ghana (Akabzaa 2000). Without the means to produce either an adequate income or subsistence, many inhabitants have undertaken informal mining activities.

The expansion of artisanal mining, which often involves rudimentary tools and the use of mercury to extract ore, has further exacerbated the rate of deforestation and water contamination levels in Western Ghana. Indeed, small-scale min-

ing has become the new “subsistence industry,” involving an estimated 200,000 Ghanaians (Banchirigah 2006) and representing 10% of all mining production in Ghana (Hilson et al. 2007). In addition to large-scale mines, artisanal miners have destroyed thousands of acres of agricultural lands, leaving behind “moonlike landscapes consisting of unstable piles of waste, abandoned excavations, and vast stretches of barren land... (that are) virtually incapable of supporting plant growth in addition to being exposed to erosion” (Aryee et al. 2003, 135).

Artisanal miners’ use of mercury and other toxic chemicals to extract gold has exacerbated the conditions that produce both environmental degradation and widespread poverty (Hilson and Pardie 2006). Mercury and arsenic contamination from small-scale mining has contaminated fish supplies and groundwater stocks in villages throughout Western Ghana (Amonoo-Neizer et al. 1996; Asante et al. 2007; Babut et al. 2003; Bonzongo et al. 2003; Donkor et al. 2006; Hilson et al. 2007; Serfor-Armah et al. 2004). Unable to derive adequate levels of subsistence from the surrounding environments, inhabitants often increase artisanal mining activities to raise income to support household subsistence levels. Artisanal mining, however, often inserts miners into a “mercury-poverty trap” (Hilson and Pardie 2006). Artisanal miners are often subject to monopolistic markets for mercury supplies and monopsonistic markets for gold, which means that artisanal miners face high prices for the mercury needed to extract gold and low prices for the gold they sell. Caught in between these two markets, artisanal miners face declining earnings from artisanal mining, which in turn creates an incentive to further increase the scale of mining activities, mercury use, environmental degradation, and poverty (Hilson and Pardie 2006).

Globalization, the Environment, and Migration in Ghana

While globalization has been associated with various forms of environmental degradation in Ghana, it has also been associated with increased levels of migration in and out of the country. Ghana is clearly attracting international migrants: between 1985 and 2000, net migration averaged 41,000 per annum in Ghana (World Bank 2006). Net migration figures, however, conceal the fact that Ghana is also shedding large numbers of its citizens. By the mid-1990s, an estimated 2-4 million Ghanaians, 10-20% of the population, were living in other countries (Bump 2006). The level of international migration from Ghana is significant enough to warrant being labeled a “large-scale exodus” (Peil 1995, 346). Indeed, economic and political reforms associated with globalization have created a “new diaspora of Ghanaians searching for opportunities elsewhere” (Bump 2006, 1).

Globalization exacerbates both the frequency and scale of these movements in Western Ghana through its effects on the natural environment, discussed above, and by mobilizing segments of the population and disrupting traditional work structures. Increasingly larger segments of the population have been mobilized both directly as wage labor and indirectly through rural-urban migration. FDI in the mining sector has certainly generated formal employment on large-scale mining sites (Addy 1998). Employment on foreign-owned sites involves higher wage levels and the possibility of attaining job skills that develop human capital (Addy 1998). Higher wage levels and the acquisition of job skills have allowed the accumulation of financial resources and human capital necessary to successfully migrate to urban areas or emigrate abroad. Further acquisition of financial and human capital in urban areas has in turn promoted emigration abroad, exacerbating the “brain drain” problem that has plagued Ghana in recent years (Bump 2006; Peil 1995).

Formal employment in the large-scale mining sites, however, has not been extensive. Indirect forms of mobilization such as the increase in artisanal mining and poverty-driven rural-urban migration are much more common results of globalization. While an estimated 200,000 are employed in informal artisanal mining (Banchirigah 2006), large-scale foreign-financed operations only employ approximately 14,000 (Hilson and Nyame 2006). Although it has become a survival strategy for many, the meager income generated from artisanal mining is by its very nature dependent upon the quality of the natural environment. Thus, over time, the environmental degradation associated with artisanal mining has promoted larger poverty-driven migration streams from rural Western Ghana, as it has become more difficult for small-scale producers to maintain income and subsistence levels (Akabzaa 2000).

The growth of the urban population makes clear that rural-urban migration in Ghana has been significant since the ERP was instituted in 1983. Accra—the capital—received the largest share of migrants, increasing 129% in size between 1984 and 2000 (Yeboah 2003). Most notably, much of the population growth has occurred in peri-urban areas of Accra where squatter-type settlements have become increasingly common since the ERP. The growth of peri-urban settlements has made Accra into a sprawling urban area, covering some 200 square miles (Yeboah 2000).

Urbanization further contributes to the vicious cycle of environmental degradation, poverty, and migration in Ghana in two respects. On the one hand, urbanization has been associated with increased disparities between rural and urban areas in health, education, basic services, and infrastructure, which has in turn exacerbated rural-urban migration in Ghana (Konadu-Agyemang 2000). By increasing the size of the

population in urban areas, migrants increase the demand on rural areas for agricultural products, which increases land and soil degradation in rural Ghana and contributes to further city-bound migration. For example, a survey of 200 people in three rural communities in southern Ghana found that while 45% of the population could not adequately feed themselves, 90% of the products in rural markets in this area were “destined for urban settlements, including Accra” (Gyasi et al. 1995, 363).

On the other hand, however, urban-rural migration streams have become more prevalent, as urban labor markets have been unable to absorb the rapid influx of migrants (Arn 1996; Arthur 1991). This is particularly evident not only in the dramatic increase in informal, small-scale mining, but also in the changing socioeconomic composition of small-scale miners. While informal mining used to be characterized solely as a “poverty-driven” activity (Aryee et al. 2003) carried out primarily by unskilled persons, it is increasingly absorbing semi-skilled and skilled persons who have migrated from urban areas in search of work. These new urban-rural migration streams are related to the ERP, which required the curtailment of state spending on social welfare and development programs:

The inability of Ghana’s rapidly shrinking public and manufacturing sectors to provide new high school graduates with employment has made artisanal gold mining increasingly important in the domestic labor market...a declining standard of living has not only attracted recent school graduates, but has also persuaded a wide range of former professionals, semi-skilled laborers, and retrenched large-scale mine workers to relocate to the many rural reaches of the country where artisanal gold mining can be readily carried out (Hilson and Potter 2005, 111, 113).

Urban-rural migrations have further exacerbated environmental degradation in rural areas. An expanding population has increased the demand on soils and intensified deforestation as inhabitants have cleared forest land for fuelwood and shelter (Akabzaa 2000). Growing numbers engaged in artisanal mining have further contributed to a worsening situation by clearing more land and contaminating more groundwater sources with high levels of mercury and other toxic chemicals.

The mobilization of the population has included women, which has disrupted traditional work structures in Western Ghana. The mobilization of women is evident in the increased involvement of women in artisanal mining and mine service work. As men have migrated in larger numbers to search for employment in urban areas, women have assumed

a larger responsibility for generating income for the household. Increasing numbers of women are found working in artisanal mining sites (Heemskerk 2003). Surveys of communities in southwestern Ghana indicated that approximately 50% of small-scale miners were women (Yakovleva 2007). Women are also increasingly involved in providing services around mining sites, including serving as cooks, merchants, nightclub entertainers, and sex workers (Heemskerk 2003). Prostitution has become quite common: 70% of those surveyed in the Wassa West region reported an increase in prostitution in the community (Akabzaa 2000).

The mobilization of women has disrupted traditional work structures. In some cases, work roles have been completely reversed, as women go to work at mine sites while men tend the land for the household (Yakovleva 2007). The increased involvement of women outside the household has often had detrimental consequences for marriages: “...interviewees have said that some of the women who joined *galamsey* (informal mining work) have started to divorce their husbands and the number of divorces is on the rise” (Yakovleva 2006, 19). Indeed, larger numbers of women are living alone in Ghanaian cities, and when women have achieved education levels beyond the primary level, they emigrate from Ghana in numbers equivalent to men (Peil 1995).

The process of mobilization and disruption in Ghana may unfold gradually over time, particularly when environmental degradation is a significant contributing factor. The lagged effect of environmental change on migration patterns is evidenced by the case of logging in southern Ghana. While not directly associated with mineral production in this case, logging and surface mining exert similar effects on the natural environment (UNEP 2000), and can therefore be expected to have similar effects on migration patterns.

Surveys of three communities in central-western Ghana found that environmental deterioration associated with logging operations generated out-migration over a 35 year period (Carr 2005). Logging had gradually deforested and degraded the soils surrounding the communities, reducing crop yields year after year. The off-farm employment (OFE) generated by logging, however, provided income at a level that was usually sufficient to offset declining agricultural output.

Decreases in world timber prices in the mid-1960s caused the collapse of logging operations in the area (cf. Carr 2002). Without the OFE, inhabitants attempted to increase the intensity of production to raise household income, but logging had degraded the soils to the extent that crop yields could not be sufficiently increased. Subsequent out-migrations from the community occurred gradually over time, and were often directed toward peri-urban settlements: between 1970 and 1980, 35 households (33% of the population) emigrated; 17 more households (16%) emigrated between 1980

and 1990; and another 17 households (16%) emigrated in the early 1990s (Carr 2005).

The lagged migratory response indicates that the relationship between environmental degradation and migration was mediated by the structure and composition of households (Carr 2005), which made collective decisions about resource allocation (Stark 1991). Out-migration from these communities also makes clear the importance of the global political-economic context for the environment-migration relationship, as gradual environmental degradation engendered migration only in the context of declining world prices for timber.

Conclusion

The globalization of trade, investment, and production has integrated more of the world's population and natural resources into a single, global political-economic context. There is growing awareness of the importance of globalization for understanding international migration flows (cf. Annan 2006; Sheikh Haya Rashed Al Khalifa 2006) and environmental degradation (cf. Jorgenson and Kick 2006) in the contemporary world. Previous studies of the population-environment nexus, however, have neglected the global political-economic context in which this relationship exists. Similarly, studies of the relationship between globalization and the environment have not thoroughly considered how this relationship impacts populations through migration. Thus, the specific mechanisms through which integration into the global context may generate environmental degradation and migration flows have remained relatively unexplored.

Using the case of Ghana, the purpose here has been to elucidate these processes. Financed largely by foreign debt and large influxes of FDI, the IMF and World Bank-inspired structural adjustment plan in 1983 brought the resources and population of Ghana into much closer contact with global circuits of trade, investment, and production through the expansion of mineral production. Incorporation into the global political-economic context has disrupted and mobilized large segments of the population, including women, by concentrating landholdings, increasing risks to income and subsistence, and degrading the natural environment. The resulting migrations between rural and urban areas and the dramatic increase in artisanal mining have been both a cause and a consequence of environmental degradation, which in turn has exacerbated the prevalence of migration in a vicious cycle.

The complex interactions between the natural environment and migration in the context of globalization are certainly contingent upon local social contexts and conditions. However, given the trends toward increasing resource degradation and increasing migration streams in LDCs, an understanding of how the global political-economic context condi-

tions these factors will only become more important as globalization deepens the integration of peoples and natural resources into a single shared space.

Endnote

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References

- Addy, S.N. 1998. Ghana: Revival of the mineral sector. *Resources Policy* 24, 229-239.
- Afriyie, K. 1998. Foreign direct investment in Ghana's emerging market economy. In J. H. Dunning (ed.), *Globalization, Trade, and Foreign Direct Investment*, 217-236, New York, NY: Elsevier.
- Akabzaa, T. 2000. *Boom and Dislocation: The Environmental and Social Impacts of Mining in the Wassa West District of Ghana*. Accra, Ghana: Third World Network.
- Amonoo-Neizer, E.H., D. Nyamah, and S.D. Bakiamoh. 1996. Mercury and arsenic pollution in soil and biological samples around the mining town of Obuasi, Ghana. *Water, Air, and Soil Pollution* 91, 363-373.
- Annan, K. 2006. Address of Mr. Kofi Annan, Secretary-General, to the high-level dialogue of the United Nations General Assembly on international migration and development. *International Migration Review* 40, 963-965.
- Arn, J. 1996. Third world urbanization and the creation of a relative surplus population: A history of Accra, Ghana to 1980. *Review* 19, 413-444.
- Arrighi, G. 1994. *The Long Twentieth Century*. London: Verso.
- Arthur, J.A. 1991. Interregional migration of labor in Ghana, West Africa: Determinants, consequences and policy. *Review of Black Political Economy* 20, 89-104.
- Aryee, B.N. A. 2001. Ghana's mining sector: Its contribution to the national economy. *Resources Policy* 27, 61-75.
- Aryee, B.N. A., B.K. Ntibery, and E. Atorkui. 2003. Trends in the small-scale mining of precious minerals in Ghana: A perspective on its environmental impact. *Journal of Cleaner Production* 11, 131-140.
- Asante, K.A., T. Agusa, A. Subramanian, O.D. Ansa-Asare, C.A. Biney, and S. Tanabe. 2007. Contamination status of arsenic and other trace elements in drinking water and residents from Tarkwa, a historic mining township in Ghana. *Chemosphere* 66, 1513-1522.
- Awudi, G.B.K. 2002. The role of foreign direct investment in the mining sector of Ghana and the environment. Paris: OECD.
- Babut, M., R. Sekyr, A. Rambaud, M. Potin-Gautier, S. Tellier, W. Bannerman, and C. Beinhoff. 2003. Improving the environmental management of small-scale gold mining in Ghana: A case study of Dumasi. *Journal of Cleaner Production* 11, 215-221.
- Banchirigah, S.M. 2006. How have reforms fuelled the expansion of artisanal mining? Evidence from sub-saharan Africa. *Resources Policy* 31, 165-171.
- Bates, D.C. 2002. Environmental refugees? Classifying human migrations caused by environmental change. *Population and Environment* 23, 465-477.

- Bilsborrow, R.E. 1992. Rural poverty, migration, and the environment in developing countries: Three case studies. New York: World Bank.
- Bilsborrow, R.E. 2002. Migration, population change, and the rural environment. *Environmental Change and Security Project Report 8*, 69-84.
- Bonzongo, J.C., A.K. Donkor, and V.K. Nartey. 2003. Environmental impacts of mercury related to artisanal gold mining in Ghana. *Journal de Physique IV* 107, 217-220.
- Boocock, C.N. 2002. Environmental impacts of foreign direct investment in the mining sector in sub-saharan Africa. Paris: OECD.
- Boyce, J.K. 1994. Inequality as a cause of environmental degradation. *Ecological Economics* 11, 169-178.
- Britwum, A., J. Kwesi, and F.D. Tay. 2001. Ghana country report. Structural Adjustment Participatory Review Initiative (SAPRI), Washington, D.C.
- Bump, M.N. 2006. Ghana: Searching for opportunities at home and abroad. Accessed online May 10, 2006 at <http://www.migrationinformation.org/Profiles/display.cfm?ID=381>.
- Burns, T.J., B. Davis, and E.L. Kick. 1997. Position in the world-system and national emissions of greenhouse gases. *Journal of World-Systems Research* 3, 432-466.
- Burns, T.J., J. Kentor, and A. Jorgenson. 2003. Trade dependence, pollution, and infant mortality in less-developed countries. In W.A. Dunaway (ed.), *Emerging Issues in the 21st Century World-System*, 14-28. Westport, CT: Praeger.
- Burns, T.J., E.L. Kick, D.A. Murray, and D.A. Murray. 1994. Demography, development, and deforestation in a world-system perspective. *International Journal of Comparative Sociology* 35, 221-239.
- Carr, E.R. 2002. Managing uncertainty: Environmental and economic security in coastal Ghana, 1970-2000. *Regional Development Dialogue* 23, 20-36.
- Carr, E.R. 2005. Placing the environment in migration: Environment, economy, and power in Ghana's central region. *Environment and Planning A* 37, 925-946.
- Charnley, S. 1997. Environmentally-displaced peoples and the cascade effect: Lessons from Tanzania. *Human Ecology* 25, 593-618.
- Chase-Dunn, C. 1998. *Global Formation: Structures of the World-Economy*. New York: Rowman and Littlefield.
- Chase-Dunn, C., Y. Kawano, and B.D. Brewer. 2000. Trade globalization since 1795: Waves of integration in the world-system. *American Sociological Review* 65, 77-95.
- Darkoh, M.B.K. and J.E. Mbaiwa. 2002. Globalisation and the livestock industry in Botswana. *Singapore Journal of Tropical Geography* 23, 149-166.
- Dasgupta, P. 2000. Population and resources: An exploration of reproductive and environmental externalities. *Population and Development Review* 26, 643-689.
- de Janvry, A., E. Sadoulet, and L. Wilcox Young. 1989. Land and labour in Latin America agriculture from the 1950s to the 1980s. *Journal of Peasant Studies* 16, 396-424.
- Donkor, A.K., J.C. Bonzongo, V.K. Nartey, and D.K. Adotey. 2006. Mercury in different environmental compartments of the Pra River Basin, Ghana. *Science of the Total Environment* 368, 164-176.
- Donkor, M. 2005. Marching to the tune: Colonization, globalization, immigration, and the Ghanaian diaspora. *Africa Today* 52, 27-46.
- Ehrenreich, B. and A.R. Hochschild. 2004. *Global Woman: Nannies, Maids, and Sex Workers in the New Economy*. New York, NY: Metropolitan Books.
- FAO. 2001. Country report-Ghana. New York: United Nations.
- Godfrey, B.J. 1990. Boom towns of the Amazon. *Geographical Review* 80, 103-117.
- Grant, R. and J. Nijman. 2004. The re-scaling of uneven development in Ghana and India. *Journal of Economic and Social Geography* 95, 467-481.
- Grimes, P. and J. Kentor. 2003. Exporting the greenhouse: Foreign capital penetration and CO2 emissions, 1980-1996. *Journal of World-Systems Research* 9, 261-275.
- Gyasi, E., G.T. Agyepong, E. Ardayfio-Schandorf, L. Enu-Kwesi, J.S. Nabila, and E. Owusu-Bennoah. 1995. Production pressure and environmental change in the forest-savanna zone of southern Ghana. *Global Environmental Change* 5, 355-366.
- Heemskerk, M. 2003. Self-employment and poverty alleviation: Women's work in artisanal gold mines. *Human Organization* 61, 62-73.
- Heinonen, U. 2006. Environmental impact on migration in Cambodia: Water-related migration from the Tonle Sap Lake region. *International Journal of Water Resources Development* 22, 449-462.
- Hens, L. and E. Kwesi Boon. 1999. Institutional, legal, and economic instruments in Ghana's environmental policy. *Environmental Management* 24, 337-351.
- Hilson, G.M. 2004. Structural adjustment in Ghana: Assessing the impacts of mining-sector reform. *Africa Today* 51, 53-77.
- Hilson, G.M., C.J. Hilson, and S. Pardie. 2007. Improving awareness of mercury pollution in small-scale gold mining communities: Challenges and ways forward in rural Ghana. *Environmental Research* 103, 275-287.
- Hilson, G.M. and F. Nyame. 2006. Gold mining in Ghana's forest reserves: A report on the current debate. *Area* 38, 175-185.
- Hilson, G.M. and S. Pardie. 2006. Mercury: An agent of poverty in Ghana's small-scale gold-mining sector? *Resources Policy* 31, 106-116.
- Hilson, G.M. and C. Potter. 2005. Structural adjustment and subsistence industry: Artisanal gold mining in Ghana. *Development & Change* 36, 103-131.
- Hilson, G.M. and N. Yakovleva. 2007. Strained relations: A critical analysis of the mining conflict in Prestea, Ghana. *Political Geography* 26, 98-119.
- Hilson, G.M., N. Yakovleva, and S.M. Banchirigah. 2007. To move or not to move: Reflections on the resettlement of artisanal miners in the western region of Ghana. *African Affairs* 104, 413-436.
- Hugo, G. 1996. Environmental concerns and international migration. *International Migration Review* 30, 105-131.
- Inman, K. 1993. Fueling expansion in the third world: Population, development, debt, and the global decline of forests. *Society and Natural Resources* 6, 17-39.
- Jorgenson, A. 2004. Global inequality, water pollution, and infant mortality. *Social Science Journal* 41, 279-288.
- Jorgenson, A. 2006. Global warming and the neglected greenhouse gas: A cross-national study of methane emissions intensity, 1995. *Social Forces* 84, 1777-1796.
- Jorgenson, A. 2006. The transnational organization of production and environmental degradation: A cross-national study of the effects of foreign capital penetration on water pollution intensity, 1980-1995. *Social Science Quarterly* 87, 711-730.

- Jorgenson, A. 2006. Unequal ecological exchange and environmental degradation: A theoretical proposition and cross-national study of deforestation, 1990-2000. *Rural Sociology* 71, 685-712.
- Jorgenson, A. and T.J. Burns. 2004. Globalization, the environment, and infant mortality: A cross-national study. *Humboldt Journal of Social Relations* 28, 7-52.
- Jorgenson, A. and E.L. Kick (eds.). 2006. *Globalization and the Environment*. Leiden: Brill.
- Kentor, J. 2000. *Capital and Coercion: The Economic and Military Processes that have Shaped the World-Economy, 1800-1990*. New York, NY: Garland Press.
- Kentor, J. and P. Grimes. 2006. Foreign investment dependence and the environment: A global perspective. In A. Jorgenson and E.L. Kick (eds.), *Globalization and the Environment*, 61-78. Leiden: Brill.
- Kibreab, G. 1994. Migration, environment, and refugeehood. In B. Zaba and J. Clarke (eds.), *Environment and Population Change*, 115-130. Belgium: Derouaux Ordina Editions.
- Kick, E.L., T.J. Burns, B. Davis, and D.A. Murray. 1996. Impacts of domestic population dynamics and foreign wood trade on deforestation: A world-system perspective. *Journal of Developing Societies* 12, 68-87.
- Kitula, A.G.N. 2006. The environmental and socio-economic impacts of mining on local livelihoods in Tanzania: A case study of Geita District. *Journal of Cleaner Production* 14, 405-414.
- Konadu-Agyemang, K. 2000. The best of times and the worst of times: Structural adjustment programs and uneven development in Africa: The case of Ghana. *Professional Geographer* 52, 469-481.
- Leechor, C. 1994. Ghana: Frontrunner in adjustment. In I. Husain and R. Faruque (eds.), *Adjustment in Africa: Lessons from Country Studies*, 169-180. Washington, D.C.: World Bank.
- Lonergan, S. and M.J. Parnwell. 1998. Environmental degradation and population movement. *Environment and Security* 3, 63-83.
- Lutz, W., A. Prskawetz, and W.C. Sanderson. 2002a. Introduction. *Population and Development Review* 28, 1-21.
- Lutz, W., W.C. Sanderson, and A. Wils. 2002b. Conclusions: Toward comprehensive p-e studies. *Population and Development Review* 28, 225-250.
- Marquette, C.M. and R.E. Bilsborrow. 1998. Population and environment relationships in developing countries: Recent approaches and methods. In B.S. Baudot and W.R. Moomaw (eds.), *People and their Planet: Searching for the Balance*, 29-44. New York, NY: St. Martin's Press.
- Martin, P., M. Abella, and C. Kuptsch. 2006. *Managing Labor Migration in the Twenty-First Century*. New Haven: Yale University Press.
- Massey, D.S., J. Arango, G. Hugo, A. Kouaouchi, A. Pellegrino, and J.E. Taylor. 2005. *Worlds in Motion: Understanding International Migration at the End of the Millennium*. Oxford: Clarendon Press.
- O'Lear, S. 1997. Migration and the environment: A review of recent literature. *Social Science Quarterly* 78, 606-618.
- Peil, M. 1995. Ghanaians abroad. *African Affairs* 94, 345-367.
- Portes, A. 1997. Immigration theory for a new century: Some problems and opportunities. *International Migration Review* 31, 799-825.
- Ramlogan, R. 1996. Environmental refugees: An overview. *Environmental Conservation* 23, 81-88.
- Roberts, J.T., P. Grimes, and J.L. Manale. 2006. Social roots of global environmental change: A world-systems analysis of carbon dioxide emissions. In A. Jorgenson and E. L. Kick (eds.), *Globalization and the Environment*, 79-117. Leiden: Brill.
- Sassen, S. 1988. *The Mobility of Labor and Capital: A Study in International Investment and Labor Flow*. Cambridge: Cambridge University Press.
- Sassen, S. (ed.). 1998. *Globalization and its Discontents: Essays on the New Mobility of People and Money*. New York, NY: The New Press.
- Sassen, S. 2001. *The Global City: New York, London, Tokyo*. Princeton, NJ: Princeton University Press.
- Sassen-Koob, S. 1984. Notes on the incorporation of third world women into wage-labor through immigration and off-shore production. *International Migration Review* 18, 1144-1167.
- Sauvant, K.P., P. Mallampally, and P. Economou. 1993. Foreign direct investment and international migration. *Transnational Corporations* 2, 33-69.
- Serfor-Armah, Y., B.J.B. Nyarko, D.K. Adotey, D. Adomako, and E.H.K. Akaho. 2004. The impact of small scale mining activities on the levels of mercury in the environment: The case of Prestea and its environs. *Journal of Radioanalytical and Nuclear Chemistry* 262, 685-690.
- Shandra, J.M., B. London, and J.B. Williamson. 2003. Environmental degradation, environmental sustainability, and overurbanization in the developing world: A quantitative, cross-national analysis. *Sociological Perspectives* 46, 309-329.
- Sheikha Haya Rashed Al Khalifa, H.E. 2006. Chairperson's summary of the United Nations General Assembly high-level dialogue on international migration and development. *International Migration Review* 40, 966-972.
- Stark, O.J. 1991. *The Migration of Labor*. Cambridge: Basil Blackwell.
- Suhrke, A. 1994. Environmental degradation and population flows. *Journal of International Affairs* 47, 473-496.
- Tole, L. 2004. A quantitative investigation of the population-land inequality-land clearance nexus. *Population and Environment* 26, 75-106.
- United Nations (UN). 2004. *World population prospects, 2004*. United Nations, New York.
- United Nations (UN). 2006. *International migration and development: Report of the secretary-general*. United Nations, New York, NY.
- United Nations Conference on Trade and Development (UNCTAD). 1996. *Foreign direct investment, trade, aid and migration*. United Nations, Geneva.
- United Nations Environmental Program (UNEP). 2000. *Mining and sustainable development II: Challenges and perspectives*. United Nations Environment Program, Paris.
- Wallerstein, I. 1974. *The Modern World-System: Capitalist Agriculture and the Origins of the European World-Economy in the Sixteenth Century*. New York: Academic Press.
- World Bank (WB). 2006. *World development indicators*. World Bank, New York.
- Westing, A.H. 1992. Environmental refugees: A growing category of displaced persons. *Environmental Conservation* 19, 201-207.
- Wimberley, D.W. 1990. Investment dependence and alternative explanations of third world mortality: A cross-national study. *American Sociological Review* 55, 75-91.
- Wimberley, D.W. 1991. Transnational corporate investment and food consumption in the third world: A cross-national analysis. *Rural Sociology* 56, 406-431.

- Wimberley, D.W. and R. Bello. 1992. Effects of foreign investment, exports, and economic growth on third world food consumption. *Social Forces* 70, 895-921.
- Yakovleva, N. 2006. Perspectives on female participation in artisanal and small-scale mining: A case study of Birim North District of Ghana. The ESRC Centre for Business Relationships, Accountability, Sustainability, and Society, Cardiff, UK.
- Yakovleva, N. 2007. Perspectives on female participation in artisanal and small-scale mining: A case study of Birim North District of Ghana. *Resources Policy* 32, 29-41.
- Yeboah, I.E.A. 2000. Structural adjustment and emerging urban form in Accra, Ghana. *Africa Today* 47, 60-90.
- Yeboah, I.E.A. 2003. Demographic and housing aspects of structural adjustment and emerging urban form in Accra, Ghana. *Africa Today* 50, 107-119.
- York, R. and E. Rosa. 2006. Emissions of sulfur dioxide and nitrogen oxides in the modern world-system. In A. Jorgenson and E.L. Kick (eds.), *Globalization and the Environment*, 119-132. Leiden: Brill.