

Mining mountains: neoliberalism, land tenure, livelihoods, and the new Peruvian mining industry in Cajamarca

Jeffrey Bury

Department of Geography and Human Environmental Studies, San Francisco State University, 1600 Holloway Avenue, San Francisco, CA 94132, USA; e-mail: bury@sfsu.edu

Received 6 January 2004; in revised form 18 May 2004

Abstract. Peru has been transformed over the course of the past decade into a neoliberal, mineral-based, export-oriented, country. The author evaluates the neoliberal transformation of the country in three parts. First he examines the economic and political transformation of the country in the early 1990s, particularly in terms of how the Peruvian state and economy were rapidly restructured according to neoliberal principles. He then illustrates how, both through privatization and through transnationalization, the mining sector has become a key element for future development opportunities. This discussion is then contextualised by an examination of how mining activities are affecting land-tenure patterns and livelihoods in the Cajamarca region of Peru. In particular, drawing upon case-study research, the author evaluates how Minera Yanacocha's transnational gold-mining operations are transforming land-tenure institutions, land values, and the spatial distribution of land-use patterns throughout the region. In addition, he evaluates how livelihoods are being transformed in response to Minera Yanacocha's activities through an examination of changing household access to natural, human, social, and economic resources.

Introduction

The past decade has witnessed significant shifts in the economic and political structures of many Latin American countries. In addition to pursuing new and tenuous democratic reforms, many countries have also changed economic course through the adoption of neoliberal free-market reforms. In Peru neoliberal economic and political reforms have rapidly integrated the country into global markets and foreign direct investment flows. These neoliberal policies have reconfigured economic activity within the country as well as the political context in which discussions of Peru's development are taking place. One consequence of these reforms is that mineral extraction activities have become the key sector for future economic growth, export-led earnings, and foreign direct investment.

Because the mining sector has become such an important force of change in Peru, it is important to understand the ways in which it is likely to affect the future development trajectories of the country. One way of exploring this issue is through an evaluation of how key mineral extraction enterprises in the mining sector are altering the local human and environmental contexts in which they are operating. In this paper I seek to accomplish this task by evaluating how the gold-mining operations of one of the most important transnational mineral-extraction enterprises, Minera Yanacocha, is affecting local land-tenure patterns and livelihoods in the Cajamarca region. By examining the local effects of Peru's neoliberal restructuring, in this research I seek to contribute to geographic discussions concerning globalization and neoliberalism through a better understanding of how these forces of change are being experienced in local contexts and how they are affecting the futures of livelihoods and people in the Andean region.

Peru's neoliberal restructuring

The history of Peru between the 1960s and the early 1990s is marked by political upheaval and economic chaos. In 1968 the military government of General Juan Velasco Alvarado secured control of the country through a coup and began a series of wide-ranging economic and political reforms. Under what Lowenthal (1975) refers to as the 'Peruvian experiment' of General Velasco, a system intent on abolishing the dependency of Peru on foreign influence and creating a new social order was established after the military coup. This wide-ranging political and economic agenda resulted in successive nationalizations of key industries, a reconfiguration of land-tenure patterns, and the enactment of a host of expansive social programs.

By the early 1980s, the Peruvian experiment had begun to fray as successive oil shocks related to international oil crises, climate-related natural disasters, sharp decreases in exports, international disapproval, and unbridled international borrowing threatened the country's economic stability. In 1985, faced with imminent financial collapse, President Alan García Pérez implemented structural macroeconomic reforms, known as 'unorthodox adjustment', intended to rescue the country's new social order. His economic plan included nationalization of the banking system and a default on Peruvian international debt. García's economic strategy proved economically and politically disastrous. By 1990 annual inflation rates were higher than 7500%, GDP had decreased by more than 30% in three years, and guerrilla violence was escalating throughout the country (Skidmore and Smith, 2001).

Peru's economic and political geographies were reconfigured yet again when President Alberto Fujimori was elected in 1990. In order to confront the country's perceived problems, Fujimori embarked on a series of political and economic reforms no less ambitious than those of the Peruvian experiment under earlier military and civilian governments. However, Fujimori's reforms entailed economic and political restructuring that embraced orthodox neoliberal principles.

Fujimori's neoliberal political and economic reforms included a reconfiguration of the economy, beginning in 1990, and of the government through the adoption of a new constitution in 1992. These reforms sought to integrate the country into the rapidly globalizing international economy, end Peru's decades-long civil war, reduce the presence of the state in national economic and social affairs, and establish a system of self-regulating and more efficient supply, demand, and pricing mechanisms.

Beginning in 1991, the Fujimori administration opened all sectors of the Peruvian economy to foreign direct investment (FDI) and lifted restrictions on remittances of profits, dividends, royalties, access to domestic credit, and acquisition of supplies and technology abroad. In addition, in order to attract foreign investment, the government offered tax-stability packages for foreign investors for terms of ten to fifteen years and implemented wide-ranging privatization programs that offered international investors investment opportunities, and eliminated competition from state-owned and domestic firms that enjoyed clientelistic or material advantages. Third, in order to offer even more substantial guarantees to foreign investors, the government ratified bilateral and multilateral investment-guarantee treaties, such as the Multilateral Investment Guarantee Agency (MIGA) convention and the Overseas Private Investment Corporation (OPIC) accords.

In 1992 Fujimori reacted to increasing political and civil opposition to his neoliberal reform agenda by shutting down the government in an '*auto-golpe*', or 'self-coup', reworking the country's constitution and effectively establishing a semiauthoritarian state. The new constitution highlighted the importance of foreign investors for the country's continued economic progress, and set the stage for a revision of land-tenure rights in order to facilitate new private and individual landownership. For example, in 1996 the new

National Mining Cadastre Law (Law 26615) revised land-tenure rights throughout the country. Prior to 1996 mining concessions had been subject to competing claims under a variety of historical, and often contradictory, government decrees. This had led to many overlapping concessions and legal disputes over control of land resources. The new National Mining Cadastre Law eliminated many previous mining-claim procedures and centralized and unified concessions under a new geographic reference system. This guaranteed national and transnational mining firms exclusive control of the necessary land resources to implement their operations (Ministry of Energy and Mines, 2000; *Peru Monitor Monthly* 2000).

Alongside the creation of Peru's new neoliberal economy, the Peruvian military virtually eliminated guerilla activities in the highlands by capturing and imprisoning leaders of insurgent movements. The *Sendero Luminoso* (Shining Path) and the Tupac Amaru Revolutionary Movement (MRTA) specifically targeted foreign companies as well as large national companies during the 1980s and early 1990s. By reducing the threats of civil unrest and conflict, investor confidence in the country increased significantly.

The results of Fujimori's reforms have been significant. The Peruvian economy is now dominated by the private sector, regulated by market forces, and intricately linked to the global economy. Comparatively, although neoliberal reforms have swept through Latin America in the past decade (Gwynne and Kay, 1999; Klak, 1998), Peru has become one of the most open and liberal economies—not only in Latin America but, as the IMF argued in a recent country-level study, in the world (IMF, 2001).

The initial stages of 'shock therapy' for the country resulted in increases in economic growth, government revenues, exports, and foreign reserves, and a rapid decline in inflation rates (see table 1). In addition, FDI flows have increased during the past decade.

Table 1. Peruvian neoliberal economic change (1994–2001) (source: CONITE, 2001a; Proinversion, 2002).

	1994	1995	1996	1997	1998	1999	2000	2001
GDP growth (% annual variation)	12.8	8.6	2.5	6.7	-0.5	0.9	3.1	0.2
Devaluation (% annual variation)	10.6	2.7	8.4	8.6	10.2	15.4	3.1	0.5
Government income (soles million)	14.3	18.3	21.5	25.0	26.2	25.3	27.5	26.7
Total exports (US\$ billion) ^a	4.59	5.58	5.89	6.83	5.75	6.11	7.02	7.11
Net foreign reserves (US\$ billion) ^a	5.72	6.64	8.54	10.12	9.18	8.40	8.18	8.61
Total foreign direct investment (US\$ billion)	4.45	5.06	6.24	7.29	8.08	9.47	9.88	10.02

^a Figures in current US\$—\$1 ~3.4 Peruvian soles.

The consequences of Fujimori's reforms have also been significant for the Peruvian people. Beginning in the early 1990s, government health, education, and social service programs were radically reduced or eliminated in line with the 'shock therapy' directives. Consequently, unemployment increased dramatically and consumer prices skyrocketed. For example, in the early 1990s prices for gasoline rose by 3000%; electricity by 5300%; and water and telephone services by 1300% as government subsidies were eliminated and the currency rapidly devalued (Kuczynski, 2000; Webb and Fernández-Baca, 1993).

Overall, despite some advances in economic growth and increasingly positive assessments of macroeconomic growth rates in the country, poverty rates have either declined very little or have actually increased during the past decade (Proinversion, 2002).

Nationally, more than 37% of the population lacks basic necessities and more than 15% of the population is extremely impoverished (INEI, 2000).

In the past several years reforms have continued, albeit more slowly. Under the new political leadership of Alejandro Toledo, new laws have been created which limit the scope of future tax-stability agreements for foreign corporations and reduce some tax and investment benefits. In addition, the privatization process has been reconfigured to include a new privatization agency—Proinversion—and the composition of the official state privatization agency (COPRI) has been changed to address charges of corruption and to increase transparency. Overall, however, it appears that the neoliberal transformation that took place during Fujimori's tenure will continue.

Mountains of mines in Peru

Along with its tremendous physical and biological diversity, Peru has some of the world's richest mineral deposits. Geologically dispersed, both in veins or deposits and in quaternary sedimentation strata, are a host of polymetallic and nonmetallic resources that have fueled centuries of industry. Today, more than forty metallic and non-metallic resources are exploited in the country, and these account for significant percentages of global mineral production (see table 2).

Table 2. Peruvian mineral production and exports (source: Ministry of Energy and Mines, 2000; 2001).

Mineral	Production 2000 (metric tonnes)	World ranking (reserves)	Percentage of world production 2000	Percentage increase (1990–99)	Export value (US \$ million) 2000
Copper	567 751	6	4.5	65	931
Gold	135	8	5.8	534	1145
Lead	252 257	4	9.1	30	190
Silver	2 353	2	13.0	15	180
Tin	30 403	3	18.0	531	166
Zinc	773 757	4	10.5	67	496

Historically, the Peruvian economy has experienced several cycles of export-led growth in which mining has occupied a critical role (Thorp and Bertram, 1978; Thorp et al, 2000). After an initial period of disorganization and decline in the postindependence period, the mining sector reestablished its preeminence in the Peruvian economy in the late 1800s as new international demand for industrial metals contributed to a surge in copper, silver, and gold production. However, the influence that large foreign-led operations enjoyed came to an abrupt halt in 1968 when successive military governments nationalized or expropriated many mining operations (Becker, 1983; Dore, 1988).

During the 1990s Fujimori's reforms had significant impacts on the mining sector. Exploitation of the country's mineral reserves increased with the discovery of new deposits and the expansion of existing operations. Consequently, since 1990, the mining sector has been a critical component of the country's export-led economy. For example, between 1990 and 2000, mining products accounted for an average of 45.3% of national exports and are expected to increase even more in coming years (CONITE, 2001b; IMF, 2001).

The mining sector has also been one of the largest recipients of FDI flows into the country during the past decade. Between 1976 and the early 1990s state expropriation and nationalization of many mining operations, as well as significant economic uncertainty,

curtailed FDI flows, although several larger mining enterprises such as Southern Peru Copper continued to operate. Beginning in the early 1990s, however, in response to Fujimori's neoliberal reforms and new investor guarantees, FDI flows increased significantly. Between 1994 and 2001 the mining sector was the second-largest recipient of FDI, which totalled US\$10.7 billion. FDI is also projected to increase over the course of the next few years as new mining operations begin throughout the country (CONITE, 2001a).

Although the mining sector is an important source of FDI in the Peruvian economy, it does not account for a large percentage of the overall economic activity within the country. For example, between 1996 and 2000, both the mining and petroleum sectors accounted for, on average, only 7% of overall GDP. In addition, the mining sector only accounted for 0.4% of employment in 2000 (IMF, 2001). Thus, although the mining sector may account for a majority of national exports and be an important source of foreign currency, it is not deeply integrated into the larger Peruvian economy.

Privatization and transnationalization of Peru's 21st-century mining sector

The relative importance of the mining sector for the Peruvian national economy is largely the result of two key changes in the spatial organization and control of mineral extraction activities throughout the country. First, many existing mining operations have been transferred to private firms through the sale of state-owned interests, which has significantly altered the ownership and distribution of mineral extraction activities throughout the country. For example, in 1990 private operations accounted for 55% of mineral production throughout the country, whereas in 1999 private operations accounted for 95% of mineral production (Ministry of Energy and Mines, 2001).

The rationale for privatization has been the creation of competition in the mining sector, the promotion of the country's image as an investment target, and the generation of resources to cover government expenditures (Ministry of Energy and Mines, 2000; Proinversion, 2002). Between 1992 and 2000 more than 200 mining operations were privatized, which generated US\$1.2 billion in direct revenues. The privatization process is also projected to generate an additional US\$3.7 billion through 2009. Comparatively these figures represent 17% and 22%, respectively, of the country's GDP in 2000.

The privatization process, in conjunction with new investment guarantees and reorganization of the mining cadastre, has also stimulated new mining claims throughout the country. This has significantly altered the spatial distribution of mining activities throughout the country. In the early 1990s, mineral exploration was stagnant in Peru and was impeded by social unrest in the highlands. However, once the privatization process had begun, and the Peruvian military began to suppress insurgent groups, mining claims increased dramatically throughout the highlands. For example, more mining claims were filed in 1992 than in the previous fifteen years (*Peru Monitor Monthly* 2000).

Since 1992 mining claims throughout the country have increased from 4 million to 22 million ha (CONOCAMI, 2000). Presently, approximately 10% of all land in the country is covered by subsurface mineral rights claims. These claims have increased most in the highlands, where large-scale mineral operations have been privatized or where new mineral resources are likely to be exploited in the near future (see figure 1, over). For example, at the subnational level, mineral rights claims in the coastal and Amazonian Departments account for less than 1% of total land resources, whereas mineral claims account for 49% of land resources in the Department of Cajamarca, 32% in the Department of Cusco, and 31% in the Department of Huancavelica (Ministry of Energy and Mines, 2000).

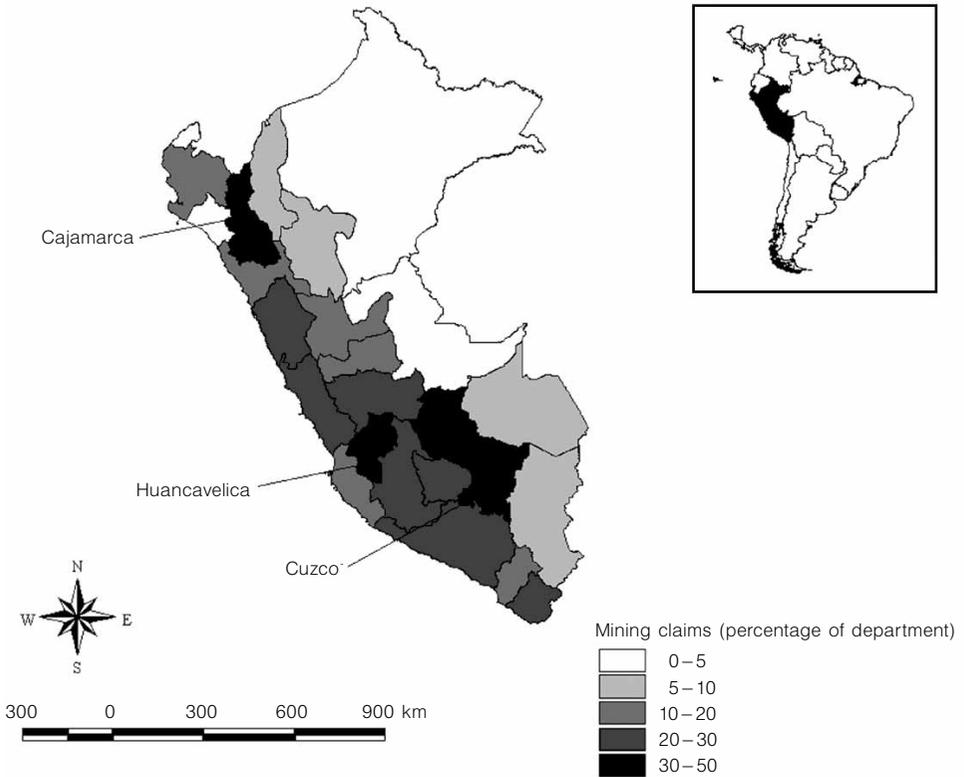


Figure 1. National mining-claims distribution by department, 2000 (source: Ministry of Energy and Mines, 2000).

The second key spatial change in the mining sector has been the transnationalization of ownership. Transnational corporations (TNCs) have been at the forefront of Peru's economic growth and expansion since 1992. In the mining sector eleven of the world's top-twenty transnational mining corporations (see table 3) now have operations in Peru (*Peru Monitor Monthly* 2000). In addition, ten mining corporations are among Peru's top-100 corporations in terms of sales, and sixteen are among the top-100 corporations with the highest net profits (*Peru Report* 1999).

The transnationalization of Peru's mining sector has been accomplished largely through FDI into the country, which has been spread between investments in existing Peruvian mining firms through joint enterprises or new operations, acquisitions of mining operations through the privatization process, and the exploitation of new mineral deposits. Mineral production is now concentrated into a few large-scale operations that are increasingly integrated into transnational mining networks as foreign mining interests have provided new capital, technology, and highly skilled professionals. Thus, not only have ownership and production in the mineral sector been concentrated into large-scale private enterprises, they have also been integrated into transnational networks of capital and production.

A brief survey of gold production in Peru illustrates how both privatization and transnationalization have significantly transformed the spatial distribution and organization of the mining sector. Prior to 1990 gold production was dominated by informal, small-scale, mining operations located primarily in Madre de Dios and other areas of the Peruvian Amazon. Medium-scale enterprises exploited underground veins and smaller deposits as well, but this production was generally of a limited scale.

Table 3. Large transnational mining operations in Peru (sources: Directorio Minero del Peru, 2000; GTMA-NOVIB, 2000; Ministry of Energy and Mines, 2001).

Corporation	Head-quarters	Project	Mineral	Projected investment (US \$ million)
RGC Explorations	Australia	Cerro Corona	copper, gold	250
Noranda/Rio Algom/Teck	Canada	Antamina	copper, lead, zinc	2950
Cambior	Canada	La Granja	copper	1100
Barrick	Canada	Pierina	gold	320
Manhattan	Canada	Tambogrande	copper, zinc	170
Cominco/Marubeni	Canada/Japan	Cajamarquilla	zinc refinery	296
Shougang	China	Marcona	iron	292
Mitsui	Japan	Pallca	various	30
Grupo Mexico	Mexico	various	copper	1572
Anglo American	South Africa	Quellaveco	copper, molybdenum	797
Glencore	Switzerland	various	zinc, lead	52
Phelps–Dodge	USA	various	copper, various	612
Newmont (MYSA)	USA	Cajamarca	gold	480
Doe Run	USA	various	polymetallic	194
Cyprus Amax	USA	Cerro Negro	copper	99

After Fujimori's reforms, new, large-scale, transnational enterprises began operations throughout the highlands. By 1995 the production of large transnational gold-mining operations surpassed the total production of all small and medium-size operations, and by 2000 accounted for 67% of all Peru's gold production (Ministry of Energy and Mines, 2000). This rapid increase in gold production is due, in large part, to the opening of several new transnational 'mega' mining operations in the highlands that rely on massive and diffuse subterranean gold deposits, open-pit mining, and new technological advancements such as cyanide heap leaching. Gold production from these large mining operations will continue to increase rapidly as several new projects begin operations in the highlands and as more large state-owned gold-mining operations are privatized, parceled, and auctioned in the next few years.

Development and mountains of mines

The rapid transformation of the ownership of the mining sector has ushered in a new development imaginary for Peru's political, economic, and social future in areas where the new mining sector is asserting its influence. Understanding how this transformation is affecting development trajectories in local and regional places and spaces is important both for theoretical and for empirical reasons.

Theoretically, it is important to understand the relationships between the neoliberal transitions that are taking place at the national scale and local and regional changes. Examining these relationships across scales can provide for a better understanding of how the patterns of previous development efforts throughout the region, most notably inward-orientated industrialization and import-substitution industrialization, are being changed, and in what ways. Scholars in geographic studies have called for more research addressing these scalar relationships as a way of understanding the ways in which development processes are shifting throughout the region (for example, Bebbington, 2002; Gwynne and Kay, 1999; Klak, 1998).

Another reason why it is theoretically important to explore the relationship between neoliberal restructuring at the national scale, on the one hand, and local change and development, on the other, is that the combined and uneven effects of

such policies are spurring new types of relationships between political, economic, and social processes. These new dynamics are important to understand as they are affecting the behaviour of local actors as well as the futures of local environments. Analyzing these relationships might allow for the development of new theoretical lenses and conceptual frameworks through which we might understand the behaviour of local actors as well as how future development efforts might be more effective.

Empirically, it is important to evaluate these scalar relationships because, although popular and overly simplified accounts either praise or challenge the neoliberal model, they have often neglected to address the uneven nature of human and physical geographies at different scales of analysis. Scholars in geographic studies have called for more research examining the complex nature of geographies of neoliberal change in local places and spaces (for example, Bebbington, 2000; Hays-Mitchell, 2002). This can allow for a more refined understanding of how neoliberal change is experienced at the local scale, and how it might vary across different contexts.

Examining how local places are being transformed by the neoliberal development model is also important for empirical reasons, as the debate surrounding contemporary political and economic change in Latin America continues to be a pressing question and, as Gwynne and Kay (2000) argue, the 'futures' of neoliberalism in Latin America are still uncertain. As the debate over neoliberal reform in Latin America has recently become increasingly polarized, and has often devolved into polemical and rhetorical positioning, rigorous geographic research at the local scale can still inform this discussion and, more importantly, contribute to future discussions through continued examinations of the spatial dynamics of development transformations.

In order to engage in the theoretical and empirical discussions surrounding Peru's neoliberal mineral extractive economy, in the next sections of this paper I draw upon case-study research conducted in Peru on the impacts of Newmont Mining Corporation's Yanacocha (MYSA) operations on household land-tenure patterns and livelihoods in the Cajamarca region. These foci provide useful theoretical and empirical lenses through which we might understand how neoliberal geographies of development are related to the nested and complex changes taking place across scales of analysis and within local and regional contexts.

Minera Yanacocha and Cajamarca

Minera Yanacocha is one of the most influential new transnational mining operations in Peru. In 1992 Denver-based Newmont Mining Corporation, the largest gold company in the world, began construction of the Yanacocha gold-mining operation in the Cajamarca region of Peru in cooperation with its Peruvian partner, Compañía de Minas Buenaventura, SA and the International Finance Corporation (together known as Minera Yanacocha, or MYSA). The Yanacocha project was the first new large foreign investment in the Peruvian mining sector since 1976.

MYSA's operations are located in the northern region of the country at elevations ranging between 3500 m and 4000 m, approximately 35 km from the city of Cajamarca (see figure 2). MYSA's gold reserves in the Cajamarca region are estimated to amount to approximately 37 million ounces, and it has become one of Latin America's leading gold producers with annual gold production of 1.8 million ounces in 2000 at an average cost of US\$88 per ounce—one of the lowest in the world. Since MYSA began operations in the region, it has produced more than 7.5 million ounces of gold and reserves have grown more than fivefold over the same period. In terms of Peruvian gold production, MYSA accounted for 43% of all gold production in 2000 (Newmont, 2002).

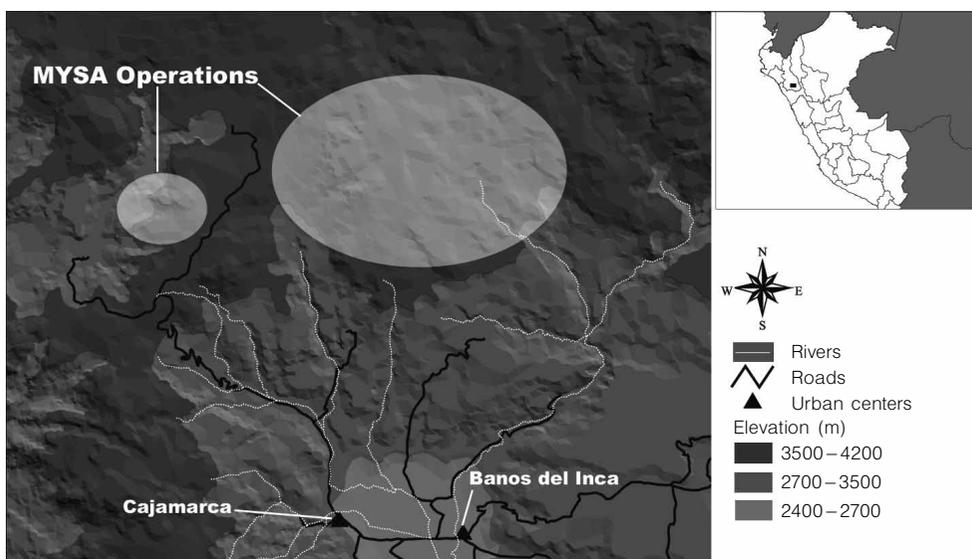


Figure 2. Shaded relief map of MYSA operations in Cajamarca Region.

MYSA's operations are illustrative of the neoliberal transformation that has taken place within the Peruvian mining sector as they commenced in the early 1990s under the Fujimori administration, are controlled by the world's largest transnational gold-mining corporation, and are part of the country's new 'mega' mining sector in that they account for a substantial majority of the country's export earnings.

MYSA's operations have also had significant impacts both on the natural and on the human environments of the Cajamarca region. Since MYSA began operations, it has introduced a host of new economic and human resources into the region. Table 4 illustrates that MYSA has introduced more than US\$2 billion into the region since 1992. In addition, in 2000 the mine employed more than 7000 people, of whom 57% were from the Cajamarca region; purchased goods and services from more than 413 providers in the region; and became the largest landowner in the region (MYSA, 2002).

The effects of these new economic resources throughout the region have been significant. The construction and housing markets have expanded as demand for new materials and accommodations have increased. Within the city of Cajamarca, the impacts of the mine have been extraordinary—but also hotly debated. Critics of

Table 4. Selected MYSA economic impacts in Cajamarca (source: MYSA, 2002).

Mine activity	Subtotal (US\$ thousand)	Total investment (US\$ thousand)
Investment in mine facilities (1992–2000)		85 542
Exploration (1992–2000)		770 158
Employment		153 573
Purchases of goods and services		1 720 497
Cajamarca (1993–2000)	127 248	
national and foreign (1992–2000)	1 593 249	
Rural development programs (1993–2000)		11 898
Total		2 741 668

the mine charge that MYSA's activities have created a 'gold boom town' atmosphere that is leading to serious political and social problems while bringing only limited and isolated economic growth to the region, reflecting traditional enclave mining patterns (for example, GRADE, 2000; Kuramoto, 1999). On the other hand, proponents of the mine argue that MYSA is fostering an economic dynamism in the region that is leading to a host of complementary economic and social effects (for example, Indacochea, 1998; Schwalb, 2000). Although these debates are continuing in a variety of forums, both in Peru and internationally, what is clear is that there are a host of transformative, albeit uneven, economic and social changes taking place that are affecting the region in diverse ways.

MYSA's operations have also had significant impacts on the natural environments of the Cajamarca region, primarily because of the types of mining technologies being employed to extract gold concentrates. In order to exploit the rich mineral deposits of the Cajamarca belt, and to minimize costs, MYSA has deployed open-pit mining and cyanide heap-leaching technologies. Once the ore has been removed from large open pits and placed on lined leach pads in terraced piles, cyanide leach solution is applied to the ore through drippers. The gold-pregnant solution then flows to large ponds, where it is separated. MYSA's operations were the first large-scale heap-leaching project in Peru, and in 2001 became the largest heap-leaching operation in the world (Newmont, 2002).

MYSA's cyanide heap-leaching operations have led to a dramatic shift of landcover patterns and a widespread alteration of environmental processes in the region. Across more than 10 000 ha, the mine has altered watercourses and shifted millions of tons of earth. By 2000 the physical extent of the mine site was larger than the nearby city of Cajamarca—which has more than 80 000 people. In 2000 more than 130 000 tons of earth were moved at the site—which is comparable to the amount of earth being moved at large copper operations throughout the world (Newmont, 2002).

In order to evaluate how MYSA has been affecting households in the Cajamarca region field research was conducted between 1999 and 2003, focused on the impacts of the mine on land-tenure patterns and the resources that households access in the production of their livelihoods. The research design for the primary data-collection component of the project was based on formal questionnaires conducted with randomly sampled households in three communities in the region affected by the mine's operations. Consideration was given to the varied climatic zones of the region and the diverse geographic impacts of MYSA's operations during the community-selection process. Overall, fifty-nine households were interviewed during the course of the study—which included a total population of 349 people. In addition to the formal questionnaire, extensive archival research, secondary-data collection, key-informant interviews, and focus groups were conducted during the course of the study and in subsequent field research periods to complement the case-study findings.

Shifting land-tenure patterns

As neoliberal restructuring has transformed Peru's mining sector, there has been a concomitant transformation of rights to use land, or land tenure, throughout the country. Prior to the neoliberal transformation of the 1990s, research concerned with land-tenure patterns focused primarily on the impacts of state regulation and the redistribution of land resources throughout the country under the Peruvian experiment (for example, Deere, 1990; Lowenthal, 1975; Slater, 1989). However, under the new neoliberal agenda, private actors such as transnational corporations have become new and important forces affecting land-tenure patterns. Recent research has begun to recognize how Latin America's neoliberal agenda is leading to a spatial reordering of land-tenure patterns (for example, Deere and Leon, 2001; Mayer, 2002), particularly in the context of the transnational mining sector (Bridges, 2002).

The spatial reordering of land-tenure patterns related to Peru's new transnational mining sector illustrates three important processes that contribute to theoretical and empirical discussions surrounding land tenure in the region. First, transnational mining operations are accelerating the transformation of land-tenure institutions from communally managed, or informally negotiated, to private ownership. Second, the magnitude of transnational mining claims is transforming land values and leading to a 'revalorization', as Bridge (2002) argues, of land-use resources and priorities. Third, transnational mining operations are also significantly affecting the vertical distribution of land-use patterns. This is leading to a rezoning of household land-use activities across the historically important vertical ecological production zones of the region (Murra, 1985; Pulgar Vidal, 1981).

The impacts of MYSA's mining activities on land-tenure patterns in the Cajamarca region illustrates each of these three processes. Prior to Fujimori's reforms, mining operations in the Cajamarca region were largely concentrated in the silver-mining district of Hualgayoc and a few large parastatal operations. However, when MYSA began operations in the region, mining claims increased dramatically. Figure 3 (see over) illustrates the magnitude of changes in mining claims in the periods prior to 1991 (the beginning of Fujimori's reforms) and between 1991 and 2003. More mining claims, covering a larger area of land, were filed between 1991 and 2003 than in the entire period of nationally recorded mining claims for the region (from the late 1800s). Figure 3 also demonstrates the magnitude of MYSA's mining claims and the degree to which it has the potential for even larger effects in the future. Although MYSA's operations presently encompass approximately 10 000 ha, it has secured 1386 km² of mineral rights throughout the region (the parcels are identified in figure 3).

The first process that MYSA's mining activities and mineral claims have affected is land-tenure institutions. Prior to Fujimori's reforms, many rural land holdings in Cajamarca were managed communally or informally negotiated. Once Fujimori began a series of land-reform measures to recognize private rural land holdings, including the 1991 Law to Promote Foreign Investment in the Agricultural Sector (Law 653), constitutional measures that legalized the parcelization and sale of land in 1993 and the 1995 Land Law (Law 26505) that allowed collective groups to parcel and sell land held in common, the collective and informal land-tenure institutions throughout the country began to change. However, as with the agrarian reforms under the Peruvian experiment, state recognition of private rural landholdings has been very slow. Only 60% of private land holdings in rural communities throughout the country have been formally recognized by the Peruvian state (CONOCAMI, 2000). Consequently, often the new mineral claims of large transnational operations, although formally recognized by the state, are being superimposed over communally managed lands or private lands that are not recognized by the state.

In the absence of effective state mechanisms to facilitate the transfer of these lands, mining corporations have frequently assumed this role. For example, in rural Cajamarca, where the neoliberal land-titling initiatives of the state were virtually nonexistent in the early 1990s, MYSA became the *de facto* agent of land-tenure change because the mine needed to clarify the legal ownership of lands where it planned to commence operations. Thus MYSA became the principal actor facilitating the transformation of communal land-management institutions.

When MYSA began operations, many of the communities situated in the area of planned mineral extraction operations managed land resources collectively through communal or familial institutions. In order to commence operations, MYSA was required to negotiate the purchase of these lands. However, before the land could be legally acquired under Peru's new land laws, it had to be reparceled into private holdings.

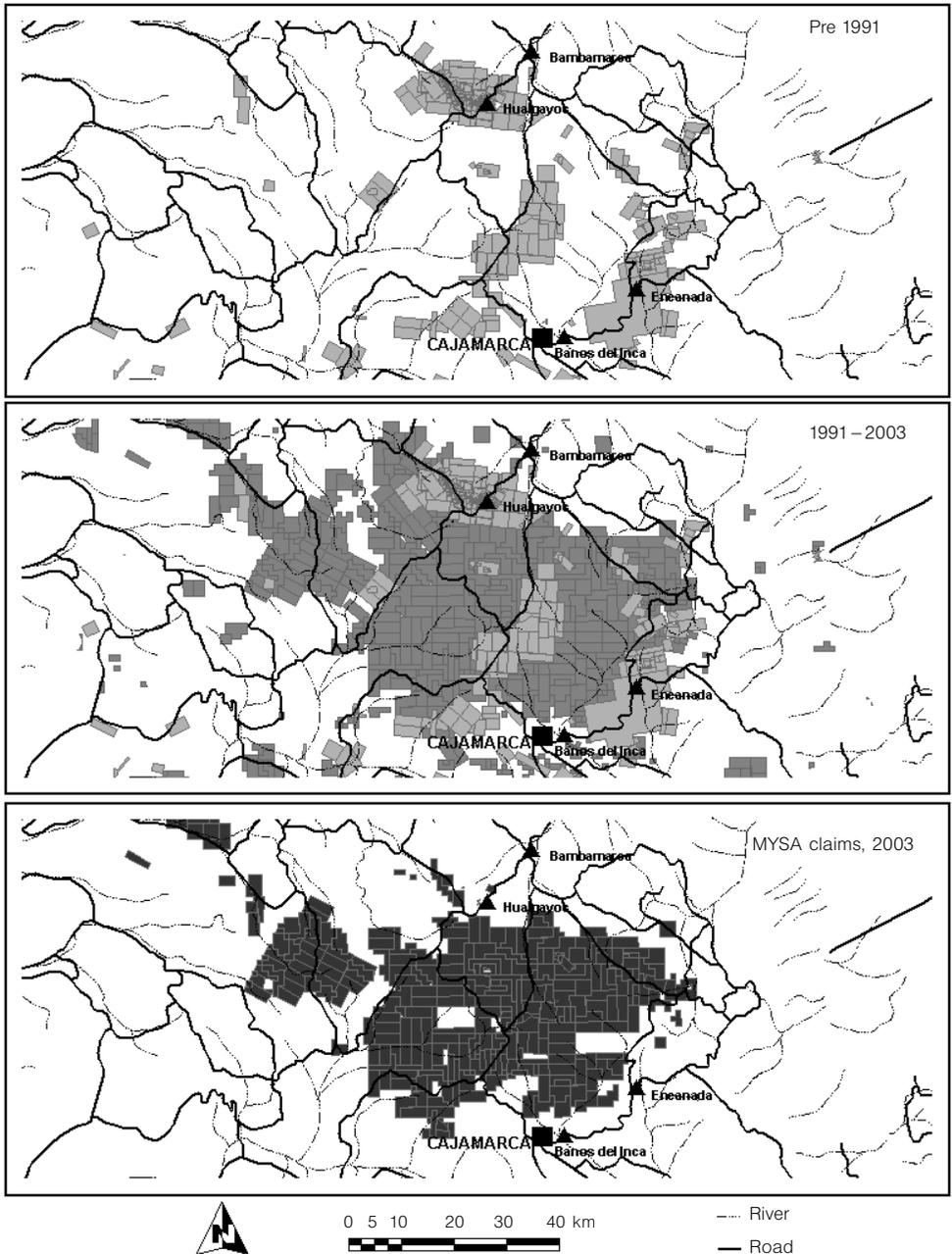


Figure 3. Mining claims in the Cajamarca Region (source: INACC, 2003).

In order to facilitate the reparcelization of land, MYSA initiated a series of rapid land-titling initiatives in communities. According to respondents in the case-study communities, MYSA employees organized community meetings, transported people to the city in mine vehicles, and ushered them through the land-titling process so that the mine could then purchase their land. Thus MYSA became the principal agent affecting land-tenure institutions in the area of its planned operations.

MYSA's land-titling efforts in the region have been significant. Between 1992 and 2000 MYSA purchased over 11 000 ha in the region for approximately US\$5 million (MYSA, 2002). This includes 259 different land purchases in forty-four different communities of parcels ranging from less than 1 ha to more than 1000 ha (Martinez and Oblitas, 2000). Aside from these figures, it is also important to note that MYSA's operations have also spurred a host of new parcelization and privatization efforts in communities throughout the region which are anticipating possible future land purchases. Thus, as MYSA's operations have increased and it has consolidated its mineral claims to a much larger area than that covered by its present operations, so too has the rate and scale of land tenure institutional transformation.

The second land-tenure process that MYSA has affected in the region is related to land values. One of the common effects of mining booms on land resources is that values increase dramatically as mines acquire land resources for their operations. This has also been the case in the Cajamarca region. When MYSA began its land-acquisition program, it was required to pay fair market value to landholders. In several of the case-study communities, MYSA encountered resistance from landholders and resorted to state-sanctioned expropriation procedures and forced land evictions, while compensating landholders at what it determined to be the estimated market value of the land. Beginning in 1992, MYSA began purchasing lands for less than US\$80 per ha (GRADE, 2000). However, since 1992 land prices have increased dramatically. Between 1992 and 1996 prices for land surrounding the mine increased more than 600% (GRADE, 2000). In 2000 several case-study respondents indicated that landholders were demanding several thousand dollars per ha. In a recent complaint filed with the International Finance Corporation (IFC), one peasant organization demanded that MYSA pay US\$500 per m², or US\$500 000 per ha, to landholders (Project Underground, 2001). Although land values may not reach these extraordinary levels, as MYSA's operations expand it is certain that land prices in the region will continue to increase.

One consequence of these dramatic increases in land values in the region is that the value placed on the use of land resources is being altered. As Bridge has noted, mining activities often contribute to a "shuffling in the sociospatial distribution of rights to use land" and a "revalorization" of land use (2002, page 382). Because MYSA's operations are so large and it has become the largest determinant of land tenure in the region, its land use has rapidly redefined land-use rights and shifted the perceived value of land towards mining activities. There has also been a significant shift away from non-mining-related land-use activities, particularly because former landholders have been unable to obtain new land resources in the region and the increasing prices of the 'mining value' of lands in the region have decreased the availability of land for other activities.

The third land-tenure process that MYSA's activities have affected is related to the spatial distribution of land-use activities throughout the region. Households in the Cajamarca region have traditionally utilized land resources across different vertical ecological production zones, which vary across climatological, vegetational, and landscape criteria (Mayer, 2002). Although researchers have disputed the conceptual and definitional criteria concerning the extent and classification of ecological production zones in the Andean region (for example, Zimmerer, 1999), households produce crops and engage in other livelihood activities across, as Mayer (2002) states, 'real' production zones in the region in specific ways. According to the case-study research, households engage in a variety of different livelihood activities across three different ecological zones (*quechua*—2400–2700 m in elevation; *ladera*—2700–3500 m; *jalca*—3500–4200 m) in the areas affected by MYSA's mining operations (see figure 2 for map of elevation zones). This vertical zonation of livelihood activities has allowed

households historically to engage in a diverse portfolio of production techniques to meet household-subsistence needs.

Since MYSA began operations in the region, the vertical production strategies of households have been significantly affected. This is a result both of the magnitude of MYSA's operations as well as of their vertical location. MYSA's operations are primarily located at the very highest elevations of the region (ranging from 3500 to 4000 m—primarily the jalca zone). This has significantly affected household production strategies in many communities because the mine has come to occupy most of the jalca production zone, which has truncated household land-use possibilities. This 'rezoning' of production zones has forced many households to change their land-use activities. Generally, the jalca zone of production was utilized by households for seasonal grazing activities. However, since MYSA obtained mineral land-use rights to much of the zone, households which either sold their land to the mine or which relied upon communal or informal grazing arrangements have had to shift these livelihood activities to lower zones. This rezoning of production zones in the region has contributed to the intensification of agricultural and livestock strategies at lower ecological production zones.

Mining and livelihood transformations in Cajamarca

The rapid expansion of MYSA's mining operations, in conjunction with significant shifts in land-tenure patterns, has also had significant implications for household livelihoods in the Cajamarca region. These changes are transforming household livelihoods as access to the resources upon which they are based is shifting in complex, uneven, and diverse patterns.

Recent research in Peru has just begun to examine the nexus of relationships between neoliberal-led mining operations and communities (Caravedo, 1998; CONOCAMI, 2000; Cooperación, 1999; GRADE, 2000; Kuramoto, 1999; Ossio, 1998). However, little of this research has specifically examined how the impacts of mining activities might be understood at the level of the household or across a broad spectrum of resources that households draw upon in the production of their livelihoods. In order to address these concerns, the case-study research draws upon conceptual frameworks that have emerged in geographic development studies that allow for a broader examination of how the resources that households utilize in their local livelihood activities are changing in response to MYSA's operations (Bebbington, 1999; 2000; Leach et al, 1997; Scoones, 1998). Drawing upon these new perspectives, the case-study findings illustrate that significant alterations in household access to natural, economic, social, and human resources are taking place.

In the case-study communities, household livelihoods are based primarily on access to natural resources—including land and the seasonally variable water supplies of the region. Based on access to these natural resources, households engage in a variety of agricultural, livestock, and small-market activities. Livelihood activities across the three case-study communities include agricultural production, agroforestry, livestock production, and a host of smaller activities such as migration, dairy production, salaried labor, and artisanal production of ceramics and textiles.

As MYSA's operations have expanded, so too have its impacts on local communities. Although many of these impacts have been related to the operation of the mine (for example, roads, employment, water resources, land purchasing), MYSA has also implemented a variety of rural assistance programs that have significantly affected household livelihoods in the case-study communities. Since 1993 MYSA has implemented several different programs for fostering economic development in the region that have had differing goals, methods of implementation, and impacts. Overall, these programs have included health and nutritional assistance, the construction of medical

Table 5. Summary of changing household access to resources.

Resource category	Nature of change	Type of change
Economic	positive	Increased access to roads, seed banks, irrigation extensions, latrines, potable water systems, money from land transactions, employment, rural credit programs, livestock supplies, markets for dairy products.
Human	positive	Increased access to formal education, technical training, health services, preventative health care, sanitation.
Natural	negative	Decreased access to irrigation water supplies, land resources for livestock and agriculture, water quality, quality of land (erosion, intensification).
Social	negative	Decreased number and quality of, and access to, interhousehold relationships, community organizations and leadership, local conflict-resolution mechanisms; increased linkages with national and transnational protest networks and groups.

posts and schools, technical assistance, reforestation programs, agricultural development, rural credit, and the construction of potable water systems (Indacochea, 1998).

Since MYSA began operations in the region, households in the case-study communities indicated that a diverse array of changes in household access to resources has taken place. Generally, households reported declining access to natural and social resources and increasing access to economic and human resources. Table 5 briefly summarizes the nature of changes in household access to resources taking place in the case-study communities.

Although households across the case-study communities reported a diverse array of changes in their access to resources, it is important to note that these changes have varied over time, between households, and across communities. These uneven impacts have contributed to two important dynamics of change. First, because MYSA's rural programs have favored certain communities (those closest to the mine, or where the mine is likely to begin operations in the future), some households have experienced greater access to economic and human resources. However, these households have also experienced greater decreases in access to natural resources and, because many of MYSA's programs have created serious tensions within communities, social resources. This has forced these households to alter their livelihood activities, in the short term, much more rapidly than households further away from the mine.

The other important dynamic of change is related to the uneven impacts of MYSA's activities at the interhousehold level within communities. Although MYSA's activities have affected resources throughout the case-study communities, all households have not been able to access them equally. Thus, whereas some households have experienced positive increases in access to human and economic resources and relatively few decreases in access to natural resources, other households have experienced dramatic decreases in access to natural resources and little or no new access to human and economic resources. These uneven changes taking place within communities have contributed to substantial perceptions of inequality between households and increasing tension over how MYSA is and should be allocating the positive benefits of its operations. In addition, because interhousehold tensions over access to resources have increased within communities, there has also been a significant decline in social resources, including interhousehold trust and cooperation, community participation, and communal conflict-resolution mechanisms.

Many households that have experienced the most significant decline in access to natural resources (particularly land holdings and quantity and quality of water) and interhousehold and communal social resources have engaged in activities to resist these changes. These activities include the development of new linkages with national and transnational protest networks and groups (Bury and Kolff, 2003). Although many of these relationships may not have allowed households to access new resources in the short term, they have generated substantial new social and political relationships across scales that may generate new dynamics of change in the future.

Overall, households impacted by MYSA's activities in the Cajamarca region have experienced substantial alterations in their access to economic, human, natural, and social resources. These changes are contributing to livelihood transformations in the region affected by the mine; this is treated more extensively in recent research that corroborates these case-study findings with regards to natural resource impacts as well as discussing more extensively the nature of livelihood transformations in the region (Bury, 2002; 2004; Bury and Kolff, 2003; INGETEC, 2003).

The household-livelihood transformations that are taking place in the case-study communities can be briefly illustrated across three general categories. First, those households most acutely affected by declining access to natural resources (either by the sale of their lands or through lack of water) have often resorted to livelihoods based on permanent or more frequent migration, salaried labor, or the purchase of smaller parcels of land in neighboring communities. The pre-MYSA livelihoods of households in this category have been most significantly transformed, as households have been forced to adapt to such a dramatic decline in access to natural resources.

Second, those households that have experienced declining access to natural resources as well as some increasing access to human and economic resources have slowly adapted their livelihood activities through the purchase of new livestock animals, increased dairy production, and shifting agricultural activities on their remaining lands. This has intensified household land use, but is also decreasing land fertility. The intensified use of land resources in the region has been particularly salient for households living below the mine, as grazing areas at higher elevations have disappeared. For households in this category, livelihoods have been changing—but in a very complex and diverse fashion. It is also likely that, although many households in this category have enjoyed some increases in agricultural and livestock production in the short term, these increases will only be sustainable for a short period as their remaining land reserves are being rapidly depleted.

Third, the very small percentage of households that have experienced the largest degree of positive increases in access to human and economic resources have generally increased livestock herds, dairy and agricultural production, artisanal production, and market-based activities. Based on the household-survey data, these households are also the most likely to have one or more family members working for MYSA or to have purchased new land in the city. For households in this category, although they are few in number and are enjoying the benefits of MYSA's activities in the region, their livelihoods have also been changing in a complex and diverse fashion as they have adapted to Peru's new neoliberal mining economy.

Conclusion

Peru's new neoliberal mining political economy is transforming the geographies of land tenure and livelihoods in Cajamarca. During the past decade, MYSA's transnational gold-mining activities have contributed to significant shifts in land-tenure patterns, land-tenure institutions, and land-use values throughout the region. In addition, livelihoods are being transformed as household access to economic, human, natural, and social resources is

rapidly changing in the areas surrounding MYSAs's mining operations. Although the changes taking place in the Cajamarca region of Peru are illustrative of the new neoliberal mining economy of Peru, similar transformations are also taking place in other areas of the country where new transnational mining operations are underway. Understanding the nature of these changes is important both theoretically and empirically as they will largely define the future development trajectories of the country over the course of the next decade. Understanding how and in what ways these transformative processes continue to take place is important for geographic scholars concerned with the shifting development imaginaries of the country. In this paper I have only begun to examine these issues in one area of Peru; future research efforts could examine how Latin America's increasingly privatized and transnationalized natural resource extractive economy is affecting local geographies throughout the region in more detail and at greater length. This is particularly important as the neoliberal experiment in Latin America is under increased scrutiny by scholars and policymakers as reports of its immediate political and economic benefits are now giving way to more measured analyses. Research concerned with illustrating the ways in which neoliberal reforms are transforming local geographies would be able to contribute to this discussion more effectively as new directions of change are considered and new research agendas formulated.

Acknowledgements. The author would like to thank Anthony Bebbington, Nancy Wilkinson, and the anonymous reviewers for their assistance and timely discussions. This research was conducted with the support of a National Science Foundation Doctoral Dissertation Improvement Grant in Geography and Regional Sciences (BCS-0002347).

References

- Bebbington A, 1999, "Capitals and capabilities: a framework for analyzing peasant viability, rural livelihoods and poverty" *World Development* **27** 2021 – 2044
- Bebbington A, 2000, "Reencountering development: livelihood transitions and place transformations in the Andes" *Annals of the Association of American Geographers* **90** 495 – 520
- Bebbington A, 2002, "Geographies of development in Latin America?", in *Latin America in the 21st Century: Challenges and Solutions* Ed. G Knapp (University of Texas Press, Austin, TX) pp 105 – 148
- Becker D, 1983 *The New Bourgeoisie and the Limits of Dependency: Mining, Class, and Power in "Revolutionary" Peru* (Princeton University Press, Princeton, NJ)
- Bridge G, 2002, "Grounding globalization: the prospects and perils of linking economic processes of globalization to environmental outcomes" *Economic Geography* **78** 361 – 386
- Bury J, 2002 *The Political Ecology of Transnational Gold Mining Corporations and the Transformation of Livelihoods in Cajamarca, Peru* unpublished PhD thesis, Department of Geography, University of Colorado, Boulder, CO
- Bury J, 2004, "Livelihoods in transition: transnational gold mining operations and local change in Cajamarca, Peru" *Geographic Journal* **170** 78 – 91
- Bury J, Kolff A, 2003, "Livelihoods, mining and peasant protests in the Peruvian Andes" *Journal of Latin American Geography* **1** 3 – 17
- Caravedo B, 1998 *El Impacto Social de las Empresas Mineras en el Peru* [The social impact of mining companies in Peru] Seguimiento Analisis y Evaluación para el Desarrollo, Lima
- CONITE, 2001a, "Registered foreign investment", Comisión Nacional de Inversiones y Tecnologías Extranjeras, Lima, <http://www.mef.gob.pe/peruinv.htm>
- CONITE, 2001b *Peru Legal Framework for Mining* Comisión Nacional de Inversiones y Tecnologías Extranjeras, Lima
- CONOCAMI, 2000 *El Rostro de la Minería en las Comunidades del Peru* [The roster of mining in the communities of Peru] Coordinadora Nacional de Comunidades del Peru Afectadas por la Minería, Lima
- Cooperación, 1999 *Minería y Comunidades* [Mining and communities] Acción Solidaria para el Desarrollo, Lima
- Deere CD, 1990 *Household and Class Relations: Peasants and Landlords in Northern Peru* (University of California Press, Berkeley, CA)

- Deere C D, Leon M, 2001 *Empowering Women: Land and Property Rights in Latin America* (University of Pittsburgh Press, Pittsburgh, PA)
- Directorio Minero del Peru, 2000 *Directorio Minero del Peru 2000* [Mining directory of Peru 2000] Promotores y Consultores Andinos SRL, Lima
- Dore E, 1988 *The Peruvian Mining Industry: Growth, Stagnation and Crisis* (Westview Press, Boulder, CO)
- GRADE, 2000 *Gran Minería y La Comunidad* [Large mining and the community] Grupos de Análisis para el Desarrollo, Lima
- GTMA – NOVIB, 2000 *Minería y Contaminación Ambiental en el Peru* [Mining and environmental contamination in Peru] Grupo Temático Medio Ambiente, Lima
- Gwynne R, Kay C, 1999 *Latin American Transformed: Globalization and Modernity* (Edward Arnold, Sevenoaks, Kent)
- Gwynne R, Kay C, 2000, “Views from the periphery: futures of neoliberalism in Latin America” *Third World Quarterly* 21 141 – 156
- Hays-Mitchell M, 2002, “Resisting austerity: a gendered perspective on neoliberal restructuring in Peru” *Gender and Development* 10(3) 71 – 81
- IMF, 2001 *Peru Selected Issues* IMF Country Report No. 01/51, International Monetary Fund, Washington, DC
- INACC, 2003 *Mining Claims Data for Peru* Instituto Nacional de Concesiones y Catastro Minero, Lima
- Indacochea A, 1998 *Cajamarca Competitiva* [Cajamarca competitive] (Sawya Ediciones SRL, Lima)
- INEI, 2000, “La medición de la pobreza en el Peru” [The measurement of poverty in Peru] Instituto Nacional de Estadística y Informática, <http://www.inei.gov.pe/inei4/Novedad/novedad.htm>
- INGETEC, 2003 *Informe Final de la Auditoria Ambiental y Evaluaciones Ambientales de las Operaciones de Minera Yanacocha en Cajamarca* [Final environmental evaluation report of Minera Yanacocha’s operations in Cajamarca] INGETEC, Colombia, <http://www.ingetec.com.co>
- Klak T, 1998 *Globalization and Neoliberalism: The Caribbean Context* (Rowman and Littlefield, Lanham, MD)
- Kuczynski P, 2000, “The impact of privatization in Peru”, in *The Impact of Privatization in the Americas* Eds M H Birch, J Haar (North – South Center Press, Miami, FL) pp 99 – 114
- Kuramoto J, 1999 *Las Aglomeraciones Productivas Alrededor de la Minería: El Caso de Minera Yanacocha S.A.* [Productive agglomerations around mining: the case of Minera Yanacocha] Grupo de Análisis para el Desarrollo, Lima
- Leach M, Mearns R, Scoones I, 1997, “Environmental entitlements: a conceptual framework for understanding the institutional dynamics of environmental change”, DP 359, Institute for Development Studies, University of Sussex, Brighton, Sussex
- Lowenthal A, 1975 *The Peruvian Experiment: Continuity and Change Under Military Rule* (Princeton University Press, Princeton, NJ)
- Martínez J N, Oblitas J J, 2000 *Situación y Condición de las Familias que Vendieron sus Tierras a MYSRL 1992 – 2000* [Situation and condition of the families that sold land to MYSRL 1992 – 2000] (CES E.I.R.L, Cajamarca)
- Mayer E, 2002 *The Articulated Peasant: Household Economies in the Andes* (Westview Press, Boulder, CO)
- Ministry of Energy and Mines, 2000 *Reference Plan for Mining 2000 – 2009* Ministry of Energy and Mines, Lima
- Ministry of Energy and Mines, 2001 *Inversión en Minería 1992 – 2007* [Mining investment 1992 – 2007] Ministry of Energy and Mines, Lima
- Murra J V, 1985, “El archipelago vertical revisited”, in *Andean Ecology and Civilization: An Interdisciplinary Perspective on Ecological Complementarity* Eds S Masuda, I Shimada, C Morris (Tokyo University Press, Tokyo) pp 3 – 19
- MYSA, 2002 *Yanacocha: Its Commitment with Cajamarca* Minera Yanacocha, Cajamarca, Peru
- Newmont, 2002 *South American Operations* Newmont Mining Corporation, Denver, CO
- Ossio J, 1998 *Empresas Mineras y Poblaciones Rurales* [Mining companies and rural populations] Instituto de Estudios Energético Mineros, Lima
- Peru Monitor Monthly* 2000, “Mining: plenty of glitter” 7 75 – 78
- Peru Report 1999* (Peru Reporting, Lima)
- Proinversion, 2002 *Peru: Indicadores Económicos y Sociales* [Economic and social indicators] Proinversion, Lima

-
- Project Underground, 2001 *Complaint to the IFC Ombudsman Office* Project Underground, Oakland, CA
- Pulgar Vidal J, 1981 *Las Ocho Regiones Naturales del Peru* [The eight natural regions of Peru] (Editorial Universo, Lima)
- Schwalb F, 2000 *Cajamarca: Dinamización de la Economía Local* [Cajamarca: dynamics of the local economy] (IPAE, Cajamarca, Peru)
- Scoones I, 1998, "Sustainable rural livelihoods: a framework for analysis", WP 72, Institute for Development Studies, University of Sussex, Brighton, Sussex
- Skidmore T, Smith P H, 2001 *Modern Latin America* (Oxford University Press, New York)
- Slater D, 1989 *Territory and State Power in Latin America* (St Martin's Press, New York)
- Thorp R, Bertram I G, 1978 *Peru 1890 – 1970: Growth and Policy in an Open Economy* (Columbia University Press, New York)
- Thorp R, Cardenas E, Ocampo J A (Eds), 2000 *An Economic History of Twentieth-century Latin America* (Palgrave, New York)
- Webb R, Fernández-Baca G, 1993 *Peru en Números 1993* [Peru in numbers 1993] (Instituto Cuánto, Lima)
- Zimmerer K, 1999, "Overlapping patchworks of mountain agriculture in Peru and Bolivia: toward a regional – global landscape model" *Human Ecology* **27** 135 – 165

