

Introduction: Developing-Country Firms as Agents of Environmental Sustainability?

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The second sector, which is typical of a Southern economy, is directed toward the domestic markets, and has a much thinner capital base, which results in the downwards business spiral of poor training and poor technology leading to poor profit margins....It comes as little surprise that this sector is also frequently the more polluting and resource inefficient (Wehrmeyer and Mulugetta 1999:5).

Most evaluations of the potential of developing-country firms as agents of environmental sustainability are pessimistic. Developing-country firms are assumed to be environmental laggards, particularly in comparison to their industrialized country counterparts. They are assumed to be trapped in structures that dictate polluting practices as the only viable business model. And it is assumed that greatest potential for improving firm environmental practice in developing countries lies with the local subsidiaries of foreign multinationals and not with developing-country firms.

These assumptions reflect empirical realities. Developing-country economies are polluting. However, they can also be misleading. The articles in this special issue of *Studies in Comparative International Development* offer competing characterizations of developing-country firms as potential agents in processes of sustainable development. Ranging across the globe from Ecuador to China, they each profile cases of developing-country firms embracing aspects of environmental protection, and even emerging as global leaders in the manufacturing and dissemination of clean technologies.

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While such examples of action by developing-country firms as agents of environmental sustainability may be exceptions rather than the rule, they play the crucial role of destabilizing assumptions about the environmental practices of the developing-country private sector. Rejecting the common image, the articles in this special issue suggest three alternative starting propositions. First, developing-country firms are *not* locked into a single, polluting trajectory but have some choice about how to accumulate profit. Second, under certain conditions, developing-country firms will exceed the environmental performance of their industrialized country counterparts. Third, developing-country firms are key actors in determining the trajectories of both domestic and global environmental systems.

This special issue places developing-country firm greening at the center of analysis and evaluates the insights generated by this novel point of view. As described above, the first set of insights relates to the firms themselves. Analyzing the environmental practices of developing-country firms challenges standard assumptions and offers a new view on their potential as agents of environmental sustainability. A second set of insights relates to the dynamics of globalization. Much of the early globalization literature is framed around dichotomies: hyper-globalists versus the antiglobalization movement (Held et al. 1999); globalization and its dark underbelly (Flynn 2002); hegemonic versus counterhegemonic globalization (Evans 2005); global versus local dynamics (Hart 2002); and globalization's winners and losers (O'Brien and Leichenko 2003). These framings are crucial in drawing attention to the conflicts generated by globalization. In particular, they highlight two axes of conflict: the first between the agents of globalization and those upon whom it is imposed, and second between global dynamics and local responses. Focusing on these two dimensions of conflict has generated fascinating research on the reach of globalization. Scholars have investigated the political and institutional work that enables processes of globalization (Chorev 2005; Fairbrother 2007), the counterstrategies of antiglobalization movements (Burawoy et al. 2000; Evans 2005), and the mediating role of national and subnational dynamics (Holm and Sorenson 1995).

Developing-country firm greening fits uncomfortably into dichotomous framings of globalization dynamics. Each of the four contributions to this special issue reveals not conflict but confluence between globalization dynamics and local, counterhegemonic interests. Hegemonic forces of globalization, such as trade liberalization and increased foreign direct investment, are key drivers in improving developing-country firm environmental performance. In turn, such improvements meet the needs of local communities and groups mobilized around protecting and enhancing local environmental quality. Which is not to say conflict is absent in developing-country firm greening. Foreign and domestic firms compete to control clean technology markets. Local communities target transnational and domestic firms about the limitations of their environmental commitments. Actors compete to define different versions of environmental responsibility. Yet these are not conflicts that fracture along globalization and antiglobalization lines. Developing country-firm greening points to a new analytic framework, which emphasizes not the contested reach of globalization but how globalization transforms patterns of politics. To paraphrase Evans (1995:10), in the contemporary world, withdrawal and involvement are not the alternatives. Globalization is a given. The appropriate question is not "how much" but "what kind."

The following sections lay out a framework for evaluating developing-country firm greening. I proceed through a three-stage process of taking stock, empirical assessment, and theory extension. The conclusion then examines the contribution of the four research articles in this special issue, showcasing how a developing-country firm point-of-view offers both a reevaluation of the firms themselves and of the transnational dynamics in which they are embedded.

The Current State of Knowledge

Authors use a variety of terms to describe firms owned and operated by developing-country capitalists, including “indigenous private sector” (Perkins 2003), the local private sector, the domestic private sector (Utting 2002), and the “other private sector” (Davis 2005; Solo 1999). Here, firms owned and operated by developing-country capitalist are referred to as developing-country firms to emphasize their geographical home base. They are firms established and incorporated in developing countries. They are neither necessarily local—many developing-country firms are multinational with subsidiaries both in other developing and in industrialized countries—nor are they any more indigenous than firms headquartered in industrialized countries.

There is surprisingly little targeted study of the environmental motivations and practices of these firms. Most research on environment and development does not single out the developing-country private sector as a distinct object of study. Rather, globalization and its environmental consequences constitute the core of research on the environment-development nexus, across the range of social sciences. In this research, developing-country firms are secondary to global corporations and are mentioned only to the degree that they are influenced by the practices of multinational subsidiaries. For example, economists working on these issues focus on how trade liberalization and foreign direct investment drive changes in the size, sectoral composition, and production techniques of developing-country economies (Jenkins 2000a). Scholars have advanced competing “pollution haven” versus “pollution halo” hypotheses. The former hypothesize a global race-to-the-bottom as multinationals relocate polluting facilities to countries lacking strict environmental regulations (Birdsall and Wheeler 1992; Roberts 1998). The latter predict environmental benefits arising from increased trade and foreign direct investment (Hoffmann et al. 2005). Sociological and anthropological analyses of the environment-development connection emphasize the disruptive force of global flows. Scholars have explored how globalized discourses of underdevelopment or sustainable development impose identities and reshape power dynamics (Escobar 1995; Watts and McCarthy 1997). Research in the political ecology tradition situates local resource-use decisions in the national, regional, and global institutions that shape microdecisions (Bryant 1996). The exploitative practices of transnational corporations in developing countries feature prominently as sites of contestation over meaning, rights, and access to environmental goods and exposure to environmental harms (Sawyer 2004).

Following trends set in academia, policy perspectives also privilege multinationals over developing-country firms. For example, the three international texts that

define the scope and focus of the global sustainable development agenda—the *Report of the World Summit on Sustainable Development* (UN 2002), *Agenda 21* issued at the 1992 Rio Earth Summit (UN 1992), and the Brundtland Commission report, *Our Common Future* (WCED 1987)—all mention multinational corporations but overlook the developing-country private sector in their catalogue of actors central to achieving sustainable development goals.

Developing-country firms are overlooked, in part, due to pessimistic assessments of their environmental prospects. The assessment that developing-country firms must be environmental polluters is based on two lines of explanation. The first focuses on the domestic conditions in which firms operate. Theories of firm environmental behavior point to government regulation, market forces, and civil society pressure as driving improvements in firm environmental policies and practices (Bansal and Roth 2000; Levy 1995; O'Rourke 2003; Tombs 1993; Welford and Starkey 1996). Transferring this model to developing-country contexts generates the pessimistic assessment of developing-country firms as environmental polluters. Economies oriented toward growth, the absence or lack of enforcement of environmental regulation, and relatively nascent environmental movements all suggest that developing-country firms face a business climate less amenable to green-business models than their industrialized-country counterparts. Expressions of this assessment are embodied in environmental Kuznets curves, which link environmental protection and per capita income (Barbier 1997), theories of postmaterialism, which link environmental values and per capita income (Inglehart 1995), and theories of ecological modernization, which link environmental management to bureaucratic rationalization (Mol and Buttel 2002).

The second line of explanation predicting the poor environmental performance of developing-country firms focuses on transnational economic drivers. The Heckscher–Ohlin model of international trade holds that countries (and firms) will specialize in areas where they have a comparative advantage. In the environmental arena, this suggests that developing-country firms should take advantage of the weaker environmental regulations in their home countries and leverage the ability to pollute into a comparative advantage (Pethig 1976). The “pollution haven” literature, which catalogues North–South exports of hazardous goods, such as toxic waste (Clapp 2001), and processes, for example to the maquiladora region on northern Mexico (Frey 2003; Karliner 1997), is consistent with this line of explanation.

Yet, such pessimistic models offer only a partial view of the environmental performance of the developing-country private sector. There are sufficient empirical cases of environmental innovation by developing-country firms to suggest that they are not locked into a single polluting trajectory. Take the four articles in this special issue. Joanna I. Lewis documents the innovation strategies pursued by India and China's leading wind turbine manufacturers. My contribution focuses on the processes by which Mexico's national oil company developed a proactive climate change policy. Cristian J. Melo and Steven A. Wolf analyze the environmental practices of ecocertified Ecuadorian banana producers. Finally, Richard Perkins tracks improvements in firm environmental technologies, organizational practices, and performance in India's automobile, steel, and electricity sectors. These articles complement dispersed empirical accounts of environmental entrepreneurialism in a range of developing-country firms. For example, the pulp and paper sector has been

a site of environmental innovation across the globe, from Argentina to Thailand (Chudnovsky, Lopez, and Freylejer 2000; Dalcomuni 2000; Sonnenfeld 1998). Chemical companies in Brazil and Mexico are adopting US environmental management standards (Dasgupta, Hettige, and Wheeler 2000; Garcia-Johnson 2000). Developing-country firms are the driving force behind the growth of the solar energy sector in Kenya (Jacobson 2007). Some of the most dynamic markets for clean energy technology manufacturing and implementation are located in India and China (Zhao and Michaelowa 2006). Ecotourism is a burgeoning industry (Rivera 2004). Certification as organic, sustainable, and fair trade is driving improvements in agricultural and forestry practices from Mexico to the Solomon Islands (Cashore et al. 2004; Robins and Roberts 1999).

This patchwork of empirical studies constitutes an emerging and burgeoning substrand of scholarship focused on developing-country firm greening. The time is ripe for a systematic empirical assessment of this body of research and for a comprehensive and integrative theoretical analysis. This introduction tackles both of these tasks.

Empirical Trends in Developing-Country Firm Greening

Three recent edited volumes—*The Greening of Business in Developing Countries: Rhetoric, Reality, and Prospects* (Utting 2002), *Industry and Environment in Latin America* (Jenkins 2000b), and *Growing Pains: Environmental Management in Developing Countries* (Wehrmeyer and Mulugetta 1999)—bring together a collection of articles on environmental management in developing countries. Although none of articles specifically focuses on the developing-country private sector, a survey of the findings relevant to developing-country firm greening reveals several trends.

First, research tends to focus on advanced developing countries. In Latin America, for example, most empirical data is available on firm practices in Brazil and Mexico. Likewise, China, India, and the newly industrializing countries of Southeast Asia have been the focus of research. Very little information is available on the environmental practices of firms in Africa, except for a few studies on South Africa, Kenya, and Egypt.

Second, in terms of sector focus, research is wide-ranging. The studies surveyed focus on pollution-intensive sectors, such as petrochemicals and mining, sectors central to the economy, including manufacturing and agriculture, and industries of ranging technological sophistication. The steel, pulp, and paper manufacturing industries appear to have attracted the most consistent attention across regions.

Third, the studies share similarities in the metrics used to assess firm environmental performance. Scholars, relying primarily on survey data or firm case studies, track changes in firm behavior in three broad categories: implementation of environmental management programs, adoption of clean technology, and reductions in air, water, and hazardous waste emissions. Data on the latter are often not available, therefore most studies document changes in environmental management. This category includes beyond compliance initiatives such as writing an environmental policy, implementing an environmental management system, performing

environmental audits, ensuring compliance, etc. Researchers are aware of the limitation of this metric, noting that changes in firm environmental practice do not automatically equate to changes in firm environmental performance (Jenkins 2000b).

Fourth, the studies are remarkably consistent in the characteristics of firms likely to improve their environmental practices. Foreign ownership, size, export orientation, and financial performance were all found to positively correlate with improvements in firm environmental performance. Most studies also established a negative relationship between facility vintage and environmental performance, except Dominguez-Villalobos (2000) who found no relationship, and Sonnenfeld (1999) who found a positive relationship. Findings regarding pollution intensity and improvement in firm environmental performance were also mixed and may be linked to facility vintage (Gallagher 2007).

The fifth characteristic of the patchwork of empirical studies is that they present a generally optimistic picture. The majority of the articles included in the edited volumes document sector and even economy-wide improvements in firm environmental practices and in adopting clean technologies. The others offer a more mixed picture, documenting some improvements by single firms within a sector or a few firms from within the larger sample (Barkin 2002; Pratt and Fintel 2002; Sowers 1999). Those that find a downward trend argue that global economic changes have caused some developing-country firms to specialize in the most polluting stage of the production of a commodity (Odegard 2000). More generally, the positive picture of developing-country firm greening merits three caveats. First, the results are likely skewed by selection bias. Firm and sector case studies of developing-country firm greening are likely to focus on firms that appear to challenge rather than reinforce standard assessments of the environmental performance of the developing-country private sector (Luken 1999). Surprising results are more publishable than those that reaffirm common understandings. Second, researchers emphasize the poor environmental performance starting point from which they are tracking improvements (see for example Pratt and Fintel 2002). Third, firm-level improvements do not automatically imply aggregate national-level improvements. Top-down, aggregate studies of developing-country environmental performance generally show a downward trend (York, Rosa and Dietz 2003). Scholars reconcile this disjuncture by arguing that bottom-up improvements in production processes are outweighed by scale effects, i.e. increases in overall production, and composition effects, i.e. shifts across sectors to more polluting activities (York 2004).

Despite these caveats, empirical research does suggest that developing-country firms should not be classed uniformly as environmental polluters. The disjuncture between predictions of poor environmental performance based on standard models and empirical examples of developing-country firm environmental innovation points to opportunities for refining and re-theorizing the drivers of environmental behavior in the developing-country private sector.

Re-theorizing Drivers of Developing-Country Firm Environmental Behavior

Re-theorizing the drivers of developing-country firm environmental behavior means rejecting the premise that pressures for firm greening are weak or absent in

developing countries. In the following paragraphs, I detail eight potential drivers of developing-country firm greening, grouped into two clusters. The first cluster centers on the firms' domestic market, regulatory, and stakeholder contexts. The second cluster of drivers adds a transnational dimension to market, regulatory, and stakeholder dynamics.

Domestic Drivers

Considering only domestic drivers, one improvement on the general proposition that domestic pressures for firm greening are weak in developing countries is to recognize difference within the group of developing countries. The homogenizing “developing-country” label masks significant variation in levels of economic and political development. Specifically, we might expect that examples of firm greening will be concentrated in developing countries and regions characterized by relatively higher levels of per capita income. A Kuznets curve analysis of sulfur dioxide, a common pollutant associated with industrialization, suggest that the turning point in the curve occurs at approximately \$4,000 (PPP 1991 real dollars; Torras and Boyce 1998). PPP-adjusted per capita income in several developing countries, particularly in Latin America and South East Asia, where there have been documented examples of firm greening, exceeds this minimum (WRI 2003).

Other domestic explanations for developing-country firm greening take a more radical approach and reject the logic that domestic drivers of firm greening are tied to per capita income. The clearest evidence comes from the arena of stakeholder pressure. Scholars from a range of disciplines have documented active environmental movements across a variety of developing-country contexts. Steinberg's (2001) analysis of biodiversity protection initiatives in Costa Rica and Bolivia purposively aims to explode the myth that the poor do not care about the environment. He correctly points out that poorer communities are often more reliant on ecosystem services and thus have a more direct stake in their protection. Steinberg also provides compelling survey data that environmental values do not correlate with income levels. Focusing on a different context and set of environmental concerns, O'Rourke (2003) highlights the power of local communities to exert pressure on firms. He profiles a dynamic of community-driven environmental regulation that has led to improvements in environmental practices of factories in Vietnam. Bauer (2006) offers a third example. She documents the role of urban social movements in India in pressuring firms by promoting air pollution regulation.

A third potential domestic driver of firm greening—and one that also challenges the standard models—shifts focus to developing-country regulatory systems. The sweeping generalization that developing-country governments lack the capacity to regulate firms is untenable. There is a broad consensus among scholars that domestic regulation is a primary driver of developing-country firm environmental behavior (Carrere 2002; Latorre 1999; Mercado 2000; O'Rourke 2003; Pratt and Fintel 2002). While environmental enforcement of regulation can be lacking, there are numerous examples of government-sponsored environmental initiatives. In Indonesia, a government-sponsored rating system of the country's worst environmental polluters caused firms to clean up operations (Afsah et al. 1995). In Brazil, the court system has evolved to compensate for weak regulatory agencies (Barnhorn 2005).

Participatory governance initiatives harness the synergies between local communities and state agencies to provide environmental protection (Evans 1997). Finally, Steinberg's analysis is again particularly instructive. He documents environmental leadership in Bolivia, one of the poorest countries in Latin America, characterized by low levels of adult literacy and high political instability. The Bolivia case suggests that innovative environmental regulation is possible in even the least conducive environment (Steinberg 2001).

A fourth potential domestic driver of firm greening is market pressure. Standard models of firm environmental behavior assume that the market context in developing countries does not foster environmental protection. Standard logic holds that economies in the early stages of industrialization will sacrifice environmental protection for the sake of growth. Yet some market drivers of firm greening, such as the high cost of raw materials, are as relevant to firms in industrializing as in industrialized economies (Jenkins 2000a). Moreover, there are greater opportunities for efficiency improvements and clean technology innovation inherent in early-stage industrialization than in advanced industrialized economies. The former have not yet made the significant investments in polluting infrastructure that characterize the production systems of industrialized economies (Goldemberg 1998). And while technology innovation is not a purely domestic process in developing countries—often the innovative technology is imported from abroad—the pressure for technology innovation may still be domestic.

Transnational Dynamics

The second cluster of explanations of developing-country firm greening emphasizes transnational dynamics. The starting premise of the following four drivers is that transnational pressures on developing-country firms are not uniformly toward worsening environmental performance. Rather, increased cross-border market, regulatory, and ideational integration has created some upward pressures on developing-country firm environmental behavior.

There are at least two potential mechanisms driving developing-country firm greening associated with economic integration. First, export orientation is hypothesized to ameliorate developing-country firm environmental performance. Developing-country firms can be divided into those oriented toward a domestic market and those oriented toward an export market. There is consistent evidence that the latter implement clean production processes to meet the environmental criteria of external markets, a phenomenon Vogel (1995) labeled “trading up.” This demand might be expressed via consumer preferences (Cashore et al. 2004) or government standards for green products (Gupta and Falkner 2006) in the importing country.

Andonova (2003) finds that export orientation explains why certain Central and Eastern Europe firms more rapidly adopted clean technologies than their peer firms oriented toward domestic markets. Jenkins (2000a) finds some evidence of export orientation driving clean production, but also documents variation from industry to industry. For example, the pulp industries in Mexico, Chile, Argentina, and Brazil have been responsive to the environmental demands of European buyers (Birdsall and Wheeler 1992; Chudnovsky et al. 2000; Dalcomuni 2000; UNCTAD 1999), while there is no consistent pattern in the steel and petrochemical industries (Barton

2000; Chudnovsky et al. 2000; Roberts 1998). Variation appears to depend on the type of product produced and on firm-level characteristics such as firm size and corporate culture. Of five export-oriented steel manufacturers in Brazil, the two companies with the worst environmental performance have a long history of polluting the environment (Barton 2000).

Second, economic integration, in the form of increases in foreign direct investment and trade liberalization, can be a direct driver of firm greening via the transfer of clean technologies. Critiquing the “pollution haven” hypothesis, i.e., that trade liberalization leads to the export of polluting industries, some scholars have promoted a competing “pollution halo” hypothesis (Hoffmann et al. 2005). They argue that increases in trade and FDI may lead to improvements in developing-country environmental quality through exporting green technologies between corporate headquarters and their subsidiary firms. Spill-over dynamics may extend the effects of intrafirm exchanges between multinationals and their subsidiaries to developing-country firms, either through a demonstration effect or through supply chain linkages (Gallagher and Zarsky 2004). At its most developed, green technology transfer can take the form of “technology leapfrogging,” by which firms, industries, or even economies jump over stages of technological development (Goldemberg 1998; Perkins 2003). For example, the future of communications systems in many African countries is apt to focus on wireless technologies, leaping over the wire technology stage of development and making unnecessary large-scale investments in wire technology infrastructure (Cogburn and Nyaki Adeya 1999). Technology leapfrogging is considered especially promising in the communications, biotechnology, and environmental domains. In the environmental arena, it may allow developing countries to avoid the environmentally destructive development trajectories of advanced industrial economies. Environmental technology leapfrogging could entail installing advanced, low-pollution technologies in manufacturing (Sonnenfeld 1998) and agriculture (Pingali 1987), leaping over standard combustion engine vehicles to hybrid vehicles (Sims Gallagher 2003), or investing in clean energy technologies (Lefevre 2005; Lew 2000).

Despite promising prospects, research documents the practical challenges of technology leapfrogging. Technology transfer is possible only when the appropriate technologies are available. Most environmental technologies are the property of private firms, which will transfer technology only if they can realize a financial benefit. While these firms may share technology with their subsidiaries in developing countries, there are few incentives for technology sharing across firm boundaries with the developing-country private sector (Sims Gallagher 2003). There is also a small window of opportunity for leapfrogging in the technology development cycle of industrializing countries. Technology innovation is most likely to succeed when the recipient country has developed a certain level of technological capability, but has not yet “locked into” a polluting technological infrastructure (Perkins 2003). Finally, technology transfer depends on conducive policy environments. Domestic regulation determines the strength of the local “pull” for new technologies, while international policies can create a “push” for technology transfer (Piper and Naghshpour 1996).

In addition to transnational market dynamics, international regulation is a third potential driver of developing-country firm greening. Hansen (2002) offers a

typology of international environmental rules that can drive firm environmental behavior. Those relevant to developing-country firms include multilateral interventions, such as the provisions of environmental and investment treaties, and bilateral initiatives, such as foreign-aid programs. An example of the former is the Montreal Protocol on Substances that Deplete the Ozone Layer. The protocol created a multilateral implementation fund to assist developing-country firms with the phase-out of ozone depleting chemicals (DeSombre and Kauffman 1996). More recently, the Kyoto Protocol to the United Nations climate change convention established the Clean Development Mechanism (CDM), a market mechanism by which developing-country firms sell credits earned for greenhouse gas emissions reduction projects to governments and firms in industrialized countries (Chandler et al. 2002). The U.S. Environmental Protection Agency's Methane-to-Markets program is an example of a bilateral initiative. It aims to assist solid waste facilities in a few key developing countries to capture and market methane, a potent greenhouse gas (Alves and Lucon 2005).

How much developing-country governments, and indirectly developing-country firms, participate in multi- and bilateral initiatives depends on a variety of factors. For example, participation in the CDM depends on opportunities for greenhouse gas reductions, national institutional capacity, and the overall business environment (Ellis et al. 2007; Fankhauser and Lavric 2003). Empirical studies analyzing developing-country participation in multilateral treaties in general identify civil society pressure, level of democracy, and world systems position (Roberts et al. 2004) and integration into world society (Frank 1999) as predictors of treaty ratification. Firm-level participation in multilateral treaty initiatives has not yet been a focus of research.

The fourth potential transnational driver of developing-country firm greening is the international flow of environmental norms. Along with increases in trade and FDI, globalization also has an ideational dimension (Najam et al. 2007). The international spread of environmental norms, especially since the 1972 Stockholm Conference on the Human Environment, has been widely documented (Haas 2002; Meyer et al. 1997). Environmental norms are diffused transnationally through various state, civil society, and private sector channels. The latter two are particularly applicable to greening in the developing-country private sector. Firms are widely recognized as subject to norms-based pressures through civil society channels (Wapner 1995; Schurman 2004), although developing-country firms often escape the scrutiny of international environmental NGOs, who tend to target global multinationals (Keck and Sikkink 1998; Perry and Singh 2002). Developing-country firm greening may also be driven by norm diffusion in the private sector. The best example is the international diffusion of voluntary codes of environmental conduct, such as the Chemical Manufacturers Association Responsible Care program and the International Organization for Standardization's 14000 environmental management series (Nash and Ehrenfeld 1997). The dominant channel of private-sector transnational environmental norm diffusion is between multinationals and their developing-country subsidiaries (Rondinelli and Vastag 1999). However, environmental values can also spread through less direct ties. Industry actors are brought together and exchange information through numerous international business associations and through informal industry networks (Pulver 2002).

Pathways to Developing-Country Firm Environmental Leadership

The purpose of this elaborated list of potential drivers of developing-country firm greening is to serve as a framework for further scholarship. Taken individually and in juxtaposition, the four contributions to this special issue build on this framework and advance our understanding of developing-country firm greening.

Lewis compares the pathways by which two developing-country firms, India's Suzlon and China's Goldwind, advanced into the ranks of the global top 10 wind turbine manufacturers, a sector historically dominated by U.S. and European firms. Her analysis offers an exemplar case of developing-country firms acting as agents of sustainability, in ways that rival their industrialized-country counterparts. Suzlon and Goldwind are both cases of successful technology innovation, and Lewis identifies the shared features contributing to each firm's growth. She highlights the international technology licensing arrangements at the core of both firms' innovation strategies and the elements of the domestic policy context conducive to the firms' success. The comparative aspect of her analysis focuses on differences in the transnational learning networks in which Suzlon and Goldwind have embedded themselves. Lewis argues that Suzlon's network of strategically positioned global subsidiaries explains the firm's greater global market presence. Although Suzlon and Goldwind were established approximately a year apart, Suzlon is far ahead in exporting turbines to the U.S. and other countries.

My contribution to this special issue unravels the puzzle of Petroleos Mexicanos' (Pemex) proactive climate policy. Pemex is the only developing-country oil company with a greenhouse gas emissions reduction target. My analysis shows that external market, regulatory, and stakeholder drivers did not motivate Pemex's proactive climate policy. Rather, the Pemex case is an example of developing-country firm environmental agency. Entrepreneurial managers in the company's environmental division identified climate change as a key corporate strategy issue, scanned the international arena for global best climate practices, selected a template, tailored it to national circumstances, and promoted it to constituencies within and outside Pemex. Recognizing firm agency is particularly relevant in developing-country contexts because much theorizing strips developing-country actors of agency, depicting them as passive puppets motivated by dynamics originating elsewhere. In addition, the emphasis on agency highlights the intrafirm dynamics that determine external strategies. Decisions to invest in environmental friendly technologies or implement environmental management systems are never automatic responses to external pressures, be they domestic or transnational. Instead, firm greening is a strategic choice promoted by firm managers in a competitive environment of other choice possibilities.

Melo and Wolf's analysis of ecocertification in Ecuadorian banana production offers a crucial counterweight to perspectives on firm greening based on analyses of large firms in industrial sectors. One consistent finding in the burgeoning empirical literature of developing-country firm greening is that large firms are more likely to have the internal resources and capabilities to pursue greening strategies. Melo and Wolf's research documents that small operators can have parallel capacities for greening. Their study examines the environmental risk management practices of Ecuadorian banana producers. They examine four categories of farms, small and

large and certified and noncertified, and find that ecocertification, in both small and large farms, leads to tangible improvements in farm-level environmental risk management. Their second important finding is that extralocal resources were central to the certification processes of both small and large farms. The small certified farms in their sample are all members of a producers' cooperative, which benefited from training, technical, and financial support from the Dutch government, among others. The large certified farms are part of the Favorita Fruit Company network and adopted environmental certification as a by-product of receiving international financing. Finally, theirs is a cautionary account. They argue that industry-led innovation is not sufficient for dealing with the environmental and social consequences of banana production in Ecuador. Only a small subset of banana producers in Ecuador have sought certification.

In his article on corporate environmentalism in India, Perkins shifts analytic focus away from individual firms to trace sector-wide trends. His analysis offers a broader theoretical argument. Perkins distinguishes between proximate causes of firm greening, such as market and regulatory pressures, and the underlying dynamics creating the proximate pressures. He evaluates the predictive power of two explanations of underlying dynamics: a market liberalization model, which contends that liberalization leads to changes in domestic conditions, which in turn create pressures to improve firm environmental performance; and a global convergence model, which argues that growing political, market, and social integration have led to the globalization of corporate environmentalism. Evidence from firm greening in India's automobile, steel, and power sectors supports the latter explanation. Yet convergence pressures do not lead to uniformity. Perkins' detailed analysis of individual automobile, steel and power producers demonstrates that firms' strategies, capabilities, and degree of exposure to transnational pressures shape their specific responses to convergence pressures.

Beyond each article's individual merit, the collective contribution of these studies emerges from their juxtaposition. First, the four articles are remarkable in the breadth of theoretical literature that they engage to analyze and theorize the dynamics of firm greening and its implications for local, regional, and national development trajectories. The group of authors draws on insights from the literatures on international technology transfer, transnational norm dynamics, firm strategy, ecocertification, transnational advocacy, and sociological institutionalism, in addition to standard theories in the environment, development, and globalization literature. This breadth of theoretical engagement highlights the diversity of perspectives relevant to the comparative assessment of green development trajectories.

Second, though the articles differ in regional and sector focus and unit of analysis, several common themes emerge. Each of the four contributions highlights that developing-country firm greening is a globalization phenomenon. The authors all find that firm greening is not a response to primarily domestic drivers. Rather transnational dynamics are at play. Extralocal resources—be they wind turbine technology (Lewis), environmental management templates (Pulver), financing and technical expertise (Wolf and Melo), or a combination thereof (Perkins)—are essential to the environmental innovation of each of the firms profiled. However, the articles vary in the importance ascribed to foreign resources. At one end of the spectrum, Melo and Wolf present a case where ecocertification of Ecuadorian banana

production is driven primarily by foreign financing and technical support. In contrast, my analysis shows that Pemex's decision to adopt a proactive climate policy drew on international templates of oil company best practices, but impetus for action came from corporate policy entrepreneurs in Mexico.

A third trend across the four contributions to this special issue is the importance of domestic policy. Lewis' analysis of wind turbine innovation in India and China argues that national policy commitment to advancing renewable energy was crucial to Suzlon's and Goldwind's success in becoming leading wind turbine manufacturers. Domestic policy directly facilitated firm environmental entrepreneurialism. In the Pemex case, the Mexican government's generally supportive stance to global action on greenhouse gas reduction was not a direct driver of Pemex's proactive climate policy choices, but an enabling condition for climate policy entrepreneurship by Pemex managers. Perkins' analysis of the uptake of corporate environmentalism in India also documents the presence of domestic regulatory pressures for firm greening. His analysis offers an explanation of the dynamics shaping developing-country domestic environmental policy contexts. The Melo and Wolf account of Ecuadorian banana production offers an example of the consequences of a hostile domestic policy environment. The dismantling of environmental regulation via neoliberal reforms created domestic conditions more likely to lead to environmental exploitation than innovation.

A fourth shared feature of the studies is the emphasis on firm strategy. Developing-country firm greening is not simply a response to static drivers and constraints. Firms innovating green practices and technologies do so as part of their business strategy. Environmental innovation can be part of a firm's core strategy, its reputational strategy or a side-effect of nonenvironmental strategy decisions. Lewis' analysis of wind turbine manufacturing in China and India provides an example in which two developing-country firms built a business strategy around clean energy technology manufacturing. In the Pemex case, concerns about climate change did not affect the oil company's fossil fuel-based growth strategy. Yet the proactive climate policy contributed to preexisting Pemex business objectives. Perkins highlights that environmental innovation can be a secondary effect of firm strategy choices. He describes how large Indian steel firms leveraged their internal capabilities to produce to high quality steel for international export and, through international market participation, were exposed to further pressures for corporate greening. Even Melo and Wolf, whose research emphasizes the "top-down" sustainability at work in certification of Ecuadorian banana production, acknowledge the strategic initiative of small farmers in the El Guabo producers' association in seeking EUREGAP certification required by European supermarkets.

In conclusion, the shared features across the four articles shed light on the pathways by which developing-country firms become and act as agents of environmental sustainability. The trajectories to firm greening profiled follow a common pattern of developing-country firms tapping into transnational flows of resources, institutions, and ideas to further firm specific business goals. Developing-country firm greening is thus a globalization phenomenon, but one based on the agency of developing-country firms. The benefits realized from greening in the developing-country private sector are not the products of a top-down, globalized push for improvements in firm environmental performance. Nor are they the result of a counter-hegemonic campaign rejecting global

influence. Developing-country firm greening is incongruous to analytic frameworks that juxtapose global versus local and hegemonic versus counterhegemonic forces of globalization. Rather, processes of greening in the developing-country private sector showcase a kind of globalization that can benefit developing-country constituencies, but is only realized through their purposeful engagement in global dynamics.

Recognizing the environmental agency of developing-country firms is a starting point, not the final destination. The firms profiled in this special issue are exceptional. The greening of their practices is partial. Nevertheless, tracing the pathways by which they came to adopt innovative environmental technologies and practices illuminates the institutional dynamics that enable and foster developing-country firm greening and will be central to any search for global sustainability.

References

- Afsah S, Laplante B, Wheeler D. What is PROPER? Reputational incentives for pollution control in Indonesia. Washington, DC: World Bank New Ideas in Pollution Regulation NIPR; 1995.
- Alves JW, dos Santos Lucon O. Brazilian country profile. Washington, DC: US EPA Methane to Markets Partnership; 2005.
- Andonova L. Openness and the environment in Central and Eastern Europe: can trade and foreign investment stimulate better environmental management in enterprises? *J Environ Dev* 2003;12:177–204.
- Bansal P, Roth K. Why companies go green: a model of ecological responsiveness. *Acad Manage J* 2000;43:717–36.
- Barbier EB. Introduction to the environmental Kuznets curve special issue. *Environ Dev Econ* 1997;2:369–81.
- Barkin D. The greening of business in Mexico. In: Utting P, editor. *The greening of business in developing countries: rhetoric, reality, and prospects*. London: Zed Books; 2002.
- Barnhorn L. Environmental enforcement and the rule of law in Brazil. PhD dissertation. Berkeley: University of California; 2005.
- Barton J. “Aco Verde”: The Brazilian steel industry and environmental performance. In: Jenkins R, editor. *Industry and environment in Latin America*. London: Routledge; 2000.
- Bauer J, editor. *Forging environmentalism: justice, livelihood, and contested environments*. Armonk, NY: Sharpe; 2006.
- Birdsall N, Wheeler D. Trade policy and industrial pollution in Latin America: where are the pollution havens? In: Low P, editor. *International trade and the environment*. Washington, DC: World Bank Discussion Papers; 1992.
- Bryant R. *Third world political ecology*. London: Routledge; 1996.
- Burawoy M, Blum J, George S, Gille Z, Gowan T, Haney L, Klawiter M, Lopez S, O’Riain S, Thayer M, editors. *Global ethnography: forces, connections, and imaginations in a postmodern world*. Berkeley, CA: University of California Press; 2000.
- Carrere R. The environmental and social effects of corporate environmentalism in the Brazilian pulp industry. In: Utting P, editor. *The greening of business in developing countries: rhetoric, reality, and prospects*. London: Zed Books; 2002.
- Cashore B, Auld G, Newsom D. *Governing through markets: forest certification and the emergence of non-state authority*. New Haven, CT: Yale University Press; 2004.
- Chandler W, Schaeffer R, Dadi Z, Shukla PR, Tudela F, Davidson O, Alpan-Atamer S. *Climate change mitigation in developing countries: Brazil, China, India, Mexico, South Africa, and Turkey*. Arlington: Pew Center on Global Climate Change; 2002. p. 64.
- Chorev N. The institutional project of neo-liberal globalism: the case of the WTO. *Theory Soc* 2005;34:317–55.
- Chudnovsky D, Lopez A, Freylejer V. The diffusion of pollution prevention measures in LDCs: environmental management in Argentine industry. In: Jenkins R, editor. *Industry and environment in Latin America*. London: Routledge; 2000.
- Clapp J. *Toxic exports: the transfer of hazardous wastes from rich to poor countries*. Ithaca, NY: Cornell University Press; 2001.

- Cogburn D, Nyaki Adeya C. Globalization and the information economy: challenges and opportunities for Africa. In: African Development Forum '99. Addis Ababa, Ethiopia: United Nations Economic Commission for Africa; 1999.
- Dalcomuni SM. Industrial innovation and the environment in the pulp export industry in Brazil. In: Jenkins R, editor. Industry and environment in Latin America. London: Routledge; 2000.
- Dasgupta S, Hettige H, Wheeler D. What improves environmental compliance? Evidence from Mexican industry. *J Environ Econ Manage* 2000;39:39–66.
- Davis J. Private sector participation in the water and sanitation sector. *Annu Rev Environ Resour* 2005; 30:145–183.
- DeSombre E, Kauffman J. The Montreal protocol multilateral fund: partial success story. In: Keohane R, Levy MA, editors. Institutions for environmental aid: pitfalls and promise. Cambridge, MA: MIT Press; 1996.
- Dominguez-Villalobos L. Environmental performance in the Mexican chemical fibers industry in the context of an open market. In: Jenkins R, editor. Industry and environment in Latin America. London: Routledge; 2000.
- Ellis J, Winkler H, Corfee-Morlot J, Gagnon-Lebrun F. CDM: taking stock and looking forward. *Energy Policy* 2007;35:15–28.
- Escobar A. Encountering development: the making and unmaking of the Third World. Princeton, NJ: Princeton University Press; 1995.
- Evans P. Embedded autonomy: states and industrial transformation. Princeton, NJ: Princeton University Press; 1995.
- Evans P. ed. State–society synergy: government and social capital in development. Berkeley, CA: UC Berkeley International and Area Studies Publications; 1997.
- Evans P. Counter-hegemonic globalizations: transnational social movements in the contemporary global political economy. In: Janoski T, Hicks AM, Schwartz M, editors. Handbook of political sociology. Cambridge, UK: Cambridge University Press; 2005.
- Fairbrother M. Making neoliberalism possible: the state's organization of business support for NAFTA in Mexico. *Polit Soc* 2007;35:265–300.
- Fankhauser S, Lavric L. The investment climate of climate investment: joint implementation in transition countries. *Climate Policy* 2003;3:417–34.
- Flynn S. America the vulnerable. *Foreign Aff* 2002;81:60–74.
- Frank DJ. The social bases of environmental treaty ratification, 1900–1990. *Sociol Inq* 1999;69:523–50.
- Frey S. The transfer of core-based hazardous production processes to the export processing zones of the periphery: the Maquiladora centers of Northern Mexico. *J World-Syst Res* 2003;9:317–54.
- Gallagher K. Toward a theory of innovation and industrial pollution: evidence from Mexican manufacturing. In: Herbert-Copley B, Parto S, Mytelka L, editors. Industrial innovation and environmental protection: toward an integrated approach. New York, NY: United Nations University Press; 2007.
- Gallagher K, Zarsky L. Sustainable industrial development? The performance of Mexico's FDI-led integration strategy. Medford, MA: Global Development and Environment Institute, Tufts University; 2004.
- Garcia-Johnson R. Exporting environmentalism: U.S. multinational chemical corporations in Brazil and Mexico. Cambridge: MIT Press; 2000.
- Goldemberg J. Leapfrog energy technologies. *Energy Policy* 1998;2:729–41.
- Gupta A, Falkner R. Implementing the Cartagena protocol: comparing Mexico, China, and South Africa. *Global Environmental Politics* 2006;6:23–55.
- Haas P. UN conferences and constructivist governance of the environment. *Glob Gov* 2002;8:73–91.
- Hansen M. Environmental regulation of transnational corporations: needs and prospects. In: Utting P, editor. The greening of business in developing countries: rhetoric, reality, and prospects. London: Zed Books; 2002.
- Hart G. Disabling globalization: places of power in post-apartheid South Africa. Berkeley, CA: University of California Press; 2002.
- Held D, McGrew A, Goldblatt D, Perraton J. Global transformations. Stanford, CA: Stanford University Press; 1999.
- Hoffmann R, Lee C-G, Ramasamy B, Yeung M. FDI and pollution: a granger causality test using panel data. *J Int Dev* 2005;17:311–7.
- Holm H-H, Sorenson G. eds. Uneven globalization and the end of the Cold War. Boulder, CO: Westview Press; 1995.
- Inglehart R. Public support for environmental protection: objective problems and subjective values in 43 Societies. *Polit Sci Politics* 1995;28:57–72.
- Jacobson A. Connective power: solar electrification and social change in Kenya. *World Dev* 2007;35:144–62.
- Jenkins R. Globalization, trade liberalization and industrial pollution in Latin America. In: Jenkins R, editor. Industry and environment in Latin America. London: Routledge; 2000a.

- Jenkins R. ed. *Industry and environment in Latin America*. London: Routledge; 2000b
- Karliner J. *The corporate planet: ecology and politics in the age of globalization*. San Francisco: Sierra Club Books; 1997.
- Keck M, Sikkink K. *Activists beyond borders: transnational advocacy networks in international politics*. Ithaca, NY: Cornell University Press; 1998.
- Latorre E. The Colombian road to environmental management. In: Wehrmeyer W, Mulugetta Y, editors. *Growing pains: environmental management in developing countries*. Sheffield UK: Greenleaf; 1999.
- Lefevre N. *Deploying climate-friendly technologies through collaboration with developing countries*. Paris: International Energy Agency; 2005.
- Levy D. The environmental practices and performance of transnational corporations. *Transnatl Corp* 1995;4:44–67.
- Lew D. Alternatives to coal and candles: wind energy in China. *Energy Policy* 2000;28:271–86.
- Luken R. The effect of environmental regulations on industrial competitiveness of selected industries in developing countries. In: Wehrmeyer W, Mulugetta Y, editors. *Growing pains: environmental management in developing countries*. Sheffield, UK: Greenleaf; 1999.
- Mercado A. Environmental assessment of the Mexican steel industry. In: *Industry and environment in Latin America*. London: Routledge; 2000.
- Meyer JW, Frank DJ, Hironaka A, Schofer E, Tuma NB. The structuring of a world environmental regime, 1870–1990. *Int Organ* 1997;51:623–51.
- Mol A, Buttel F. eds. *The environmental state under pressure*. Amsterdam: Elsevier Science; 2002.
- Najam A, Runnalls D, Halle M. *Environment and globalization: five propositions*. Winnipeg: International Institute for Sustainable Development; 2007.
- Nash J, Ehrenfeld J. Codes of environmental management practice: assessing their potential as a tool for change. *Annu Rev Energy Environ* 1997;22:487–535.
- O'Brien K, Leichenko R. Winners and losers in the context of global change. *Ann Assoc Am Geogr* 2003;93:89–103.
- O'Rourke D. *Community-driven regulation: balancing development and the environment in Vietnam*. Cambridge, MA: MIT Press; 2003.
- Odegard JT. Economic liberalization and the environment: a case study of the leather industry in Brazil. In: Jenkins R, editor. *Industry and environment in Latin America*. London: Routledge; 2000.
- Perkins R. Environmental leapfrogging in developing countries: a critical assessment and reconstruction. *Nat Resour Forum* 2003;27:177–88.
- Perry M, Singh S. Corporate environmental responsibility in Singapore and Malaysia: the potential and limits of voluntary initiatives. In: Utting P, editor. *The Greening of business in developing countries: rhetoric, reality, and prospects*. London: Zed Books; 2002.
- Pethig R. Pollution, welfare, and environmental policy in the theory of comparative advantage. *J Environ Econ Manag* 1976;2:160–9.
- Pingali P. From hand tillage to animal traction: causes and effects and the policy implications for Sub-Saharan African agriculture. Addis Ababa, Ethiopia: African Livestock Policy Analysis Network; 1987.
- Piper WS, Naghshpour S. Government technology transfer: the effective use of both push and pull marketing strategies. *Int J Technol Manag* 1996;12:85–94.
- Pratt L, Fintel ED. Environmental management as an indicator of business responsibility in Central America. In: Utting P, editor. *The Greening of business in developing countries: rhetoric, reality, and prospects*. London: Zed Books; 2002.
- Pulver S. Organizing business: industry NGOs in the climate debates. *Green Manag Int* 2002;39:55–67.
- Rivera J. Institutional pressures and voluntary environmental behavior in developing countries: evidence from the Costa Rican hotel industry. *Soc Nat Resour* 2004;17:779–97.
- Roberts JT. The end of the “pollution haven” as “comparative advantage”: emerging international environmental standards and the Brazilian chemical industry. In: *Space, place, and nation: reconstructing neoliberalism in the Americas*. Amherst: University of Massachusetts; 1998.
- Roberts JT, Parks B, Vasquez A. Who ratifies environmental treaties and why? Institutionalism, structuralism and participation by 192 nations in 22 treaties. *Glob Environ Polit* 2004;4:22–64.
- Robins N, Roberts S. Reaping the benefits: trade opportunities for developing-country producers from sustainable consumption and production. In: Wehrmeyer W, Mulugetta Y, editors. *Growing pains: environmental management in developing countries*. Sheffield, UK: Greenleaf; 1999.
- Rondinelli D, Vastag G. Multinationals corporations' environmental performance in developing countries: the aluminum company of America. In: Wehrmeyer W, Mulugetta Y, editors. *Growing pains: environmental management in developing countries*. Sheffield, UK: Greenleaf; 1999. p. 1.

- Sawyer S. *Crude chronicles: indigenous politics, multinational oil, and neoliberalism in Ecuador*. Durham, NC: Duke University Press; 2004.
- Schurman R. Fighting Frankenfoods: industry opportunity structures and the efficacy of the anti-biotech movement in Western Europe. *Soc Probl* 2004;51:243–68.
- Sims Gallagher K. Foreign technology in China's automobile industry: implications for energy, economic development, and environment. In: *China Environment Series*. Washington, DC: Woodrow Wilson Center for International Scholars; 2003.
- Solo TM. Small-scale entrepreneurs in the urban water and sanitation market. *Environ Urban* 1999; 11 (1):117–131.
- Sonnenfeld D. From brown to green? Late industrialization, social conflict, and adoption of environmental technologies in Thailand's pulp industry. *Organ Environ* 1998;11:59–87.
- Sonnenfeld D. Logging versus recycling: problems in the industrial ecology of pulp manufacturing in South-East Asia. In: Wehrmeyer W, Mulugetta Y, editors. *Growing pains: environmental management in developing countries*. Sheffield, UK: Greenleaf; 1999.
- Sowers J. Just green marketing? State, business, and environmental management in Egypt. In: Wehrmeyer W, Mulugetta Y, editors. *Growing pains: environmental management in developing countries*. Sheffield, UK: Greenleaf; 1999.
- Steinberg P. *Environmental leadership in developing countries: transnational relations and biodiversity policy in Costa Rica and Bolivia*. Cambridge, MA: MIT Press; 2001.
- Tombs S. The chemical industry and environmental issues. In: Smith D, editor. *Business and the environment: implications of the new environmentalism*. New York: St. Martin's Press; 1993. p. 131–49.
- Torras M, Boyce JK. Income, inequality, and pollution: a reassessment of the environmental Kuznets curve. *Ecol Econ* 1998;25:147–60.
- UN. Agenda 21. Rio De Janeiro: United Nations Conference on Environment and Development; 1992.
- UN. Report of the World Summit on Sustainable Development. New York; 2002.
- UNCTAD. Trade, environment and development—lessons from empirical case studies: the case of Brazil. In: *Reconciliation of environment and trade policies: the results of case studies*. Geneva: UN Conference on Trade and Development; 1999.
- Utting P. Introduction: towards corporate environmental responsibility? In: Utting P, editor. *The greening of business in developing countries: rhetoric, reality, and prospects*. London: Zed Books; 2002. p. 1.
- Vogel D. *Trading up: consumer and environmental regulation in a global economy*. Cambridge, MA: Harvard University Press; 1995.
- Wapner P. Politics beyond the state: environmental activism and world civil politics. *World Politics* 1995;47:311–40.
- Watts M, McCarthy J. Nature as artifice, nature as artifact: development, environment, and modernity in the late twentieth century. In: Lee R, Wills J, editors. *Geographies of economies*. London: Edward Arnold; 1997.
- WCED, World Commission on Environment and Development. *Our common future*. Oxford: Oxford University Press; 1987.
- Wehrmeyer W, Mulugetta Y, editors. *Growing pains: environmental management in developing countries*. Sheffield, UK: Greenleaf; 1999.
- Welford R, Starkey R. eds. *Business and the environment*. Washington, DC: Taylor and Francis; 1996.
- WRI. *World resources 2002–2004. Decisions for the earth: balance, voice, and power*. Washington, DC: World Resources Institute; 2003.
- York R. The treadmill of (diversifying) production. *Organ Environ* 2004;17:355–62.
- York R, Rosa E, Dietz T. Footprints on the earth: the environmental consequences of modernity. *Am Sociol Rev* 2003;68:279–300.
- Zhao XS, Michaelowa A. CDM potential for rural transition in China case study: options in Yinzhou district, Zhejiang province. *Energy Policy* 2006;34:1867–82.

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