

Fostering Environmental Prosperity
Multinationals in Developing Countries



GLOBAL ENVIRONMENTAL
MANAGEMENT INITIATIVE

Business Helping Business Achieve Global Environmental, Health and Safety Excellence™

The Global Environmental Management Initiative (GEMI) is a nonprofit organization of leading companies dedicated to fostering environmental, health and safety excellence worldwide through the sharing of tools and information in order for business to help business achieve environmental excellence.

GEMI MEMBERS

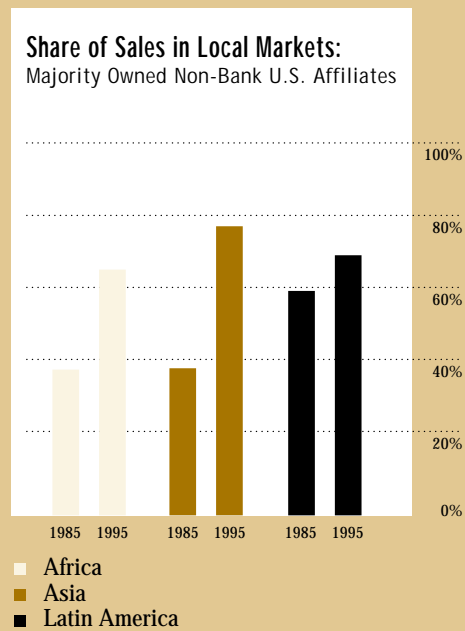
Anheuser-Busch Companies
Ashland, Inc.
Bristol-Myers Squibb Company
Browning-Ferris Industries
Burlington Northern and
Santa Fe Railway Company
The Coca-Cola Company
Colgate-Palmolive Company
Coors Brewing Company
The Dow Chemical Company
Duke Energy
The DuPont Company
Eastman Kodak Company
Elf Atochem North America
Georgia-Pacific Corporation
Goodyear Tire and Rubber Company
Halliburton Company
Johnson & Johnson
Koch Industries, Inc.
Lockheed Martin Corporation
Merck & Company, Inc.
Motorola
Novartis Corporation
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Pharmacia & Upjohn
Phillips Petroleum Company
The Procter & Gamble Company
The Southern Company
Temple-Inland
Texas Instruments Incorporated

The world's national economies are increasingly and inextricably interconnected. When large companies operate across international borders, the evidence shows that international companies are positive forces for both economic development and environmental health and safety performance.

No country is an economic island. The signs are all around us: In 1998, tens of thousands of American workers lost their jobs as Asia's economic downturn erased export demand for their employers' products; mergers and acquisitions routinely take on an international flavor; short-term economic turmoil on one continent causes companies based on another continent to revise earnings estimates; electric and natural gas utilities, traditionally limited to highly regulated domestic markets, are crossing borders to expand their businesses; and, the media routinely report as important daily news the closing prices of major stock indexes around the world.

Multinational corporations (or MNCs) – those that are headquartered in a home country and operate in many countries around the world – account for a large and growing share of business across the globe. In fact, among large companies headquartered in developed countries, those that do not operate across international borders are exceptions to the more general practice of operating in multiple markets.

Despite their significant contributions in fostering international commerce – or perhaps because of their role – MNCs are controversial. MNCs, critics claim, are socially and environmentally destructive forces of economic exploitation in developing countries. The essence of the critics’ claim is this: MNCs extract the raw materials of developing nations, pay substandard wages to overseas workers, operate without regard to local communities, and then transfer what critics regard as illegitimately gained profits to MNCs’ home countries. In addition, critics allege that MNCs have – in part due to their sheer size – caused significant



Source: *U.S. Direct Investment Abroad: 1994 Benchmark Survey*, U.S. Dept. of Commerce

environmental damage in developing countries. Because MNCs have operated for a long time and in so many countries, there undoubtedly have been cases where these criticisms are accurate.

The overwhelming preponderance of the evidence today, however, supports exactly the opposite assessment: Leading MNCs consistently are positive forces for both economic development and environmental health and safety quality in the developing countries in which they operate.

The United Nations Conference on Trade and Development (UNCTAD) concludes, in its 1998 World Investment Report, that developing countries “are striving to promote themselves” by adopting policies to attract MNCs. In addition, the report



Advances in technology
have helped the environment.



Management integrates environmental and quality-of-life concerns into core business decisions.

Leading MNCs consistently are positive forces for both economic development and environmental health and safety quality in the developing countries in which they operate.

says, many of the economic reforms that developing countries must make to attract MNC investment are necessary for such countries' long-term success. Developing countries recognize that MNC investment not only provides near-term economic benefits, but also provides a crucial foundation for economic prosperity.

The economic data and case studies in the following report similarly show how MNCs positively influence industry's environmental health and safety performance in developing countries. Leading MNCs clearly hold themselves to much higher environmental health and safety standards than those of their indigenous competitors. It also stands to reason that indigenous companies can be forced by competition with MNCs to improve their environmental health and safety performance.

Two types of evidence – analytical and anecdotal – are presented in this report to support the fact that MNCs foster economic prosperity

and improved environmental performance. The first evidence consists of analytical data on the important role that investment by MNCs plays in foreign direct investment in developing countries, the many respects in which MNC investment lifts local economies, and – importantly – the superior environmental performance of MNCs when compared to that of indigenous firms. The evidence includes a unique, comprehensive data set, assembled for GEMI by International Resources Group, Ltd., from factory-level World Bank data, that shows MNCs in developing countries outperform all other firms on environmental grounds.

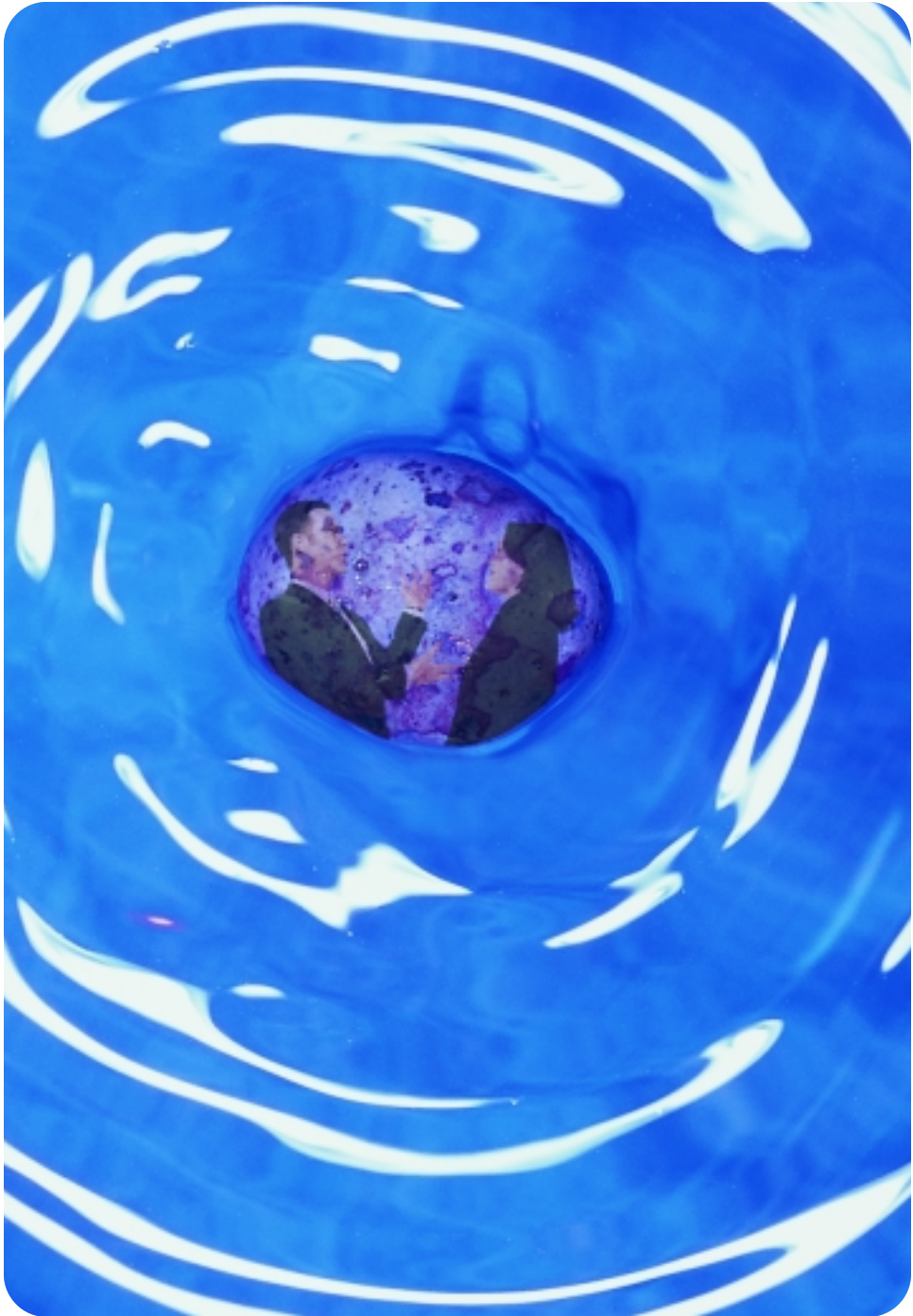
In addition to this statistical analysis of MNCs' environmental health and safety performance, this report also presents a series of anecdotal studies of operations of GEMI-member companies in developing countries. The case studies, reporting on both those companies that are new to international markets and those with long international experience, point to the dramatic positive effects that MNCs have in

Leading MNCs clearly hold themselves to much higher environmental health and safety standards than those of their indigenous competitors.

developing countries. The cases show one U.S. pharmaceutical company introducing EH&S systems and standards to a Russian pharmaceutical plant that had none, and another entering into agreements to preserve threatened habitat in Costa Rica; U.S. consumer-products companies working in China and Brazil to reduce water use and improve water quality; and major U.S. chemical companies combining new plant development with habitat restoration and preservation in Spain, and also upgrading wastewater treatment in Venezuela so well that the quality of the effluent from the plant far exceeds the quality of the water drawn in from a major lake. The cases also describe a U.S. oil services company building a landfill for not only its wastes but also those of the Brazilian community in which it operates; the world's leading maker of photographic film setting an example for Mexican firms on waste minimization and resource conservation; and a semiconductor manufacturer inno-

vating to reduce the use of heavy metals and recycle wastewater. Finally, the case studies show one U.S. oil company almost reinventing petroleum extraction in Ecuador to reduce its "footprint" in remote jungle areas, and another company training students in China to test for and monitor water quality; and a consumer products company so improving the environmental health and safety practices of an acquired plant in the Czech Republic that that country's president cited it as a model for other companies.

Coupled with the rapidly accumulating statistical evidence demonstrating the superior environmental health and safety performance and positive economic contributions of MNCs in developing countries, the examples outlined in this report lead to an inescapable conclusion: Once one recognizes that economic development inevitably will take place in these countries, it becomes clear that it is to developing nations' distinct economic and environmental advantage to foster environmental prosperity by orienting their policies to attract MNCs. ■



Knowledge and information
transfer to the local economy,
improving the quality of life



Companies become **embedded** in local communities as they shift to serving emerging markets.

Economic Report

Multinational Corporations' Economic and Environmental Impact in Developing Countries

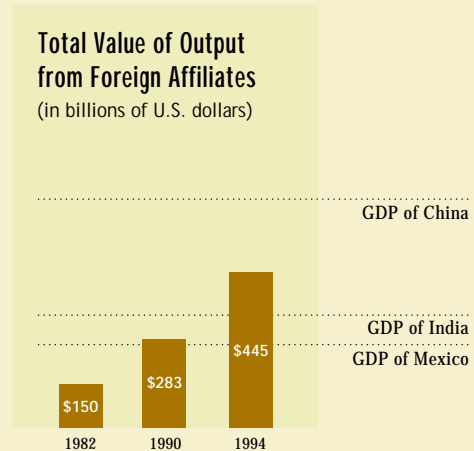
In order to quantify the impacts of MNCs in developing countries, GEMI commissioned International Resources Group, Ltd. (IRG) to survey the current economic and related environmental literature and to provide fresh analysis based on its own databases. The results suggest that MNCs collectively have significant, positive environmental,^A social, and economic impacts in the developing world.

Moreover, the quality of MNCs' environmental performance and their contributions to economic growth in host countries often are superior to those of domestic firms.^B Direct foreign investment (DFI) – defined by the World Bank as net inflows of capital to acquire a lasting management interest (more than 10 percent of voting stock) – by MNCs is steadily rising, having reached \$350 billion^C by 1996.^[31] The resulting output of MNC affiliates in developing countries^D is well in excess of the GDP of India^[31] (see figure 1).

We examine the impacts of MNCs in developing countries under three broad topics:

1. National and regional influences of MNCs' DFI.
2. Economic impact of MNCs' operations, according to indicators on trade, employment, incomes, and transfer of intellectual capital.
3. Environmental performance.

figure 1



Source: U.S. Direct Investment Abroad: 1994 Benchmark Survey Final Results, U.S. Department of Commerce

DATA SOURCES

Existing data on MNCs, while ample, are scattered among many different sources, and therefore IRG was required to extract and reorganize a great deal of information from other studies and databases. The most widely available and reliable data are on U.S. MNCs, from which larger conclusions may be drawn about MNCs globally when no other data exist.

Data sources used include U.N. Conference on Trade and Development (UNCTAD) World Investment Reports (1992-1997); U.S. Department of Commerce Benchmark Surveys of U.S. Direct Investment Abroad (1982, 1989, 1994); Organization on Economic Cooperation and Development (OECD) Reports; World Bank World Development Indicators (1997); academic studies; our own survey of GEMI member companies; and International Resources Group's proprietary databases.

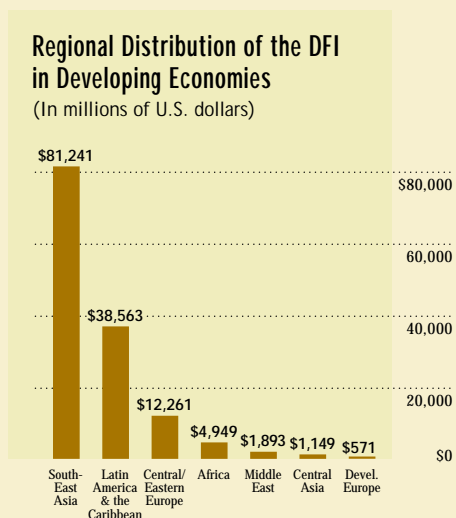
A. In this report, the term "environmental" can be understood to include health and safety.

B. The terms "host country," "domestic," and "local" are used interchangeably throughout this report.

C. All figures in this report and case studies are in U.S. dollars unless otherwise noted.

D. In this report we define "developing countries" as low-income economies (GNP per capita of less than \$765) and middle-income economies (GNP per capita between \$766-\$9,386). These cutoff points are based on the World Bank's World Development Report 1997.

figure 2

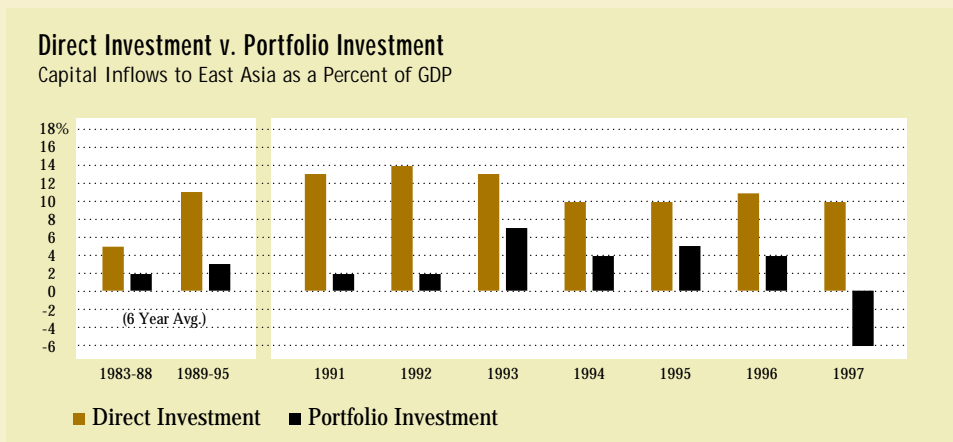


Source: *World Investment Report 1997*, OECD

MNC'S MAKE LONG-TERM INVESTMENTS IN EMERGING MARKETS

It is important here to distinguish the types of investments most relevant to MNCs from other DFI. Foreign funds can be seen as either non-direct foreign investment – typically short-term portfolio investments – and direct foreign investment. Our analysis focuses on DFI in non-financial sectors, such as trade, manufacturing and resource industries, that are most typical of MNC activity. As shown in *figure 3*, DFI – the mechanism most often used by MNCs in the developing world – is much less volatile than portfolio investment.^[31] MNCs make long-term investments in people, plant and equipment.

figure 3



Source: *World Investment Report 1997*, UNCTAD

The scale and concentration of these investments is significant. Developing countries now receive nearly 40 percent of global inflows of DFI.^[31] These investments are heavily concentrated in Asia and Latin America with just 14 countries receiving 80 percent of DFI (see *figure 2*).^[31] China alone accounted for 43 percent of the DFI received by those 14 countries in 1996, including Hong Kong.^[20] Given the two regions' large population share and rapid economic growth in recent years, these data may not be surprising. Under liberalized trade rules, these emerging markets naturally attract investment.

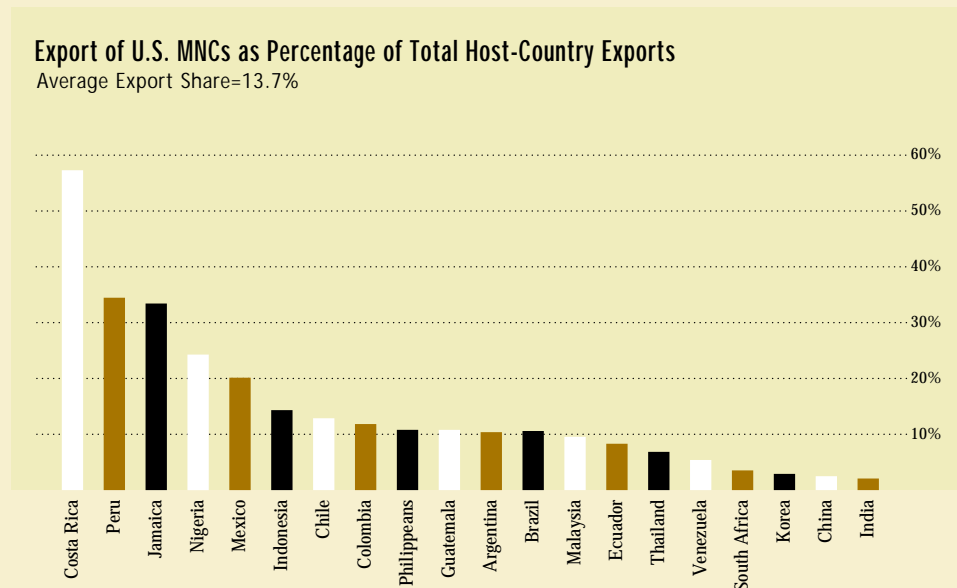
MNC INVESTMENTS LIFT LOCAL ECONOMIES

There are six important mechanisms to assess MNCs' economic effects in developing countries:

1. *Employment and wages*
2. *Local capital formation*
3. *Penetration of host-country markets*
4. *Contribution to host-country exports*
5. *Public revenue gains*
6. *Transfers of intellectual capital*

Because MNCs typically incorporate in their foreign operations advanced technologies and management concepts developed and fine-tuned in MNCs' home countries, the resulting efficiencies would be expected to cause rela-

figure 4



Source: *U.S. Direct Investment Abroad: 1994 Benchmark Survey*, U.S. Department of Commerce

tively low MNC employment per unit of output as compared to local firms. This result obviously may cause some short-term economic dislocations in local markets, but in the longer run – as recent U.S. experience shows – the net result is a higher living standard for the population as a whole.^[20]

Yet total employment of MNCs in developing countries is estimated to be between 30 million and 36 million people, or about the same size as Mexico’s entire workforce.^[20] In addition, foreign firms in developing countries account for a greater share of manufacturing wages paid than would be expected from their share of the workforce (*figure 5*).^[31] MNC employment appears to make positive contributions to developing countries’ economies.

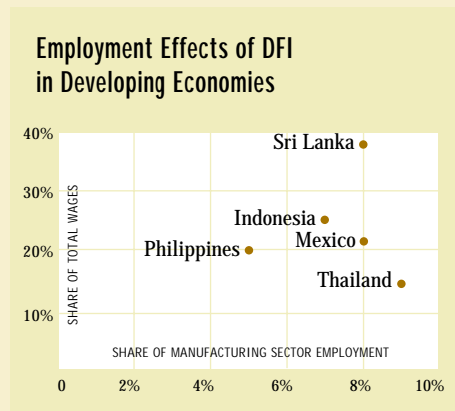
As one might expect at this point, DFI is a major source of capital in developing countries, comprising about 10 percent of fixed capital – and growing.^[31]

In a historic shift, an increasing amount of this capital appears to be focused on developing local markets. Indeed, as shown in the graph on *page 2*, U.S. majority-owned firms are increasing the share of their production output sold in host-country markets.^[33] The trend is most pronounced in Asia and Africa, where U.S. MNCs nearly doubled their local market share of production; the trend is less dramatic in Latin American because those

markets are more mature. In addition, U.S. MNCs have become significant contributors to host-country international trade. As shown in *figure 4*, they account for nearly 14 percent of host-country exports; manufacturing firms enjoy nearly identical export share.

Economic investment on such a large scale has obvious positive effects on host countries’ tax revenues. This is a very complex subject that receives extensive, ongoing study by OECD and the United Nations. Significant differences in tax policies, the difficulty of making fair comparisons of tax payments, and other challenges make it difficult to compare tax effects of MNC investments among different countries and companies. Here we simply

figure 5



Source: *U.S. Direct Investment Abroad: 1994 Benchmark Survey Final Results*, U.S. Department of Commerce

figure 6

Share of Environmental Patents Originating from OECD Markets			
	Air Pollution	Water	Alternative Energy
China 1984-88	58%	82%	83%
India 1974-88	20%	58%	62%
Brazil 1971-88	37%	34%	64%
TOTAL	36%	63%	68%

Source: *Taxes, Tariff and Transfer Pricing in MNC Decision Making*, Grubert and Mutti, 1991

note that total tax payments by majority-owned U.S. MNCs is approximately \$6 billion annually – enough money to replace Venezuela’s total annual government revenue.^[34]

Finally, perhaps the single most important economic contribution of MNCs to developing countries is the transfer of “intellectual capital,” which includes technology and know-how. We admittedly draw inferences here because intellectual capital by its very nature is difficult to quantify. But there is no question that a nation may position itself for sustainable growth by fostering increased efficiency of labor and capital, to which growth of intellectual capital is key.

The most common means to transfer intellectual capital is the direct supply of advanced technologies, research and development, training of local employees, and the spillover

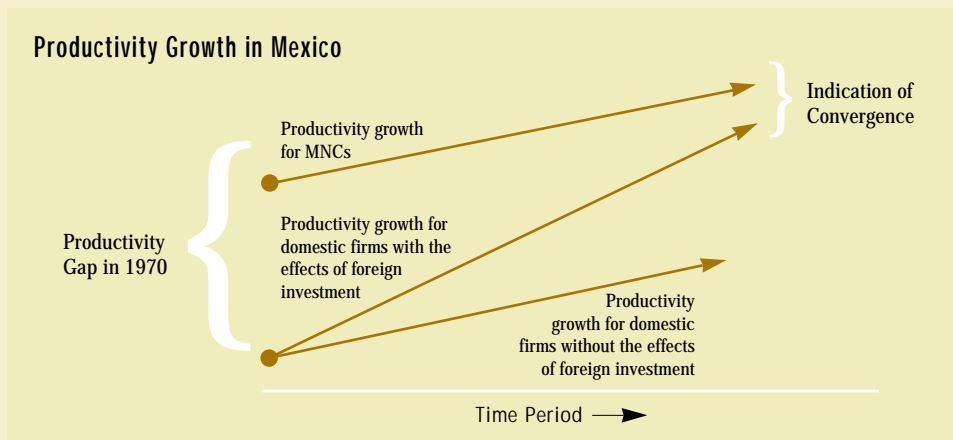
effects that result.^D Indeed, as shown in *figure 6*, a significant share of the environmental patents in large, developing economies like Brazil, China, and India comes from OECD countries.^[12]

A study of MNCs’ impact in Mexico examines data from 20 industry sectors from 1965 to 1984. It finds that the productivity level in Mexican and U.S. industries were merging over time and that the degree of foreign participation was a major factor.^[3] As shown in *figure 7*, this implies that, without foreign investments, Mexico would have had lower productivity gains.

There is evidence of increasing investments by U.S.-owned MNCs in research and development, one key indicator of intellectual capital. Between 1989 and 1994, as shown in *figure 8*, R&D spending in host countries by U.S.-owned MNCs more than doubled in Latin America and more than quadrupled in Asia.^[34,35] This trend may well feed on itself, with R&D investments continuing to increase as technical expertise improves in the developing world. Already, data reported by a number of GEMI members strongly indicates that EH&S spending by MNCs is comparable, as a percentage of sales, to home-country levels.

On a human dimension, MNCs consciously are fostering transfer of intellectual capital through the ordinary flow of information within their global corporate structures and through training programs. MNCs systematically transfer advanced management skills

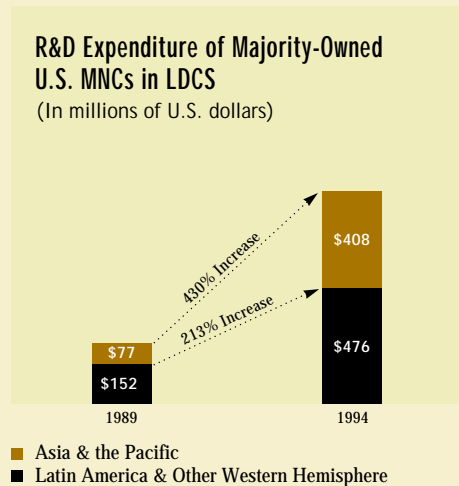
figure 7



Source: *Convergence of Productivity*, Baumol, Nelson, Wolff (eds.)

A. Strategic behavior might influence transfer of technologies, such as a perceived need to protect intellectual property from expropriation. It is not clear whether such behavior is socially or privately sub-optimal.

figure 8



Source: *U.S. Direct Investment Abroad: 1994 Benchmark Survey Final Results*, U.S. Department of Commerce

to host-country personnel, as illustrated in figure 9. When trained workers eventually move from MNCs to domestic firms, they can be expected to spread their knowledge.

Another indicator of investment in intellectual capital is the degree to which companies adopt international standards in environmental management systems. MNCs are among the first to adopt ISO 14000 in Mexico, for example.^[10]

figure 9

Modes of Management Training by Foreign Affiliates in Czech Republic	
On-the-job	New or promoted managers are paired with experienced managers to learn management practices while on the job
Training abroad	Used for exposing local managers to an international environment. However, as business climate has changed within the region, this sort of training has been increasingly replaced with in-country training
Corporate training	Customized, in-house training in specialized countries
Internship abroad	Usually held in a Western European affiliate for three to six months
Management centers	MNC-funded institutions providing courses ranging from full MBA programs to company specific classes
Public workshops	Used by MNCs to supplement in-house training programs
After-work	Many MNCs provide tuition reimbursement for classes taken after-hours to improve skills

MNCs DEPLOY INTELLECTUAL CAPITAL TO SUPPORT ENVIRONMENTAL STEWARDSHIP

Deployment of intellectual capital is a key to MNCs' strong environmental performance in developing countries. MNCs are major sources of pollution-control technologies and environmental management concepts. As a result, not only do MNCs generally produce less pollution per unit of output than similar domestic firms, but they also serve as catalysts for economy-wide environmental performance improvements.

This assessment of MNCs' environmental performance is based on four fundamental indicators:

1. *Investment patterns*
2. *Adoption of clean technology and pollution prevention*
3. *Compliance performance*
4. *Quality of environmental management systems*

Developing countries usually have weaker environmental regulatory systems compared to those of industrialized nations. Does it necessarily follow that MNCs will go "permit shopping" among developing countries in

AN INDEPENDENT STUDY BY
THE SOUTHERN COMPANY

ENVIRONMENTAL AND HEALTH
IMPROVEMENTS AS FACTORS IN
MARKET ANALYSIS

The Southern Company studied China not only in terms of market potential but also in terms of environmental health improvements from deployment of advanced power-generation in place of widespread direct use of coal. The results of Southern's study offer a unique glimpse at how one MNC assessed the environmental potential of a developing market.

In evaluating the People's Republic of China as a market for electric power generation facilities, the Southern Company devoted considerable attention to the market need for improved air quality and other environmental health issues.

The World Bank, among others, has identified poor air quality, especially indoor air quality, as China's most serious environmental problem. Most of the air quality concerns are a result of particulate matter emissions. A major source of particulate matter generation is direct household and plant-level use of coal for fuel, where burning is less efficient and generates a higher degree of emissions than in large electric power-generation plants. For example, coal is the primary fuel for cooking in Chinese cities. Only 25 percent to 33 percent of Chinese coal consumption is for electricity generation, compared to 85 percent of coal use in the United States.

In addition, less than 40 percent of China's thermal power capacity comes from units with a capacity in excess of 200 megawatts, while the average among industrialized nations is 60 percent. Smaller generation plants tend to be less cost-efficient and energy efficient than larger plants, and they tend to have greater environmental impact per unit of output.

The public health consequences of poor environmental quality are severe: According to the World Bank, smoke and particulate pollution from burning coal causes more than 50,000 premature deaths and 400,000 new cases of chronic bronchitis each year in 11 large Chinese cities.

Southern Company concluded that, if managed properly, electrification can reduce the environmental impacts created by the direct combustion of primary fuels in the developing world, improve public health, and support economic growth.

order to avoid home-country environmental regulation? A detailed review of existing studies revealed no evidence that U.S. and other OECD direct foreign investment is affected by so-called "pollution havens." In addition, strict U.S. regulation does not appear to encourage MNCs to go permit shopping.^[2]

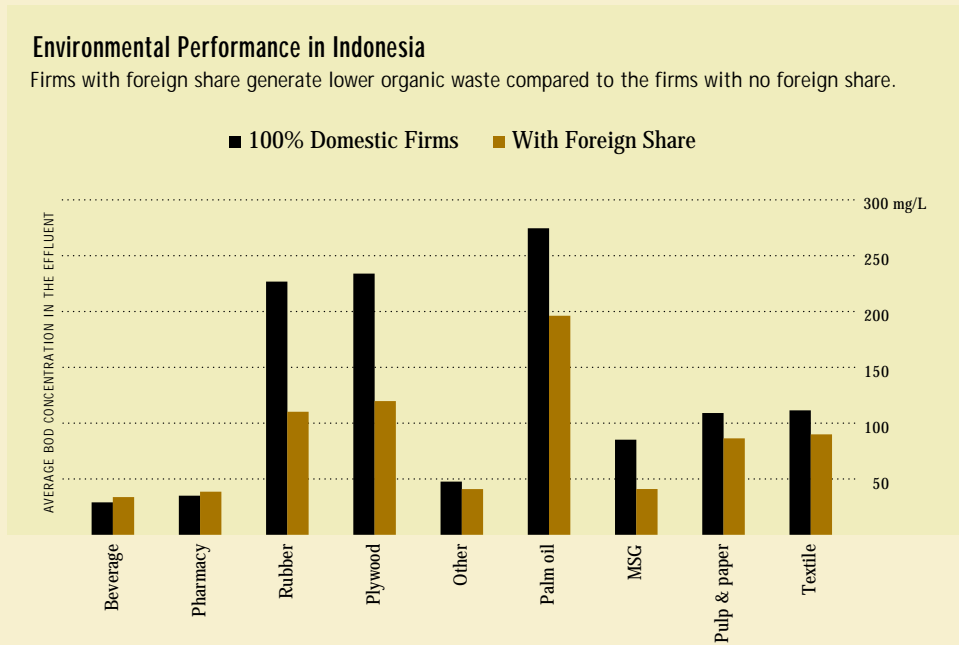
Economic openness makes it possible for investments in intellectual capital to flourish, while comparatively lower wages in developing countries obviously help to attract investments in new markets. One study of Latin American economies, covering the period 1960-1988, strongly suggests that over the long term more-open economies will attract a cleaner set of industries.^[20]

figure 10



MNCs tend to bring their higher pollution-control and energy-efficiency standards with them when setting up operations overseas. Clean technologies learned and developed in the United States or other MNC headquarters markets are built into production processes that are exported. There are several probable reasons for this, among them: to ensure product quality, to avoid the costs of changing production processes, to reduce production costs, and to assuage shareholders' concerns. When skilled and workers from MNCs move to domestic firms, they can be expected to disseminate this knowledge.

figure 11



Meeting high standards requires more than advanced pollution-control technology, however. Efficient use of production inputs plays an equally important role. Perhaps not surprisingly, a World Bank study of environmental performance in Venezuela concludes that foreign firms are more likely than domestic firms to use energy-efficient production technologies.^[2] The same study also found that foreign firms are more likely than their domestic counterparts to use clean fuels, such as natural gas.

Market factors, not regulation, appear to drive these trends. Environmental regulations in developing countries tend to be poorly enforced. If MNCs' environmental behavior were motivated by the presence or absence of regulation, then there would be virtually no compliance difference between domestic firms and MNCs. But in fact, enterprise-level data indicate that firms with foreign ownership have significantly better compliance records than do domestic firms.

Our results are based on factory level data from Indonesia's environmental ratings program, called PROPER. Under PROPER, factories are assigned color codes based on their performance relative to regulatory standards. A *black* rating is assigned to factories that do not invest in any effort to comply, while *red* is for factories that apply some effort but not

adequate for full compliance. Similarly, good performance has three categories – *blue*, *green* and *gold*. Compliant factories get *blue* ratings; *green* is for significant over-compliance, while *gold* is reserved for factories that use clean production and that are close to zero emission.

An analysis of the 1996 ratings (the latest available) of nearly 300 Indonesian enterprises by ownership shows that for the group that had some foreign ownership, 80 percent of the factories had *blue* or *green* ratings. In comparison, fewer than 50 percent of the private domestic plants of comparable size and type had *blue* or *green* ratings. Comparison of the pollution levels in waste streams confirmed that the enterprises that had foreign ownership had superior performance compared to the private and state-owned firms (see figures 10 and 11).^A

STUDY CONCLUSION

The evidence is clear: When today's leading multinationals operate in developing countries, on balance they not only bring the financial benefits of long-term investment but also raise the bar for environmental performance and serve as sources of advanced management and technical know-how for host countries.

A. For further information on PROPER, see the Indonesian environmental agency (BAPEDAL) website, www.bapedal.go.id and the World Bank's website, www.worldbank.org/nipr.

ANHEUSER-BUSCH COMPANIES

Expansion designed around global standards in the People's Republic of China

In 1995, Anheuser-Busch acquired an 80 percent majority interest (since increased to 87 percent) in a brewery in Wuhan, People's Republic of China. Since then, the company has invested \$100 million in the plant to double its capacity, to an estimated 2.1 million barrels of beer annually. Budweiser spent more than \$3.8 million on environmental upgrades alone during the first three years of the joint venture.

The expansion of the Budweiser-Wuhan brewery is designed around Anheuser-Busch's global environmental health and safety standards, perhaps most significantly involving the plant's use and treatment of water. During the first two to three years, Budweiser-Wuhan cut its water use in half through water-conservation



Budweiser-Wuhan International Brewery's investment in wastewater treatment technology helped reduce by 50 percent the quantity of waste solids for disposal.

awareness programs and projects. The expansion included building an anaerobic pretreatment system for the existing aerobic wastewater treatment plant (WWTP). The anaerobic system, or Bioenergy Recovery System (BERS), turns wastewater constituents into methane and reduces by approximately 50 percent the quantity of waste solids for disposal. The methane will be used to generate steam, providing 10 percent to 15 percent of the brewery's energy needs. The BERS also helps to stabilize the operation of the aerobic WWTP and therefore improve the quality of the plant discharge.

In addition, a new sludge dewatering facility has eliminated pollution associated with wet sludge disposal. Studies are being conducted on the beneficial use of the dewatered sludge, including its use as a fertilizer or soil amendment.

An internal safety audit, continuous worker-safety training, and the resulting process safety improvements – among them improved risk management of ammonia and chlorine systems – have yielded a dramatic 88 percent reduction in workplace injuries among Budweiser-Wuhan's 500 permanent employees. Training efforts include financial support for job-related educational expenses, sending workers to the United States or other countries for specialized training and enrollment in formal MBA programs. Contractors working at the plant also are required to receive in-depth safety training.

Budweiser-Wuhan International Brewery has set a new standard for environmental protection in its local area, and the company shares its EHS technology and knowledge, in keeping with Anheuser-Busch's corporate EHS policy. As a result, the Wuhan city government in 1996 presented the brewery with an award for "Advanced Enterprises in Environmental Protection" for excellence in environmental protection and management.

BRISTOL-MYERS SQUIBB

A joint venture facility in the former Soviet Union

The fall of Soviet Communism revealed a significant gap between the level of pharmaceutical care available to Russians and that generally available in the West. Without a market economy, state-owned enterprises in the former Soviet Union had little incentive to invest in research and development of new medicines.

That has changed in the 1990s, in part as a result of direct investment by Bristol-Myers Squibb, which entered a joint venture with the newly private Akrihin Company at a plant near Moscow. Supported by a \$4.9 million U.S. Agency for International Development grant and an additional \$5.2 million from Bristol-Myers Squibb, the joint venture is designed to foster medical technology transfers and to help the Russian people develop an indigenous, state-of-the-art pharmaceutical industry.

The joint venture produces cardiovascular drugs, such as Capoten™, Corgard™, Lipostat™, Monopril™, and Sotalex™, originally developed by Bristol-Myers Squibb. The need for such drugs is particularly acute in Russia, which has the world's second-worst rate of death from cardiovascular disease. There are no Russian domestic analogs to the medicines produced by Bristol-Myers Squibb-Akrihin; thus, the plant's production represents a major advance in public health.

From an environment, health and safety perspective, the joint venture presented significant challenges. The plant represented not only a technological leap in pharmaceuticals, but also the introduction of comprehensive EH&S systems in a market where strong EH&S practices were very new. For example, the joint venture deployed engineering controls to minimize worker exposure to pharmaceutical dusts.

Under both Bristol-Myers Squibb global codes of practice and the conditions of the U.S. AID grant in support of the joint venture, the plant is required to have environmental management systems that conform to ISO 14001. In early 1998, Bristol-Myers Squibb-Akrihin became the first pharmaceutical plant in Russia to achieve ISO 14001 certification. It also is the only pharmaceutical plant in Russia that meets GMP medical manufacturing requirements, the global standard for the pharmaceutical industry. These high standards are maintained through both external and internal performance audits, as well as ongoing self-assessments at the facility.

Bristol-Myers Squibb-Akrihin has been widely described in the Russian media as representing a significant advance in health and technology, and the Russian government often showcases it as an example of the benefits of foreign investment.



HABITAT RESTORATION Natural resources are necessary for the production of goods and the preservation of species.

MNCs show how they can coexist.

The 800 acres surrounding DuPont's facilities in Asturias, Spain, are closer to their natural state than when DuPont began construction eight years ago. This restored habitat is now home to large amounts of wildlife, including some endangered species.

The quality of water returned to Venezuela's Lake Maracaibo by Olin's petro-chemical plant is actually better than when it is

first taken in, while Occidental Petroleum's exploration and development in Ecuador's Oriente rain forest is designed to minimize surface disturbance. Here the trees that were removed were inventoried and trees of the same species were replanted after construction. Barge and airlifts were favored over road building, and all pipelines were buried.

THE COCA-COLA COMPANY

Reducing impact and costs through water management in Brazil

Panamerican Beverages, an anchor bottler group for Coca-Cola, since 1993 has implemented innovative management practices at its plant in Jundiai, Brazil (60 km north of São Paulo) that have dramatically reduced water usage and reduced waste. These improvements have had a significant impact on the community, because Jundiai is located in an area where there is great demand on limited water resources.

A water committee of technicians at Jundiai meets regularly to create new ideas to conserve water and improve water quality. The primary objective of the plant's water-management system is to ensure a steady flow of water meeting The Coca-Cola



Plastic straws recovered from returnable bottles are used to filter wastewater as part of a progressive water-management program where the employees initiate the solutions.

Company's high standards for beverages, by employing a strategy of initiating numerous small steps rather than large, expensive projects. The team educates the entire plant workforce on the value of water management. The team solicits ideas from employees, and provides regular updates in terms of water and dollars saved through progressive water management.

As a result of the committee's work, water use per unit of product output has been cut 61 percent since 1993. Among the process improvements initiated by the committee are the following:

- *Effluent from bottle-washing operations is used in the plant's boiler exhaust-gas scrubber. The acidic exhaust gas of the boilers naturally reduces the pH of the water, which eases further water treatment.*
- *Bottle rinse water is controlled by a simple sensor that determines whether containers actually are being fed into the washer and turns off water flow when no containers are present.*
- *The plant uses ordinary plastic straws recovered from returnable bottles in a biofilter array as part of its wastewater treatment system. Effluent then passes through aeration, and at the second stage of clarification, water is made available to operate a fountain and fishpond near the plant entrance or for watering the landscape.*

These and other seemingly simple steps have resulted in large water savings. In recognition of its management practices, the plant has received various international certifications. The Brazilian government also has bestowed awards on Jundiai and Coca-Cola's Brazil Division for exemplary environmental management programs.

The Coca-Cola Company has actively spread knowledge among other Coca-Cola bottlers about the Jundiai plant's innovative practices through its "Always Sharing Knowledge" program, which makes in-depth reports on exceptional management practices available to all bottlers and company employees. This global communication link ensures that initiatives in Brazil are being shared throughout Coca-Cola's worldwide bottling system as an example of good water-conservation practices.

THE DUPONT COMPANY

Five-plant chemical and fiber facility in Spain

In 1990, DuPont commenced construction of an \$800 million, five-plant specialty chemicals and fibers manufacturing facility in Asturias, Spain, on a site that had no previous industrial development. Eight years later, the surrounding land in the Tamon Valley is closer to its natural state than it was when DuPont arrived.

Working with local environmental experts and community organizations, in 1992 DuPont initiated an intensive habitat-restoration program on the land surrounding its plant, which as a result of intensive agriculture was dominated by hay and eucalyptus plantations.

Designed by the Asturias Association of Nature's Friends and assisted by the University of Oviedo, DuPont's habitat-restoration program resulted in the planting of more than 160,000 trees and shrubs of 52 native varieties on 800 acres to recreate lost habitats, such as mixed woodlands, wetlands, and peat bogs. DuPont made use of natural drainage processes on the land surrounding the plant instead of building a large, concrete drainage ditch, serving the company's and nature's needs while saving money.

Grazing livestock – all indigenous species to the area and in need of protection – have been reintroduced to 180 acres of land immediately surrounding DuPont's production plants, thus serving a maintenance need while providing a source of livestock to the local community.



Ferruginous ducks, previously thought to be extinct in Europe, have been sighted on a restored pond at DuPont's plant in Asturias, Spain.



DuPont employees helped restore habitat surrounding the company's Asturias, Spain, facility. Here employees show birdhouses erected to attract nesting birds.

The newly restored habitats have attracted a large amount of new wildlife, including birds, waterfowl, wild boar, and otters. Perhaps most remarkable was the sighting of a pair of ferruginous ducks – previously thought to be extinct in Europe – on a restored pond, an event photographically confirmed by the U.S. American Birding Association.

The visual impact of the facility, which now employs approximately 350 people, was cut by more than 80 percent by the building of berms from 100,000 cubic meters of soil excavated for plant construction that otherwise would have been trucked away. This alone saved approximately \$500,000 in construction costs. The berms are planted with vegetation screens of native species.

The total direct cost of Dupont's wildlife projects to date is about \$300,000 – an amount far outweighed by savings achieved by implementing company environmental policies that far exceed local regulatory requirements. The progress of habitat restoration projects at the Asturias site is monitored by, among others, the Spanish Ornithological Society, which conducted a census of the bird population and continues to monitor the wetlands and birds' nesting success in the area. It is the first European site to be certified by the Wildlife Habitat Council. DuPont Asturias has received numerous awards for its habitat and environmental protection projects.

EASTMAN KODAK COMPANY

The responsibilities of free trade face Kodak in Mexico

Environmental responsibility is an essential component of free trade. People in democratic nations rightly will not accept the economic benefits of trade if the price is environmental destruction.

Kodak's largest manufacturing facility in Mexico, located in the city of Guadalajara in the state of Jalisco, is a model of free trade and environmental responsibility working hand in hand. Approximately 86 percent of the optical disks, printed circuit boards, and single-use cameras made in Guadalajara are exported to other markets throughout the world.

An ongoing, comprehensive effort to reduce the plant's use of natural resources and minimize all forms of waste has made the Guadalajara plant a model of environmental responsibility. Among the results of this \$10 million investment in health, safety, and the environment are the following:

- *Kodak de Mexico has applied conservation practices for electricity and natural gas usage since 1992, when Kodak focused on optimizing office and manufacturing space and revised power-supply systems.*
- *Raw water extraction for manufacturing use is down 40 percent since 1991, partly as a result of using absorption wells to capture 25 percent of rainfall.*
- *Installation of a state-of-the-art water treatment plant and recycling system cut to zero the number of discharges into the municipal drainage system, an effort that itself represents a \$7 million investment. Kodak de Mexico is the first Kodak plant in the world to achieve this feat.*

Kodak's effluents-management efforts won a certificate of recognition from Prohabitat, a leading Mexican environmental group, and Kodak de Mexico in 1995 received the Premio a la Excelencia Ambiental award from Movimiento Ecologista Mexicano A.C., one of Mexico's most active and well-known environmental advocacy groups.



State-of-the-art water treatment at Kodak's Guadalajara plant cut to zero discharges into the municipal drainage system.

Kodak has made objective international performance standards an integral part of the production process at Kodak de Mexico, meeting ISO-9002, GMP, EN-46002/CE Marc and other quality standards. Kodak de Mexico also has a goal of achieving ISO 14000 certification.

Operational groups within the company constantly are working to incorporate HSE considerations in their decision-making. As a result, the plant not only meets but also often far exceeds local regulatory requirements, which in many cases are not as rigorous as Kodak's own uniform, worldwide standards.

Kodak's investments in Mexico extend far beyond plant and equipment. It is taking an active role in its operating communities. Kodak de Mexico contributed \$10,000 to Cante A.C., a nonprofit, for conservation of Mexican cacti. Kodak also contributed to the "Kingdom of the Sun" project at Los Colomos park in Guadalajara, which includes an area for demonstration of solar technologies and educational facilities.

HALLIBURTON COMPANY

Facility environmental improvements lead to recycling program in Brazilian city

Since 1964, Halliburton has provided oil field services to Petrobras, Brazil's state-owned oil company, in Catu, Brazil. In 1994, Halliburton initiated significant company-wide improvements in its environmental practices. In Catu, this became a comprehensive effort on the part of Halliburton's 70 local employees to identify the elements of the waste stream, reduce waste output, and subject all waste to appropriate treatment and disposal.

Prior to 1994, storm water runoff and wastewater effluents were discharged directly into the Catu River untreated, as was the standard practice of all local industry. As part of the environmental upgrade at Catu, Halliburton built a wastewater treatment facility at its field camp. Now, 100 percent of Halliburton's wastewater is treated prior to discharge. The company also reduced its use of potable water by 80 cubic meters monthly simply by recycling water from the wastewater treatment system for washing tools and equipment. Water savings totaled 3,000 m³ during the first 17 months of this program.

In the course of identifying other waste disposal needs, it became clear that Catu needed a sanitary landfill to serve not only Halliburton but also the entire community. The company helped to connect local officials with landfill experts, and it provided technical assistance for construction of the landfill.

When the landfill opened in 1996, both Halliburton and the city of Catu saw the need to actively manage the solid waste stream. In order to implement solid waste management, Halliburton trained more than 100 municipal employees on environmental best practices in intensive, weeklong seminars. This effort has since spread to a citywide educational effort to reduce waste and to promote recycling where appropriate, down to the household level.

In conjunction with Petrobras, the city of Catu now sells recyclable materials recovered at the landfill and uses the revenue to purchase non-perishable foods for Catu's poor. So far, more than 15 tons of food have been purchased.

In addition, municipal employees were trained in defensive driving and in the DuPont safety program STOP™, and Halliburton held two weeks of environmental seminars open to the entire community of Catu.

"We can only thank Halliburton for setting an example in the community for all the companies here," says Catu Mayor Jose Nardson.

Thus, what began as an effort by Halliburton to improve its own environmental practices in Catu led to city-wide environmental improvements. The company provided leadership both by example and as a result of synergies created by local officials' eagerness to make use of Halliburton's technical expertise.



Republic, Procter & Gamble was able to substantially reduce solid waste and emissions, in some cases by as much as 99%.

In Russia, the Bristol-Myers Squibb-Akrihin Joint Venture used engineering controls to reduce exposures to pharmaceutical dusts.

WASTE MANAGEMENT The distribution of knowledge is a key to substantial reduction of waste and emissions.

Local city officials in Catu, Brazil were eager to capitalize on Halliburton's environmental expertise. The result was the city's first sanitary landfill, training of municipal employees, and a city-wide education program to reduce waste and promote recycling.

By applying its worldwide EH&S standards to its newly acquired production facility in the Czech

OLIN CORPORATION

Petroleum production in Venezuela

Venezuela's Lake Maracaibo, connected to the Caribbean Sea by a channel, is the center of the country's petrochemical industry. Unfortunately, until recently, protecting the lake's environment was not a top priority of that industry. That attitude could be changing, thanks in part to a leadership role that Olin Corporation has taken in improving environmental performance.

Olin's \$1.1 million investment in a joint wastewater treatment system for the two plants it operates on Lake Maracaibo makes the plants the first on the lake to achieve world-class effluent standards. In fact, the Institute for the Control and Conservation of the Basin of Lake Maracaibo, a research environmental group sponsored by government, universities, and industry, cites Olin's project as a model for restoration of the lake's environment.

Olin's efforts to upgrade the plants' wastewater treatment systems began in 1995, when Olin became the sole owner of its Etoxyl polyols plant (the company previously was a minority partner). Olin immediately placed a top priority on building a state-of-the-art joint wastewater treatment plant with the neighboring Pralca ethylene oxide and ethylene glycol plant, in which Olin owns a 26 percent minority stake. One goal of the new treatment system was to reduce the chemical oxygen demand (COD) of effluent discharges to 150 mg/liter COD – a standard recently set by the Venezuelan environmental agency.

The company faced two significant challenges in meeting that goal. First, the raw water taken in by the plants from Lake Maracaibo already exceeds the 150-mg/liter COD standard. The plants would have to return the water to the lake at a better quality than it was at intake. Second, the existing treatment system at the Pralca plant, while more than adequate for low-strength municipal wastewaters, was not at all appropriate for a chemical plant. Discharges were running in a range of 1,500 mg/liter COD to 2,000 mg/liter COD.



Olin's wastewater treatment plant returns water to Lake Maracaibo at better quality than it was at intake.

Olin engineers turned their attention to the Etoxyl wastewater treatment system. An activated sludge system, it consisted of two large surface impoundments: a 900,000-gallon equalization basin and a 300,000-gallon aeration basin. Olin environmental engineers leveraged the existing facilities by treating both plants' wastewater at Etoxyl. They converted the large equalization basin to an aeration basin, and a smaller aeration basin to a diversion basin for potential upsets.

Extensive testing has proven that the very biodegradable ethylene glycol wastewater from Pralca improves the organism activity in the system, sharply improving the biodegradation of the refractory polyol wastewater from Etoxyl. Moreover, the new aeration basin has been double-lined with engineered clay and a high-density polyethylene liner to ensure protection of groundwater for many years to come.

One key to the success of this biotreatment system is a 40 percent reduction in its organic and hydraulic loads. Olin achieved this reduction by switching reactor washing at the Etoxyl plant from water to methanol. Once the methanol circulates through the equipment, the mixture of methanol and polyol is distilled to recover the methanol for reuse; the polyols are collected for sale as product or for burning as a boiler fuel.

Olin has shared its knowledge regarding the new treatment system with the World Bank's International Finance Corporation (IFC) as part of its effort to develop its first-ever manufacturing process safety and environmental control criteria for IFC-funded industrial plants in developing countries. Pralca, in which the IFC is a 10 percent equity partner, met or exceeded these new criteria and is serving as a model for improved environmental performance in the region.

MERCK & COMPANY, INC.

Bioprospecting in the Costa Rican rainforest

Tropical rainforests may hold the keys to the “wonder drugs” of the future, but the need to preserve rainforests in their natural state poses unique challenges to first finding and then harnessing the power of rainforest biomaterials.

Since 1991, Merck has worked with Costa Rica’s National Biodiversity Institute (InBio) to engage in systematic “bioprospecting” – the retrieval and testing of rainforest materials for pharmaceutical research – and at the same time to create economic incentives for rainforest preservation.

Under the agreement, InBio, a nonprofit scientific research institute, provides Merck with a limited number of plant, fungal, and environmental samples from Costa Rica’s protected areas (roughly 25 percent of Costa Rican territory) for scientific evaluation. The samples are collected and processed by InBio, then screened by Merck scientists in Spain and the United States for potential use as human or animal medicines.

In order to prevent prospecting endangered species, Merck adheres to the Convention on International Trade in Endangered Species (CITES) and verifies that none of the biomaterials requested for research through InBio is part of the CITES inventory. InBio, in turn, follows stringent procedures to make sure no endangered species are inadvertently collected for sampling.

In exchange for this scientific access to biomaterials, 10 percent of the InBio-Merck research budget is earmarked for preservation



An InBio paratonomist uses a butterfly net to collect insects in Costa Rica’s Santa Rosa National Park.

of Costa Rica’s conservation areas. In addition, half of any royalties derived from bioprospecting will be designated for Costa Rica’s protected wildlands.

As part of this ongoing collaboration, Merck has transferred state-of-the-art scientific equipment to Costa Ricans and provided specialized training to local people, thus transferring technologies and knowledge that will help Costa Rica to prosper.

The cooperative agreement between Merck and InBio demonstrates that it is possible to create a property interest in preservation of natural areas. Merck needs access to biomaterials to develop new medicines, and the fees and royalties generated under the agreement add economic value to vulnerable natural areas and provide the financial resources necessary to protect them for future generations. In addition, local citizens have the opportunity to expand their skills and make contributions that would never be possible otherwise – truly a win-win-win situation.



RESOURCE PRESERVATION A Coca-Cola bottling plant in Jundiai, Brazil, is located in an area where water resources are limited. Through small incremental improvements in operations and management, often suggested by the employees themselves, the plant has been able to reduce water use per unit of production by 61%.

Similarly, China’s Budweiser-Wuhan International Brewery cut its water use in half through water conservation awareness programs and projects.

Merck is extracting samples from Costa Rica’s tropical rainforest that someday may lead to the discovery of new medicines. Protection of this fragile ecosystem is paramount, and the fees and royalties generated through this effort provide the financial resources necessary to protect these rainforests for future generations.

MOTOROLA

Reducing water use and wastewater discharge in Hong Kong

Discharge of toxic wastewater into the waters of Hong Kong has been a long-standing problem. But when Motorola built two semiconductor plants there, it chose not to add to the problem. Instead, the company seized the opportunity to create a state-of-the-art wastewater treatment and recycling process, working in partnership with two key suppliers.

Good electroplating quality is essential for semiconductor products in order to provide solderability, resistance to corrosion, and electrical conductivity. Deionized water is extensively used for effective rinsing to attain a high-quality metal finish in the electroplating processes. After rinsing, the deionized water is contaminated with heavy metals and acids which requires proper treatment before dis-



WATER TREATMENT Water is the lifeblood of both our ecosystem and the manufacturing processes.

Motorola called upon its global expertise in wastewater management to create a state-of-the-art treatment and recycling process at its plants in Hong Kong. As a result, as much as 94% of wastewater is now being recycled back into the production process.

Through the installation of a water treatment and recycling system, Kodak de Mexico was able to reduce discharges into the municipal drainage system to zero. By constantly incorporating EH&S considerations into their decision-making, Kodak has developed a plant which meets, and often far exceeds, local environmental regulatory requirements.

And Phillips Petroleum holds itself accountable by teaching students how to test water quality near its facilities in China.



Motorola and its suppliers jointly developed a system to recycle 94 percent of wastewater into pure deionized water for reuse in electroplating.

charge. Conventional, end-of-pipe treatment is water intensive, and it also adds more waste to the environment.

Motorola Hong Kong jointly developed, along with its electroplating equipment supplier and treatment technology provider, a rinse-water treatment and recycling program that employs ion-exchange technology, supplemented with electrowinning and selective metal scavenging, to purify and recycle the rinse water. By using on this technology, 94 percent of wastewater can be recycled into pure deionized water for reuse in the electroplating process.

This high rate of recycled water use at the Motorola Hong Kong's Tai Po and Kwai Chung plants dramatically reduces the need for outside-water consumption. The new treatment system cut new water consumption for electroplating and reverse-osmosis operations (part of the semiconductor manufacturing process) from an expected 1.26 million gallons per month to just over 75,000 gallons per month.

In addition, use of sodium chloride and hydrochloric acid by the plants' wastewater treatment plants was slashed 96 percent, and they generate just half of the heavy metal sludge that otherwise would be produced through conventional treatment.

Because this treatment system reduces the need for new materials inputs, it saves a net \$100,000 annually in wastewater treatment costs.

THE PROCTER & GAMBLE COMPANY

Environmental solution to retrofitting a business in the Czech Republic

In 1991, P & G purchased a 91-year-old consumer products business known as the Rakona State Enterprise in the city of Rakovník in the Czech Republic. As the first plant to be privatized in the Czech and Slovak republics, it required a heavy capital investment program with focus on achieving production of global products and on health, safety and environmental upgrades.

Since this purchase in 1991, P & G has invested \$85 million to update the facility. Today, Rakona is a world-class plant producing detergent and liquid cleaners, not only for the Czech Republic and Slovakia but for fourteen other countries in the region.

P & G's investment in the facility included the installation of state-of-the-art management and production systems supported by computer-based information technologies.

The upgrade to the facility has also provided significant benefits for the local environment. By applying P & G's worldwide environmental standards to Rakona, the site was able to reduce boiler emissions by 99%. Solid waste was reduced by nearly 6,000 metric tons. The result is that today, the facility meets all worldwide P & G Health, Safety & Environmental standards.

In addition to the environmental improvements, the social and economic issues associated with sustainable development were addressed, as well. P & G now employs more than 800 people in the country. P & G introduced a competitive compensation program and unique employee benefits such as loans to renovate apartments and houses, supplementary income payments during illness, maternity leave, and language studies.

Additionally, P & G donates 4 million korunas (\$120,000) annually for the development of local education, health care, environmental protection, and social institutions.

P & G's success in modernizing Rakona has been recognized by Vaclav Havel, president of the Czech Republic. During his visit to the plant, President Havel declared, "The employees are pleased that the factory is more orderly and is equipped with modern technology. This company could serve as a model for other investors."

Worldwide environmental standards have improved the health, safety and environmental programs at the Rakona Plant which produces Procter & Gamble detergents and liquid cleaners in the Czech Republic.



OCCIDENTAL PETROLEUM

Exploring, developing and preserving Ecuador's rainforest

Since 1985, Occidental Petroleum has been engaged in exploration and development of oil resources in Block 15 in the Oriente rain forest of northeastern Ecuador. The special environmental and cultural sensitivity of the area, which remains largely undeveloped and is home to several indigenous peoples, requires detailed attention to minimizing the impact of oil development.

Occidental has developed six oil fields near Limoncocha, in the western part of the 200,000-hectare Block 15, since 1992. The fields produce 17,000 barrels of oil per day and so far have yielded \$80 million to the Ecuadorian government, which owns the fields.



Oil operations follow four guiding principles agreed to at the outset of the company's activities in Block 15: Minimize surface disturbance, protect against pollution, operate "invisibly," and reclaim natural resources. The successful implementation of these principles led to Occidental becoming the first oil and gas exploration company in Ecuador to achieve ISO 14001 certification.

In order to minimize disturbance to the Amazon jungle and discourage other development from following Occidental's operations into this sensitive area, road building was minimized – especially during exploration activities, when barge transportation and airlift

of equipment and personnel were favored over ground transportation. Also, all flow lines and pipelines are buried, and they are built with both external and internal corrosion protection.

Each field has been "cluster drilled," which means several wells are slant drilled from a single location rather than from scattered platforms. Produced water – water that comes up with oil from the well – is treated and reinjected to subsurface reservoirs, which eliminates what is typically the biggest single source of potential environmental impact from oil operations. Produced water injection, which averaged 73,000 barrels/day in 1997, and other operating practices related to environmental protection account for over 10 percent of production costs. The natural gas resulting from oil production is burned in a horizontal, smokeless flare that cannot be seen from nearby communities.

The extracted oil itself is pumped to a central facility for separation and treatment of crude, whereas standard industry practice would be to operate individual processing stations in each field. The crude oil then is pumped through a 16-mile underground pipeline to Petroecuador's TransEcuadoran Pipeline, again minimizing environmental risk and surface disturbance.

By following these practices, Occidental reduced by 85 percent the area disturbed for construction of roads and drilling platforms.

Finally, all trees that must be removed for operations are inventoried, and trees of the same species are replanted after construction is complete. Occidental maintains native botanical nurseries for this purpose. All of the biomass removed from Occidental's oil fields will be replaced by the end of the first decade of operation.

Just as important as its environmental stewardship is Occidental's relationship with the approximately 5,000 people – mostly indigenous peoples – who live in Block 15. Occidental's approach is built around four



goals and principles: respect native cultures, encourage government agencies to provide services available to other Ecuadorians, live in harmony with local communities, and help native towns pursue sustainable economic development that is not dependent on Occidental or oil-related income.

Occidental's community efforts are focused on health improvements and education. Sanitation has improved dramatically; nearly half of local residents now use treated water. Basic health education in preventive care, parasite control, and maternal and child health is now available, along with pre- and post-natal care and vaccinations. As a direct result, malnutrition has nearly disappeared, and infant mortality, which was over 40 per thousand in 1993, is now almost nonexistent.

Occidental works with local communities to create adult training programs in basic economic activities such as carpentry, agriculture, and mechanics that respect local traditions while bolstering micro-enterprise. Local farmers, for example, have used this training to increase crop yields; one villager increased his coffee yield from 93 sacks per hectare to 278 sacks. By late 1995, residents of the Limoncocha communities had received more than 19,000 man-hours of training.

Occidental takes strong steps to minimize the footprint of each operation in the Ecuadorian rainforest.

Contractors carry out much of the on-site oil development work in Block 15. In order to ensure their adherence to Occidental's policies, contractors must conform to a formal set of operational guidelines or else risk financial penalties imposed by Occidental of as much as \$10,000 per incident.

Local leaders have welcomed the company's environmental and community policies. Leaders of the Rio Jivino, Santa Elena, and San Antonio indigenous communities and Limoncocha Indigenous Association wrote to a local Occidental official: "The interest shown by you and the personnel working at Occidental maintaining our environment is worthy of admiration and gratitude, because we could see that money is not the only goal and that you have been interested in the health of our families."

PHILLIPS PETROLEUM COMPANY

Environmental excellence in the People's Republic of China

Phillips Petroleum Company has a long-standing tradition of protecting the environment in areas where it has business operations. In 1997, Phillips decided to share its environmental commitment with the people of China by developing a multi-year environmental initiative entitled "Search for Solutions," in conjunction with the State Environmental Protection Agency (SEPA) and non-governmental agencies from the United States. Over the course of five years, students from five major cities in China will take part in activities designed not only to raise their awareness but to stimulate new ideas on ways to protect natural resources.

To support the environmental initiative, Phillips has committed \$500,000 to be distributed in five communities where Phillips operates: Beijing, Lanzhou, Shanghai, Shenzhen, and Tianjin. Although the overall program will be coordinated by Phillips, the environmental protection bureaus (EPB) from each of the five cities will help administer the activities. The funding will provide:

1. *Environmental awareness handbooks for high school students,*
2. *Earth Vision posters,*
3. *Phillips Environmental Partnership (PEP) Grants in which students actively participate in such things as water quality testing, air sampling, and other hands-on activities, and*
4. *Children's work/coloring books.*

Additional activities will likely include field trips, environmental awareness videos, exchange programs with U.S. educators, and additional PEP grants.

Phillips kicked off the environmental initiative in China on Earth Day 1998 with a water quality testing program. Students from schools in Beijing performed water quality testing of estuaries with test kits purchased by Phillips. Also, SEPA distributed Phillips-funded Earth Vision posters as part of a national environmental awareness tour on World Environment Day.

The "Life Engineer" program is another Search for Solutions activity supported with Phillips funding and employee volunteers. Life Engineers is a special, experiential, out-of-classroom program that provides Chinese high school students opportunities to learn about local environmental conditions and contribute to community environmental projects. In one 1998 activity in Lanzhou, more than a thousand students toured the Lanzhou Chemical Industry Company, and participated in monitoring activities.

Under Phillips' leadership, Search for Solutions has established itself as a national initiative that helps Chinese youth become good environmental citizens through education and community service. During the past year, strong working relationships were established with local EPBs in the five major municipalities where Phillips has business operations. The Search for Solutions initiative was featured as a model program in the June 30, 1998, China Daily editorial. Search for Solutions will continue to build on the successes of 1998 by continuing three core programs in 1999: PEP grants, environmental handbooks on local environmental conditions, and Earth Vision posters.



Members of Phillips' Health, Environment, and Safety team join Beijing school children as they celebrate Earth Day '98. Youngsters tested water quality from two estuaries near the city using kits provided by Phillips through the company's Search for Solutions environmental initiative in China.

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35. United States Department of Commerce, U.S. Direct Investment Abroad: 1989 Benchmark Survey Final Results, Table III.J.1.

CREDITS

Jack Stein, Anheuser-Busch Companies, chair of the work group, directed this project, to which George Carpenter, The Procter & Gamble Company, made important conceptual contributions. Robin Tollett, also of P & G, provided substantial oversight and input. The report was written by Tom Holt, The Holt Company, the economic analysis was developed by International Resources Group, Ltd., and the design and production was provided by Staccato Design. Paul Portney, Resources for the Future, provided valuable counsel. Steve Hellem, Executive Director of GEMI, and Mary Beth Parker, also of GEMI, provided substantial input and support to the project.

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