This Article proposes a new model for dealing with environmental degradation caused by mining activities in developing countries. The proposal has two core elements. One is to assure that the appropriation of mineral wealth from future generations is at least not accompanied by unpaid environmental liabilities caused by prior generations’ mining activities. The other is to structure a way to provide foreign aid to mining countries in cases where they simply cannot afford to take corrective action themselves. The model identifies which nations, if any, ought to provide remedial foreign aid. Further, it calls for a broad consensus on matters of principle rather than on treaty negotiations.

This writing does not address the question of the intergenerational inequity implied by mining, in the sense that it permanently removes resources from a country. Also, the...
resolution this Article proposes does not conform to the radical version of intergenerational equity in which present generations have obligations to future generations in other countries.³

The argument for the expansive view of intergenerational equity is that (1) future generations in wealthier countries will ultimately gain from a collectively healthy planet, and (2) "all members of the present generation are entitled to equal access to the [planetary] legacy."⁴ Because it is such a short step from this position to the politically unmanageable proposition that we need an immediate global redistribution of wealth to equalize all people, the broad version appears insupportable as a practical matter.

2. PERVERSIVENESS OF THE ISSUE

The average industrial nation consumer buys an array of goods and packaging in a busy, competitive marketplace. The variation in prices of the same goods are often considerable, and they are generally dependent upon how much time the consumer is willing to commit to shop analytically, the season of the year, and whether he lives in a large city or a remote location. The consumer will almost surely never recognize that many of the metals in the objects he purchases were made at bargain prices. The bargains arose because many metal exporting countries are oversupplying their products and selling them into a cold-blooded world market over which they had no control as to price.⁵ In large measure such countries can oversupply because the minerals are produced under environmentally lax standards, thereby cutting costs and increasing sales. To take a homely example, consider the

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³ See EDITH BROWN WEISS, IN FAIRNESS TO FUTURE GENERATIONS: INTERNATIONAL LAW, COMMON PATRIMONY AND INTERGENERATIONAL EQUITY 26-27 (1988) (presenting the argument in favor of that sweeping concept).
⁴ Id. at 28. Perhaps I do not understand the meaning of the author's discussion; if so I apologize for my error.
⁵ Generally, efforts to organize export blocs in basic minerals have failed miserably. Significant examples include the tin exporters group and the copper exporters group. See Tin Market Collapse: Market Regulators as a Risk Factor in Mining Project—the Case of Tin, MINING MAG., Jan. 1989, at 37; Jonathan Power, The Idea of 'Resource War' Has a Last Fling in the Gulf, LOS ANGELES TIMES, Oct. 26, 1987, pt. 2, at 7 (discussing the weakness of the copper cartel).
consumer's cans made from Bolivian tin or Jamaican bauxite. The prices of these cans reflect an implicit subsidy in the form of costs not yet paid for in extracting and processing the minerals. Production costs would most likely be higher if the minerals came from the consumer's country due to the imposition of more rigorous standards there.

This persistent problem is getting the attention of policy thinkers in multinational agencies, especially the United Nations ("UN"). Given the rapid growth of environmental awareness around the world and ominous issues of global warming and ozone depletion, mining practices in developing countries have been relegated to a status that borders on being a mere curiosity. In fact, the issue is critical to the well-being of future generations of those countries. Turning a blind eye to the issue now hastens the day of reckoning when the resources become depleted and there are major unpaid environmental liabilities arising from prior years when the mines were active. Little is being done to address the issue and the clock is ticking.

2.1. Perspective

Few people in the industrialized world give Third World mining much thought, except perhaps for concerns about global warming. Otherwise, such mining has no immediate impact outside the country where the mine is located. In fact, it is slightly heartening in that it provides foreign exchange that might lighten local debt burdens. Moreover, the industrialized world generally views mining as a mature industry that needs significant environmental regulation if it is to be as environmentally sound as the industries that buy its products. By contrast, mining in the Third World is often a dynamic, dominant industry which contributes immensely to national income but is subject to minimal environmental regulation.

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6 For example, the UN has an Environment Programme ("UNEP") whose head office is Nairobi, but whose Industry and Environment Programme Activity Center, the part that deals the most with industry, is located in Paris. The Paris Center is concerned with mining and has a United Nations Development Programme ("UNDP") which supports a revolving fund for natural resources exploration.

7 The terms "Third World," "less developed countries," "developing countries," and "South" refer to the poorer countries of the world.
This Article is written with a strong preference for microeconomic analysis as opposed to philosophical reasoning. As such, it contains a cold-blooded materialistic tract. I believe that the best way in a political sense to achieve practical results is by appeals to reason and basic concepts of economic equity, as opposed to more abstract approaches. There are references to such higher principles throughout this Article, but they are largely treated as anomalies. In the present state of affairs, such concepts are unsettled ideals, somewhat like a horizon toward which a person sails indefinitely but which is never attained. That moral horizon is very important, but not of immediate concern to a crew that is trying to maneuver the ship out of a dangerous shoal.

This Article arises out of impressions gained at a week-long United Nations conference held in Berlin in June of 1991. It reflects many of the thoughts shared by mining and environmental experts from East Asia, South America and Africa and technicians from the industrialized world, especially the United States and Europe. The product of the meeting was the adoption of guidelines for environmental behavior in regard to Third World mining.

2.2. Environmental Impact of Mining

Mining compromises the environment. The immediate process itself tends to be noisy, dusty, water-intensive and frequently dangerous to human and animal health. Exploration activities are rarely a significant environmental problem, since the primary activities are aerial mapping, searches for outcroppings, core sampling, and detonation of minor seismic explosives. The developmental and operational stages, however, pose serious problems. They typically include large scale clearing of vegetation and topsoil. Thereafter, there may

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8 Vaclav Havel, President of Czechoslovakia, used this metaphor in addressing the United States Congress, speaking admiringly of the fact that the Congress had been sailing toward the horizon of democracy for over 200 years. Michael Oreskes, American Politics Loses Way as Polls Supplant Leadership, N.Y. TIMES, Mar. 18, 1990, § 1, at 1.


10 For some fragile environments, such as the Namib desert, even these activities can be destructive.
be extensive extraction in relation to the mineral yield. For example, a ratio of 1000 units of waste for each unit of mineral is not unrealistic for precious minerals. In the case of gold, a ratio of 10 grams per ton, or 10 parts per million, is considered good. The implications of such huge quantities of waste materials (also known as tailings) can be highly adverse, because the tailings commonly include contaminants used to extract the minerals. For example, in some cases cyanide lakes form (cyanide is used as a leaching agent) with devastating results for wildlife.11

The recovery stage can be even worse. Refining and smelting typically cause significant air pollution, which can lead to desertification, especially in the case of sulphurous gas emissions from copper smelting. Perhaps the most disturbing process of all is acid leaching, in which acids are percolated through core dumps, capturing and precipitating the sought-after mineral. Unless stringent rules are applied, miners have little motive to stop the waste acid from running off into the local environment. The long-term environmental implications include morbidity among workers and the accumulation of toxic sludge and tailings that gradually work their way into the general environment. Further, toxic sludge and tailings can be contained only with great expense and trouble. It is debatable whether many of these by-products can ever be disposed of safely; heavy metals such as lead and cadmium are the leading examples.12 Finally, in order to return the land to productive use, the mining site must be reclaimed. In the case of subsurface mines, the mine must be safely sealed.13

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11 Anyone allowing cyanide lakes to form is also engaged in poor economics because of the cost of cyanide. The same applies to waste heaps that are leached with acid. However, and more serious, acid water (which often contains heavy metals) can run off from waste heaps and into surface and ground water if the ore has a high sulfide content and the waste heaps are not properly situated and insulated.

12 See Mining Firm Stops Dumping Metal Wastes into Mediterranean; Land Burial Planned, 13 Int'l Env'tl Rep. (BNA) 157 (Apr. 11, 1990) (A Spanish mining company, Portman Golf S.A., ceased dumping its daily 7,500 metric tons of metal residues into the Mediterranean Sea on March 30, in compliance with a federal deadline; prior to March 30, the company dumped lead, cadmium, copper, arsenic, and mercury into the sea.)

13 The United States has an Abandoned Mined Land fee which partially cures the problem of abandoned coal mine sites. 30 U.S.C. § 1232 (1988). The fee, which is fairly viewed as a tax by the industry, falls on coal mining
In the case of surface mines, the topsoil must be replaced, and the land must be replanted to prevent its erosion. Admittedly, there will be differences of opinion as to how much of the bill must be paid. Wealthy countries can afford to remove eyesores and would treat the cost of removal as part of the mineral production price. Less prosperous countries would consider such cost of removal a luxury. Presumably there are also differences of opinion as to what constitutes an eyesore.

A central problem is the lack of a single norm of environmental correctness. There may never be one. The debate over the ethical basis of environmentalism has been raging (with a corresponding increase in the number of schools of thought) for decades, and there is little sign that it will abate. The problem seems to be that once one passes beyond the Roman's view that the law is to protect people and their property from injury, the difficult questions, such as the importance of aesthetic values and any duties not to extinguish species of animal life, are susceptible to a number of philosophical analyses.

It is possible to dwell on the adverse physical effects of mining processes at great length, but it is not helpful for the purposes of this Article. Environmental problems at each mine site tend to be unique, and therefore, each mine requires its own specific array of engineering responses. The important point is that once a mining project is underway, it is expensive to upgrade it to meet sound environmental norms. However, if the host country's legal system permits unsound environmental practices, environmental costs can be deferred companies at the rate of $.15 for each ton of subsurface coal removed and $.35 per ton of surface coal removed. The industry considers the fee to be unfair because it taxes current operators for the past actions of nonexistent or insolvent miners. See Long-Term Strategies for Programs and Issues Within the Jurisdiction of the Committee: Hearings Before the House Ways and Means Committee, 101st Cong., 2d Sess. 101-98 (1990) [hereinafter Hearings] (statement of Greg Thibedeau of Peabody Holding Co., Inc.).

14 See generally A. Dan Tarlock, Earth and Other Ethics: The Institutional Issues, 56 TENN. L. REV. 43 (1988) (discussing the curious lack of clear philosophical underpinnings for environmental values, particularly in light of the seemingly clear consensus about the importance of such values).

or even ignored. Such conduct places current miners at risk and harms future generations of citizens. 17

In spite of the major long-term costs associated with failing to identify and internalize the total environmental costs of mining, for many developing countries, a bill deferred seems almost as good as a bill unpaid. A large fraction of the developing country's population is simply unaware of the risks associated with mining processes. Likewise, to many members of a current generation, a bill payable by a future generation is no bill at all or such deferral can be rationalized by focusing on the current sacrifices of the present generation. However, the bill eventually either has to be paid 18 or the population has to abandon the area.

2.3. Types of Mining in Developing Countries

There are generally four types of mining in the developing world: large scale domestic or foreign projects, medium scale projects, artisanal mining, and "gold rush" mining. 19 Each

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17 Again, this problem is not unique to the developing world. The United States government's Savannah River nuclear enrichment facility, which processes plutonium, has reportedly been mismanaged for years. The result has been an unascertainable level of leakages and a multibillion dollar clean-up bill yet to be incurred. See U.S. GEN. ACCOUNTING OFFICE, REPORT OF EMERGENCY ACTION TO CONTROL HAZARDOUS WASTES AT ITS SAVANNAH RIVER NUCLEAR FACILITIES (Nov. 21, 1984).

18 See Court Says Firm Liable for Damages Caused by Defunct Mine, 11 Intl' Envtl. Rep. (BNA) 533 (Oct. 12, 1988) (The Fukuoka High Court ordered Sumitomo Mining Co. to pay compensation to nine survivors and the families of fourteen victims of arsenic poisoning from a mine that closed twenty-six years ago; this landmark ruling determined that the owner of the mining rights, when the mine was active, is liable for adverse health effects. The decision paves the way for poisoning victims to gain compensation from owners and past owners of nearly 6,000 now defunct mines).

19 These characterizations evolved at a joint meeting of the German Foundation for International Development and the United Nations Department of Technical Cooperation and Development ("UNDTCD"). The meeting was held in Berlin in a roundtable format and involved high-ranking mining and government personnel from developing countries, UN personnel, various experts, and the President of Germany, who is also head of the Institute for European Environmental Policy. The meeting took place between June 24-28, 1991 (hereinafter the "Berlin Conference"). The results of the meeting were published in abbreviated form in Guidelines for the Future, MINING J., July 5, 1991, at 8. The formal product of the meeting was a set of guidelines captioned "Environmental Management Guidelines from Mining," a hortatory preamble, and a list of agreed principles for encouraging improved mining processes and procedures for business
has its peculiarities.

Large scale mining operations appear to be the least problematic. There are several reasons for this. The primary reason seems to be that such activities—especially if they involve foreign concessions—are arranged well in advance and are highly visible. Prudent foreign mining operators generally consider it a good business practice to be environmentally aware, and there is objective data to support the view that if a large mining project includes state of the art environmental controls, the efficiency gains will more than pay for the extra costs. This general precept, however, is not universally true. A leading example is the Ok Tedi mining project in Papua New Guinea, which involves a consortium of several U.S. and European enterprises, as well as the government of Papua New Guinea. The project has attracted strong criticism from several groups, including the prominent Starnberg Institute, for its emission of acid and heavy metals into the environment. Moreover, international mining companies do occasionally act aggressively, especially by threatening to withdraw from the host country if they do not get their way.

Nevertheless, multinational mining corporations have much to gain by maintaining high standards. Not only can high environmental standards generally result in major cost savings, but they also appease environmentalists and limit enterprises and host country governments.

20 See Dr. A. Warhurst, Environmental Management in Mining and Mineral Processing in Developing Countries: Enterprise Behavior and National Policies (1991) (unpublished paper distributed at the Berlin Conference)[hereinafter Warhurst paper]. This paper contained an empirical study on a large array of modern mining facilities. The study is important, but should not be exaggerated. It is untested as to retrofitting practices, and the fact remains that state of the art mining technology is an aberration in the developing world. More study is needed to reconcile the Warhurst conclusion and the actual state of affairs.

21 See Starnberg Institute, Economic-Ecological Development in Papua New Guinea (1991) (unpublished paper presented at the Berlin Conference) [hereinafter Starnberg Institute paper]. This paper chronicles a financially and environmentally ill-conceived large scale gold and copper mining project and the unpleasant relations between the host government and the multinational mining enterprise.

22 See, e.g., id. at 9 (reports of threatened withdrawal from Ok Tedi mining venture in Papua New Guinea).

23 See Warhurst paper, supra note 20 (summarizing years of empirical studies of many mining locations in both developing and industrialized
the risk of personal injury litigation arising from hazards created in the host country. Curiously, there is a natural symbiosis between multinational mining corporations and environmental activists in that the higher the cost of environmental compliance, the fewer the potential participants. Cumbersome and expensive licensing processes are especially likely to favor capital rich mining enterprises. Again, large scale domestic operations tend to be environmentally sound, in part due to the reasons discussed above, but also because the World Bank and others now condition loans on meeting environmental norms. Other multilateral agencies that apply environmental guidelines include the United Nations Economic Commission for Latin America and the Caribbean, the Inter-American Development Bank, the European Community ("EC"), the Central American Bank for Economic Integration, the Pan-American Health Organization, and the Asian Development Bank. Nevertheless, problems of acid deposition and nitrous oxide emissions plague large projects in developing countries. South East Asians, for example, suffer from such problems.

24 The Bhopal gas leak disaster in 1984 furnishes the leading example of the environmental risks of overseas natural resource-related activities. The case has been largely settled between Union Carbide and the Indian government for about $470 million, but claims in the U.S. courts continue. Andrew Blum, The Bhopal Litigation May Linger; Doubts Remain, NAT'L L.J., Feb. 27, 1989, at 3.

25 See supra notes 20-24 and accompanying text.


27 See Ayesha Dias, International Development Agencies, Mining and Environment in Developing Countries (1991) (unpublished paper distributed at the Berlin Conference) (showing that multilateral agencies, such as the World Bank, are not alone in imposing environmental guidelines on the application of funds for development projects; bilateral agencies, such as the Canadian International Development Agency, do the same). Nevertheless, such guidelines are still in their early stages and are little more than abstractions in regard to monitoring and implementation.

28 See id.

Medium scale domestic mining operations are a major problem. Since such operations are often undercapitalized, they often use environmentally unsound processes. Aside from noise and dust which is common to most mining, typical problems include: improper disposal of poisonous tailings (often into domestic water supplies), acidic emissions into the atmosphere, and exposure of workers to unreasonable levels of risk on the job. These problems call for an injection of capital and improved technologies. The latter tend to be available only from the industrial world at great cost. Even then, unless accompanied by thoughtful training programs and proper monitoring, such technology is potentially fruitless.

Artisanal mining is also problematic. This part of the industry involves skilled extraction by small operators. Once the operator has removed the best of the hard minerals, the site is abandoned, commonly leaving a scarred landscape, displaced water flows, and rubbish. Controlling this kind of mining is difficult, but it can be done. Both Ghana and Morocco seem to have controlled it by taking practical control of the mining zones, providing good legal title to the operators, and offering technical advice and assistance. Ghana has gone a step further. The government is the only buyer of gold in Ghana. It purchases gold from artisanal miners at a seven percent discount from the world market price and uses the savings to fund future reclamation of land.

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30 This statement, though not supported by specific cases, developed into a consensus at the Berlin Conference.

31 The problem is not limited to areas outside of Europe. Newly unified Germany is presently struggling with the enormous cost of cleaning up the East German brown coal industry. This industry has wreaked havoc with human life and the environment for decades. Joint ventures can greatly reduce these costs through contributions of technology.

32 See ECONOMICS OF THE MINERAL INDUSTRIES, supra note 9.

33 Mohamed Karbid, Secretary General, Ministry of Energy and Mines, Morocco, Address at the Berlin Conference (June 1991).

34 Kwabena Mate, Senior Legal Officer, Minerals Commission, Ghana, Address at the Berlin Conference (June 1991). Ghana's 7% tax is purely administrative. Members of the World Mining Conference reportedly pay $5 per ounce to a central fund for mining closures. It is interesting that the gold mining tax in Ghana conforms to what is apparently a deep concept in Ghanian law. See N.A. OLENNU, PRINCIPLES OF CUSTOMARY LAW IN GHANA 4 (1962) (quoting Nan Sir Ofori Atta: "I conceive that the land belongs to a vast family of whom many are dead, some are living, and countless host are still unborn."). See also WEISS, supra note 3, at 20. One might view
"Gold rush" mining, as its name implies, entails hordes of miners descending on a newly discovered mineral zone, almost invariably in search of gold. Such mining operations tend to be subject to minimal legal controls and do the same damage as artisanal mining, but in a more chaotic manner. Moreover, gold rush miners tend to use mercury to extract the gold, commonly hunching over and inhaling mercury vapors, thereby poisoning themselves in the process. Brazil and Bolivia offer well known examples of this phenomenon.

2.4 Environmental Dumping as a Global Issue

The core economic issue is the failure to include proper environmental safeguards in the cost of mineral output. The problem of underpriced mineral production is an aspect of what has recently come to be known outside the United States as “environmental dumping.” The phenomenon arises when items produced in a country with lax environmental standards are sold in a country where the domestic industry faces more stringent environmental controls. For example, there are widespread fears among European and American manufacturers that disproportionately expensive environmental standards in the industrialized countries will lead to destructive levels of environmental dumping by Third World countries. Third World countries may be willing to scrimp on environmental safeguards to preserve or increase their levels of mineral production. These low standards, in effect, operate as a concealed financial subsidy. Moreover, if the government of a country with low standards combines subsidies with tighter environmental standards, that subsidy enables local manufacturers to retain their competitive advantage against foreign manufacturers who do not receive such subsidies. Unless the royalties demanded by the host countries in the same light as the Ghanaian retention, depending on the funds' application.

55 See Olaf Malm et al., Mercury Pollution Due to Gold Mining in the Madeira River Basin, Brazil, 19 AMBIO 1, 11 (1990).


57 There are no cases where low environmental standards have been intentionally used to enhance export competitiveness. Instead, governments resist demands to improve environmental behavior by pointing to the high cost of improving such behavior.
host (mining) country makes effective pollution control mandatory, environmental dumping will never stop without an external counterforce. The polluter pays principle is directly relevant to this dilemma.38

Conversely, there are allegations that some countries are using stiff environmental rules as an artificial barrier to foreign imports.39 According to the Deputy Director-General of the General Agreement on Tariffs and Trade ("GATT").40 "The connection between trade and the environment can become the number one trade issue of the 1990s."41 Even the United States and Canada are already haunted by this issue in their mutual dealings.42

The EC seems to be more attuned to these issues than the United States. The EC is reportedly in the process of developing concrete proposals for dealing with environmental dumping. One current proposal includes a retaliatory import duty combined with foreign aid for targets of European trade

38 See infra notes 89-94 and accompanying text.
39 See Hunt, supra note 36, at 5.
40 General Agreement on Tariffs and Trade, opened for signature Oct. 30, 1947, 61 Stat. A3, T.I.A.S. No. 1700, 55 U.N.T.S. 187, reprinted in 4 GENERAL AGREEMENT ON TARIFFS AND TRADE, BASIC INSTRUMENTS AND SELECTED DOCUMENTS (1969)[hereinafter GATT]. GATT provides a framework of rules and procedures governing its members. Its central features are most-favored-nation treatment of signatories' products, national treatment of imported products, elimination of quantitative restrictions, and a notion of reciprocity. The implicit residue is the right to impose protective customs duties as a means of protection, combined with a built-in plan to progressively reduce such tariffs. That plan has been implemented by a series of tariff rounds, the latest of which is known as the "Uruguay Round" because of its venue in Punta del Este, Uruguay.
41 Hunt, supra note 36, at 5 (quoting Charles Carlisle, Deputy Director-General of GATT at a meeting of the International Chamber of Commerce in Rotterdam). Hunt's article also describes a recent test case before the European Court which involved a Danish law that required beer and soft drinks to be sold only in returnable bottles with a compulsory deposit. Brewers from other countries claimed that the cost of recycling bottles eliminated their profits in Denmark, while the Danes could still export their beer to countries which had no such restrictions. The European Commission's complaint to the European Court was rejected in favor of Denmark. Id.
42 See Environmental Policy Expected to Become Increasingly Important in Trade Negotiations, 13 Intl Env. Rep. (BNA) 448 (Oct. 24, 1990) ("Environmental policy and the promotion of sustainable development will play a central role in future international trade negotiations . . . . Tougher U.S. standards could lead to bilateral trade disputes.").
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retaliation. Without the foreign aid component, the retaliation would foster deep suspicions of bad faith in the developing world.

The issue has recently presented itself in the United States with respect to the anticipated free trade agreement between the U.S. and Mexico. The concern of U.S. environmentalists is that Mexico will become a dumping ground for toxic wastes, due to the use of hazardous substances and improper disposal. Likewise, U.S. labor organizations have reason to fear job losses to countries with lower environmental standards, such as Mexico.

A reverse kind of environmental dumping is also practiced by industrialized countries. It consists of shipping contaminated products to, or establishing environmentally destructive processes in, less developed countries. For example, the Commonwealth of Independent States fears that it suffers from severe environmental destruction due to the influx of capital-rich Western businesses in search of lax environmental regimes. This parallels the Mexican fear of foreign enter-

43 See infra notes 100-101 and accompanying text for a further discussion of the European proposal.

44 See Linda Diebel, Powerful Congressman Offers Conditional Support, Continental Free Trade Gets a Boost, TORONTO STAR, Mar. 31, 1991, at H2 (reporting on the free trade agreement and the concerns of consumer activist Ralph Nader that Maquiladoras will become sites of environmental degradation).

45 For example, manhole covers are no longer made in the U.S. because air pollution regulations are so strict that foundry work is not profitable for such items. U.S. manhole covers are now made in Mexico and India. See Communism's Polluted Legacy, GANNETT NEWS SERVICE, July 18, 1990.

46 See Divora Ben Shaul, Environmental Dumping, JERUSALEM POST, Apr. 29, 1991 (including Israel, Africa, Asia, and South America as places where canned tuna with excessive quantities of dolphin meat, chlorofluorocarbon ("CFC") propellants, and pesticides can be exported; identifying Cameroon and Thailand as recipients of contaminated food from the Chernobyl nuclear facility disaster; describing Jordan's receipt of a shipment of contaminated meat from Ireland with a radiation level far in excess of amounts permitted in Europe).

47 See id. The kinds of projects that alarm Eastern bloc environmentalists include: a $10 billion venture by Chevron Corporation to explore for oil near the Caspian Sea; a $6 billion plan to build the largest gas and chemical complex in the Eastern Hemisphere near Guriev in Kazakhstan, which environmentalists say can produce Chernobyl-sized disaster, and a $5 billion agreement to build five large petrochemical complexes in West Siberia to make plastics and other oil-based products. Environmentalists, economists, and residents contend that this area has already been ravaged by the oil
prises thoughtlessly turning the country into a toxic waste site for the price of accelerated economic development. This anxiety was reflected in President Salinas’ political decision to shut down an enormous Pemex facility in 1991 for environmental reasons. Salinas’ action was an apparent display of force to the Mexican populace that Mexico’s environmental degradation will end, notwithstanding the free trade negotiations now underway with the United States. 48

There are some instances where mining can have transboundary effects, such as acid rain deposition or the infusion of toxins into shared rivers and the sea. These cases are important, but are not considered in any detail in this Article. They either call for an analysis of legal rights and duties between nations 49 or complicated questions of how one manages the so-called “global commons” such as clean air and water.

3. STATEMENT OF THE PROBLEM

Developing countries are busily extracting mineral resources. 50 They do so in large measure to keep up with insatiable

and gas industry. For example, the Ob River has been ruined by oil spills, and another 45 rivers in the area are sick or dead. Further, a tourist complex at Lissi Nos on the Gulf of Finland, north of Leningrad, sits atop fresh water that could become an alternative water supply to the city’s polluted reserves. See also Patrick Lee, Soviet ‘Greens’ Force Delays in Big Oxy Project, LOS ANGELES TIMES, May 7, 1990, at D1 (reporting that Occidental Petroleum, a U.S. company, delayed its plans to enter into a joint venture to build a chemical plant in the Ukrainian town of Kalush, 250 miles southwest of Kiev, due to environmentalists’ pressure).


49 For arbitration as a solution, see Trail Smelter Arbitration, 3 R.I.A.A. 1905 (1941). The right economic solution in these cases may be to place the duty to control the harm on the party which can do so at the least cost. See GUIDO CALABRESI, THE COSTS OF ACCIDENTS: A LEGAL AND ECONOMIC ANALYSIS (1970).

50 See generally WORLD RESOURCE INST. & U.N. ENVTL. PROGRAMME, WORLD RESOURCES 305-21 (1989); Ayesha Dias, supra note 27, at 2-3 (discussing the reasons for the pace of mining in the developing world). Ms. Dias is an Associate Economic Affairs Officer with the Mineral Resources Branch, Natural Resources & Environment Division/Department of Technical Cooperation for Development of the United States. Note that many viable mineral projects are not undertaken for lack of a suitor. This is often caused by political risks perceived by outside investors, currency difficulties, or other institutional barriers. Another significant statistic is
debt service obligations associated with loans from the industrialized world. The underlying problems are well known, namely swelling populations, rising expectations with respect to standards of living, migration of jobless people to cities (and on occasion to frontier areas, as in the case of Brazil), and a fundamental and massive flow of wealth from developing countries to the industrialized countries. Other reasons include the vulnerability of host countries to outsiders, which is caused by the host countries’ relative lack of sophistication in financial and industrial matters, and governmental expediency or corruption.

Mining activity has its productive aspects, however. It offers important employment opportunities, earns vital foreign exchange, and if managed prudently, can lead to more sophisticated “downstream” development, such as steel making and manufacturing. These linkages may be valuable in increasing economic independence. Moreover, gaining access to the minerals often requires creating infrastructure such as roads, bridges, and tunnels. That infrastructure can in itself offer long-term benefits for the host country’s economy.

Part of the trouble involves misapplied financial and public policies that evolved in the developed countries. One involves national income accounting. That is, extracting natural resources reduces wealth while it produces income in the host country. Nevertheless, the national income accounting process reports mining production as a measure of income. This anomaly arises because there is no equivalent of a national balance sheet on which changes in net worth are recorded and explained; even the most advanced countries lack such accounts, because the expense of generating such statistics would be tremendous. This anomaly helps drive economies in the unsustainable direction of exploiting their natural resource bases until their stocks are finally exhausted. One solution is

[that developing countries accounted for only 26.7% of world mineral and metals exports in 1989, while developed economies accounted for 64.7%. See UNCTAD COMMODITY YEARBOOK (1991). Developing countries’ share of world production is significantly smaller because their production is less apt to be exported; this does not, however, reduce the importance of mineral production to the economies of developing countries.]

[See ROBERT REPETTO, WORLD RESOURCE INST., PROMOTING ENVIRONMENTALLY SOUND ECONOMIC PROGRESS: WHAT THE NORTH CAN DO (1990).]
to exclude the value of extracted minerals as a measure of gross national income; another is to treat pollution control and other costs incurred to prevent environmental decay as intermediate costs required in order to achieve a given level of national income.\footnote{Id. at 3. Repetto reports that the World Bank, the UN, OECD, and certain developing countries are moving in this direction, but considers the pace too slow.}

Another misapplied theory involves the process of discounting future expenses. Modern theories of corporate finance evaluate projects in light of the discounted present value of cash receipts and disbursements over the period of the project.\footnote{See Franco Modigliani & Merton Miller, The Cost of Capital, Corporation Finance and the Theory of Investment, 48 AM. ECON. REV. 261 (1958); for a textbook version of this and related subjects, see Richard Brealey & Stewart Myers, Principles of Corporate Finance (3d ed. 1988).} The basic theory is that a dollar today is worth less than a dollar tomorrow. Because money is spent and received at different times, it is necessary to discount (reduce) the value of future cash receipts and disbursements over the life of the project to the extent they are anticipated in later periods. This permits an objective evaluation of whether the project is expected to make money over the span of its entire life. It is a powerful tool for evaluating financial investments.

The trouble is that this kind of reasoning has spilled over into the making of government policy in the United States and elsewhere, including the World Bank and the Inter-American Development Bank. If discounting techniques are used, the effect is to minimize or eliminate what are in fact serious long-term problems.\footnote{The World Bank reportedly uses a 12 percent rate. Id.} For example, at a discount rate of only 2%, a future liability of $1 million has a value of $500,000; this is 1900 times larger than the discounted present value at a 10% discount rate. To put it another way, an ecological loss of $1 million at 10% in 100 years has a present cost of $75. The policy implication is that one can virtually ignore the loss of biological diversity\footnote{In fact, the loss of information on genetic materials and medicinally valuable plants may prove to be a significant loss in the short-term.} and global climate changes because they are so far off in the future. Repetto's proposal is to use a low discount rate for project costs and benefits, and then screen
projects by requiring a high ratio of discounted benefits to discounted costs. This compromise is an improvement, but it still calls for finding the “right” discount rate when it may be inherently wrong to use any discount rate.

3.1 Intergenerational Inequity

The present generation can violate the interests of future generations in at least four ways: (1) they can consume the higher quality resources, which leads to higher real prices in the future; (2) they can cause uncorrected environmental degradation; (3) they can consume resources not yet identified as valuable to the present generation, or they can consume resources prior to the discovery of their best use; and (4) they can exhaust resources, resulting in a narrower range of available natural resources. The latter two are most likely to be irreversible. These actions clearly constitute appropriations from future generations, and most people can quickly sense the unfairness of the results. A rigorous way to identify the ethical issue is to start with the philosopher Rawls’ view that to understand intergenerational equity one must assume the perspective of a generation placed along a spectrum of generations, but not knowing where it is located. This perspective does not prefer one generation over another and ought to obliterate discounting practices because in effect it eliminates any justification for impoverishing future generations. One need only think about the dilemma of safely disposing spent nuclear material to understand that short-term discounting practices are out of step with Rawls’ view of appropriate policy-making with respect to the environment and the force of his ethical vantage point.

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66 Repetto, supra note 51, at 3.
67 See Weiss, supra note 3, at 6. Preservation of soil between generations is a subject that has received the attention of the world community. See World Comm’n on Env’t & Dev., supra note 2 (recommending that the world’s soil base should be treated as inventories in accordance with best use, and that such use should determine incentives and disincentives for use of particular soil areas).
69 To the extent that intergenerational equity means returning the natural environment to the same condition in which it was found, mining is inherently in conflict with that value, because it involves taking. Unless mining is accompanied by recycling, the norm simply cannot be met. That,
If a country fails to force its mine operators to internalize the costs of environmental degradation and worker's health, then the minerals are purchased at an inappropriate discount. In turn, manufacturers buy the processed minerals at unrealistically low prices, and consumers purchase bargain-priced products. The result is excessive global output and consumption of the particular mineral. This also leads to more rapid exhaustion of the host country's mineral stock than would otherwise occur. Moreover, underpricing of mineral production discourages whatever recycling would occur if prices reflected full costs. The outcome is ethically unacceptable, and, as is discussed later, produces what microeconomists refer to as a "market failure."

The winners consist primarily of the present generation of importers and consumers of the mineral output, as well as the present generation of citizens of the host country. The latter enjoy the economic benefits that flow from increased national employment, deferral of fiscal charges to pay for environmental degradation, and deferral of austerity programs imposed by international lenders in connection with restructuring foreign indebtedness. Those debts may, of course, however, is a different and even more troubling topic than the one at hand.

Anomalous situations occur in the case of individuals who temporarily reside in the country of importation, and third country firms that sell supplies to the mining operators, but who do not otherwise enjoy the fruits of excessive world output.

For recent examples of International Monetary Fund ("IMF")-imposed austerity programs, see George Black, Walea Should Look Twice at His Blessings; What IMF Austerity Measures Have Wrought in Latin America Is a Stark Example for Poland, LOS ANGELES TIMES, Mar. 31, 1991, at M5 (In discussing Poland's acquiescence to IMF restrictions on the Polish economy, Black, the foreign editor of the Nation, comments that "[a] decade of the fund's austerity programs, for example, have had about the same effect on Latin America as the U.S. Air Force did on Iraq, reducing per-capita incomes to 1976 levels."); Dominican Republic Strike Starts; 2 Killed, CHI. TRIB., Aug. 14, 1990, at 12 (Reporting that government security forces opened fire on protesters at the start of a two-day strike over government-imposed price increases; stores, factories and government offices were closed, and most public transportation was halted. In addition, gasoline prices rose by 83.6 percent, flour by 95.8 percent and sugar by 75 percent, after President Joaquin Balaguer lifted government subsidies as part of an austerity program recommended by the IMF.) These restructurings are now an essential element of the international economy. See Steven M. Cohen, Give Me Equity or Give Me Debt: Avoiding a Latin American Debt Revolution, 10 U. PA. J. INT'L BUS. L. 89 (1988).
have been incurred in part by prior generations.

The losers consist of future generations of citizens of the host country and the mine workers in the current generation who suffer unavoidable health damages. The future generations face the prospect of premature exhaustion of their country's natural resources and the costs associated with a fouled environment. It seems self-evident that this is a morally indefensible result from the perspective of virtually any environmental ethic. Aside from aesthetic losses, future environmental costs fall into numerous categories, including mortality and morbidity caused by diffusion of toxic wastes into the general environment, loss of agricultural and timber land, erosion, and the need to pay for continued impoundment of mining wastes and proper mine closings, which includes land reclamation. In theory, it is possible to balance higher real prices of resources in the future with greater wealth passed on to future generations. While this is true in principal, few people would argue that this is a current norm in developing countries. Rather, mining is commonly a means of national economic survival from moment

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62 Avoidable health damage should be prevented through health-related laws and regulations. Most health problems fall into the avoidable category, but not all. Black lung disease of coal miners (pneumoconiosis) is evidently unavoidable, but can be mitigated by protective measures such as wearing masks.

63 The topic of intergenerational inequity has been addressed in a number of ways. One leading school of thought views the present generation as persons holding their rights in trust for future generations, while at the same time standing in the position of beneficiaries. This view adapts these fiduciary concepts to intergenerational obligations. See Weiss, supra note 3; Edith Brown Weiss, Our Rights and Obligations to Future Generations, 84 Am. J. Int'l L. 198 (1990). Another view is transcendental, rather than scientific and rational. See Davis, Ecosophy: The Seduction of Sophia?, 8 ENVTL. ETHICS 151 (1986). Another school of thought would assign legal interests, but not rights, to nonhuman entities, with different rules for different classes of entities. See Christopher Stone, Earth and Other Ethics: The Case for Moral Pluralism (1987); Aldo Leopold, A Sand County Almanac (1949) (an earlier criticism of the adverse impact of exaggerating rights of individuals vis-à-vis nature). Another view tries to assign values according to the relative importance of each element of the ecosystem. See Holmes Rolston, Is There an Ecological Ethic, reprinted in ETHICS AND THE ENVIRONMENT 41-54 (Donald Scherer & Thomas Attig eds., 1983).

to moment, leaving little to pass on to the future. The critical problem, then, is how to create appropriate policies and encourage proper management of mineral resources, as opposed to ceasing production.

If one looks at all aspects of mining in developing countries in the aggregate, it is generally unnecessary to select any one of the theories of intergenerational equity as the best, because the adverse impacts of mining tend to be so obvious in terms of depleting natural resources and polluting the environment. However, special cases do exist, but those cases are not the subject of this writing. This Article focuses on identifying the regrettable cases and proposing solutions.

The important unresolved ethical question involves the difficult areas that do not directly impinge on the health and wealth of future generations, especially the loss of biological diversity and natural beauty. One could in theory appraise the value of these aesthetic losses by attempting to determine what future generations would bid to reverse these losses. One quickly recognizes, however, that such appraisals are hopelessly impossible, even if one modifies the standards for making the appraisal by requiring the imaginary appraisers to take into account "moral reflection." The subject is just too controversial, and the moral guidance is presently too faint in history. It seems best that these factors should not be included in the implicit costs of mining for purposes of implementing the proposal set forth in this Article. If and when humanity can agree on such elegant worldwide ethical questions, it can be more ambitious in this regard.

Putting the current state of affairs in the most adverse light, one can view the situation as a tacit conspiracy between the present generation of opportunists in the host country and

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65 This theory of adding a morally correct "shadow price" is the work of Professor Stone. He argues that microeconomists have a moral blind spot in that they willingly undervalue the benefits of unpriced resources. Microeconomists generally reject this concept because it invokes the now discredited principle of cardinal ranking, that is, ranking consumer preferences by reference to ultimate values, as opposed to ordinal ranking, which calls for relative ranking only. The concept of cardinal ranking is considered too intellectually "soft" by modern microeconomists and evidently has been repudiated. See PAUL ANTHONY SAMUELSON, FOUNDATIONS OF ECONOMIC ANALYSIS 90-93 (1983).

https://scholarship.law.upenn.edu/jil/vol13/iss2/1
amoral purchasers of the mineral product, both plotting against future generations of the host country.

Members of the present generation of "conspirators" in the host country may reply that they are in fact passing on value to future generations in such forms as schools, hospitals, and other national infrastructure or that they are victims of prior generations' neglect. This argument has a number of weaknesses. First, the present generation is also wearing out infrastructure, and it too may have taken advantage of, e.g., educational systems created by prior generations. Second, the current generation's behavior with respect to pricing environmental goods still falls below international environmental norms, which is a sufficient reason to require a pay-as-you-go approach. Third, it is a universally accepted expectation that every generation will produce infrastructure for the benefit of posterity; this expectation will be imposed on the host country's future generations, along with paying the deferred clean-up and hospitalization bills. Thus, the current generation is doing nothing special when it uses savings to produce and repair national infrastructure. Finally, to the extent that the current generation is making extraordinary payments for infrastructure, retiring old national indebtedness, or suffering from prior generations' neglect, the burden should be on the proponent (i.e., the present generation) to prove the claim, otherwise it becomes a facile escape hatch that will eliminate these important economic and moral considerations.

The current generation of citizens in the host country may instead simply declare that it has to defer paying its share of environmental liabilities because the country cannot afford to pay these obligations in full. This may be true in the sense that the country is insolvent and faces severe national unemployment such that the only immediate issue the country can tackle is how to most rapidly expand its mining industry. Bolivia perceives itself to be a case in point. Telling such countries that they must comply with international environmental norms will most certainly be received as intolerable preaching.

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66 The purchasers are a broad group, including consumers of the end product and even the paid waste removers.

3.2 Unsustainable Development

This portrayal of the facts is mild. It does not take into account the actual exhaustion of the minerals in the ground. That is the subject of a separate body of microeconomic analysis, which in itself poses complicated ethical issues. For a great number of countries mining is a doomed activity. Eventually, many countries will deplete their stocks of mineral wealth without establishing alternative industries or agriculture, leaving large impoverished populations with nowhere to turn for their livelihoods.

This is anything but the kind of "sustainable development" that the influential Bergen Declaration advocated, except to the extent that the mineral product is permanently recycled. The Bergen Declaration did not carefully define sustainable development. Typical Third World mining is inconsistent with a generally accepted definition of economic income, namely that the maximum amount that can be consumed in the current period is that amount which does not reduce potential future consumption.

For many developing countries, mining activities are perilously similar to addictive drugs that

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69 Some contend, however, that rapid extraction is acceptable because it will lead to generations of wealth and will promote development. Rapid extraction will result in the substitution of materials for minerals in short supply. Further, it is argued that current low mineral prices imply that there will not be increasing scarcity. See THOMAS DEGREGORI, THE THEORY OF TECHNOLOGY (1985). Also, it is at least arguable that (1) royalties account for the diminution in wealth caused by extraction, and (2) if there is no extraction, the host country is correspondingly impoverished. The latter is especially true if the mineral may become obsolete in the future.

70 Bergen Ministerial Declaration on Sustainable Development in the EC Region (May 16, 1990), in REPORT OF THE WORLD COMMISSION ON ENVIRONMENT AND DEVELOPMENT (1987) [hereinafter Bergen Declaration]. See David A. Wirth & Daniel A. Lashof, Beyond Vienna and Montreal—Multilateral Agreements on Greenhouse Gases, in WORLD RESOURCE INST., GREENHOUSE WARMING: NEGOTIATING A GLOBAL REGIME 13, 16-18 (1991) (summarizing the Bergen Declaration). The Bergen Declaration contains a joint statement of Ministers from thirty-four countries expressing a series of joint commitments, including proactive efforts to eliminate environmental risks (as opposed to waiting for crises to emerge), a drive for sustainable energy consumption, and industrial production aspirations.

71 See REPETTO, supra note 51, at 3.
ultimately render the user impoverished and exhausted. One difference is that with addictive drugs, the drama plays out in one lifetime; with imprudent mining practices, the drama spans several generations, with inconsistent amounts of pleasure or suffering among the generations.

3.3 The Market

Regardless of the mining operation form, individual mining enterprises are generally “price takers,” that is, the price of production is set by market forces with reference to the price reported on a metals exchange.\(^72\) The usual locus is the London Metals Exchange,\(^73\) but sometimes exchange occurs through direct negotiations with a large buyer. For example, Japanese buying consortiums negotiate their long-term supply contracts at prices that vary from the London market rate. An example is the Japanese pattern of buying gypsum from Thailand and China. One implication of these price mechanisms is that if the cost of mining rises for a particular mine operator, there is no mechanism whereby the operator can raise its price to include the increased cost.\(^74\)

3.4. Who is to Blame?

The dialogue between “North” and “South” can quickly become rancorous, because both sides have firmly held beliefs in their viewpoints, and both groups have justifiable objections to the other’s actions. To the North it seems clear that its mining standards are higher than those of the South, and that if the South would control its burgeoning population and rapid urbanization, the relentless pressure on its mineral base would


\(^{73}\) There are other markets as well, such as the Commodities Exchange (“COMEX”) in New York and the Penang tin market. The markets tend to be used for hedging purposes by mining buyers and suppliers. Some metals (e.g., iron) are not priced on an international exchange.

\(^{74}\) Conversely, in a period of declining prices, major buyers have attempted to avoid unfavorable long-term contracts. For example, Japanese buyers have attempted to avoid such liabilities in Canada in recent years with respect to coal supply contracts. Telephone Interview with Chris Hinde of the *Mining Journal Ltd.*
drop sharply.

The South can point out that mining reflects the North’s insatiable appetite for consumer goods. Further, any offer on the North’s part to make advanced environmental technology available is an offer of continuing economic addiction. In addition, the South can argue that its absolute contribution to pollution is trivial compared to the North’s, and that there are strong cultural and religious pressures in favor of large families.

The best way to overcome this impasse might be to try to isolate the issue and to rest the case on economic theories that have nothing to do with national mores.

A neutral way to frame the issue is to ask if there is a way one can coax countries into paying for environmental liabilities on a current basis, thereby assuring an orderly world marketplace for minerals and, to that extent, an equitable distribution of the intergenerational benefits and burdens of mining operations? I believe that the most unassailable approach begins with a microeconomic evaluation.

4. MICROECONOMIC EVALUATION

Microeconomists have their own way of looking at the issue of deferred costs. Their conclusions are important in framing the policy debate over how to handle environmental issues from a legislative perspective, and the graphic exposition of their analysis is straightforward. The following paragraphs synthesize this important analysis and the central concept of “market failure.”

Microeconomic analysis concentrates on small models in order to study consumption, production, and pricing of goods and services. The usual focal point is the behavior of business firms. The general assumptions are that every firm and consumer is a rational profit maximizer, and that in a smoothly functioning market firms will produce goods until

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76 Circumstances leading to an inefficient market are termed “market failures.” Two Nobel Prizes have been awarded in part for proof that an efficient allocation results from *laissez faire* economics, provided that certain assumptions are met. The Nobel Prize recipients were Kenneth J. Arrow (1972) and Gerard Debreu (1983).

75 These assumptions are commonly untrue, and there are various analytical adaptations to such assumptions. The variations caused by
the marginal cost of the last good produced equals the price it can command. Outside the firm, there is a so-called demand curve for each good. The curve shows the quantity of a good that consumers will purchase at any given price per unit. Each producer has a unique supply curve, which shows the quantity of a good that the producer will provide (supply) at any given price per unit. The supply curve is derived from each producer's marginal cost curve. Again, the price of the last good produced will equal its marginal cost.

Profit maximizing firms will not voluntarily pay to replace common goods, such as clean air, that they appropriate or degrade. These destructive appropriations of common goods are known as "externalities." The legal liability system is not sophisticated enough to attribute pollution to each source and to impose damages. For example, quantifying damages arising from multiple sources can be nettlesome.

Open access to these common goods means that the full costs of pollution are not included in the cost of production. Thus, market prices do not accurately reflect such costs. The result is greater than optimal levels of production and consumption, an outcome referred to as a "market failure."  

4.1. Tax on Output to Cure Market Failure

A dryly logical solution to market failures is to impose a tax on production that forces the price of the product up to the level it would have been at if the full costs of environmental externalities had been included. Once the output is "fully priced," consumption and production will fall to the "correct"
level in a smoothly functioning free market economy. Full pricing ought to include all of the damages incurred, not just the cost of avoiding the damages. Using only the cost of avoiding damages is unsound because it is completely irrelevant to the actual costs imposed on society as a result of the damages inflicted. On the other hand, the underlying assumption that the amount of damages can be quantified is generally unrealistic.

In fact, no country would ever voluntarily impose such a tax on its own mineral output. Rather, the tax is an academic concept that isolates the nature of the specific problem and implies other solutions in an objective way.

The following graph illustrates a single firm's marginal cost curve and the demand curve for the product. The vertical axis is price per unit. The horizontal axis is the number of units produced. These curves are not immutable, because both supply curves and demand curves can vary over time with such factors as tastes and technological change.

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81 See generally Hearings, supra note 13, at 109-11 (statement of the Environmental Defense Fund submitted by Daniel J. Dudek et al.).

82 Sweden has opted for the latter course in imposing its tax on carbon dioxide emissions because it considered the process of measuring damages impossible. SFS 1990:587.

83 The closest analog is perhaps the Canadian tax on timber exports to the United States. The tax was supposed to counteract alleged Canadian subsidies to its industry. Under a memorandum of understanding, dated December 31, 1986, Canada agreed to impose a 15% tax on exports of softwoods to the U.S. If Canada failed to impose the tax, the U.S. would have instantly imposed an identical tax on such imports from Canada. The U.S. argued that the timber was harvested at bargain rates from Canadian public lands, producing a de facto subsidy. The agreement between the U.S. and Canada stated that the tax could be repealed once the subsidies were lifted. Canada has since eliminated the tax, asserting that the facts have changed. See Canada Ending Tax On Lumber, N.Y. TIMES, Sept. 4, 1991, at D1.

84 See generally A. Myrick Freeman et al., Economics of Environmental Policy (1973).
If the firm appropriated a common resource to the detriment of others, and if it were accurately assessed damages for doing so, then its price per unit would rise. The following graph shows a second, higher curve that accurately reflects full cost pricing.\textsuperscript{85} This graph represents the microeconomically "correct" level of output in light of pollution damages. The new equilibrium at Q1/P2 would correct the market failure.

The second curve is often referred to as the "social margin-

\textsuperscript{85} In reality, accurate full cost pricing is difficult to determine because of the uncertainty associated with ascertaining the precise amount of damages. See Zvi Adar & James M. Griffin, Uncertainty and the Choice of Pollution Control Instruments, 3 J. ENVTL. ECON., & MGMT. 178-88 (1976). The tax can be set at a level that reflects damages done (to the extent it is possible) or it can be set at the cost of controlling pollution (e.g., the cost of installing scrubbers). In several instances, Sweden has chosen the latter course because of the difficulty associated with measuring damages. Calculating damages is so difficult because it includes such imponderables as the implicit cost of extinguishing a species.
al cost” curve because it includes the full price to society. The tax should be set at $P_2$ minus $P_1$. The tax revenues equal $(P_1 \text{ minus } P_2)$ multiplied by $Q_1$. The higher the social cost and the less “elastic” the demand curve, the higher the revenues. Elasticity refers to the sensitivity of the relationship between the amount purchased and the price of the item. Elasticity is most extreme when the demand curve appears almost flat. Whatever the degree of elasticity, the result of the tax will be to reduce production and consumption.

There is a special problem in the mining industry. The price of the mineral product is generally established by free market forces on the London Metals Exchange. Increasing the cost of a mineral to a single producer does not give that producer the opportunity to sell fewer products at higher prices. Rather, it cuts the producer’s profit margin.

Economists do not have dogmatic rules as to how society should use the hypothetical tax revenue. There are several possibilities: (1) dedicate the revenues to repairing the damages; (2) use the revenues in the most efficient manner that the government can discern; or (3) pass the revenues on to future generations that will have to pay for the actual damages. This ambivalence about the use of the revenues shows that increasing the price without repairing the damage does not in itself assure significant environmental benefits; it only cures the “market failure.” Deciding how to use tax proceeds is a political question, unrelated to the concept of market failure, but in reality the use of environmental taxes is very important indeed. If such taxes are not held and used for remedying the environment, the intergenerational impact is likely to be unacceptable.

5. DISCUSSION

Mandatory internalization of the full costs of mineral production would have important salutary results. It would eliminate two intergenerational inequities: accelerated exhaustion of the mineral wealth of future generations, and the deferral of health and environmental costs into the future.

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86 Arguably, fixing the price on the London market evidences a market that is not free. Conversely, the breadth of the market and its presumably adequate regulation lends credibility to a contrary conclusion.
At the same time, it would eliminate the windfall to importers of cheap minerals and downstream users, including current consumers. In addition, in some cases it would shift extraction to other, less environmentally destructive, mineral products or mining processes. This would result in actual economic efficiencies in the sense that the extracted minerals would have the least real cost all other things being equal. Certain mineral products and mining processes would no longer enjoy artificially low extraction costs with concealed long-term costs.

There are, however, cases where a rigid application of these principles would result in great hardship. Again, Bolivia furnishes an example where the microeconomically correct result cannot be achieved unless it is accompanied by international assistance. This relief for hardship cases is realistic; a proposal that does not contain such relief is likely to be unacceptable to the world community.

Donors of international assistance may raise some delicate questions with respect to assistance. For example, should such aid be linked to efforts at population control, since a principal cause of the overexploitation of mineral resources is a burgeoning population that cannot find employment in other sectors? Should aid be restricted if the country would not otherwise receive aid because its government engages in human rights violations? The details for determining when a hardship exists and how to identify donors are discussed later.

5.1. Relation to Polluter Pays Principle

The full cost pricing proposal is consistent with the "polluter pays" principle adopted by OECD members. The

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87 Likewise, there is a policy choice between full cost pricing plus remediation versus prevention. Another form of environmental tax, not discussed in this paper, can in theory be used to force remediation by making it cheaper for the firm to avoid environmental damage than to pay the tax.

88 See infra notes 109-111 and accompanying text.

89 This principle was adopted in the Organization for Economic Cooperation and Development's ("OECD's") "Declaration on Environmental Resources for the Future." ORG. FOR ECON. COOPERATION & DEV., Declaration on Environmental Resources for the Future, in OECD AND THE ENVIRONMENT 19, 20 (1986)[hereinafter OECD Declaration]. The organization is the result of a treaty among the countries that are typically thought of as the industrialized world. The OECD has commissioned several studies
principle is also legally in force as official EC policy.\textsuperscript{90} That principle calls for governments to avoid granting subsidies to polluters and instead to internalize environmental costs.\textsuperscript{91} The central concept is that the polluter should bear the costs of measures to reduce pollution. These costs are decided upon by public authorities in order to assure that the environment is in an "acceptable state." For example, when the U.S. proposed a surtax on imported oil to fund its federal clean-up program, European trading partners strongly protested that the tax violated the polluter pays principle because it imposed a tax at a higher level on imported oil than on U.S. produced oil. The issue was placed before the GATT Council, which ruled that the U.S. was in violation of GATT.\textsuperscript{92}

There are limits to the polluter pays principle. The OECD only encompasses a limited number of relatively prosperous countries. Also, the principle is fairly weak in that it contains significant exceptions.\textsuperscript{93} Nevertheless, as the number of OECD signatories increases, and as general sensitivity to environmental concerns mounts, the principle is likely to

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\textsuperscript{90} See OECD Declaration, supra note 89.

\textsuperscript{91} Since then, it has lost its purely economic meaning and was implicitly redefined to go beyond preventive measures agreed upon in advance.

\textsuperscript{92} See U.S. Oil Import Fee Under Superfund Law Inconsistent with GATT Obligations, Panel Says, 18 Env't Rep. (BNA) 659 (July 19, 1987) (U.S. oil import fee held inconsistent with GATT Article XXII.1). The U.S. position was that the polluter pays principle was not germane because the issue fell within the scope of GATT.

\textsuperscript{93} According to Opshoor and Vos, exceptions to the polluter pays principle apply if certain specified conditions are met. For example, this principle is not applicable within limited well-defined transition periods. As the authors point out, there are numerous ambiguities in applying this principle, such as the meaning of the term "an acceptable state of environment," the length of transition periods, the treatment of administrative costs, the acceptability of charges and grants, and so forth. In 1981 the OECD Environment Committee reviewed a number of these ambiguities and other problems and revised the concept to achieve more effective use of policy instruments. The Committee concluded that polluters should bear the costs of keeping environmental quality at some publicly determined level, without normally relying on subsidies. OPSHOOR & VOS, supra note 89, at 27-28.
increase in importance. Moreover, in this author’s opinion it is a worthy principle; it ought to be considered on its own merits, regardless of OECD membership. It is fundamentally appropriate, both as a moral and economic matter, that polluters should pay for the damages they cause. Adopting this principle—even in the absence of a treaty obligation—reduces suspicions about the seriousness of a nation’s intent to join the fraternity of countries that want to control environmental degradation. It is important that no other major environmental norm conflicts with the polluter pays principle.

5.2. The Problem of Socialist Countries

Full cost pricing is a difficult concept to apply if the host country’s economy functions with no direct price signals. Centrally planned economies of such countries as Mainland China depend on extraction, labor, and transportation directives, not on arm’s length purchases, for monetary consideration. It is unreasonable to expect centrally planned economies to change their fundamental suppositions in order to accommodate a free market concept with respect to minerals. Moreover, it is unlikely that these countries could reconstruct hypothetical prices of mineral output even if they tried. The difficulties are too great. For example, the depreciation of mining equipment is clearly a cost factor, but if there are no records of the monetary cost of the equipment, then there is no logical starting point for determining such a cost. Conversely, labor costs are higher than their nominal wage rates because they include a large social welfare component, such as free medical attention and subsidized housing.

Fortunately, the situation is not hopeless. One way to salvage this dilemma is to forego trying to reconstruct nonexistent prices and instead to substitute the prices of comparable minerals produced under similar engineering and environmental circumstances in free markets. The U.S. Internal Revenue Code ("I.R.C.") has long granted the Commis-

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84 It forces the polluter to internalize the cost of its environmental damage, which is consistent with the discussion of microeconomic theory outlined above. See supra notes 75-86 and accompanying text.

85 See generally ERNEST MANDEL, INTRODUCTION TO MARXIST ECONOMIC THEORY (1970); MARX ON ECONOMICS (R. Freedman ed., 1961).
sioner specific authority to impose an arm's length price on transactions among commonly controlled businesses.\textsuperscript{96} Section 482 is accompanied by a plethora of regulations and has a long and rather successful history. This section can easily be adapted to the problem at hand.

One approach would be to use production costs in countries with comparable economies as proxies for data on domestic costs in Socialist countries. This would not be easy.

Another approach, which seems less satisfactory, is to apply a variant of the theory of the "second best." This concept presumes that markets are in reality imperfect, and that the price of each good does not reflect its incremental cost (as would be the case if perfect competition existed); as a result, one cannot be sure in which direction prices need to move with respect to a particular good in order to eliminate an inefficiency.\textsuperscript{97} It might be possible to study the overall price level of the country on the basis of those selective items that do carry prices, including other exports. With this information, one can evaluate whether the price of the mineral product seems proportionate to the general price level. That is much easier

\textsuperscript{96} I.R.C. § 482 (1988). The section reads as follows:

Allocation of Income and Deductions Among Taxpayers

In any case of two or more organizations, trades, or businesses (whether or not incorporated, whether or not organized in the United States, and whether or not affiliated) owned or controlled directly or indirectly by the same interests, the Secretary may distribute, apportion, or allocate gross income, deductions, credits, or allowances between or among such organizations, trades, or businesses, if he determines that such distribution, apportionment, or allocation is necessary in order to prevent evasion of taxes or clearly to reflect the income of any of such organizations, trades, or businesses.

In the case of any transfer (or license) of intangible property (within the meaning of section 936(h)(3)(B)), the income with respect to such transfer or license shall be commensurate with the income attributable to the intangible.

\textsuperscript{97} Consumers therefore must look at relative prices in deciding whether to buy goods. Thus, for example, if the entire economy is monopolistic, relative prices may be in order, and there is no way to be sure whether lower prices will really result in economic efficiency. See generally Stephen Breyer, Regulation and Its Reform 16-17 (1982) (a good prose discussion on this topic); R.G. Lipsey & Kelvin Lancaster, The General Theory of the Second Best, 24 Rev. Econ. Stud. 11 (1956-57).
said than done.

5.3. European Community Proposal

The European Community has considered this issue\(^9\) and appears to support the idea of imposing import duties on products produced under environmentally unacceptable circumstances.\(^9\) Evidently, the notion is to impose duties that would operate as surrogates to proper internalization of costs at the mining or manufacturing level; in effect, it is the microeconomist's tax on output imposed at the international border. The consequence should be to diminish the extent of environmental dumping into the EC countries, while reducing the incentive to operate at environmentally substandard levels.

5.4. Relationship to GATT

The concept of retaliatory duties raises questions under GATT in the sense that it implies steeper import duties than specifically negotiated under the GATT treaty. However, GATT has no enforcement mechanism,\(^1\) and it may be that...
such duties can be justified on the grounds of being outside the kind of discrimination that GATT is aimed at preventing (i.e., collectively destructive trade behavior). The purpose of GATT has been described as follows:

The GATT agreement, including the remarkably detailed commitment on tariffs that comprise the "Tariff Schedules," fills many volumes of treaty text. The "General Articles" of GATT comprise the basic trade policy commitments of the contracting parties. These articles, now numbering thirty-eight and covering eighty or ninety pages of text (see Documentary Supplement) contain a number of detailed rules and obligations designed generally to prevent nations from pursuing "beggar-thy-neighbor" trade policies which would be self-defeating if emulated by other nations. Consideration of various of these GATT obligations will be found throughout this book, particularly in Part II.101

The purposes of an antidumping duty are to improve the global environment and to impose intergenerational equity. It is beyond the purposes of GATT to restrict such a policy. For those who subscribe to the venerable doctrine cessante ratione, cessat et ipse lex102 that should be enough.

If this doctrine does not render the GATT inapplicable, there is always a technical escape under the security exception located in Article XXI.103 There is a seemingly more relevant exception under Article XX.104

102 "Where the reason for the law ends, so does the law." See HERBERT BROOK, BROOK'S LEGAL MAXIMS 126 (7th ed. 1900).
103 GATT, supra note 40, at art. XXI. The key aspect of this exception is that the party invoking it has carte blanche authority to subjectively determine whether a national security risk exists. The United States was the first to espouse this position, and it has been the rule ever since. See Summary Record of the Twenty-Second Meeting, GATT Doc. CP.3/SR22 (June 8, 1949). A variety of anomalous, if not comical, results have been supported by the GATT Council. The most extreme case appears to be the Swedish use of the exception to defend import restrictions on certain footwear. See GATT Doc. C/M/109 (1976) (the Swedish argument was based on a limited stockpile of rubber for boots).
104 GATT, supra note 40, at art. XX. The text reads in pertinent part:

Subject to the requirement that such measures are not applied in
The key problem with the European anti-environmental dumping duty is purely practical. The duties may be unenforceable because of the opportunities for evasion in the international minerals markets. To take a simple case, if Bolivian tin were extracted under unacceptable conditions, but country X's tin were not, then Bolivian dealers could sell into the X market, and the mining companies in X could sell to the EC. These kinds of commodities exchanges occur frequently in international markets. Moreover, transshipment at intermediate ports of call on international shipping routes present further opportunities for evasion. The situation is worse if there are several mining firms in the country. How can voices complaining of discrimination vis-à-vis other exporters be sorted out thoughtfully on an objective basis? For example, assume that there are two copper miners in a particular country and only one is an environmental miscreant, how does one confidently know that a particular shipment of copper from that country is the product of the offending mineral operator?

Second, there is the question of fixing the duty at the right level. It is difficult to conjure up a tax on production to act as a surrogate for full costing for a single firm. How can one determine a duty for a number of countries, each containing a multitude of mineral operators? How can the EC obtain the facts needed to decide whether a duty is required, and if so, at what level? Again, these are extremely difficult questions, and they have the potential for generating hard feelings between trading partners.

It appears that to date no such duty has been imposed.

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Nevertheless, this kind of antienvironmental dumping duty is likely to become a fairly common proposal in the future, as enterprises in the industrialized world feel their profit margins encroached upon by the costs of environmental compliance.

Another way to structure an antidumping duty would be to couch it in terms of lowering tariffs for those countries whose mining standards satisfy requirements imposed by the importing country.\textsuperscript{106} Although the practical effect of either system is the same, this proposed format is superficially less offensive because it has the air of a prize based on good behavior, as opposed to punishment for bad behavior.

Coming to a conclusion about whether an antienvironmental dumping system could in fact work is beyond the scope of this writing. Suffice it to say that the concept of an import duty to substitute for a domestic system that forces internalization of costs is a good one conceptually, but there is a great deal of room for pessimism about its practicability. The better result would be to induce compliance at the mine operator level. An international consensus must be reached that concludes that full internalization of costs is required of all mine operators as the right starting point for such compliance. As a worldwide norm, and not one imposed by a privileged group of importing countries, it could operate consensually on a "grass roots" level, buttressed by ethical values. With that kind of an institutional background, import duties could be a backstop in extreme cases. The inherent right to impose such duties in cases of noncompliance could be made part of the international consensus.

5.5. Assistance

Many developing countries with chronic unemployment have limited access to capital,\textsuperscript{107} and at present there is no

\textsuperscript{106} See Professor Thomas Waelde, Environmental Policies Toward Mining in Developing Nations: Perspectives on the Future (1992) (available from the author). Professor Waelde is the Director of the University of Dundee's Center for Mineral and Petroleum Studies. Professor Waelde was formerly a UN Interregional Advisor.

\textsuperscript{107} Such countries are on occasion referred to as "fourth world" (least developed) in UN parlance. They include large countries with massive foreign debts, whose debt service costs are a high proportion of their gross national products. The U.S. maintains a list of about forty least developed countries that fulfill certain standards, most notably low per capita income.
special fund to assist them. There will, therefore, be cases where compliance with sound environmental norms cannot realistically be achieved. Insisting that less developed countries internalize the costs of proper mining activities will appear as pontification of the worst sort. Under the proposal advanced in this Article, countries that cannot realistically correct their own situations would be able to turn elsewhere for help. By forcing noncomplying countries to come forward with requests for assistance, the paying countries have the advantage of being able to demand practical evidence of what the environmental problems really are, what help is needed, and how much it would cost. This places the burden of proof where it ought to be—on the party seeking exceptional treatment.

As a matter of equity, the providers of international assistance should be the parties that benefitted from the historic underpricing of the mineral product. These beneficiaries primarily consist of the private owners of the mine, importing countries, and countries that consumed the products manufactured in the importing country.

There are other participants as well. They include the handlers of the minerals, international shippers, suppliers to the mine, suppliers to the importing country's industry that converted the minerals, as well as accountants, lawyers, consultants and other professionals who advised the mining companies, the importers, and the manufacturers. These people are generally very difficult to trace, and it is questionable whether there is any chance of tracking them down. Even if they could be located, such participants would probably refuse to part with their earnings, regardless of the legal structure established to implement the overall full costing proposal. In most cases, there will never be satisfactory attribution of benefits because the facts will be difficult to establish. In ambiguous cases, countries that were identified as importers may claim that their importers were mere

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108 The World Bank, the UNDP, and the UNEP jointly administer a large new fund to assist in cases where pollution causes transboundary or global environmental degradation, but the fund is not for purely internal problems. In addition, the World Bank lends funds for environmental improvement, but the loans are issued at standard rates, and the Bank generally does not favor loans for retrofitting. Telephone Interview with Nicholas van Praag, Advisor, World Bank (Oct. 17, 1991).
transshippers, or that their industries added little value to the market or operated at losses and were eventually closed down. In such cases, the question presented is whether assistance should be granted anyway, primarily because the country seeking the aid will by then have made such a good case for it—including a showing of great national deprivation. At this point, the moral justification for the help will be well established.

No request for bilateral assistance should be tendered before private owners of the mine have made a maximum contribution to remedying the problem. Thereafter, the burden falls upon others to help. The country seeking assistance should also be expected to show by means of national statistics that it is unable to rectify the problem.

The assistance could take a number of forms. The simplest would be a transfer of cash. Because the purpose of the full internalization of environmental costs is to induce environmental improvement, it would generally seem best to tie the assistance to technology transfers that assure the mining site is brought into compliance with environmental norms. In some cases, however, cash transfers might be better. For example, if the real problem is that the process is inexorably injuring the miners, then the right form of aid would be cash to support health services for them.

Technology transfers are not as simple as they seem. The technology must be usable. That means it must be accompanied by appropriate training and maintenance. The equipment itself must not be too complex to manage effectively, and there must be assurance of the availability of parts in later years. Because of the uncertainties associated with determining the appropriate technology, it seems prudent to assure that a dispassionate observer participates in this part of the process. One such observer might be a competent firm of consulting engineers. Another could be the United Nations Environment Programme.

One helpful group might be the personnel who report to the Global Environmental Facility ("GEF"). GEF, which was established in November of 1990, is designed to support projects in developing countries in order to address global warming, ozone depletion, loss of biological diversity, and to protect international waters. It implements its activities through the UN Development Programme, the UN Environ-
ment Programme, and the World Bank. Taken together, the three entities compile a unique list of skills which should be useful in administering the proposal set forth in this Article. This group consists of a significant staff of experts, but they may need further help depending on the circumstances.

There is another significant problem with transfers of technology that is not often appreciated. Less developed countries fear becoming too dependent on imported technology. Acquiring the technology is expensive, but that is only the beginning. The host country is dependent on the original provider for spare parts, training, and upgrades. Meanwhile, no domestic industry springs up to provide competing technology. The value added from manufacturing the equipment stays with the manufacturer. The buyer continues its role as a genteel addict. In short, there is a strong case for technology transfers, but its application must be sensitive. In sensitive cases, cash grants in exchange for the host country's assurance of remediation may be the better path.

5.6. Tax Surcharge in Importing Country

The countries of importation might want to impose a remedial surtax on their industrial processors for the windfall benefit of overproducing. Such a surcharge is a step in the direction of curing the market failure, but it is a limited one in the sense that it captures only a share of the profits. If the unremedied environmental and human costs are so great that the importing country's industries would be unable to earn a profit, the surtax would have to be greater than any tax on net profits.

Putting aside the difficulties of constructing the tax and obtaining the data needed to fix it at the right level, the political problems of targeting the tax on a small number of domestic producers make its prospects unlikely. Nevertheless, this surtax is an option, and it should operate as a defense to host country requests for assistance with respect to periods

109 UNDP coordinates and manages project preparation and technical assistance work. UNEP provides scientific and technological guidance in identifying and selecting projects. The World Bank administers the fund and is responsible for appraising and supervising investment projects. The fund has over $1 billion at its disposal.
during which the tax was in force.

6. IMPLEMENTATION OF PROPOSAL

The centerpiece of the proposal is to make full cost pricing of mineral products an international norm. The other semantic expression is to force the mining firm to "internalize" all of its costs. The principal corollary would be that in extreme cases, where the host country needs foreign assistance in order to comply, the first source ought to be the trading partner or partners that benefitted the most from historical underpricing of the mineral output. Noncompliance with full cost pricing could justify retaliatory import duties.

There are probably a number of alternatives to the following methods of implementation. If this Article's proposal is accepted, the method of implementation must be considered. The following proposals would never be adopted in toto, but they nevertheless are a starting point from which policy makers can disagree and perhaps negotiate a resolution.

6.1. United Nations Resolution

Only with a broad consensus can an essentially moralistic proposal such as this one gain force in dealing with particular cases. The first step is to get a broad consensus recognizing that full internalization of costs is a proper norm, and that the burden of assistance in the cases of ongoing projects should be tied to historic benefits of underpricing. Due to the lack of any other body, the right forum must be the United Nations, and within the United Nations, the appropriate entity must be the General Assembly, rather than some lesser body. The consensus would be embodied in a resolution. Such resolutions are nonbinding. Many might prefer a treaty.

Hopefully, there is no need for a treaty. Ultimately, treaties are voluntary documents, just like resolutions.

110 The UN has 159 members as of September 5, 1991. By contrast, GATT has only 85. There is no other international organization whose membership approaches these levels. Moreover, the UN has great prestige, which adds to the weight of any collective understanding to which it is a party.

111 Perhaps a declaration can be used instead. While declarations appear somewhat more compelling, I leave this for others to consider.
Moreover, treaties are notoriously tedious to develop. They require detailed negotiations and invite country-by-country exceptions and reservations. Resolutions, by contrast, tend to be shorter and more general. A multilateral treaty would be preferable if it could successfully grapple with the technical issues posed by the norm, such as determining when there is noncompliance in borderline cases, identifying historic beneficiaries of underpricing, and assessing how much assistance such beneficiaries should provide. However, it is unlikely that the really difficult questions posed by the full pricing norm could ever be worked out with precision. This dilemma invites the more consensual approach of a resolution. Such an agreement is consistent with the kind of collective good faith that is needed in order to implement the present proposal.

The arguments in favor of a treaty are that resolutions have too little practical impact and fail to define definite obligations of states. Also, if the scheme is to involve financial duties, a treaty is of great value in inducing governments to raise funds through domestic legislation. The treaty versus resolution issue would ultimately be decided by diplomats.

The proposal should include a provision that favors the existence of a multinational fund to cover those cases where the developing countries need assistance and the beneficiaries are too diffuse to identify an industrialized country that could fairly be called upon to remedy the situation.

The resolution would not be limited to cases of malfeasance with respect to existing mines. It should cover new mines as well as existing mines.112 There is no doubt that the best approach to minimizing mining pollution is to make environmental considerations an integral part of the process of opening any new mine. This approach places a heavy burden on developing countries to regulate artisanal and gold rush

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112 In that connection, it would be sound to adopt the UN Economic and Social Council's report Programme of Work on the Intergovernmental Working Group of Experts on International Standards of Accounting and Reporting: Discussion of Accounting and Reporting Issues Identified During the Eighth Session, Accounting for Environmental Protection Measures, Report of the Secretary-General, U.N. Economic and Social Council, U.N. Doc. 91-04235 211f(E) (1991). The report emphasizes the need for accounting procedures that assure that businesses take full account of their environmental liabilities when reporting for financial purposes.
mining practices.\textsuperscript{113} EC countries will find this approach awkward because the Treaty of Rome precludes them from imposing unilateral tariff increases.\textsuperscript{114} Accordingly, the EC members will not likely participate in the resolution unless they reach a consensus on this issue and on how to use the proceeds of such duties.

The resolution may be ignored or trivialized in practice. If so, the next step is to promptly begin negotiating a treaty, while standing by the resolution in the interim.

6.2. \textit{Notification}

Assuming the norm is in place, the first issue would be to accurately identify cases of noncompliance. That is not as easy as it might seem. Although a mine site may accumulate slag, the mine operator may be internalizing the costs of cleaning up the site by setting aside reserve funds.\textsuperscript{115} Likewise, substandard health conditions for miners can be offset by health funds to pay for the consequences of such neglect.

There should be a free flow of initial information on environmental violations in order to assure that the issue is raised. The information could come from miners, local populations, domestic or overseas competitors, and government bodies. In the case of large and medium sized operations, competitors are especially motivated to inform on each other and would generally have the wherewithal to provide

\textsuperscript{113} Morocco and Ghana have regulated such practices, and their strides should serve as models to other countries.

\textsuperscript{114} \textsc{Treaty Establishing the European Economic Community} arts. 12-29.

\textsuperscript{115} One problem in this area is that reserve funds in governmental hands are not necessarily free from the risk of encroachment. Likewise, funds in private hands are also unsafe, and in some cases may even be subject to the claims of general creditors. To deal with this problem, one concept raised at the Berlin Conference was to have a multinational organization, such as the World Bank, hold such funds, disbursing them only as needed. The U.S. permits a current income tax deduction for accruals recorded to reserves for closing and reclaiming mines and solid waste disposal sites. \textsc{I.R.C.} § 468A (1988). The flaw with this approach is that additions to reserves are purely bookkeeping entries. No actual fund need exist and no cash need be transferred. By contrast, § 468 of the \textsc{I.R.C.} authorizes current deductions for actual contributions to actual reserves established to fund shutdowns of spent nuclear facilities. \textit{Id.} at § 468. The funds are in effect under joint corporate and state control.
useful information. However, in artisanal and gold rush situations, it is unlikely that competitors would inform on each other, as most of them would be out of compliance with the norms. Domestic legislation can help in this area. For example, the host country can enact laws which: (1) require miners to post notices to workers describing minimum environmental and health standards and advising on whom to notify in the event of violations; (2) provide rewards to informants;\textsuperscript{116} (3) assure anonymity of informants; and (4) protect "whistleblowers" from employer retaliation, perhaps by including attorneys' fees for obtaining damages as a result of such retaliation.

6.2.1. Whom to Notify

This process is essentially one in which the industrialized world tells the less developed countries how to go about their business. Many less developed countries will find the concept to be an offensive infringement on their sovereignty. This consideration makes it important to give the host country every opportunity to resolve its own environmental problems. Respect for national sovereignty makes the national government of the host country the first logical choice to receive information on alleged noncompliance in its domestic mining industry. Within the governmental structure, the information should be disclosed to the environmental ministry, which typically has jurisdiction in the mining field.\textsuperscript{117}

\textsuperscript{116} In this regard, § 7632 of the I.R.C. furnishes an analogy. \textit{Id.} at § 7632. This section grants rewards to informants of up to ten percent of what the Internal Revenue Service extracts from the taxpayer as a consequence of the information. It assures anonymity. \textit{See} Treas. Reg. § 301.7623-1(e), (f) (as amended in 1973).

\textsuperscript{117} The membership list at the Berlin Conference indicates that environmental authority over mining activities is most often lodged in the mining ministry. In addition, health authorities may have separate jurisdiction. The International Labor Organization advises on miners' health and safety issues worldwide.
6.3. Ministry Activity

Before focusing on how the ministry ought to act, it should be noted that most mining ministries have a perfectly good grasp on the mining activities within their countries. Their problems arise in dealing with difficult situations with limited resources and frustrations over law enforcement.118

Regardless of the information's source, the ministry should have a policy of openness towards such information. Ideally, there should be an explicit path for possessing such information, which should include a specific individual responsible for such work. The ministry should evaluate the information to the best of its abilities. It should reject information determined to be erroneous or trivial, and it should begin inquiry into reliable information. With luck, the problem will be pragmatically resolved at the mine operator level. Assuming that the mining ministry concludes that the problem is resolved in a manner that is consistent with the imaginary UN resolution, should that end the investigation as a procedural matter? Respect for local sovereignty argues for this concession, despite the risk of abuse. Moreover, it is impractical to design a system that could function otherwise, given the impossibility of forcing a bureaucracy to act when it considers its job done. If a country or trading bloc felt that the ministry's job was inadequate, it has the usual sovereign right to protest diplomatically, and perhaps to ultimately retaliate with an anti-environmental dumping duty or some other coercive remedy.119

6.4. Request for Bilateral Assistance

If the host country is unable to rectify the problem for lack of funds, it would seek the proportional assistance of the country or countries that benefitted most from the underpriced goods. This process would presumably be handled through

118 See, e.g., E. SCHANZE ET AL., supra note 16, at 216.
diplomatic channels. An arbiter might be asked to validate or reject the basis of the claims.

6.5. Request for Multilateral Assistance

This last step would be a ministry level request for multilateral assistance. This sort of request would be possible only after the host nation exhausted its other remedies and found itself unable to pay for remediation. An appropriate governing body would have to be established as an element of the resolution.

7. CONCLUSION

Readers are likely to view this Article as idealistic. In fact, it is nothing of the sort. It only offers a modest short-term solution. Mining without recycling is an extremely risky economic path that is entirely incongruent with the reasonable concept of "sustainable development." Many developing countries are on a road to suicide, as populations swell and natural resources expire. Unfortunately, there seems to be no real hope of changing the pattern. A worldwide consensus that environmental clean-up costs should be attributed to those who created the problems is more than a fig leaf, but it will not divert the economic and human tragedies so many developing countries face. For that, far more dramatic means are needed.

In this era of free market theory domination, consistency requires that the free market adherents insist on full cost pricing. A sense of fairness calls for leniency and assistance in otherwise intractable cases. Failure to adhere to this standard and to refuse to seriously address the issue on any other ground is an unacceptable inconsistency.