GATEKEEPER SERIES No LEEC GK 92-04

Briefing papers on key issues in environmental economics

The Rationality of Land Degradation in Latin America: Some Lessons from the Ecuadorian Andes

DOUGLAS SOUTHGATE

IIED
INTERNATIONAL INSTITUTE FOR ENVIRONMENT AND DEVELOPMENT

LONDON ENVIRONMENTAL ECONOMICS CENTRE

The Rationality of Land Degradation in Latin America: Some Lessons from the Ecuadorian Andes

Douglas Southgate

London Environmental Economics Centre

Gatekeeper Series

GK 92-04

December 1992

Paper prepared for International Symposium on Soil and Water Conservation, Honolulu, Hawaii, October 1992.

GATEKEEPER SERIES

This **Gatekeeper Series** is produced by the London Environmental Economics Centre (LEEC). LEEC was established in 1988 and operates as the economics programme of the International Institute for Environment and Development (IIED). Its aim is the furtherance of policy relevant research in the field of environmental and natural resource economics, particularly in the context of developing countries.

The **Gatekeeper Series** highlights key topics in the field of environmental and resource economics. Each paper reviews a selected issue of contemporary importance and draws preliminary conclusions of relevance to development activities. References are provided to important sources and background material.

The Swedish International Development Authority (SIDA) funds the series, which is aimed especially at the field staff, researchers and decision makers of such agencies.

THE AUTHOR

Dr Douglas Southgate is Associate Professor, Department of Agricultural Economics, Ohio State University

CONTACT ADDRESS

The author can be contacted at:

Department of Agricultural Economics
Ohio State Univesity
Columbus
Ohio 43210-1099
USA

INTRODUCTION

During the past fifteen to twenty years, national governments and donor agencies have mounted soil conservation projects throughout Latin America. Typically focused on small hillside farmers, projects are justified in terms of impacts on that group's welfare and also on the basis of externalities.

At least over the long term, it is argued, controlling erosion enhances agricultural incomes. One spillover benefit of this is that economic incentives for rural-to-urban migration, which can create a host of problems, are reduced. Furthermore, keeping soil in place is supposed to yield major downstream benefits, such as diminished flooding and more reliable supplies of irrigation water and hydroelectricity.

There is reason to be sceptical about the external benefits claimed for improved watershed management. For example, Hamilton (1985) points out that there is little scientific basis for claiming a strong linkage between tree cover in upper watersheds and stream flow variability at lower elevations. Likewise, the argument that soil conservation can greatly alleviate rural-to-urban migration is not very convincing. It is frequently the case that migrants are recruited primarily from landless populations in the countryside. At best, the behaviour of those populations is marginally influenced by land owners' decisions to construct terraces, to install vetiver grass (*Vetiveria zizanioides*) bunds, or to adopt other conservation techniques.

A different critique of the standard rationale for developing country soil conservation projects is offered in this paper. In particular, I argue that, given the market conditions and government policies small hillside farmers usually face, reducing erosion is not in their best interests. To the contrary, the best way to respond to declining prices for crops and livestock, policy-induced shortages in rural financial markets, and attenuated property rights is to depreciate farm assets, especially land, as a prelude to exiting the agricultural economy.

The arguments made in the pages that follow are illustrated by recent experience in the Ecuadorian Andes, where erosion problems are severe (de Noni and Trujillo, 1986). As is stressed throughout the paper, the decision-making environment in that region is representative of what one finds elsewhere in Latin America. Consequently, principal findings and recommendations are applicable well beyond Ecuador's borders.

DETERIORATING TERMS OF TRADE AND AGRICULTURAL LAND USE

In recent decades, nothing has had a greater impact on the use and management of land inputs to highland Ecuador's agricultural economy than declining prices for agricultural commodities.

In large part, the decline has been caused by the country's adoption of an economic development strategy predicated on import substitution and industrialization. Major elements of that strategy, which has been pursued with vigour throughout Latin America (Krueger, Schiff, and Valdés, 1988), include an over-valued currency and food price controls. These policies have had a depressing effect on commodity prices in Ecuador (Scobie, Jardine, and

Greene,1990).

But deteriorating terms of trade for the farmers of the Ecuadorian *Sierra* cannot be attributed exclusively to import substitution and industrialization policies. It is important to keep in mind that, as recently as the 1960s, most Andean valleys had rudimentary road and rail links with the outside world. Almost by necessity, those places were traditionally self-sufficient in the production of food, generally, and staple grains, specifically. Road construction, which began in earnest in the 1960s and accelerated in the 1970s (when Ecuador became a petroleum exporter), exposed highland farmers to unprecedented external competition. Rice, plantains, and other tropical crops were brought up from the coast in large quantities. The downward trend in prices for barley, rye, and, most importantly, wheat was further accelerated because the *Sierra* found itself in the novel and uncomfortable position of competing with North America, Australia, and Argentina.

Ecuador's Andean farmers have responded as their counterparts in neighbouring countries and in Central American highlands have done to declining grain prices. The region's comparative advantage in dairy production has been exploited (Lasso and Robayo, 1990) and there has been a switch to potatoes, beans, and other staples (Ramos and Acosta, 1990). Also, production of cut flowers, asparagus, and other specialty crops, which are sold in North America and other markets around the world, has risen.

However, the combination of an adverse policy environment and the loss, through infrastructure development, of previously insulated markets was also bound to stimulate some withdrawal of assets from the *Sierra*'s agricultural economy. Between, the late 1960s and early 1980s, when Ecuador began to turn away from the import substitution and industrialization model, cropland declined by more than 50 percent in the Andes (Southgate).

FACTOR MARKET DISTORTIONS AND RESOURCE DEGRADATION

Depreciation of immobile assets is only to be expected in a sector of the economy undergoing decline. Soil erosion prior to the abandonment of *Sierran* cropland is a case in point.

Of course, decisions about what to do with real estate should not be driven exclusively by reduced profitability of the current use. Other purposes to which land can be put, both now and in the future, need to be examined. For example, the possibility that some alternative use will be remunerative a few years from now should be considered before allowing soils to be lost.

Unfortunately, severe and interrelated distortions in rural Ecuador's financial and land markets have assured an intertemporally inefficient response to deteriorating terms of trade for agriculture. Policy-induced credit shortages have discouraged land users from considering the future consequences of current resource use and management. In addition, attenuation of private land rights, which is also a consequence of government policies, has caused owners to doubt that they will be able to capture the benefits of conservation.

FINANCIAL SECTOR REPRESSION

In recent decades, most developing country governments have chosen to interfere with financial intermediation in rural areas (Adams, Graham, and Von Pischke, 1984). The Ecuadorian case is illustrative.

Since the early 1970s, controlled interest rates were consistently pegged below inflation rates, which have increased over the years along with public sector deficits (Ramos and Robison, 1990). While direct controls are no longer in force, legal limits on the difference between what a bank can charge on its loans and what it pays savers have continued to depress overall interest rates (Camard, 1992). Real rates continue to be low, with adverse consequences for savings mobilization and credit availability.

Financial sector repression has been particularly severe in rural areas. With very few exceptions, private banks do not find it worth their while to open branches in small towns. In much of the countryside, then, the only source of loans is the government's National Development Bank (BNF), which does not make a serious effort to attract deposits since it receives funds rediscounted from the Central Bank. Moreover, the BNF has never satisfied more than a fraction of the demand for rural credit. The institution's own periodic reports indicate that, throughout the 1980s, much less than a fifth of all the country's agricultural land was covered by its loans. Since the BNF tends to concentrate its lending on lowland rice growers, coverage of land planted to other crops or used for livestock production has been even more limited, especially in the *Sierra* (Ramos, 1991).

Rural credit being in very short supply, financing of soil conservation measures and other real estate improvements is difficult. In particular, it is frequently impossible to cover soil conservation's short-term capital costs, which can be large. At the same time, the long-term benefits of erosion control cannot be realized in the short term without financial intermediation.

ATTENUATED LAND RIGHTS

Along with financial sector repression, weak property rights are a salient feature of the rural economy, in Ecuador and elsewhere in Latin America.

In part, land rights in the Ecuadorian countryside are attenuated because rural property registries are in shambles (Lambert *et al.*, 1990). Instead of being defined by boundary lines that have been properly surveyed, the typical holding is merely described in terms of neighbouring properties and the owners of same. Furthermore, registries typically comprise nothing more than chronological accounts of recorded sales and inheritances and many transactions are never recorded. Under these circumstances, which Ecuador shares with other countries (Southgate and Basterrechea, 1992), verification of title is quite difficult (Rosholt, 1992).

First put in place in the Nineteenth Century, rural registries probably satisfied the needs of a limited number of large estate owners, for whom the system was designed. However, the registries fall well short of what is required for the functioning of modern land and credit

markets. In particular, a lending institution unable to verify title reliably and cheaply must instead inspect entirely on its own all characteristics of any holding being offered as collateral. The transactions costs implied by this arrangement impede financial intermediation.

Throughout Latin America, property rights attenuation also has to do with agrarian reform, which is administered in Ecuador by the country's Institute for Agrarian Reform and Colonization (IERAC). To be exempted from the general ban on renting land, which was enacted in the early 1970s in the hopes of ending "precarious" forms of tenure, an owner must prove that he or she is physically incapable of farming (e.g., because of illness). Also, IERAC has a legal mandate to review all real estate transfers in the countryside. Since that mandate seriously outstrips the institution's administrative capacity, official approval of a sale, for example, can take years (Southgate and Whitaker,1992). While waiting for an adjudication, one's property rights are in limbo.

The most damaging consequences of agrarian reform relate to expropriation risks. According to many countries' laws, land not fulfilling its "social function" can be taken from its current owner. In practice, redistribution follows a finding by an agrarian reform official that the parcel in question is being used inefficiently (e.g., that yields are too far below the national average) or that resources are not being conserved. Almost always, such findings are highly subjective. Even a well-managed farm can be seized if an official determines that population pressure is "high" in the surrounding area.

The displaced owner does not receive the current market value for his or her real estate. Typically, he or she is instead given agrarian reform bonds that can only be redeemed after several years have elapsed. The redeemed value of Ecuadorian bonds, which pay around 5 percent nominal interest, is roughly equivalent to the nominal value of property assessments carried out ten years before the expropriation. Obviously, this compensation amounts to a tiny share of real estate values given the 50 percent annual inflation that Ecuador has experienced for several years.

Since losing one's land through an agrarian reform action is so costly, many owners sell their holdings at bargain prices when faced with a real or threatened invasion -- that is, the physical occupation of land by a group of people, which can trigger governmental involvement. Small fortunes have been made organizing such invasions and subsequently dividing up holdings extorted from the previous owners.

Conceivably, expropriation risks discourage some individuals from allowing their land assets to depreciate. However, a much more important impact of land reform has been to discourage improvement of those same assets. That is, owners are unlikely to invest in, say, conservation measures if they are afraid that they will be displaced entirely from their property through an invasion, the action of an agrarian reform agency, or both.

THE PLIGHT OF SMALL HOLDERS

A disproportionate share of the burden created by policy-induced financial sector repression and property rights attenuation is borne by Latin America's poorest farmers. As a result,

their ability and inclination to invest in land improvement are both diminished.

In spite of development banks' sporadic attempts to channel funds to small holders, the rural poor are, by and large, unable to get formal credit (Adams, Graham, and Von Pischke, 1984). Instead, they can only borrow from informal lenders. At the higher interest rates charged by those lenders, the expense of land improvement is difficult to justify.

Small farmers also tend to have weak rights in their land. They are less likely than the owners of larger holdings to register real estate sales or hereditary transfers. Also, they are in a poor position to exert pressure on agrarian reform agencies to expedite a land adjudication or to get a favourable hearing in a property dispute.

No group in the Latin American countryside has weaker property rights than the members of agrarian communes, called *ejidos* in Mexico and Central America and *comunas* in the Andean Region. Passed in 1937 during a fit of admiration for pre-Columbian group tenure (as perceived by romantics) and Soviet agricultural collectives, Ecuador's *Ley de Comunas* contains standard restrictions on *comuna* members' land rights. For example, they only possess usufructuary privileges in the land where they plant crops or graze livestock. If a *comuna* member decides to migrate, he or she cannot raise a little capital through a real estate sale. When ready to retire, members cannot be sure that their offspring will be allowed to join the *comuna* and thereby inherit usufructuary rights. In addition, they cannot obtain formal credit because they do not really own their land (Camacho and Navas, 1992).

Attenuation of private land rights is not quite as severe for the members of agricultural cooperatives, which are a form of group tenure created by agrarian reform legislation in a number of countries. Procedures exist for dividing cooperatives among individual holdings. But since those procedures are highly complicated and involve close supervision by the state, dissolving a cooperative is a rare event. Cooperative members' land rights, then, are virtually indistinguishable from those held by people belonging to *comunas*.

Among other economists, Runge (1986) argues that resources owned by groups can be used and managed as well as private properties. All too often, though, real conditions are best described by Hardin's (1968) term, "tragedy of the commons." That is, members of *comunas* and cooperatives are reluctant to make productivity-enhancing investments, in conservation measures for example, because they doubt that they will be able to internalize those investments' full benefits.

In a study of resource tenure and agricultural productivity in the Ecuadorian Andes, Camacho and Navas (1992) have found that, on *comunas* and cooperatives, the ratio of crop and livestock output to land area is less than a third of the ratio for privately-owned holdings, be they large or small. Since production is positively related to conservation measures and other land improvements, the two researchers' findings constitute strong support for the hypothesis that investments of this type are well below efficient levels on most group holdings. This is highly disturbing since more than two thirds of the agricultural land in the four jurisdictions that were surveyed are in *comunas* or cooperatives (Camacho and Navas, 1992).

The lasting legacy of agrarian reform in Latin America is a mixture of cumbersome group tenure as well as land markets heavily burdened by bureaucratically-induced transactions costs. Even in Mexico, where it has been sacrosanct for generations, President Salinas de Gortari has promised "to end the possibility of land reform" (Fraser, 1991).

SOIL DEGRADATION AND RURAL-TO-URBAN MIGRATION

At the beginning of this paper, the claim that improved soil management can reduce rural-to-urban migration is mentioned. To be sure, environmental degradation can contribute to rural poverty and emigration from the countryside. However, the possibility that an opposite relationship between population movements and declining soil quality merits consideration. Without a doubt, the latter relationship is reenforced for many small holders by the financial and real estate market distortions described in this paper.

To understand the argument that, in the face of financial sector repression and attenuated property rights, land degradation in the Ecuadorian highlands is more a consequence than a cause of rural-to-urban migration, one must recognize that the latter demographic trend was bound to take on major proportions in recent decades. As Commander and Peek (1986) point out, improved employment opportunities have been drawing people off *Sierran* farms since the 1960s, at least. Census returns demonstrate that hundreds of thousands of peasants saw fit to relocate during the past quarter century (Southgate and Whitaker, 1992).

If real estate and financial markets were allowed to function efficiently, there would be no reason for people to use and to manage land depletively prior to resettling in cities and towns. At any given time, a holding could be sold at a price equal to the net present value of its future agricultural production. Also, if rural credit were not artificially scarce, financing would be obtained for conservation measures and other improvements, regardless of how long current owners expected to hold onto their land.

However, financial and real estate market distortions discourage families from using and managing their land efficiently before emigrating. Because of transactions costs associated with inefficient property registries as well as agrarian reform, the full present value of benefits associated with land improvement cannot be captured in the sale price. In addition, improvements cannot be financed because credit is artificially scarce.

Under these circumstances, the best option for many families is to live off of the proceeds of soil "mining" prior to resettling. For example, relocation often begins with a household's teenage and adult men circulating periodically to urban areas in order to work on construction projects or in other jobs. Wives, children, and other dependents can stay on farms and help to support themselves with the produce they raise, often by farming in ways that exhaust renewable resources.

There has been no empirical investigation of the possibility that owners of small farms are choosing to deplete soils as a prelude to migrating to cities and towns. This is an important omission since those holdings tend to be concentrated in areas where erosion risks are high, due to steep slopes, heavy precipitation, soils that are easily detached, or some combination of the three. Research should prove that rural-to-urban migration can be

accomplished with less environmental damage by reforming the policies that now cause real estate and financial markets to perform inefficiently. Distortions almost certainly cause small holders not to consider long-term resource values prior to resettling.

SUMMARY AND CONCLUSIONS

For anybody who has sat through an economics class, this paper's analysis of why small farmers in places like the Ecuadorian Andes choose to allow soils to erode is not particularly earth-shaking. If you are in the business of producing something for which the price is falling, it is highly rational to depreciate your fixed assets before finding another line of work. This response is virtually inevitable if you have no access to credit (and therefore cannot bank against some future increase in the value of those assets) and if asset markets are heavily burdened by transactions costs. This is precisely the decision-making environment in which highland farmers in Ecuador and many other parts of Latin America are obliged to operate.

Unfortunately, the policies and market conditions that can encourage land degradation are not always reflected in soil conservation and watershed management projects. It should surprise no one that efforts to promote costly erosion control measures, like terraces, often collapse after funding has ended and technical advisors have departed. Where terms of trade for agriculture are deteriorating, financial intermediation is repressed, there are high transactions costs in land markets, and people are seeking better opportunities in other sectors of the economy, conservation techniques have to be cheap and to yield benefits fairly quickly. Otherwise, they will never be adopted.

In some areas, no technique can satisfy the two economic criteria, low costs and quick returns. Under these circumstances, there is no alternative other than to address the distorted policies, described in this paper, that impede economic development while at the same time discouraging renewable resource conservation.

REFERENCES

Adams, D., D. Graham, and J. Von Pischke, 1984. *Undermining Rural Development with Cheap Credit*. Boulder: Westview Press, Boulder.

Camacho, C. and M. Navas, 1992. "Evaluación del Proceso de Cambio en la Tierra y Mercado de la Tierra en la Sierra Norte y Central, 1964-1991" (Technical Document Number 41), Instituto de Estrategias Agropecuarias, Quito.

Camard, W., 1992. "Trade and Industry in Ecuador: Business Groups and Structural Adjustment," Agency for International Development, Quito.

Commander, S. and P. Peek., 1986. "Oil Exports, Agrarian Change, and the Rural Labor Process: The Ecuadorian Sierra in the 1970s," *World Development*, 14:1, 79-96.

de Noni, G. and G. Trujillo, 1986. "La Erosión Actual y Potencial en Ecuador: Localización, Manifestaciones, y Causas," in *La Erosión en el Ecuador*. Centro de Investigación Geográfica, Quito.

Fraser, D., October 25, 1991 "Land Reform: A Second Agricultural Revolution Under Way," *Financial Times*, p. VI.

Hamilton, L., 1985 "Overcoming Myths about Soil and Water Impacts of Tropical Forest Land Uses," in S. El-Swaify, W. Moldenhauer, and A. Lo (eds.), *Soil Erosion and Conservation*. Ankeny: Soil Conservation Society of America.

Hardin, G., 1968, "The Tragedy of the Commons," *Science*, 168, 1243-1248.

Krueger, A., M. Schiff, and A. Valdés, 1988, "Agricultural Incentives in Developing Countries: Measuring the Effect of Sectoral and Economy-Wide Policies," *World Bank Economic Review*, 2:1, 255-271.

Lambert, V., A. Frank, A. Cisneros, D. Sherrill, B. DeWalt, A. Abellan, and J. Uquillas, 1990, "Ecuador Land Titling Project Evaluation," Agency for International Development, Quito.

Lasso, R. and J. Robayo, 1990, "Condiciones de la Producción Lechera en la Zona Centro Norte de la Sierra Ecuatoriana y sus Principales Procesos de Comercialización" (Technical Document Number 25), Instituto de Estrategias Agropecuarias, Quito.

Ramos, H., 1991, (Instituto de Estrategias Agropecuarias, Quito). Personal communication, 1991.

Ramos, H. and M. Acosta, 1991, "Impactos de la Apertura Comercial Regional en el Sector Agropecuario" (Technical Document Number 26), Instituto de Estrategias Agropecuarias, Quito.

Ramos, H. and L. Robison, 1990, "Credit and Credit Policies," in M. Whitaker and D. Colyer (eds.), *Agriculture and Economic Survival: The Role of Agriculture in Ecuador's Economic Development*. Westview Press, Boulder.

Rosholt, J., 1990 (Agency for International Development, Quito). Personal communication.

Runge, C., 1986, "Common Property and Collective Action in Economic Development," *World*

Development, 14:6, 623-635.

Scobie, G., V. Jardine, and D. Greene, 1990, "The Importance of Trade and Exchange Rate Policies for Agriculture in Ecuador," *Food Policy*, 16:1, 34-47.

Southgate, D., 1990, "Development of Ecuador's Renewable Natural Resources," in M. Whitaker and D. Colyer (eds.), *Agriculture and Economic Survival: The Role of Agriculture in Ecuador's Economic Development*. Westview Press, Boulder.

Southgate, D. and M. Basterrechea, 1992, "Population Growth, Public Policy, and Resource Degradation: The Case of Guatemala," *Ambio*, 21:7, 460-464.

Southgate, D. and M. Whitaker, "Promoting Resource Degradation in Latin America: Tropical Deforestation, Soil Erosion, and Coastal Ecosystem Disturbance in Ecuador," *Economic Development and Cultural Change*, 40:4, 787-807.

DISCUSSION PAPERS

LEEC Discussion Papers examine a wide range of issues in environmental economics, including theoretical questions as well as applications, case studies and policy analysis. They are directed mainly at academics and researchers.

DP 88-01

David W. Pearce, Edward B. Barbier and Anil Markandya
Environmental Economics and Decision Making in Sub-Saharan Africa
September 1988 (£3.50)

DP 88-02

Edward B. Barbier
Sustainable Agriculture and the Resource Poor: Policy Issues and Options
October 1988 (£3.50)

DP 88-03

David W. Pearce, Edward B. Barbier and Anil Markandya
Sustainable Development and Cost Benefit Analysis
November 1988 (£3.50)

DP 89-01

Edward B. Barbier and Anil Markandya
The Conditions for Achieving Environmentally Sustainable Development
January 1989 (£3.50)

DP 89-02

Nicholas Michael and David W. Pearce
Cost Benefit Analysis and Land Reclamation: A Case Study
February 1989 (£3.50)

DP 89-03

Douglas Southgate
Efficient Management of Biologically Diverse Tropical Forests
March 1989 (£3.50)

DP 89-04

Timothy Swanson
A Proposal for the Reform of the African Elephant Ivory Trade
June 1989 (£4.00)

DP 89-05

Edward B. Barbier and Joanne Burgess
The Demand For African Elephant Ivory
June 1989 (£3.50)

DP 89-06

Scott Barrett
Deforestation, Biological Conservation, and the Optimal Provision of Wildlife Reserves
July 1989 (£3.50)

DP 89-07

Scott Barrett
On The Overgrazing Problem
July 1989 (£3.50)

DP 89-08

Scott Barrett
Optimal Soil Conservation and the Reform of Agricultural Pricing Policies
July 1989 (£3.50)

DP 89-09

Douglas Southgate, Rodrigo Sierra and Lawrence Brown
The Causes of Tropical Deforestation Ecuador: A Statistical Analysis
October 1989 (£3.50)

DP 89-11

Charles Perrings, Alison Gilbert, David W. Pearce and Anne Harrison
Natural Resource Accounts for Botswana: Environmental Accounting for a Natural Resource-Based Economy
November 1989 (£3.50)

DP 89-12

Gardner Brown Jr. and Wes Henry
The Economic Value of Elephants
November 1989 (£3.50)

DP 89-13

Charles Perrings
Industrial Growth, Rural Income, and the Sustainability of Agriculture in the Dual Economy
December 1989 (£3.50)

DP 90-01

R. Kerry Turner and David W. Pearce
The Ethical Foundations of Sustainable Economic Development
March 1990 (£3.50)

DP 90-02

Anil Markandya
Environmental Costs and Power Systems Planning
May 1990 (£3.50)

DP 90-03

Edward B. Barbier
The Economics of Controlling Degradation: Rehabilitating Gum Arabic Systems in Sudan
June 1990 (£3.50)

DP 90-04

Charles Perrings
Stress, Shock and the Sustainability of Optimal Resource Utilization in a Stochastic Environment
October 1990 (£3.50)

DP 90-05

Edward B. Barbier, Joanne C. Burgess and David W. Pearce
Slowing Global Warming: Options for Greenhouse Gas Substitution
October 1990 (£3.50)

DP 90-06

David W. Pearce
An Economic Approach to Saving the Tropical Forests
November 1990 (£3.50)

DP 91-01

Douglas Southgate
Tropical Deforestation and Agricultural Development in Latin America
January 1991 (£3.50)

DP 91-02

Edward B. Barbier, William M. Adams and Kevin Kimmage
Economic Valuation of Wetland Benefits: The Hadejia-Jama'are Floodplain, Nigeria
April 1991 (£3.50)

DP 91-03

Timothy M. Swanson
Wildlife Utilisation as an instrument for natural habitat conservation: A survey of the literature and of the issues
May 1991 (£3.50)

DP 91-04

Gregor Büchner, Joanne C Burgess, Victoria C Drake, Tom Gameson, David Hanrahan
Gender, Environmental Degradation and Development: The Extent of the Problem
June 1991 (£3.50)

DP 91-05

Edward B. Barbier
The Role of Smallholder Producer Prices in Land Degradation
The Case of Malawi
July 1991 (£3.50)

DP 91-06

Anil Markandya, Charles Perrings
Resource Accounting for Sustainable Development: A review of Basic Concepts, Recent Debate and Future Needs
November 1991 (£3.50)

DP 91-07

Edward B. Barbier
Environmental Management and Development in the South Prerequisites for Sustainable Development
November 1991 (£3.50)

DP 92 -01

Edward B. Barbier, Joanne C. Burgess, Bruce A. Aylward, Joshua Bishop
Timber Trade, Trade Policies and Environmental Degradation
June 1992 (£3.50)

DP 92-02

Joanne C. Burgess
Impact of Wildlife Trade on Endangered Species
June 1992 (£3.50)

DP 92-03

Joanne C. Burgess
Economic Analysis of the Causes of Tropical Deforestation
June 1992 (£3.50)

DP 92-04

Edward B. Barbier
Valuing Environmental Function: Tropical Wetlands
October 1992 (£3.50)

DP 92-05

Bruce A. Aylward and Edward B. Barbier
What is Biodiversity Worth to a Developing Country? Capturing the Pharmaceutical Value of Species Information
November 1992 (£3.50)

GATEKEEPER SERIES

The LEEC Gatekeeper Series highlights key topics in the field of environmental and resource economics. Each paper reviews a selected issue of contemporary importance and draws preliminary conclusions of relevance to development activities. References are provided to important sources and background materials. The Swedish International Development Authority (SIDA) funds the series, which is aimed especially at the field staff, researchers and decision-makers of SIDA and other development agencies.

GK 89-01

David W. Pearce
Sustainable Development: an Economic Perspective
June 1989 (£2.50)

GK 89-02

Edward B. Barbier
The Economic Value of Ecosystems: 1 - Tropical Wetlands
August 1989 (£2.50)

GK 89-03

David W. Pearce
The Polluter Pays Principle
October 1989 (£2.50)

GK 89-04

Joanne C. Burgess
Economics of Controlling the Trade in Endangered Species: The African Elephant
November 1989 (£2.50)

GK 90-01

Edward B. Barbier
Natural Resource Degradation Policy, Economics and Management
March 1990 (£2.50)

GK 91-01

Edward B. Barbier
The Economic Value of Ecosystems: 2 - Tropical Forests
January 1991 (£2.50)

GK 91-02

Joshua Bishop, Bruce A. Aylward and Edward B. Barbier,
Guidelines for Applying Environmental Economics in Developing Countries
May 1991 (£2.50)

GK 91-03

Bruce A. Aylward
The Economic Value of Ecosystems: 3 - Biological Diversity
June 1991 (£2.50)

GK 91-04

David W. Pearce
Afforestation and the Greenhouse Effect: The Economics of Fixing Carbon by Growing Trees
May 1991 (£2.50)

GK 92-01

Joshua Bishop
Economic Analysis of Soil Degradation
March 1992 (£2.50)

GK 92-02

Edward B. Barbier
The Nature of Economic Instruments: A Brief Overview
September 1992 (£2.50)

GK 92-03

James P. G. Spurgeon, Bruce A. Aylward
The Economic Value of Ecosystems: 4 - Coral Reefs
October 1992 (£2.50)

LONDON ENVIRONMENTAL ECONOMICS CENTRE

BOOKS

Edward B. Barbier

Economics, Natural-Resource Scarcity and Development: Conventional and Alternative Views, Earthscan, London, 1989 (paperback £15.00)

The history of environmental and resource economics is reviewed; then using insights from environmentalism, ecology and thermodynamics, Barbier begins the construction of a new economic approach to the use of natural resources and particularly to the problem of environmental degradation. With examples from the global greenhouse effect, Amazonian deforestation and upland degradation on Java, Barbier develops a major theoretical advance and shows how it can be applied. This book breaks new ground in the search for an economics of sustainable development.

David W. Pearce, Anil Markandya and Edward B. Barbier

Blueprint for a Green Economy, Earthscan, London, 1989 (paperback £8.95)

This book was initially prepared as a report to the Department of Environment, as part of the response by the government of the United Kingdom to the Brundtland Report, *Our Common Future*. The government stated that: '...the UK fully intends to continue building on this approach (environmental improvement) and further to develop policies consistent with the concept of sustainable development.' The book attempts to assist that process.

Edward B. Barbier, Joanne C. Burgess, Timothy M. Swanson and David W. Pearce

Elephants, Economics and Ivory, Earthscan, London, 1990 (paperback £10.95)

The dramatic decline in elephant numbers in most of Africa has been largely attributed to the illegal harvesting of ivory. The recent decision to ban all trade in ivory is intended to save the elephant. This book examines the ivory trade, its regulation and its implications for elephant management from an economic perspective. The authors' preferred option is for a very limited trade in ivory, designed to maintain the incentive for sustainable management in the southern African countries and to encourage other countries to follow suit.

Gordon R. Conway and Edward B. Barbier
After the Green Revolution: Sustainable Agriculture for Development, Earthscan Pub. Ltd., London, 1990 (paperback £10.95)

The Green Revolution has successfully improved agricultural productivity in many parts of the developing world. But these successes may be limited to specific favourable agro-ecological and economic conditions. This book discusses how more sustainable and equitable forms of agricultural development need to be promoted. The key is developing appropriate techniques and participatory approaches at the local level, advocating complementary policy reforms at the national level and working within the constraints imposed by the international economic system.

David W. Pearce, Edward B. Barbier and Anil Markandya
Sustainable Development: Economics and Environment in the Third World, London and Earthscan Pub. Ltd., London, 1990 (paperback £11.95)

The authors elaborate on the concept of sustainable development and illustrate how environmental economics can be applied to the developing world. Beginning with an overview of the concept of sustainable development, the authors indicate its implications for discounting and economic appraisal. Case studies on natural resource economics and management issues are drawn from Indonesia, Sudan, Botswana, Nepal and the Amazon.

David W. Pearce, Edward B. Barbier, Anil Markandya, Scott Barrett, R. Kerry Turner and Timothy M. Swanson
Blueprint 2: Greening the World Economy, Earthscan Pub. Ltd., London, 1991 (paperback £8.95)

Following the success of *Blueprint for a Green Economy*, LEEC has turned its attention to global environmental threats. The book reviews the role of economics in analyzing global resources such as climate, ozone and biodiversity, and considers economic policy options to address such problems as global climate change, ozone depletion and tropical deforestation.

E.B. Barbier and T.M Swanson (eds.)
Economics for the Wilds: Wildlife Wildlands, Diversity and Development, Earthscan Pub. Ltd., London, 1992 (paperback £12.95).

This collection of essays address the key issues of the economic role of natural habitat and wildlife utilization in development. The book argues that this role is significant, and composes such benefits as wildlife and wildland products, ecotourism, community-based wildlife development, environmental services and the conservation of biodiversity.

Copies of publications listed above may be obtained from the bookshop at IIED. Please use the order form below, and send to:

Marilyn John
Publications Department
IIED
3 Endsleigh Street
London WC1H 0DD, UK
Tel: 071-388 2117
Fax: 071-388 2826
Telex: 261681 EASCAN G

Please add £1.00 post and packing per publication. Orders over £20.00 in value will be sent post free **(UK only).**

Overseas customers: please do **not** send payment with your order; you will receive a *pro forma* invoice once the cost of dispatching your order has been calculated.

Publications Department
IIED, 3 Endsleigh Street
London WC1H 0DD

PUBLICATIONS ORDER FORM

Name: _____

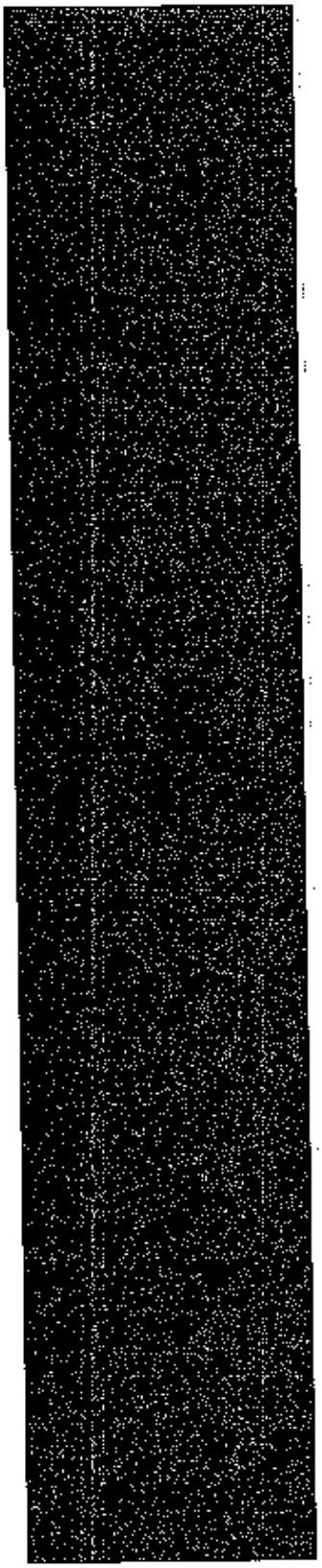
Address: _____

_____

_____

Reference/Title	**Price**	**Quantity**

Payment enclosed: £ _____



IIED

INTERNATIONAL INSTITUTE FOR ENVIRONMENT AND DEVELOPMENT

LONDON ENVIRONMENTAL ECONOMICS CENTRE

The London Environmental Economics Centre (LEEC) was established in 1988 and operates as the economics programme of the International Institute for Environment and Development (IIED). LEEC's aim is the furtherance of policy relevant research in the field of environmental and natural resource economics, particularly in the context of developing countries.

LEEC has as its main objectives:

- Research into problems of environment and development from an economic standpoint;
- Dissemination of research and state of the art environmental economics through publication, public and professional address and specialist conferences;
- Advice and consultancy on specific issues of environmental policy.

3 Endsleigh Street, London WC1H 0DD, UK, tel: 071~388 2117