Biodiversity and Business in Latin America

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Glossary

Biodiversity	A shortened form of the term "biological diversity," which refers to the large number, variety, and variability of living organisms and ecosystems. Decline in biodiversity includes all those changes that relate to reducing biological heterogeneity, from individual members of a species to regional ecosystems.
EEAF	Environmental Enterprises Assistance Fund
FAO	UN Food and Agriculture Organization
FSC	Forest Stewardship Council
GEF	Global Environment Facility
IBRD	International Bank for Reconstruction and Development
IDB	Inter-American Development Bank
IFC	International Finance Corporation
IFOAM	International Federation of Organic Agriculture Movements
IRR	Internal rate of return
ISO	International Organization for Standardization
ITTO	International Tropical Timber Organization
IUCN	The World Conservation Union
MIGA	Multilateral Investment Guarantee Authority (World Bank)
MSC	Marine Stewardship Council
NGO	Nongovernmental organization
NRC	National Research Council
NTFP	Nontimber forest products
OCIA	Organic Crop Improvement Association
ROE	Return on equity
Sustainable	When used with respect to a practice, process, system, product development, or other item, the term "sustainable" means that the practice, process, system, product, development, or other item allows people to meet their current needs without compromising future stocks of environmental capital, such as productive topsoil, clean air, fertile forests, abundant fish stocks, or genetic diversity of both plants and animals.

UN	United Nations
UNEP	United Nations Environment Program
WBCSD	World Business Council for Sustainable Development
WTO	World Tourism Organization
WTTC	World Travel and Tourism Council
WWF	World Wildlife Fund

Executive Summary

"Biodiversity businesses" represent a new and dynamic partnership. This alliance between business and conservation interests offers enormous potential benefits for all humankind. Like traditional businesses, biodiversity enterprises seek to earn a profit. At the same time, they make a deliberate effort to conserve biological diversity through the sustainable use of environmental products in sectors such as forestry, agriculture, and tourism. If their record in Latin America is any indication, these businesses are booming. But the industry is still in its infancy and in need of new sources of capital. This report outlines (a) the business and conservation rationale for investing in such businesses and (b) some of the investment opportunities in biodiversity-linked markets.

The Business and Conservation Rationale

Consumer demand for environmental products is on the rise. Vigorous markets have emerged for products such as shade-grown certified organic coffee, the juice and heart of selectively harvested palms, tourism on an aerial tram through the canopy of a rainforest, ecotourist lodges next to nature reserves, laminated flooring manufactured from certified wood harvested by community forest operations, cultivated scallops, and the essences of flowers used in perfumes and yogurt. According to IFC investigations in collaboration with Terra Capital Fund (a biodiversity investment fund for Latin America) and the Global Environment Facility, many of the businesses currently producing biodiversity-friendly goods and services represent investment-grade opportunities. As yet, the volume of these products is small in relation to the overall market, but production is increasing rapidly and the profit potential looks promising. The sales of organic agricultural products, for example, are in the neighborhood of US$15 billion a year at the wholesale level and since 1990 have been increasing at the rate of 20% to 25% a year in Europe and North America.

The rationale for investment is equally persuasive from the conservation point of view. Biologically rich habitats throughout the world are under mounting threat from increased population, pollution, and expanding croplands and urban settlements. As emphasized by the 1992 Convention on Biological Diversity, it is essential for the private sector to contribute its vast technical, managerial, and financial resources and expertise to using the products of such habitats in ways that protect and sustain their biodiversity and thus ensure human survival. Investing in biodiversity businesses also helps such businesses create new value from ecosystems and genetic resources. And it encourages businesses to employ methods that have a low impact on natural habitats.

The practices that help to conserve and ensure the sustainable use of the resource base are being debated by businesses, industry associations, nongovernmental organizations (NGOs), and governments. However, there will be no input with which to develop guidelines unless biodiversity businesses of all types are attempted.

Investors will be interested to hear that "ecoefficient" enterprises exhibit a talent for hold-

ing down long-term costs, reducing liability, and raising profit margins. Furthermore, such businesses are geared to meet the environmental requirements imposed by global agreements, which may be a condition for access to certain resources. Other benefits arise from reaching out to new partners (such as NGOs), participating in the definition of environmental standards, and creating new brand names to promote biodiversity-friendly products. The biodiversity enterprise's emphasis on conservation and sustainable use should also appeal to institutions concerned with monitoring the environmental effects of their investments. In sum, there are many compelling reasons for entrepreneurs to pay attention to biodiversity businesses.

Investment Opportunities in Biodiversity Markets

Biodiversity markets are especially active in Latin America. Real investment opportunities of all sizes exist in agriculture (including aquaculture), forestry, products sustainably harvested from the wild such as nontimber forest products (NTFPs), and ecotourism.

Sustainable Agriculture

Businesses in sustainable agriculture in Latin America far exceed the number in other biodiversity sectors. The products include certified organic crops, underutilized species, and aquaculture products farmed in environmentally sensitive ways. Certified organic producers range from small and large farms to processing companies and producer cooperatives. Most Latin American countries have one or more certification organizations. The major markets are the United States and Europe, although local demand is growing.

Underutilized species and wild relatives of domesticated species also offer considerable investment potential, particularly in areas of degraded or arid land. One such area is the Andean region, known for its native roots, fruits, grains, vegetables, and legumes. Many of these products have been cultivated since pre-Colombian times and may present investment opportunities today.

Sustainable Forestry

At present less than 5% of total forest products are certified. However, certification is expected to become widespread under mounting pressure for more environmentally and socially responsible operations. Some producers are adopting certification as part of a total quality management approach to production. Leading producers in Bolivia, Brazil, and Costa Rica, for example, have taken steps to gain certification from the Forest Stewardship Council. Many entrepreneurs believe that some sort of certification will be required for market access and may be positioning themselves to maintain or gain market share.

This development offers some hope for the conservation and sustainable use of the Amazon and other large stands of tropical forest in Latin America—among the last remaining "frontier" forests in the world. Local and international companies continue to exert tremendous pressure on these forests for fuelwood cutting, charcoal making, land clearing for agriculture, and logging.

Nontimber Forest Products

Sustainable nontimber forest products include resins, essential oils, edible oils, plant gums, fibers, nuts, fruits, dyes, insect products, latex, ornamental plants, spices, herbs, and handicrafts. Also, game hunting, wildlife ranching, and recreational fishing may contribute to biodiversity conservation. Best practices for products in this category depend upon the species harvested, though in general they are likely to be akin to those developed for sustainable forestry. So far, this is a fragmented sector in Latin America, in the hands of small businesses, NGOs, and cooperatives. Entrepreneurs will find ample opportunity to start processing facilities near forests, provide equipment, and enter into marketing.

Ecotourism

Ecotourism by definition contributes to biodiversity conservation. It offers financial assistance for conservation, follows ecologically sensitive designs, and helps sustain the well-being of local people. Best practices have been outlined by ecotourism societies, and joint NGO-tourism industry efforts

are under way to educate consumers about the differences between ecotourism and nature tourism, which is simply geared toward bringing tourists to attractive sites.

Ecotourism is still in the early stages of development, with small facilities and few links to major tour companies. Operators in Latin America are introducing new approaches—such as one developer/operator with multiple sites, exclusive rights (e.g., concessions for a national park), or a small luxury operation—in the hope of expanding the ecotourism industry. Several of these approaches are being tested in the Amazon, the Pantanal, Patagonia, the Yucatan, and Costa Rica.

Financing Needs

Biodiversity enterprises in Latin America have been financed largely by traditional sources: family savings, cash flow reinvested from existing businesses, trade finance, advance payments or loans on product, bilateral and development bank financing, and some traditional bank financing. As yet, these businesses have been unable to tap into sufficient longer-term equity and debt to meet their capital needs and the market potential of projects in these sectors. As a result, they have been unable to grow fast enough to make a positive contribution to biodiversity conservation.

These ventures face typical financing hurdles: many are too small for standard IFC and other institutional financing, local bank debt is scarce and often runs at prohibitively high rates, business risks and transactions costs are perceived to be high by potential investors, local banks are unfamiliar with these sectors, and business development costs are high. However, the tide may be turning now that biodiversity enterprises are showing a profit. Private investors, larger companies, and institutional investors (banks, pension funds, insurance companies) are paying more attention.

Pioneering investors have led the way by providing capital to enterprises that adhere to sustainable practices in Latin America. A handful of investment funds—among them Terra Capital Fund—now target organic agriculture, sustainable forestry, and ecotourism. Investors in these funds include several private investors and companies, IFC, the Multilateral Investment Fund, bilateral investors such as the Swiss Government, and foundations. Much larger amounts of money are being invested by agribusiness companies and entrepreneurs in the natural foods industry. And the forestry industry's move to certified production is attracting several larger institutional investors to Latin America.

Moving Forward

Biodiversity businesses offer entrepreneurs and investors alike significant opportunities for financial gain while performing a valuable service to humankind and biodiversity conservation. But biodiversity business sectors are still small in relation to the overall market in which they operate, although they have made considerable headway in recent years.

Before much larger amounts of money are invested in such enterprises, a number of questions need to be answered: How can more widespread adoption of sustainable production methods be promoted and thereby act more quickly to stem biodiversity losses? Can the market growth of the various biodiversity business sectors be sustained or increased? And how can additional private sector money be brought into play? IFC, investment funds such as Terra Capital Fund, and IFC partnerships with the Global Environment Facility, NGOs, bilateral investors, and foundations are working to help answer these critical questions for conservationists and investors.

The verdict is still out on the financial success and conservation impact of many of the biodiversity businesses now in operation. By some definitions, best practices required for certification may not be "sustainable." But low-impact practices are generally far better for biodiversity conservation than clearly unsustainable practices. Biodiversity-friendly businesses will gradually yield not just examples of entrepreneurship but also lessons indicating how to refine best practices and certification standards and whether such activities actually conserve and sustainably use biodiversity. If we do not try, these questions will remain unanswered. From the growth record of the pioneering ventures described in this report, it appears that biodiversity enterprises may well succeed in meeting both conservation and market development objectives.

1 Introduction

"Biodiversity businesses" are thriving. These businesses seek to earn a profit and conserve biological diversity—meaning the number, variety, and variability of living organisms, species, and ecosystems. Such enterprises make biodiversity concerns an integral and proactive part of all their operations, in a deliberate effort to conserve biodiversity and achieve sustainable use. Thus, they do not merely endeavor to reduce the negative impacts of their activities and contribute to conservation by being better than the alternative use. Examples of biodiversity businesses and products include

- shade-grown certified organic coffee,
- the juice and heart of selectively harvested palms,
- an aerial tram through the canopy of a rainforest,
- ecotourist lodges next to nature reserves,
- laminated flooring made of certified wood harvested by community forestry operations,
- aquaculture of native scallops, and
- essences of flowers used in perfumes and yogurt.

There are compelling market and conservation reasons to find new sources of capital for such businesses. On the market side, the economic potential of biodiversity enterprises is demonstrated by the rapidly growing consumer demand for environmental products. On the conservation side, the rapid depletion of biological resources worldwide makes it all the more urgent to encourage these enterprises. This report outlines the investment opportunities in biodiversity-linked markets and ways to help such companies meet their capital needs. Experience in Latin America is used to illustrate the potential and development needs of biodiversity businesses. Throughout, the term "biodiversity business" is used interchangeably with "biodiversity-friendly practices" and "biodiversity-linked practices."

The Business Rationale

Why would entrepreneurs, driven by profit and self-interest, pay attention to conservation?[1] The answer is, they are drawn by the same forces that attract them to any business endeavor: market demand, cost savings, regulation, and partnership.

Market Demand

Biodiversity-linked markets are booming. The demand for natural products, certified organic agriculture, ecotourism, and certified forest products is on the rise. Although the volume of these products is still small in relation to the overall market, their production is increasing rapidly. Entrepreneurs are successfully producing for these markets in many locations, especially in Latin America. Real investment opportunities of all sizes exist.

Other Drivers

"Ecoefficient" processes show considerable potential for holding down long-term costs, reducing liability, and raising profit margins.[2] Another strong incentive is that government regulations and glo-

bal agreements may impose stringent environmental requirements and make the use of sustainable practices a condition for access to resources. At the same time, numerous benefits can arise from reaching out to new partners (such as nongovernmental organizations, NGOs), participating in the definition of environmental standards, and creating new brand names to promote biodiversity-friendly products. Some businesses are drawn toward conservation by the biodiversity concerns of their institutional investors (e.g., pension funds and insurance companies), many of whom monitor the environmental effects of their investments.

Biodiversity Conservation and the Private Sector

From the conservation point of view, investing in biodiversity businesses fulfills another important objective: it ensures the sustainable use and protection of natural resources critical for human survival. Such businesses not only create new value from ecosystems and genetic resources. They also divert pressure from critical components of those ecosystems and achieve sustainable yields by employing methods that have a low impact on natural habitats.

The mounting threat to biologically rich habitats—from increased population, pollution, and expanding croplands and urban settlements—drew worldwide response in 1992 with the signing of the Convention on Biological Diversity.[3] Biodiversity, the Convention concluded, will not be conserved unless the economic reasons for protecting and sustainably using biodiversity become widely known and unless the private sector contributes its vast technical, managerial, and financial resources and expertise to such conservation.[4]

The public sector cannot provide the necessary funds to conserve biodiversity. If anything, government aid to developing countries with significant biodiversity resources has been declining since 1990. However, private sector investment in developing countries over the same period has expanded dramatically.[5] If even a small portion of this flow into emerging market countries could be directed to biodiversity businesses, the impact on conservation could be enormous.

The Questions

Channeling private investment toward biodiversity businesses may be one way of stemming biodiversity loss while generating good returns on capital. A great idea—at least in theory. But investors are unlikely to commit large amounts of capital to such businesses without knowing more about their operations:

- How many and what types of businesses are producing biodiversity-friendly goods and services?
- Do any of these businesses represent investment-grade opportunities?
- What are their financing needs?
- How fast will they grow and when will they become mainstream business activities?
- Can these businesses expand even faster and thereby counter biodiversity losses more quickly?
- What evidence indicates that these activities actually conserve biodiversity?
- How do consumers know that they are buying a biodiversity-friendly product and that best practices are followed in its production and processing?

Preliminary Answers

IFC and a few other groups have begun addressing these questions in an effort to find ways to invest in biodiversity businesses. Some findings of particular interest stem from IFC's 1994–99 investigation of the market forces, potential investments (the "deal flow"), and financing constraints for biodiversity enterprises in Latin America. Much of the work was undertaken in conjunction with the development of Terra Capital Fund (a biodiversity investment fund for Latin America)[6] and the IFC/GEF Small and Medium-Scale Enterprise Program.[7] Both initiatives received financial and other support from IFC and the Global Environment Facility. This paper draws on that investigation and on EA Capital work sponsored by the John D. and Catherine T. MacArthur Foundation.

The discussion opens in Chapter 2 with an outline of the private sector links to biodiversity

conservation. The emphasis here is on the types of private sector activities that enhance biodiversity conservation. Best practices, certification, and environmental labels are also defined.

Chapter 3 turns to the markets for biodiversity-linked products in agriculture (including aquaculture), forestry, products sustainably harvested from the wild such as nontimber forest products, and ecotourism.

Chapter 4 presents financing and market development steps that may facilitate the expansion of biodiversity businesses. In Latin America, ventures of this kind are often unable to obtain long-term capital because they are too small for standard IFC and other institutional financing. They face numerous other problems as well: local bank debt is scarce and often runs at prohibitively high rates, business risks and transactions costs are perceived by potential investors to be high, local banks are unfamiliar with these sectors, bilateral agencies and foundations focus on NGOs and microenterprises, and business development costs are high. The chapter examines (a) the financing problems of entrepreneurs and investors in biodiversity businesses, (b) sources of capital for such businesses, and (c) ways to combine financial and biodiversity objectives.

Chapter 5 returns to some of the critical questions posed at the beginning of this discussion, particularly those about possible rates of business expansion and the sustainability of the markets for biodiversity products.

Examples of businesses in Latin America with the potential for both economic and biodiversity benefits appear in the Appendix. These are drawn from a database of over 100 projects. The examples show that biodiversity businesses can indeed thrive in traditional and new markets and that there are opportunities for increased investment.

Notes

1. For further discussion of this question, see World Business Council for Sustainable Development (WBCSD) and the World Conservation Union (IUCN), *Business and Biodiversity: A Guide for the Private Sector* (Geneva, June 1997); P. Hawken, A. Lovins, and L. Hunter Lovins, *Natural Capitalism: Creating the Next Industrial Revolution* (Boston: Little, Brown, 1999); and M. C. Rubino, "Biodiversity Finance," *International Affairs,* vol. 76, no. 2 (April 2000), 223–240.

2. Ecoefficient companies may also lower their risks and liabilities and make better use of their assets (through less waste, recycling, competitive advantage, loyal customers, cost savings of "total quality management"). The WBCSD coined the term "ecoefficiency" to describe these cost-saving actions. See S. Schmidtheiny and F. Zorraquin, with the WBCSD, *Financing Change* (Cambridge, Mass.: MIT Press, 1996).

3. Examples of events that have caused the loss of critical natural habitats are the recent forest fires in tropical forests and cyanide poisoning and bleaching of coral reefs. For a status summary, see World Resources Institute, *World Resources: A Guide to the Global Environment 1996–97* (New York: Oxford University Press, 1996); C. Jaka, "World Biodiversity Experts Gather in Washington to Assess Biodiversity Crisis," *Diversity*, vol. 13, no. 4 (1997–98), 16–18; J. Warrick, "Mass Extinction Underway, Majority of Biologists Say," *Washington Post,* April 21, 1998, A4.

4. In addition, meetings of the Convention's Conference of the Parties stated a desire to "explore further possibilities for encouraging the involvement of the private sector in supporting the Convention's objectives."

5. Between 1990 and 1997 annual government aid declined 20%, to less than US$50 billion. During the same period, private capital flows between developed and developing countries rose from about US$50 billion per year to US$256 billion and accounted for more than 85% of total net flows. These figures are drawn from IFC and World Bank statistics.

6. Terra Capital Fund began operations in October 1998. IFC and the fund manager for Terra Capital Fund conducted the feasibility work, initially through a study in 1994 (sponsored by IFC, GEF, and the Heinz Endowments) and then during 1995–97. See IFC, Technical and Environment Department, *GEF Project Document: Latin America Terra Capital Fund* (Washington, D.C., January 1997).

7. IFC, Technical and Environment Department, *GEF Project Document: Small and Medium-Scale Enterprise Program Replenishment* (Washington, D.C., January 1997).

2

Private Sector Links to Biodiversity Conservation

The attraction of biodiversity markets for investors is best understood by examining the benefits of linking the private sector and biodiversity. Linking in this sense does not simply mean pursuing production and processing practices that are more environmentally friendly than other methods of production. Rather, it refers to the pursuit of *biodiversity-friendly* practices.

The first question to ask, then, is how will an investor or consumer recognize such practices? Will it also be easy to tell whether the product is biodiversity friendly? What environmental criteria should guide investment decisions? These and other questions regarding investment in biodiversity enterprises can be answered in part by drawing on the results of scientific research, observations of the Convention on Biological Diversity, best practices required for environmental certification, and the lessons learned from existing businesses. This chapter outlines some basic information along these lines by explaining

- the kinds of links that may be forged between business and biodiversity,
- the nature of biodiversity-friendly practices,
- the differences between direct and indirect impacts on biodiversity and the need for project-specific information, and
- the importance of best management practices and certification.

The fundamental question of why biodiversity conservation itself is important is addressed in Box 2.1.

Business Connections to Biodiversity

The links between business and biodiversity may take several forms. *First, a business may seek to conserve and ensure the sustainable use of those resources.* In fact, this is a defining characteristic of biodiversity businesses: as mentioned in chapter 1, these enterprises make biodiversity conservation and sustainable use an integral and proactive part of the business operation. Biodiversity businesses are concentrated in industries such as forestry, agriculture, fisheries, tourism, and pharmaceuticals, all of which depend on the bounty of biological resources. Some of the production methods available to these industries can do terrible damage to the biodiversity of the ecosystems from which they draw their resources. Other methods, both old and new, help to conserve and ensure the sustainable use of the resource base, thus conserving biodiversity. By abandoning harmful practices for ones that help prevent the loss of biodiversity, the private sector can become a steward of biodiversity, while its firms continue to operate profitably.

Second, business activities have an environmental impact. Businesses that practice the best available environmental controls can thus contribute to biodiversity conservation in comparison with similar businesses with no environmental controls. Note that if a business tries to reduce those impacts simply by controlling pollution, it is not defined here as biodiversity-friendly. Many mining and petroleum industries fall into this category.

Box 2.1. Why Is the Conservation of Biodiversity Important?

Natural habitats and the diverse species they support maintain the ecosystem functions on which human life depends. Among their functions, ecosystems cycle water and nutrients, manage watersheds, regulate climate, and provide a diverse and healthy source of plant and animal genes for human food, fuel, shelter, medicines, recreation, and other products. Wild relatives of domesticated plants and animals are the source of genetic material used to improve crop yields and combat agricultural diseases and pests. Ecosystems also offer intangible benefits, notably "existence value" (the knowledge that large areas of natural habitats still exist on the planet) and "option value" (the possibility of discovering life-saving pharmaceuticals from plant or animal essences).

Preventing biodiversity loss has therefore become a key objective of many NGOs, governments, and aid agencies worldwide. Some industry groups have also joined the bandwagon and are emphasizing the use of sustainable, biologically diverse production methods. The shrimp-farming industry, for example, is looking to sustainable production "best practices" to achieve long-term profitability and combat the recent outbreak of disease caused in part by environmentally damaging production methods. To cite another example, certified organic farmers have long mimicked some aspects of natural ecosystems by growing interdependent species, maintaining soil fertility, recycling waste, extending natural habitats, and avoiding the use of most man-made chemicals.

Biodiversity conservation efforts are complicated by a number of factors. First, it is not known how much biodiversity exists; hence its potential uses are difficult to judge. Estimates of the number of species worldwide vary significantly, from 1.4 million to 5 million or even 30 million. Estimates vary so widely because research on ecosystems—whether river and marine ecosystems, coastal wetlands, or montane habitats—is still limited. For the time being, a sound policy approach would be to abide by the "precautionary principle," that is, to address biodiversity issues by erring on the side of caution. Second, in the absence of detailed knowledge about how ecosystems work, it is difficult to determine how past, present, or future human activities may affect those systems. One activity with enormous impact has been the migration of human populations. Over the past 500 years, human travel and trade have rapidly moved species and rearranged ecosystems around the world, most notably in the exchanges between Eurasia and the Americas. Furthermore, no one yet knows how much loss of biodiversity can be tolerated before an entire natural system will break down. Biodiversity users are faced with many difficult questions: How much biodiversity can we afford to lose? How much do we need to save? What should the priorities for protection be? The wisest course seems to be to try to conserve as much as possible and use the resources wisely.

Sources: G. C. Daily, ed., *Nature's Services: Societal Dependence on Natural Ecosystems* (Washington, D.C.: Island Press, D.C., 1997); L. Boulton, "FT Guide to Biodiversity: Why Extinction Is Bad for Economic Progress," *Financial Times*, May 5, 1998; E. O. Wilson, *The Diversity of Life* (Cambridge, Mass.: Harvard University Press, 1992); H. J. Viola and C. Margolis, eds., *Seeds of Change* (Washington, D.C.: Smithsonian Institution Press, 1991).

A hotel next to a scenic natural site that treats its wastewater, say, can only be considered a biodiversity business if in addition it follows the best practices recommended for ecotourism and thereby actively contributes to the conservation and sustainable use of adjacent biodiversity resources.

Third, businesses linked to biodiversity can have a distributional or social impact, through the flow of revenues arising from the sustainable use of biological resources. Such benefits are not widely available when the revenues go primarily to the business elite and hence deter economic development, not to mention environmental conservation. This has long been the case in Latin America, although the tide is beginning to turn there through the help of community activists, politicians, and business leaders.[1] Some large petroleum and mining companies now engage stakeholders to design programs that will mitigate the negative social and environmental effects of extractive or industrial activities. Social impact is also a priority of the Convention on Biological Diversity, which calls

for the benefits arising from biodiversity use to be shared equitably. The ecotourism industry has been a proponent of this view, one of its goals being to improve the well-being of local people. Field experience provides numerous examples of best practices that have generated local income and conserved resources.[2] However, more needs to be done in the social sphere. Organizations such as the World Bank and IFC have adopted and continue to refine guidelines for worker health and safety, the displacement of local people, and other social impacts as part of their environmental review policies. Some countries have also begun to take note of intellectual property rights and access to genetic resources connected with biodiversity.

For all these reasons, the concept of biodiversity has wide-reaching political as well as scientific implications. That is why the objectives of Article 1 of the Convention include not only the conservation of biodiversity and sustainable use of biological resources, but also the equitable sharing of the benefits arising from this use. Convention participants recognized the critical role of the private sector in meeting these objectives and challenged signatory countries to (a) seek new financial resources, including private sector resources, to implement the objectives of the Convention, and (b) work with the private sector to encourage sustainable use.

Private sector engagement is only one of the paths to biodiversity conservation. Government policies and the establishment of protected areas, for example, can play a role as well. Nor should the social potential of biodiversity enterprises be overemphasized: a few specific ecotourism or nontimber forest projects may not necessarily do as much to improve the well-being of local populations as general education and training programs. However, biodiversity business may, by example, help to set, change, or enforce government policies that affect biodiversity.

Issues of Definition

Full agreement has not yet been reached on how to define the central terms currently used to assess biodiversity businesses: namely, "biodiversity-friendly," "biodiversity-linked," and "sustainable." Whether they are defined broadly or narrowly will depend on one's objectives and perspective. Thus a "green" mutual fund or venture capital fund manager,[3] a purchaser of tropical wood, the Convention,[4] and the GEF[5] (the financial mechanism for the Convention) are all likely to use these terms in a slightly different sense. How to define them, especially when it comes to preparing certification labels or investment guidelines, is a question that environmental, industry, consumer, government, and other stakeholder groups are still trying to resolve.

They are hampered in part by the trade-offs between conservation and use. Government policies, high interest rates favoring quick mining of natural resources as opposed to more sustainable activities, and other socioeconomic factors often make sustainable approaches unprofitable and unlikely to be adopted. Furthermore, "sustainable use" is not a panacea that can be implemented without complementary government policy and stakeholder participation.

One definition of sustainability proposed recently is "taking care of capital and living off the interest."[6] Other definitions would take into account the possibility for substitution between types of capital assets and on that basis distinguish between "weak," "strong," and "sensible" sustainability.[7] By sensible sustainability they mean transformations of natural into human or man-made capital that will not pose a threat to sustainability if they stay within the critical levels of each type of capital. But the critical limits for each type of capital are not always known, so "it behooves the sensible person to err on the side of caution in depleting resources (especially natural capital)."[8] The advantage of using "weak" and "sensible" definitions of sustainability is that they do not suggest the need to freeze or preserve all natural resources at existing levels.

What constitutes "sustainable" or more simply "low-impact" operations has been the subject of a good deal of research in forestry and agriculture. To illustrate the complexities of the issue, forestry experts cite the example of an operation that mines one high-value tree species (which may not be sustainable in the sense that the particular species is difficult to replace owing to regeneration char-

acteristics or economic factors) but leaves the rest of the forest and its biodiversity values intact.[9] Should this be termed "sustainable" or "low-impact" or "wise-use" forestry? Should it be certified as a biodiversity-friendly operation? Furthermore, researchers caution, not all management plans based on inventories, directional felling, harvest inspection, and impact minimization and enforced by regulation necessarily conserve biodiversity. Nor can the term "sustainable forestry" automatically be taken to indicate biodiversity-friendly or conserving practices. Similar caveats apply in other market sectors. An ecotourism venture, say, may be certified as following best practice, but if it brings tourists to areas that previously had few visitors, it may also have an adverse impact on the natural habitat and local people. Or suppose that organic agriculture is subject to certification but it is not sufficient to establish a biodiversity linkage: in other words, the operation may be certified to plant organic coffee but in doing so it may cut down primary forest and thus have a negative impact on biodiversity.

To be classified as biodiversity friendly, business practices should meet some or all of the criteria outlined in this chapter. The definitions and criteria will be refined over time as information from research and from business experience increases. Some businesses will do better than others at trying to maximize both profitability and conservation objectives. Investors waiting for a clear-cut definition of sustainability to follow before investing in biodiversity businesses may wait in vain. Consumers and buyers are seeking and purchasing "green" products now. In response to this demand, industry groups, NGOs, scientists, and governments are scrambling to define biodiversity best practices and to draw up guidelines for certification labels. There will be no input on which to base the guidelines unless biodiversity businesses of all types are attempted.

Practices That Conserve or Sustainably Use Biodiversity

Thus far, all definitions of biodiversity-friendly practices mention both *conservation* and the *sustainable use* of biodiversity. The Convention emphasizes both. In certain cases (national parks, nature preserves, wilderness areas), resources can be conserved only if they are preserved intact and more or less left unchanged or undisturbed. In other cases, biodiversity conservation consists of a wide variety of interactions—between human consumers and users, on the one hand, and biological and ecological resources, on the other—that put those resources to use but also ensure their sustainability. Some uses, such as farming, depend on those resources (e.g., genetic variety, genetic sources, and ecosystems) for their long-term success. Unfortunately, unless they have an incentive to do otherwise, many users—especially people who are hungry and poor or who seek financial profit—will give little thought to sustainability as they expand farmland, cut forests, or pollute natural habitats. Conservation efforts must therefore extend across a wide range of habitats, from publicly financed reserves and national parks to agricultural and urban landscapes.

Although a succinct definition of biodiversity-friendly practices has yet to be formulated, such practices do the following:

- *Employ low-impact or minimal disturbance methods*—such as certified organic agriculture and sustainable forestry—that produce a variety of interdependent crops, husband organic and soil resources, reduce the use of agrochemicals, and maintain buffer areas of natural habitat.[10]
- *Maintain and enhance biodiversity* such as organic agriculture, which relies on a multiple crop strategy, intercropping and crop rotation, natural pest management, and soil restoration.
- *Extend natural habitats* and conduct complementary activities, especially in the buffer zones surrounding protected areas. Such activities would include the cultivation of organic/shade coffee; reforestation, especially with local species that maintain remnants of native forest; plantation or natural forest management, which maintains corridors of natural forest and animal habitat; and agroforestry of fruit and other economically useful trees and plants that can extend natural habitats. [11]
- *Ease pressure* on critical, threatened biodiversity resources. By way of example, catch-and-release recreational fishing could take the place of commercial fishing to allow the populations of

a particular fish species to regain their strength; buffer zone activities and alternative livelihood/employment could take place in areas surrounding a nature reserve, or agricultural production could be concentrated or intensified in a smaller area than usual to limit encroachment on natural ecosystems.

- *Cultivate underutilized agricultural species* and wild relatives of domesticated species. This would help conserve the agricultural gene pool, alternative crops, and strains of crops.
- *Create new market value* from extractive, derived, or *in situ* uses of intact ecosystems. Such uses might include sustainable or low-impact harvesting of lesser known wood species, new plant- or animal-based chemicals, nontimber forestry products, hunting, fishing, wildlife management, ecotourism, and carbon-offsets.
- *Finance the conservation of land, coral reefs, or other habitats* as an integral part or a by-product of a business venture. One example would be an ecotourism project that donates a portion of its profits to habitat preservation.
- *Actively clean up* (as opposed to imposing "end-of-pipe" pollution control) industrial, urban, or agricultural wastes that directly affect critical habitats.

Direct and Indirect Impacts of Sustainable Practices

Businesses in each biodiversity market sector can have a direct impact on the sustainable use and protection of biodiversity. The degree of impact will depend more on how a particular project is structured than on the characteristics of a particular sector. In other words, biodiversity benefits tend to be project specific. Such benefits (or level of biodiversity friendliness) can be assessed through classic impact analysis, looking at the before and after cases, and the alternative uses. Impact analysis would show that cutting down virgin forest to grow organic coffee is not biodiversity friendly. By contrast, planting organic or shade-grown coffee on degraded land in buffer zones around natural forest is biodiversity friendly.[12]

In some cases the biodiversity link will be clearly evident, as in the organic/shade coffee example or in the harvest of NTFPs that provides an economic rationale for maintaining forest habitat. In other cases, the link and effects may be uncertain. The culture of Amazonian fish, for example, may make use of indigenous species, take pressure off wild stock if major buyers switch to aquaculture, and offer an alternative livelihood to fishermen. But aquaculture might also encourage further exploitation of wild fish if the market does not distinguish between cultured and wild stock. At times, such effects can be mitigated, in this instance by requiring that fish be tagged or that the origin of a fish be documented through a "paper trail" (as has been done with striped bass in the United States). Such arrangements may successfully steer a market to aquaculture.

Impacts can also be indirect. For example, Amazon boat tours and biodiversity prospecting may not directly protect the rainforest, but such activities provide financial reasons and political support for conservation. Similarly, a recycling program may indirectly remove harmful compounds from the environment by channeling them to a hazardous waste incinerator. Or an investment in an NTFP marketing company will provide an additional market outlet for sustainably harvested products.

Best Practices and Certification

Anyone concerned about biodiversity issues—whether a consumer, exporter, purchaser of raw material, wholesaler, or retailer—will want to be assured that the product involved in a transaction was in fact produced and processed in accordance with biodiversity-friendly methods. Also, financial institutions that purport to follow biodiversity or environmental guidelines need to be able to demonstrate to their investors that their investments are indeed biodiversity friendly. Because they may not be able to afford detailed studies of each investment, these institutions are likely to rely in part on certification to determine whether an investment is biodiversity friendly.

Several market sectors have adopted or are designing best management practices to distinguish their product in the marketplace and to help ensure that its production is sustainable and has

minimal impact on the environment. Such practices are now becoming more common, in response to regulation, the costs of regulation, and consumer demand for environmental products. Equally important, businesses are finding that best practices enable them to capture the efficiency and cost savings of improved production. Producers have developed environmental labels, certification standards, and producer or marketing organizations to indicate their commitment to such practices, which in turn helps promote biodiversity business sectors. The way best practices are designed and implemented is of direct interest to investors and financial supporters of biodiversity enterprises.

Some producers are certified by an independent third party; others self-certify. Some standards are set by industry groups or by industry-NGO partnerships; others are legislated or adopted by governments. A key question for each industry or market sector is which of these groups should have the authority to grant certification labels.[13] The approach usually depends on the industry or market segment, for each has a different culture, history, and relationship with consumers. A critical point to remember is that consumer confidence in the certification standard or label has a great effect on market growth (and on the level of biodiversity benefits).

One of the best-known and widely used certification systems can be found in organic agriculture (also known as biodynamic agriculture in some parts of Europe and Latin America).[14] In this case, the standards are designed by industry associations. Many countries have one or more industry associations or private sector certifiers who use the association standards in checking and certifying a producer's or processor's operation.[15]

Other sectors are developing their own systems. The forestry sector, for one, has designed internationally recognized third-party "sustainable" or "wise-use" standards with the help of the International Tropical Timber Organization (ITTO), the International Organization for Standardization (ISO), and the Forest Stewardship Council (FSC). Other forestry standards are being promoted by industry groups and governments. In the ecotourism sector, the World Tourism Organization, the United Nations Environment Program (UNEP), the Ecotourism Society, and other tourism groups have published best practices for ecotourism and are working on certification methods. And in the area of aquacultures, the Marine Stewardship Council and various groups are working on standards for fisheries and aquaculture. Certification methods are discussed further in Chapter 3.

Notes

1. See *Time* magazine special issue, "Latin American Leaders for the New Millennium," May 24, 1999, 24–119.

2. See J. W. Clay, *Generating Income and Conserving Resources: 20 Lessons from the Field* (Washington, D.C.: World Wildlife Fund, 1996).

3. Mutual funds managed by Dutch, Swiss, and German banks, and several U.S. and U.K. social investment or environmental mutual funds use environmental criteria in making investment decisions. The Environmental Enterprises Assistance Fund (EEAF) and Terra Capital Fund have developed investment guidelines for Central America and Latin America, respectively.

4. The Conference of the Parties to the Biodiversity Convention has met four times to discuss the implementation of the Convention. The documents and papers produced by the Conference include language on agrobiodiversity.

5. See GEF Secretariat, "A Framework for GEF Activities Concerning Conservation and Sustainable Use of Biological Diversity Important to Agriculture," GEF Draft under discussion, March 1998.

6. D. H. Janzen, "Commercialization of Biodiversity: Costa Rica's Guanacaste Conservation Area as a Base for Development," paper presented at Commercial Issues of Biodiversity: The Biodiversity Conference for Business, sponsored by Scientific American, San Jose, Costa Rica, April 7–10, 1997.

7. See P. Hazel and E. Lutz, "Integrating Environmental and Sustainability Concerns into Rural Development Policies," in E. Lutz, ed., *Agriculture and the Environment: Perspectives on Sustainable Rural Development* (Washington, D.C.: World Bank, 1998); I. Seregeldin, *Sustainability and the Wealth of Nations: First Steps in an Ongoing Journey*, World Bank Environmentally Sustainable Development Studies and Monographs Series 5 (Washington, D.C., 1996).

8. Seregeldin, *Sustainability and the Wealth of Nations*.

9. See R. E. Rice, R. E. Gullison, and J. W. Reid, "Can Sustainable Management Save Tropical Forests?" *Scientific American*, vol. 276, no. 4 (April 1997), 44–51; P. C. Frumhoff and E. C. Losos, "Setting Priorities for Conserving Biological Diversity in Tropical Timber Production Forests," A Policy Report from the Union of Concerned Scientists and the Center for Tropical Forest Science (Washington, D.C.: Smithsonian Institution, July 1998); A. A. dos Santos, M. Nuvunga, and E. Salati, eds., *Workshop: Forest Policies and Sustainable Development in the Amazon* (Rio de Janeiro: Fundacao Brasileira Para o Desenvolvimento Sustentavel and UN Development Program, 1997).

10. See J. P. Srivastava, N. J. H. Smith, and D. A. Forno, *Biodiversity and Agricultural Intensification*, World Bank Environmentally Sustainable Development Studies and Monographs Series 11 (Washington, D.C., 1996); S. Pagiola and J. Kellenberg, *Mainstreaming Biodiversity in Agricultural Development: Toward Good Practice*, World Bank Environment Department Paper 15 (Washington, D.C., 1997); L. A. Thrupp, ed., *New Partnerships for Sustainable Agriculture* (Washington, D.C.: World Resources Institute, 1996); T. Clunies-Ross, "Marygolds, Manure and Mixtures: The Importance of Crop Diversity on British Farms," *Ecologist*, vol. 25, no. 5 (September/October 1995), 181–87; GEF, "A Framework for GEF Activities Concerning Conservation."

11. D. Current, E. Lutz, and S. Scherr, eds., *Costs, Benefits and Farmer Adoption of Agroforestry: Project Experience in Central America and the Caribbean*, World Bank Environment Paper 14 (Washington, D.C., 1995).

12. R. A. Rice and J. R. Ward, *Coffee, Conservation, and Commerce in the Western Hemisphere*, Report by the Smithsonian Migration Bird Center and the Natural Resources Defense Council (Washington, D.C., June 1996).

13. N. Dudley, C. Elliott, and S. Stolton, "A Framework for Environmental Labeling," *Environment*, vol. 39, no. 6 (July/August 1997), 16–20, 42–45.

14. Organic Crop Improvement Association, 1995 International Certification Standards, as revised, February 1995, Bellefontaine, Ohio. Also, see Internet information on this group at http://www.qconsulting.com/ocia/ociahome.htm

15. The International Federation of Organic Agriculture Movements (IFOAM) is the international association of organic agriculture organizations.

3

The Market: Biodiversity Business Sectors

The markets for sustainably produced products are thriving, especially in Latin America. Many companies, large and small, are already serving these markets, and the prospects for their growth appear good. This chapter reviews the biodiversity market sectors with businesses that make an active contribution to conservation or sustainable use: agriculture (including certified agriculture, other agricultural products, and aquaculture), forestry, nontimber forest products, and ecotourism. Each sector is defined and information provided on the status of best practices and certification, the market (trends, business opportunities, and key factors), and types of businesses in operation there.

The discussion does not cover biodiversity prospecting, which refers to the extraction of useful essences or compounds from wild plants and animals. Although this sector may someday develop into a major industry, only a few "pure play" private sector companies and investment opportunities are present there at this time. Most of these enterprises are research institutes and large pharmaceutical, agricultural, and cosmetics companies.

Introduction to Markets

Market Transformations

Notable changes are taking place in various parts of the agriculture, forestry, and tourism sectors: enterprises are moving away from destructive forms of production and operation toward environmentally sensitive practices. These market transformations are driven by market demand, operational benefits, added value, and regulation:

- Market demand. Growing environmental awareness among industrial or commercial customers (e.g., in forest products) and end-use consumers (e.g., in food products) in the industrial and developing worlds is creating a strong demand for environmentally sustainable products.[1] Businesses are discovering a wealth of attractive growth opportunities and market niches for these products.
- Operational benefits. Enterprises of all sizes now recognize that adopting environmentally friendly processes carries important benefits, including cost savings, reduced liability, and more effective environmental risk management. The term used to describe the operational gain when production processes move in this direction (by polluting less and by reducing, recycling, and reusing waste products) is "ecoefficiency."[2]
- Added value. In the past, the private sector tended to perceive environmental requirements as costs that reduce profitability. However, more and more businesses have come to believe that concern for the environment generates opportunities for adding value to investment. That concern leads enterprises to make better use of assets, promotes market restructuring, and encourages partnering with stakeholders. All these endeavors help increase sales through positive image, give

rise to new products that solve problems and respond to market transformations, create new brand names, and provide competitive advantage.

- Regulation. Conflicting government policies and regulations or poor enforcement thereof can have a negative effect on biodiversity, as demonstrated in many parts of Latin America (e.g., in subsidies, land use, and import/export controls).[3] With the increasing emphasis on environmental goals, however, sustainable approaches may become a requirement for gaining access to a particular resource (e.g., a forestry reserve). Forest reserves have already been established in Brazil, and there are reserves for ecotourism in Peru and Chile and a biodiversity institute in Costa Rica.[4]

Market Trends

As the statistics in this chapter demonstrate, the growth prospects for biodiversity markets appear to be strong. In the food sector, for instance, certain companies are positioning themselves to attract environmentally conscious consumers. Among these are tuna-processing firms in the United States and Europe, many of which now produce brands certified to be dolphin-safe, as well as mainstream mass-market firms that have acquired organic food companies. Major European, U.S., and Japanese companies are also buying organic agricultural supplies in increasing quantities, notably from Latin America. And environmentally friendly goods now include tropical timber, guitars, bananas, and seafood.

Supporting Infrastructure

These nascent sectors will benefit not only from market demand, but also from the infrastructure emerging in support of biodiversity investments. This consists in part of networks of universities, research centers, extension services, industry associations, and Internet services becoming established in each market sector. In addition, dozens of public or nonprofit institutions—NGOs devoted to conservation, foundations, and bilateral and multilateral agencies—have been actively seeking and participating in economically self-sustaining biodiversity projects.[5] Governments, too, are introducing policies to encourage biodiversity investment, recognizing that such businesses can make a positive contribution to the national economy.[6] In Latin America, nature tourism now accounts for 25% of Belize's GNP,[7] while Costa Rica has established itself as one of the leading ecotourism destinations. In addition, the government of Costa Rica has made "sustainable development" the centerpiece of its business development, natural resources management, agriculture, health, and education programs.[8] Brazil has launched its "Green Protocol" program aimed at encouraging industrial companies to comply with pollution control laws, and its government pledged in 1998 to designate 25 million hectares of Amazon forest protected land by 2000 as part of a joint initiative with the World Bank and the World Wildlife Fund.[9]

Sustainable Agriculture

Definition

The term "sustainable agriculture" refers to a system of agriculture that has a low impact on the environment which is achieved through some combination of organic fertilizers, crop rotation, integrated pest management, minimal or no use of chemical and pesticide inputs, and the recycling of waste materials.[10] While these systems may not restore the biodiversity of an original natural habitat, they maintain a higher level of biodiversity than conventional agriculture: they enhance soil fertility, encourage higher levels of soil fauna, provide habitats for bird and insect species, and aim for greater genetic diversity in crops. They also control runoff or the seepage of chemicals so as to avoid contaminating local water courses and make efforts to maintain aquatic biodiversity.

Sustainable agriculture can be divided into roughly two types: "certified organic" and "low-input" agriculture. Certified organic agriculture produces crops without man-made chemicals or synthetic inputs (inorganic fertilizers, pesticides, or herbicides), and its techniques include minimal soil tillage, crop rotation or intercropping, integrated pest management, and soil fertility res-

toration. One of its primary goals is to enhance on-site and surrounding biodiversity. While production per hectare may be lower (although not always) and labor costs higher than with conventional practices, profit margins and return on investment may be higher as chemical costs and the cost of applying chemicals are eliminated, certain market risks are reduced (e.g., a product does not stand to be rejected because of chemical contamination, as happened in the case of Chilean grapes), niche market prices are higher, and organic certification is required for market access and shelf space in certain stores.[11]

"Low-input" agriculture uses some of the inputs forbidden by an organic regime, but it applies them in moderation. This approach, like certified organic agriculture, is geared toward sustaining food production without adverse effects on the environment. Latin America, with its large land area devoted to agriculture, provides substantial evidence that this sector has a significant impact on biodiversity.

Best Practices/Certification

Most Latin American countries have one or more certification organizations. These groups are affiliated with the International Federation of Organic Agriculture Movements (IFOAM), and they use the standards of European and/or North American organic industry groups for export products.[12] The standards used in the United States and in Europe differ slightly, and standards have not yet been developed for all crops. Several U.S. state governments (one being California) have adopted specific organic standards, and the U.S. Department of Agriculture, following industry recommendations, recently proposed tentative national organic standards.[13] IFOAM, the United States, and European governments, as well as the European Union, are attempting to harmonize organic requirements.

Other labels follow standards similar to organic ones but allow some agrochemical use. An example would be the ECO-OK label that Rainforest Alliance, a U.S. NGO, applies to bananas grown in Central America.[14] Migros, the Swiss supermarket cooperative, has long had its own environmental label for products coming from Swiss farmers who follow Migros best practices, which discourage the use of chemicals.[15] The coffee industry provides many examples of certified organic practices, as well as guidelines and marketing labels for fair trade and "shade-grown" coffee.[16]

The Market

The sustainable agriculture sector is supported by a variety of existing markets, technology, infrastructure, and services. With the sector's recent growth, mainstream supermarkets are entering the natural foods business, supply links are becoming more sophisticated, and acquisitions and consolidation are increasing. The sector includes fast-growing medium-sized producers, larger farms and processing companies converting to organic production or adding organic lines, and producer cooperatives linking with processing and marketing companies. Certified organic crops and value-added products include coffee, grains, cacao, olive oil, fruits and vegetables, beef, and cotton. The demand for organic bananas, tropical fruit purees, and temperate zone tree fruits (fresh or processed) is so great that it cannot yet be met. Because the area devoted to agriculture in Latin America is so large and continues to expand, sustainable agriculture has important implications for the region's biodiversity.

The Organic Crop Improvement Association, the largest association of organic growers in the world, has 20,000 members in Latin America.[17] In Brazil, many small organic farmers have formed cooperatives for marketing and distributing their products, and many sell directly to the public at open markets in São Paulo and Porto Alegre.[18] A small number have begun adding value to their organic produce by producing nonperishable items such as flour and granola.

The world's largest organic market is found in Europe: sales there rose from about US$4.0 billion in 1993 to US$6.8 billion in 1995 (the latest years for which figures are available).[19] Leading the mainstream demand for organic products in this market are the United Kingdom, Denmark, the Netherlands, and Germany. Large retailers in Austria (Billa and Spar), Germany (REWE), France

(Monoprix, Carrefour), Switzerland (Migros and Coop), Sweden (ICA and Konsum), and the United Kingdom (Sainsbury) are boosting sales by introducing more organic products. Lufthansa and Swissair now offer organic meals to their passengers, and more hospitals, universities, and government institutions, especially in Germany, include organic meals in their food services. In Luxembourg, one can even find packaged organic bread in gas stations.

Another group bringing in organic supplies is the Fair Trade Movement (e.g., Max Haavelar), which represents 5–10% of coffee markets in Germany and the Netherlands. A 1995 survey of Dutch consumers indicated that 84% of respondents associated high quality with the Max Haavelar certification label.[20] Germany has been another strong supporter of the organic movement: the government's development agency (GTZ) has funded organic agriculture conferences and projects in Latin America;[21] and according to the German Marketing Board for Agricultural Products, in 1996 more than 60% of all German households had incorporated organic products into their regular buying patterns. Approximately 50% make weekly purchases, and 56% of German consumers are willing to pay 15% or more in premiums for organic products.[22] Denmark, too, shows a proactive pattern, with the government now pushing all of its farmers to adopt organic production methods by 2005.[23]

In the United States, sales of certified organic agricultural products rose at an average annual rate of more than 20% between 1990 and 1999—total sales jumped from US$1 billion in 1990 to over US$5 billion in 1999—and today organic/natural food supermarket chains are expanding rapidly.[24] Many U.S. companies rely on South America for raw and processed ingredients such as organic sugar, berries, tropical fruits, and out-of-season temperate zone fruits.

The growth of the organic market in the United States is particularly evident in the expansion of organic/natural food supermarket chains and in the increasing stocks of organic foods in traditional supermarkets, especially organic baby food, fruits, and vegetables.[25] With the recent mergers among natural foods stores, distribution channels now have a larger reach and greater efficiencies. After acquiring Fresh Fields and a number of other chains, Whole Foods, Inc., an organic/natural foods supermarket chain based in Austin, Texas, is expected to have 100 stores and annual sales of US$1.5 billion by the year 2000.[26]

This strong performance is not so surprising in view of the 20–25% growth rates posted by natural food companies in the United States. Indeed, the natural foods industry is expected to continue to grow rapidly and is likely to see other strategic acquisitions. Companies in this niche command the highest retail prices, offer high-quality foods, and have good relationships with suppliers and retail stores. Thus these companies are expected to outperform other companies in the food sector, may be priced at higher multiples, and are likely to have higher investor returns.[27] Although there is little published information on returns for privately held production and processing companies in the United States, which resemble the projects of greatest interest to investors in Latin America, anecdotal evidence and data from industry analysts indicate that returns could be good.[28] These prospects have led investment groups and companies focused on natural foods to acquire firms and brand names in the sector.[29]

Although precise figures are not available for Japan, purchases of certified organic products from companies in the United States and in Brazil have gone up, especially in the wake of recent food scares in Japan. The market for organic products is thriving within Brazil as well: the country's three largest supermarket chains now feature organic fruits and vegetables and dairy products.[30]

Types of Businesses

Latin America offers opportunities for various kinds of biodiversity business. According to a feasibility study for Terra Capital Fund, a biodiversity investment fund for Latin America, the number of businesses in agriculture alone are numerous and exceed those in all other sectors (see the Appendix). Furthermore, agricultural markets, technology, infrastructure, and support services are all reasonably well developed. The sector includes

fast-growing, medium-sized organic producers, with some larger farms converting to organic production along with many producer cooperatives linked with processing and marketing companies. Hence Latin America has tremendous potential as a source of organic products. Also, pesticide use is low in many areas, sometimes because producers cannot afford agrochemicals.

The countries of Latin America already have organic agriculture associations and one or more local certification agencies. There are also a few large growers in the region. Brazil, Argentina, and Chile have about 20 medium-sized growers each; Costa Rica has a few. Most countries have thousands of small growers, many feeding their products into cooperative processing and marketing organizations. Medium to large operations tend to be family owned.

Box 3.1. Organic Agriculture in Argentina

A 1996 report by Argentina's Ministry of Agriculture devotes an entire page to each of 23 mid- to large-sized companies producing and exporting certified organic products. These companies grew apples, pears, beef, soybean, corn, sunflowers, and olive oil on about 150,000 hectares in 1996, up from 10,000 hectares in 1992. Several companies are seeking long-term investment capital for expansion.

Box 3.2. Organic and Shade-Grown Coffee

Several medium- to large-sized coffee growers in Brazil have converted or are considering conversion to certified organic production. Industry experts report attractive returns on investment for Brazil's organic coffee and note that Japanese trading companies are buying or establishing organic coffee farms in Brazil. Smaller operations may also develop, along the lines of two U.S. organic coffee marketing and distribution companies that have established joint ventures with coffee cooperatives and roasting facilities in Mexico, Peru, and elsewhere. These U.S. companies each have several million dollars in annual sales. According to published reports of several NGOs, shade-grown and organic coffee offers numerous bidoversity benefits: such enterprises extend the natural forest, preserve animal habitat, employ low or no chemical inputs, and recycle their waste products.

Other Agricultural Crops and Underutilized Species

Definition

Biodiversity benefits in the agricultural sector derive not only from organic production, but also from the cultivation of underutilized species and wild relatives of domesticated species.[31] As the UN Food and Agriculture Organization (FAO) points out, only 120 of the 30,000 known edible plant species are cultivated for food today, the most successful being rice, corn, wheat, sugar cane and beets, which together account for two-thirds of plant-derived human food.[32]

If these major agricultural crops are to survive, their genetic stock must be replenished from wild and little-used related species when it is threatened by pests or disease. Plant material of this nature is already being preserved in gene banks. In addition, underutilized species may be suitable for land not under cultivation or for degraded or arid land. Such species may also have important but as yet undiscovered or little-explored pharmaceutical, cosmetic, industrial, or nutritional uses. Even agricultural wastes can have biodiversity benefits if recycled into commercial products such as paper, or animal feed.

Among the underutilized species of growing interest to farmers and investors are jojoba, a desert plant of the southwestern United States and Mexico, the oil of which can be used as a lubricant for machinery and for cosmetic products; salicornia or samphire, another desert plant high in oil and linoleic acid (a healthy polyunsaturated fat); and natural cottons and other fibers that can be used in the manufacture of clothing, mats, and other products. Some species of herbs, spices, and flowers—such as aloe, vanilla, and essential oils derived from

shrubs and flowers (e.g., geranium, tea, lavender)—have already proved useful in the manufacture of "natural" health care or beauty products.

A great variety of underutilized plant and animal species can be found in Latin America, which is also a genetic reservoir for many commercially valuable species. The Andean region, for example, is home to native roots, fruits, grains, vegetables, and legumes whose domestication dates back to pre-Colombian times and some of which may present investment opportunities today. Some of these crops—finger millet, lucuma, quinoa, and oca—are particularly suited to highland cultivation. Examples of the more popular and established products are cacao, bananas, coffee, macadamia nuts, and carrots, which are also among the largest crops. All of these crops offer biologically diverse varieties. Other important products in the region include tropical fruit trees, which can also be used to reforest degraded land; native palms, which supply domestic and export markets with hearts of palm and palm oil; wool cultivated from ranching native animal species such as llama and alpaca in the Andes; amaranth, a grain and vegetable crop popular in ancient Latin America; and relatives of the few widely cultivated crops found in the wild or maintained at international, national, university, or private research institutes, such as potatoes in Peru. Some of these products may also be nontimber forest products, as explained in a later section.

Best Practices and Certification

Many of the foregoing may be certified as "organically grown" products.

The Market

Market figures for underutilized species are not tracked by the industry. These products may be included in organic agriculture or natural foods products.

Types of Businesses

The businesses include a range of agricultural ventures similar to those discussed in the category of sustainable agriculture.

Aquaculture

Definition

Although aquaculture is a form of agriculture, it is treated separately here because its principal input is water rather than land. The term refers to the cultivation of marine or freshwater aquatic species (such as fish, crocodiles, turtles, shrimp, and seaweed) in captivity, either in ponds or in cages or other structures in open waters. Aquaculture has been practiced for centuries in many parts of the world, notably China and other parts of Asia. Now it is being looked at in a new light, as a means to address biodiversity loss:

- Since aquaculture itself can be adversely affected by poor water quality, lack of natural buffer areas, and pesticide and urban runoff, the industry has a long-term economic interest in maintaining the natural ecosystem functions of the surrounding environment.
- In some cases, aquaculture can substitute for wild caught species and thus reduce overfishing and restore wild stocks (fish, crocodiles, turtles, shrimp).[33] Shellfish farming, for example, may help to repopulate depleted native stocks and provide an economic incentive for maintaining a region's water quality. Farming of native scallops and other mollusks is well developed in Chile, and pilot projects of this nature are under way in Brazil.[34]
- Underutilized local species can be grown in culture, as demonstrated in Brazil, where aquaculture farms have begun raising Amazonian fish in place of African perch. Brazil's research institutes and private companies are also cultivating some of the larger Amazon and Paraguay/Parana basin fish threatened by overfishing and habitat destruction, notably, the fish known as pirarucu in Brazil (peche in Spanish-speaking countries), tambaqui, matrinxa (*Brycon* sp.), and pacu.[35] Maturing technology and training programs have recently given farmers the confidence to enter this industry.[36]

Best Practice and Certification

Like most agricultural practices, aquaculture often has an adverse effect on biodiversity.[37] Best

practices can reduce this problem and at the same time achieve more efficient production. The technical literature offers abundant information on best practices in water use and discharge, water use minimization, siting and coastal zone management, the use of chemicals and drugs, and guidelines for nonindigenous species.[38] These practices continue to improve with the help of experience and new techniques, and some can clearly be described as sustainable or biodiversity friendly. Nevertheless, unsustainable practices remain in use because of the possibility of earning high profits over the short term (three to four years) for some species and because of the lack of education, technical knowledge, or technical/extension services.

In response to NGO pressure and the need for a coordinated response to disease and other animal husbandry issues, several industry and industry/NGO associations have taken steps to introduce aquaculture standards and certification:

- The Global Aquaculture Alliance, an industry association with a keen interest in shrimp farming, was formed in 1997 to educate the public and the aquaculture industry and to "develop a comprehensive set of standards to further en-

Box 3.3. The Shrimp-Farming Experience

Shrimp farming has caused environmental damage and social disruptions: cutting mangroves, altering coastal wetlands, overharvesting wild post-larvae to stock shrimp ponds, and pushing local peoples out of traditional land uses. These practices have in some cases made shrimp farming unsustainable: too many farms in one area, poor management practices, the movement of shrimp from one area or continent to another (transferring shrimp viruses), and the lack of coastal zone management (too many farms in the wrong locations) combine to stress the shrimp with naturally occurring and imported shrimp diseases. The diseases can wipe out a crop or stunt the growth of the shrimp. The disease syndromes have thrown shrimp farming into crisis worldwide.

Latin America is no exception. Shrimp aquaculture has grown rapidly in Ecuador and Central America and is expanding in Brazil. Until five years ago, profit margins per crop for some operations were very high (although risks were also high). However, the best shrimp farms in Ecuador and Central America are currently breaking even owing to the taura syndrome, white spot, and other diseases. The spread of disease has pushed some shrimp farmers in Latin America to adopt more environmentally sensitive techniques. While some farmers overstock post-larvae to compensate for loss, others are adopting a variety of disease-prevention measures and more environmentally sensitive production methods (careful selection of hatchery stock, better hatchery and growout practices, careful siting of farms [no crowding], lower stocking densities). The shrimp industry is experiencing growing pains familiar to other agricultural sectors. Techniques for working with disease and stress are being developed, and best management practices are gaining wider industry acceptance. In the Gulf of Fonseca in Honduras, for example, the shrimp farmers association, NGOs, and the government plan to set up large areas of mangrove reserves. Because of the large size of the shrimp farming industry, the widespread adoption of best management practices may have a beneficial impact on local biodiversity.

Sources: J. Tobey, J. Clay, and P. Vergne, *The Economic, Environmental and Social Impacts of Shrimp Farming in Latin America*, University of Rhode Island, Coastal Resources Center, Coastal Management Report 2202 (University of Rhode Island, Narragansett, June 1998); discussions with shrimp farming industry experts, 1998; "Shrimp Farming Going Swimmingly," *Economist,* February 21, 1998, 80–1; C. Browdy and S. Hopkins, "Swimming through Troubled Waters," *Shrimp News International*, (May/June 1995), 9–11; "World Aquaculture '96 and the Bangkok Seafood Show," *Shrimp News International*, January/February 1996, 14–15; "Shrimp Farming in Nicaragua," *Shrimp News International,* March/April 1996, 1, 2, 14, 15, 16; "Shrimp Farming in Ecuador in 1994," *Shrimp News International,* March/April 1995, 3–4; "Resistant Strains of *Vannamei* and *Stylirostris* in Venezuela and Colombia," *Shrimp News International,* November/December 1995, 4; C. Lightfoot et al., "Aquaculture and Sustainability through Integrated Resources Management," ICLARM Contribution 948, *Outlook on Agriculture,* vol. 22, no. 3 (1993), 143–50; "Honduran Shrimp Farmers Avoid Environmental Problems," *Shrimp News International*, May/June 1994, 3–4.

vironmentally acceptable aquaculture."[39] The Alliance's founding members include aquaculture companies, food and restaurant companies, and national aquaculture associations from at least six Latin American countries, the United States, and Thailand.

- Several producers are experimenting with organic certification of aquaculture products, and several U.S. and European organic agriculture associations are developing organic aquaculture guidelines.[40]
- The Marine Stewardship Council (MSC), started by Unilever and the United Kingdom's World Wildlife Fund, is developing guidelines for marine fisheries similar to those of the Forest Stewardship Council.[41] The MSC may add aquaculture at a later date.
- In October 1995, the FAO adopted a code of conduct on responsible fisheries.[42] The code sets environmental and technical standards for the industry.

The Market

One of the world's fastest-growing agricultural sectors, aquaculture accounts for roughly 20% of world fish output. In 1996 world aquaculture production totaled 34.12 million tons, valued at more than US$46.5 billion.[43] As global wild catches decline or remain stable, and as consumers show greater preference for fish over meat, the aquaculture industry is expected to play an increasing role in meeting the demand for foodstocks from a growing world population.

FAO statistics on the decline in wild catch and increase in aquaculture sales in the world fish market suggest that aquaculture will outstrip wild catches early in the new century (see Figure 3.1).[44] In some countries where certain species can no longer support commercial fishing, these species are being reserved for sport fishing.

Latin American markets, both local and export-oriented, are responding strongly to the rising demand for aquaculture products. In 1996, aquaculture production in Latin America and the Caribbean reached a record level of 614,000 tons, which accounted for 1.8% of the world total and was valued at US$1.95 billion, or 4.2% of total world value.[45] Two prime examples of the significant expansion in export-oriented aquaculture in the region are Chile, now the world's second largest producer of salmon, and Ecuador, a major producer of shrimp. Other segments of the industry—such as freshwater fish, mollusks, and aquatic plants—have shown slower growth, but they are still in the early stages of development. Latin America will likely experience even greater demand for its aquaculture products as fast-food chains (for local consumption) and food companies (for exports) seek additional supplies of these products.

Types of Businesses

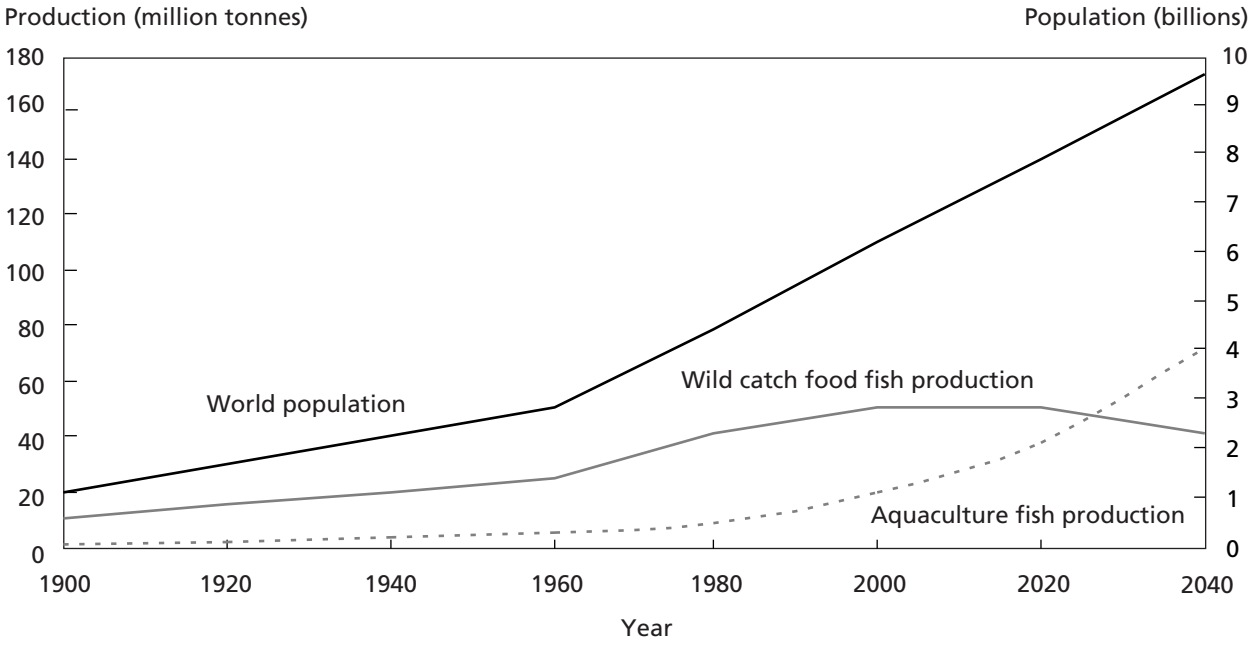
Notable centers of aquaculture production in Latin America are Chile (salmon, mollusks), Ecuador and Mexico (shrimp), Colombia (various products), and Brazil (freshwater fish, mollusks). Businesses include production, value-added processing, feed manufacture, and technical consulting.

Sustainable Forest Management

Definition

Sustainable forestry refers to various systems of management that permit selective harvesting of wood from forests without undermining their use by present and future generations and without harming the biodiversity therein. More than half of the world's biodiversity exists in tropical forests, although they cover only 7% of the earth's surface.[46] Temperate and boreal forests, which cover nearly 10% of the earth's surface, are also valuable harbors of biodiversity. Yet the various biota in these regions remain under threat as many primary forests are still being cut for firewood and logs and cleared for rubber and palm plantations or for other agriculture. Uncertain land tenure and taxation/subsidy policies permit cutting in many areas. Some countries have enacted laws restricting cutting in primary forests but lack the power to enforce them.[47] Long-term projections point to an increasing demand for wood (the Asia financial crisis notwithstanding). This

Figure 3.1. Trends in World Fisheries, 1900–2040



Source: FAO.

demand will have to be met by new plantations, or the pressure on primary forests will continue. Asian logging companies, for example, have already moved beyond Asia into the other remaining stands of primary forest, in the Amazon, the Congo Basin, and Russia.[48]

Best Practices and Certification

"Sustainable" or "wise-use" forestry operations are noted for their careful mapping, planning, and selective logging, all of which help reduce damage to other trees and plants, cut fuel costs, leave more trees for later harvest, and require much less cutting per hectare for the same return on investment.[49] Sustainable management can be applied in existing forests, plantations of mixed local species on degraded land, and monoculture plantations. Each category of forest requires a particular system of management, depending on the intended output and the species that it contains. Sustainable forestry makes stakeholders aware of the ongoing value of the forest, thereby creating incentives for its conservation.

Owing to public concern over the loss of forests, a small but growing number of timber producers worldwide are developing and adopting sustainable forestry techniques. Timber that is certified as having been produced by such techniques is known as "certified" or "green" timber. Through the collaboration of environmental and timber industry groups, scientists, and bilateral and multilateral institutions, an effort is currently under way to develop broadly accepted definitions of sustainable forestry. Organizations involved in this endeavor include the Forest Stewardship Council, the International Tropical Timber Organization, and the International Organization for Standardization to develop broadly agreed definitions of sustainable forestry. Production standards are similar in some ways to those for organic agriculture. Under schemes designed by these organizations, an independent third party or a producer

using audited environmental management systems is able to certify and label forest products that meet these standards.[50]

Some standards are intended to conserve or reestablish biodiversity in forest areas. They may require a project to set aside a percentage of the concession or managed area as a reserve, to maintain as such any existing remnants of native forest and wildlife corridor, to use techniques that will protect or regenerate the habitat of threatened species, and to plant and/or harvest a greater range of species so as to conserve natural diversity. Other standards may help to conserve biodiversity indirectly, as in the case of the careful mapping of low-impact harvesting regimes.

Best practices may increase a firm's costs or be unprofitable because of high interest rates or restrictive government policies. Even so, such practices will continue to be competitive in situations where regulations and market forces work in their favor. For example, government regulations may deny the *right to access* unless best practices are followed; in such a case, a certified company would be able to obtain concessions and buy land, whereas nonsustainable operators would be shut out. Best practices would also ensure *market access* in countries where commercial and end users want to buy certified wood. Furthermore, a certified company might gain *market share* more readily than noncertified competitors.[51]

Some best practices are already part of the standard operating procedure for several companies in Latin America. For example, large plantations of eucalyptus on degraded land in Brazil seek to preserve the remnants of natural forest that provide fire and pest protection for the adjacent monoculture plantation areas.[52]

Other countries and forest organizations are adopting similar standards—whether their own or those of the FSC—along with sustainable forestry objectives. The government of Sweden, for one, has pledged to put all of its country's forests under FSC-approved harvest methods. The ITTO, for another, has incorporated industry-

Box 3.4. The Forest Stewardship Council

The FSC is an international and independent organization dominated by NGOs, with some industry representation. The FSC has designed criteria for sustainable forest management and trains and certifies third-party labelers in the application and monitoring of these standards. At least six certification organizations have been accredited by FSC to use the FSC logo. By January 31, 2000, more than 120 forest products companies in 25 countries in Africa, Asia, Europe, and the Americas had sought and received FSC certification, bringing the total area certified to 17.7 million hectares (up from 2.3 million hectares in 1996). So far, most of the FSC-accredited forests are in Europe and the Americas. Countries in Latin America with FSC-certified forests include Brazil (with 1.4 million hectares), Bolivia (660,000 hectares), Mexico (143,000 hectares), Costa Rica (36,400 hectares), Honduras (20,000 hectares), Paraguay (16,000 hectares), Guatemala (46,000 hectares) and Belize (96,000 hectares).

FSC certification has gained some market acceptance, in part because it enables retailers to focus their advertising and educational efforts on one standard and thus avoid confusing the consumer with multiple labels. This strategy has proved successful for firms such as B&Q in the United Kingdom. The FSC method not only certifies the management of forests but also traces the wood to its consumer. This function will become increasingly important because it ultimately gives the forest owners and managers information about the demand for certified products. This system will serve to stimulate certified forestry, as managers are given the economic incentive to provide for the growing demand of sustainability-minded consumers.

Sources: Update of July 31, 1999, on the Forest Stewardship Council web site, www.fscoax.org. See also R. Crossley et al., "WWF: Global Forestry and Finance Initiative," Report to WWF 1998; J. Polak et al., *Sustaining Profits and Forestry: The Business of Sustainable Forestry* (Chicago: John D. and Catherine T. MacArthur Foundation, 1997); "Forestry: From Poachers to Gamekeepers," *Economist*, August 22, 1998, 64; Knight, "Save a Forest—Use Bar-Codes," *Tomorrow*, April–June 1995, 68–69; Knight, "United by a Common Purpose," *Financial Times*, September 13, 1995.

specific criteria for forest management into the ISO 14000 series of environmental systems standards.[53] In addition, the organization's "Year 2000 Objective" calls for producer member countries to create a market of only sustainably harvested internationally traded tropical timber by the year 2000. This objective has been upheld across the Amazon basin in the form of the "Tarapoto Proposal."[54] Additional pressure may come from the initiative launched by the WWF and the World Bank. These organizations are committed to working together to establish 50 million hectares of new-forest protected areas by 2005, and to encourage the independent certification of 200 million hectares of sustainably managed forests (including 100 million hectares of tropical forest) also by 2005.[55]

Some of the emerging technologies may also have a positive effect on sustainable forestry practices and profit margins. These include

- new uses of wood waste (especially hardwood and softwood trim ends and "shorts");
- microthin veneering;
- new methods of drying and laminating wood, which are particularly useful for firms where small charges, energy efficiency, and cost-effectiveness are major concerns;
- low-impact wood harvesting;
- wood product coding, used to track a product's chain of custody;
- new methods of sawing suited to lesser-known and/or underutilized wood species; and
- new ways of hardening wood that can increase the overall value of lower-grade softwoods and hardwoods used in value-added processes.

The Market

While certified products represent only 1–5% of total forest products, some industry observers predict that certification will soon become widespread.[56] Companies are facing mounting pressure from buyers, customers, and stakeholders, especially in northern countries, to operate in a more environmentally and socially responsible manner. Market demand and public pressure are not the only forces behind this move. Some companies and even some countries (e.g., Sweden)[57] are adopting certification as part of a total quality management (or ecoefficient) approach to production. They believe that some sort of certification will eventually be required for market access and may be positioning themselves to maintain or gain market share. Operational benefits (cost savings, employee morale) and public relations benefits are also contributing factors.

The path to a market for certified forest products remains rocky, however. Although the demand for certified products appears to be growing in northern Europe, as yet little consumer interest is evident in North America. As with other certification programs, false claims of sustainability, self-certification, and a plethora of ecolabels may be confusing buyers. To gain a better sense of the overall trends in the wood products industry, one needs to examine, first, the supply side responses, most notably in Latin America, which is where a great deal of the action is occurring; and, second, the demand side responses, which is to say, the major buyers moving the market toward certification.

Supply-Side Responses in Latin America. Forest industries in Latin America are poised for growth: whereas log production in Africa, Asia, and North America is declining,[58] the markets for Latin America's forest products are growing at the rate of about 2% a year, in tandem with the world economy.[59] This figure masks distinct regional differences, however: in the developed world, demand is growing, but at a fairly low and steady pace; in the developing world, with its rapidly expanding populations and economies, the demand for wood products is strong. Although the financial crisis in Asia that began in 1997 and the associated drop in construction activity there sharply reduced the demand for timber in Asia, this decline will be temporary if the region's economies recover. Because forests in Africa, Asia, and North America have been extensively harvested, timber supply from those regions is diminishing; prices are therefore expected to rise over the next 20 years. Demand is now being filled increasingly by producers in South America, where forests have been less extensively harvested to date.

A shortage of timber in Asian countries such as Japan, Malaysia, the Philippines and Thailand, which are now net importers of tropical timber products, has created a sizable market for more species from Amazonia. Hence Asian and other timber companies that in the past showed little interest in selective harvesting are moving into Latin America. The tropical timbers they harvest are sold locally and into the export markets. Annual sales to the United States, for instance, amount to about US$500 million and those to Europe about US$1 billion.[60] Certified tropical timber represents less than 1% of this market but is estimated to be growing at a rate of more than 25% a year.[61] Ultimately, the domestic markets of Latin America will also become more important. Brazil shows particular promise in this regard, what with a growing economy and a population of 160 million people whose purchasing power is also on the rise.

About 95% of Latin America's wood industry is now based on natural (primary and secondary) forest exploitation. Most forestland is under private, not state, ownership, a pattern different from that in other regions.[62] However, national laws and development programs may eventually exert some influence on forestry practices.[63] Brazilian law, for example, already places limits on harvests from natural forests, but these laws are difficult to enforce. The Brazilian government is also working to create and strengthen a system of reserves, protected areas, and development corridors in the Amazon.[64]

The Buyers. On the demand side, several major European buyers limit tropical hardwood purchases to certified sources. Major corporate wood buyers and furniture makers in the United Kingdom, continental Europe, the United States, Australia, and Japan have formed buyers' groups to promote and encourage certified sustainable sources.[65] Buyers' groups, whose membership includes private companies, local and state governments, universities, and others, are committed to increasing their purchase of certified timber. Most require that the wood be FSC-certified.

In the United Kingdom, the "1995-Plus Group" now has 78 participating retailers and represents 25% of the U.K. market for wood and paper product sales.[66] The group is led by B&Q, a home-supply firm, which has agreed to buy only FSC-certified wood as of 2000. All B&Q suppliers were expected to have plans in place to meet this target. The MacArthur Foundation and several private companies and NGOs have set up a similar group in North America, called the Certified Forest Products Council. Most large wood-purchasing companies have yet to join, but several are considering membership, among them construction companies, retail stores, manufacturers, and distributors and suppliers of sustainably harvested wood. The FSC also has had support from large retailers such as IKEA in Scandinavia. Many certified operations develop markets via distribution groups, specialty importers, and traditional distributors. Several makers of guitars and other musical instruments are shifting their purchases of wood to certified sources or away from threatened species.[67]

Types of Businesses

Wood buyers are sending strong signals that they would buy more certified wood if they could get access to a larger reliable supply. Demand therefore appears to outweigh supply, creating ample opportunity for the creation of new business. Several companies in Latin America have already been certified, and others are investigating the possibility of obtaining certification (see FSC statistics for Latin America in Box 3.4 above). These range from community-based projects to industrial-size concessions, which meet or will soon be able to meet sustainable certification requirements.[68] The operations include the harvesting of secondary and some primary forest, the use of secondary species, and value-added processing. Perhaps as many as 100 commercial or community-based projects are either in the early stages of commercial expansion or are serving only local markets. A number of large-scale producers are moving to or considering certification. Several businesses with mixed species plantations may also consider certification.

Investment opportunities may include forest service companies that provide nursery-raised seedlings and turn-key planting for the reforestation of degraded land and mining sites, value-

Box 3.5 Example of a Sustainable Forestry Company in Paraguay

A two-year-old startup company in Paraguay purchased low-priced forestlands (20,000 hectares to start) to harvest, replant, and process mixed species of hardwoods (mostly in secondary forest). After raising more than US$10 million in capital from U.S. forestry and institutional investors, the company established a milling operation, and now plans to expand by working with other landowners and purchasing additional land. The company is also harvesting and exporting Yerba Mate (a tea).

added products and manufacturing of semifinished construction products and furnishing/decorating items, certified plywood production (there is as yet no source of sustainable plywood or paneling in Latin America), and certification and training services.

Nontimber Products Sustainably Harvested from the Wild

Definition

A variety of products other than trees may be harvested from the wild in such a way that allows the plant or animal species to regenerate and has minimal impact on intact or wild forests or other ecosystems. Over the 1990s, new markets for nontimber forest products took root for products such as resins, essential oils, edible oils, plant gums, fibers, nuts, fruits, dyes, insects, insect products, latex, ornamental plants, spices, herbs, and handicrafts. The demand for herbal supplements (e.g., kava, ginkgo biloba, St. John's wort, and echinacea) has also shot up, especially in the United States, where annual sales of all such products totaled $2 billion in 1997.[69]

Like nontimber products, game hunting, wildlife ranching, and recreational fishing may contribute to biodiversity conservation by managing herd size, placing limits on harvests, or generating revenue to maintain or protect reserves and parks.[70] As a result, local people may in some cases be able to continue subsistence hunting with minimal impact. Commercial fishing that adheres to strict limits on harvests or to certain harvest techniques may also help to conserve species as opposed to unregulated fishing.

Best Practices and Certification

Best NTFP practices depend upon the species harvested, though in general they are likely to be akin to those developed for sustainable forestry.[71] Recreational fishing associations promote catch-and-release techniques, which more and more fishing enthusiasts are employing in prime recreational fishing areas such as Patagonia and the Pantanal. In Asia and in Latin America, several NGOs are promoting best practices for harvesting food fish and aquarium species from reefs, in place of ecologically destructive practices such as the use of dynamite and cyanide.

The Market

NTFPs are part of the larger "natural products" industry. In the United States, sales in this market topped US$28 billion in 1999.[72] Among other market indicators, world imports of Brazil nuts reached US$33.5 million and natural rubber US$5 billion in 1991; world palm oil sales totaled US$5.4 billion in 1992; and existing markets of exotic and tropical fruit products (which have potential for expansion) posted sales of US$250 million in 1990.[73] The heart of palm market is among the largest for NTFPs, with sales of US$300 million in Brazil and a growing export market in the United States and Europe.[74] Another growing sector of this market involves the extraction of spices, herbs and chemicals for use in herbal products, medicines, and cosmetics. One of the main risks for this sector lies in developing a reliable supply to satisfy market demand, given the remote location of some projects and their community-based approach to harvesting products.

Statistics on catch-and-release recreational fishing, game ranching, and the sustainable harvesting of coral reefs for the aquarium trade are not

Box 3.6. Examples of Palm Heart Processing in Brazil

Located near the mouth of the Amazon, one established producer with a large landholding of native forest in Brazil selectively harvests fruit from the acai species of palmito, *Euterpe oleracea,* which regenerates and produces subsequent crops. Products are sold under the "King of Palms" brand name. The company also processes and distributes acai juice, which, like milk in northern countries, is a staple of the local diet, especially for children. Another proposed venture seeks to purchase palm hearts from the local population for processing on a river barge and at an industrial factory. The canned palm hearts would be sold to the United States and Europe.

yet available in Latin America. Proxy statistics, such as recreational fishing and exports of aquarium species, were not gathered for this report.

Types of Businesses

The majority of NTFP projects are managed by NGOs, cooperatives, and a few expanding small businesses.[75] The number of entrepreneurs entering this sector is still limited because the infrastructure is underdeveloped and thus the areas in which NTFPs are extracted remain inaccessible. Although this sector is small and fragmented, opportunities exist for entrepreneurs to start processing facilities near forests, and to provide equipment for processing NTFPs and for marketing and brokering companies. Some of the NTFP operations likely to be of interest to investors are the large landholdings engaged in mixed-use projects, including selective timber harvesting, mixed hardwood and fruit/nut tree plantations, NTFPs, and ecotourism.

Ecotourism and Nature Based Tourism

Definition

Defined as a type of nature tourism, ecotourism directly links travel (including leisure, adventure, and educational activities) to undisturbed and pristine areas and to the conservation of their natural resources. Ecotourism lodges range from simple structures built in the local style to high-end luxury accommodations. Ecotourists often spend their time viewing, exploring, and learning about the surrounding ecosystem by hiking in rainforests, diving on coral reefs, climbing in wilderness areas, or trekking or canoeing in mountain or subpolar environments. The number of visitors is often small and restricted so as not to exceed the carrying capacity of the area and thereby damage the ecosystem.

Many types of nature tourism and so-called ecotourism do not qualify as sustainable ecotourism as defined in this discussion. Ecotourism businesses actively contribute to conservation rather than just seek to minimize environmental impacts. Ecotourism projects are expected to provide financial assistance in preserving or maintaining the land resource on which the business is based, whether it is a neighboring forest or a coral reef. Land preservation must be part of the project, and it must assist or wholly manage a protected area or support educational and research programs. These ventures are expected to follow ecologically sensitive architectural and land use designs, help sustain the well-being of local people, and keep negative impacts on environmental resources to a minimum.[76]

Best Practices and Certification

Expecting an enterprise to follow all of these guidelines is a tall order. One of the main problems is that ecotourism activities, however defined, can greatly alter both the biological and human environment if too many tourists invade areas that were little visited before.[77] If ecotourism is to be sustainable, it must follow best practices in the design and management of its activities. The lack of consistent and accepted standards is a major risk for the sector. The name "ecotour" is no guarantee that ecology will be a prime concern.[78] The credibility of the sector may suffer if travelers have difficulty separating the environmentally sustainable operators from low-quality imitators.

Ecotourism societies, NGOs, industry associations, and governments are developing guidelines

and certification standards to help remedy this situation. The Ecotourism Society in the United States, the World Travel and Tourism Council (WTTC) in the United Kingdom, the World Tourism Organization, and the IUCN have already published best practices and industry guidelines. The WTTC also has a "green globe" program geared toward tourism, but this is an environmental compliance/best practices approach designed for tourism facilities or operations based on ISO 14000/1 principles, not an ecotourism program. Thus, while best practices have been documented, there are as yet no widely accepted guidelines for ecotourism. Australia and Costa Rica are among the few countries to have an accreditation system for rating tour operators and resorts on the basis of their "green-ness."[79] Ongoing research on the impacts of ecotourism operations will help to refine best-practice guidelines.[80]

The Market

Ecotourism is a subsector of one of the world's largest industries—tourism. World travel and tourism generate an estimated 11% of world GDP, or US$3.4 trillion a year, and account for more than 11% of the world's capital investment.[81] Statistics on the ecotourism segment are sparse. Estimates on the number of ecotourists vary widely, depending on how they are defined and where they travel. Nevertheless, nature tourism (including ecotourism) is recognized as a fast-growing market that has benefited from an existing tourism infrastructure, travel agents, and other booking services. Nature tourism is expected to continue its rapid growth, fueled by an increasing demand for outdoor and adventurous travel in isolated regions as well as by concerns for the environment.

To promote ecotourism, as opposed to the more general nature tourism, an enterprise would have to emphasize its positive contribution to conservation and overcome its inherent financial difficulties. So far, most ecotourism businesses have few links to major tour companies. Small facilities are difficult to finance and operate profitably. Thus, while "small is beautiful" in terms of minimizing the impact of the tourism activity on the environment, small projects reach few tourists and may have little impact on the industry as a whole. Operators hoping to expand the influence and the number of ecotourism facilities might try bioregional planning, a one-developer/operator approach with multiple sites, an exclusive rights approach, or a small luxury operation.

Bioregional Planning. Biodiversity land use planning and cooperative projects of the government, local community, and private sector might create opportunities for ecotourism. For example, much of the Yucatan peninsula and the Mayan ruins of Mexico have yet to be developed for tourism. Local universities and governments and NGOs are working on the "rules of the game," so as to avoid the overdevelopment of places such as Cancun and to encourage small facilities to enter the sector, reduce environmental impacts, and maintain large areas of natural habitat.

One Developer/Operator with Multiple Sites. A few tour operators, hotel developers, and private investors are considering multisite operations in Latin America and the Caribbean. The proposals have several features in common: the hotels are small (20–30 rooms for the high-end market and 100 rooms for the midpriced market); all the facilities are run by one operator (for economies of scale in marketing, brand name, supplies, technical knowledge); they all follow an ecotourism design (in terms of facilities, activities, and local-community involvement); they operate as a joint venture, investment coming from local partners, with the active involvement of an international NGO and local NGOs; and a portion of the profits will be earmarked for the protection of local natural resources or land preservation.

Exclusive Rights. Concessions and lodging in one region or around one national park could operate under a system of exclusive rights. Governments, private sector developers, and NGOs are currently considering a range of approaches to the management of national parks: one possibility would be to privatize park management or concessions/lodging and limit development rights to one or a few developers (in exchange for revenue sharing or conservation benefits).

Small Luxury Operations. With the right ingredients, small luxury operations may be profitable.

Table 3.1. Summary of Biodiversity-Based Sectors and Their Links to Biodiversity

Sector	Definition	Link to Biodiversity	Market Summary
Sustainable agriculture	Combination of certified organic agriculture, crop diversification, intercropping, use of local species and other sustainable forms of "low-input" production; agroforestry; partial restoration of degraded areas.	Sustainable agriculture ecosystems are more diverse than current practice; improves land productivity by reducing pressure to clear land; less damage to surrounding ecosystem and humans; can extend natural habitat for some species.	Many producer co-ops integrating processing and marketing; fast-growing medium-sized producers; some larger farms converting; increasingly effective marketing; scaling up for fast-growing markets in the European Union, United States, Japan, and Latin America.
Sustainable forestry	Certified forest products from plantations on degraded lands; reforestation with indigenous species; low-impact logging; value-added processing.	Large projects offer direct biodiversity protection; increases value of intact forest; certified projects set "best practice"; mixed species plantations can act as genetic reserves.	Several community forestry operations; emerging commercial scale operations with deals of $5–50 million; good infrastructure and technical expertise; existing certification standards.
Ecotourism	Nature tourism travel to protected and undisturbed natural areas; can include leisure, adventure, and/or educational activities. Environmentally sensitive design and operation. Financial or other contribution to protect adjacent natural habitat.	Potential for low impact, in situ development in protected areas and buffer zones; hard currency investment in conservation activities; income for local population; may reduce pressure on undisturbed areas.	Relatively new market; Costa Rica and Ecuador most developed markets; documentation on operators' impact on ecosystems and communities limited; best management practices exist but certification nascent.
NTFPs	All goods derived from forested areas that are not of wood origin (e.g., fruit, nuts, dyes, plant gums, essential oils, spices); cultivation/harvest of natural stands/reserves, agroforestry plots; value-added processing.	Provides income to local population from low-impact activities; harvesting methods nondestructive; gives financial reason to maintain natural habitat.	High potential for biodiversity protection; local population benefits; diverse deal flow; smaller-deal size and export markets; both private sector and NGO initiatives; lack of research on many products.

Table 3.1. (continued)

Sector	Market Size	Main Opportunities	Existing Examples
Sustainable agriculture	Established and growing market; annual U.S. and European organic agriculture sales about US$10 billion, with sales growing at 20%/year for the last seven years.	Organizing diverse sources of supply to meet the demand of mainstream supermarkets, value-added processing, organic inputs, and aquaculture.	Organic soybeans, sugar, coffee, cashews, vegetables, beef, Amazonian fish.
Sustainable forestry	Still a small percentage of the market; emerging export-driven demand for "certified" sustainably produced products growing rapidly; very diverse demand segments; significant country and regional differences.	Sustainable forest products companies, value-added wood processing equipment, certification and training.	Selective harvest of primary and secondary species by co-ops and companies, reforestation, value-added processing.
Ecotourism	WTO estimates world nature tourism market is greater than $200 billion.	Lodges and hotels in protected areas and buffer zones; training facilities for operators and staff; facilities that combine travel, education, and scientific research; energy conservation and renewable energy.	Lodges in Costa Rica, Belize, Brazil, Bolivia, Peru, Argentina.
NTFPs	Market data for NTFPs not available; local, regional, and international markets for most products; largest trade: fruits, nuts, essential oils, resins; proxy figures: world tropical fruit juice market about $250 million; Babassu market $100 million.	Mobile and fixed processing facilities for value-added fruits, nuts, and oils; agroforestry plots with mixed species endemic to area.	Natural rubber products, palm heart, and Brazil nut processing.

Their drawing card is exclusivity, very high "wow factor" for the site, good security, ease of access, attention to detail, gourmet food, and large bathrooms. The high-end safari camps and lodges in Africa are one example that might be attempted in other parts of the world.

Ecotourism has considerable potential in Latin America, particularly in Argentina, Ecuador, Costa Rica, Belize, and Brazil.[82] Costa Rica has already built a strong tourism industry, largely through its emphasis on nature-oriented tourism. This nation of only 3 million people hosted nearly 800,000 visitors in 1994 (up from 260,000 in 1985). As a result, tourism is now its most important foreign exchange earner (US$623 million in 1994, or 28% of the total value of the country's exports).[83] Other Latin American governments are adopting policies to promote ecotourism, while ecotourism societies, NGOs, industry associations, and governments are developing guidelines and certification standards to ensure the uniform development of the industry.[84]

Types of Businesses

Businesses include lodges or hotels in protected areas; facilities that combine travel, education, and scientific research; and support services such as training, alternative energy sources, (organic) food supplies, and transport. Most operations that will qualify as "ecotourism" under the definitions discussed earlier are small lodges or hotels with less than 40 rooms. However, several ventures may combine tourism with other commercial activities or package several ecotourism facilities into one company.

Latin America provides several examples of ecotourism businesses at various stages of development. Some hotel developments in Brazil—in the coastal Atlantic rainforest area, the Amazon, and the Pantanal—are tied to preserving adjacent land and coastal resources considered to be ecologically sensitive. These hotels also serve as a base for regional tourism activities such as forest visits and the viewing of rare orchids, plants, and birds. Other ecotourist destinations include Peru, Argentina (Patagonia), Ecuador, Belize, Paraguay, and, as already mentioned, Costa Rica.

Box 3.7. Rainforest Aerial Tram

One of Costa Rica's newer ventures is a ski lift with gondolas, now in operation for three years, that takes visitors into the canopy of a rainforest located near San Jose. The aerial tram runs a distance of 1 to 2 kilometers through the canopy of the trees. Trained local guides take visitors on a half-hour instructional hike through the forest prior to the almost two-hour gondola ride. An outdoor covered restaurant serves lunch and refreshments. The poles and equipment were installed partly by helicopter to limit the damage to existing forest. The company purchased the land around the aerial tram and plans to maintain the area in its natural state. The World Bank's Multilateral Investment Guarantee Authority (MIGA) provided risk insurance for the venture. The company is considering other sites in the region.

Notes

1. See D. Koechlin and K. Muller, eds., *Green Business Opportunities* (London: Pitman, 1992), 56, 61–77; issues of *Tomorrow Global Environment Business*, Tomorrow Publishing AB, Sweden (e.g., forestry issue, April/June 1995); *National Green Pages, the Yellow Pages for People and the Planet* (Co-op America, 1994); A. Manning, "96 a Banner Year for Boomer Trends," *USA Today,* December 14, 1995; "Editorial: A New Maturity," in *Business,* September/October, 1995, 4

2. On the benefits of ecoefficiency, see S. Schmidheiny et al., *Financing Change* (Cambridge, Mass.: MIT Press, 1996), 61–76. Enterprises of all sizes are recognizing "ecoefficiency" as a criterion for higher profit margins and long-term success. See also S. Schmidheiny et al., *Changing Course* (Cambridge, Mass.: MIT Press, 1992); B. Smart, *Beyond Compliance: A New Industry View of the Environment* (Washington, D.C.: World Resources Institute, 1992); Vaughn, ed., *Greening Financial Markets*, Report of the UNEP Round-Table Meeting on Commercial Banks and the Environment, September 26–27, 1994, Geneva, esp. 59–94 on how banks manage environmental risks; N. Walley and B. Whitehead, "It's Not Easy Being Green," *Harvard Business Review* (May–June, 1994), 46–52; R. Abramson, "The Profits of Clean Living," review of Moore and Miller's book *Green Gold, Washington Post* Book World, December 18, 1994, 9,

3. M. J. Dourojeanni, "Public Sector Roles and Economic Policies Affecting Biodiversity Conservation in Latin America and the Caribbean," in *Investing in Biodiversity Conservation*, Inter-American Development Bank, Environment Division Report ENV-111 (Washington, D.C., 1997).

4. Dourojeanni, "Public Sector Roles."

5. See, for example, New Partnerships Working Group, U.S. Agency for International Development and World Resources Institute, *New Partnerships in the Americas, the Spirit of Rio* (Washington, D.C.: December 1994), 66–67, 71–83.

6. A. Sanchez de Lozada, National Director for the Conservation of Biodiversity in Bolivia, "Facing the Challenges of Biodiversity Conservation in Bolivia," Ministry of Sustainable Development and Environment, La Paz, April 1997; B. Dias, "Biodiversity Issues and Opportunities in Brazil," paper presented at Commercial Issues of Biodiversity: The Biodiversity Conference for Business, conference sponsored by Scientific American, San Jose, Costa Rica, April 7–10, 1997. See also *Issues and Options in the Design of GEF Supported Trust Funds for Biodiversity Conservation*, World Bank Environment Department Paper 011 (Washington, D.C., April 1995), which contains examples of trust funds set up in Latin American countries; U. G. Cordani, J. Marcovitch, and E. Salati, Rio 92 Cinco Anos Depois: Avaliacão das acoes brasileiras em direcão ao desenvolvimento sustentavel cinco anos após a Rio-92 (São Paulo: Alphagraphics, 1997); *Making Development Sustainable: The World Bank Group and the Environment, Fiscal 1994*, (Washington, D.C.: World Bank, 1995), 33, 34, 35, 51; *Mainstreaming the Environment, Summary: The World Bank Group and the Environment since the Rio Earth Summit* (Washington, D.C.: World Bank, 1996), 1, 6, 29, 39, 40, 92, 93, 98, 112, 118, 145, 183, 184, 194; K. R. Miller and S. M. Lanau, *National Biodiversity Planning: Guidelines Based on Early Experiences around the World* (Washington, D.C.: World Resources Institute, 1995), 114–17, 123–25.

7. K. Lindberg and J. Enriquez, "An Analysis of Ecotourism's Economic Contribution to Conservation and Development in Belize," vol. 1, Summary Report, World Wildlife Fund and Belize Ministry of Environment and Tourism, 1994; K. Wells, "Belize Offers an Adventure in Ecotourism," *Wall Street Journal,* May 10, 1996.

8. On Costa Rica's national commitment to sustainable development, see C. F. Zamora Murillo, ed., *Del Bosque a la Sociedad—From Forest to Society: Results of the First International Forum* (San Jose, Costa Rica: Editorial Universidad Estatal a Distancia, Costa Rica, 1994).

9. Protocolo Verde agreement signed by President Fernando Henrique Cardoso on November 14, 1995. See M. Suzman, "Cardoso Sets Aside 62m Amazon Acres," *Financial Times,* April 30, 1998.

10. National Research Council (NRC), *Alternative Agriculture* (Washington, D.C.: National Academy Press, 1989).

11. For background on low-impact and organic farming, see NRC, *Alternative Agriculture*; L. A. Thrupp, *Bittersweet Harvests for Global Supermarkets: Challenges in Latin America's Agricultural Export Boom* (Washington, D.C.: World Resources Institute, 1995); Organic Crop Improvement Association (OCIA), *1995 International Certification Standards* (Bellefontaine, Ohio: OCIA International, 1995).

12. See, for example, OCIA, 1995 International Certification Standards for the U.S. and Guidelines for the Quality Standards, Demeter and Organico "Instituto Biodinâmico", accredited by IFOAM for Plant Production and Processing, May 1996, for Brazil.

13. R. Weiss, "When Is Food 'Organic'? USA Proposes 1st Rules," *Washington Post*, December 16, 1997, A1, A11.

14. Rainforest Alliance's Eco-OK banana certification program in Central America. See, for example, Rainforest Alliance newsletter, "Earth University Becomes Largest Banana Grower to Earn Eco-OK Seal of Approval," *The Canopy*, Spring 1994, p 1.

15. Migros Annual Report, 1996.

16. R. A. Rice and J. R. Ward, *Coffee Conservation, and Commerce in the Western Hemisphere* (Washington, D.C.: Smithsonian Migratory Bird Council and Natural Resources Defense Council, June 1996); D. Griswold and J. Ward, "Mexico's Mistaken Coffee Policy," opinion article in *Journal of Commerce*, November 6, 1996, 7A; "Coffee: Green, As in Greenbacks," *Economist* (San Jose, Costa Rica correspondent), February 1, 1997, 42.

17. Thomas Harding, past president of IFOAM, personal communication, 1997.

18. Board members of Widar, a private nonprofit group in São Paulo, Brazil, and Alexandre Harkaly of Instituto Biodinâmico, a Brazilian organic agriculture research and certification organization, personal communications, 1998.

19. Figures from Carol Haest, organic agriculture consultant in Belgium. Information on the European

market is based on the author's interviews with officials from Migros and Monoprix and reports on the European market in two trade newsletters: *Natural Business* and *Organic Trends*.

20. Information from Max Haavelar.

21. For example, Bio Fair, an annual organic agriculture conference in Costa Rica, was cosponsored by GTZ, the German government aid agency, in 1996 and 1997.

22. German Marketing Board for Agricultural Products.

23. D. Holing, "Down on the High-Tech Farm," *Tomorrow*, January/February 1998, 19.

24. See June issues of *Natural Foods Merchandiser*.

25. C. Sugarmann, "In for the Long Haul: Organic Produce Isn't Small Potatoes Anymore," *Washington Post* (September 13, 1995), E12.

26. M. Webb, "Fresh Fields Will Be Bought by Rival Chain," *Washington Post* (June 19, 1996), D1, D3; "Whole Foods Acquires Fresh Fields," *Natural Business,* Issue 2, July 1996, 1; K. Murphy, "Organic Food Makers Reap Green Yields of Revenue," *New York Times,* October 26, 1996, Business Day Section. Also see *National Foods Merchandiser,* June 2000, p. 21. Whole Foods and Wild Oats (the other major US natural foods supermarket) together had US$2.34 billion in sales in 1999.

27. Examples include Whole Foods and Wild Oats (the two natural foods supermarkets), Vestro Natural Foods (formed in 1988 to acquire Westbrae Natural Foods and Little Bear Organic Foods, two processing/products companies), Odwalla, the Hain Food Group (processing), Celestial Seasoning (teas), and Ben and Jerry's. Earnings/share and return on equity (ROE) vary widely, depending on the capital intensity of recent investments or on acquisitions of other companies (ROEs for the latest fiscal year for public natural foods companies range from 5 to 30%). Early venture capital investors generally profited handsomely from the initial public offerings in the natural foods sector.

28. M. Patsky et al. *Healthy Returns: How Healthier Lifestyles Create Investment Opportunities*, Adams, Harness & Hill, Inc. report, September 23, 1996; Adams, Harness & Hill, *First Annual Healthy Loving Conference—Information*, New York, March 19–20, 1997.

29. Condor Ventures, which handled a $5.2 million private placement for Stoneyfield Farm in New Hampshire (the no. 1 natural and organic yogurt company in the United States, and no. 4 overall), expects high returns for Stoneyfield's investors after five years (Adnan Drrani of Condor Ventures, personal communication, 1998). Stoneyfield had $29 million in sales in 1996 and in each of the subsequent three years sales increased 25% (Matt Patsky, industry analyst, personal communication, 1998). Mark Retzloff, the cofounder of the country's largest organic dairy farm, Horizon Organic Dairy, reported $30 million in sales in 1997. The company also buys milk from 75 organic dairy farms in Wisconsin. Horizon's recent private placement raised cash to buy a 4,000-acre, 3,000-head farm in Idaho; this increased the company's assets on its balance sheet from $2.5 million to $20 million. Horizon's goal is to earn 35–40% returns on this long-term investment. Horizon buys organic sugar from Paraguay and organic fruits from all over Latin America (Retzloff, personal communication, 1998). Trefoil Partners (Roy Disney, major shareholder) bought a controlling interest in Cascadian Farm, a privately held company in Washington, which specializes in frozen organic vegetables and desserts. Cascadian had $20 million in sales in 1996, up 70% from the previous year. Trefoil outbid Kibun Shokuhin of Tokyo, which reportedly tried to acquire the Cascadian interest for $9 million or "twice the face value of the U.S. company's assets (K. Murphy, "Organic Food Makers Reap Green Yields of Revenue," *New York Times*, October 26, 1996). After-the-Fall, the no. 2 organic juice maker, was sold to Smuckers last year for two times the sales (Drrani at Condor Partners, personal communication, 1998). Earth's Best baby food was sold to Heinz in March 1996 for 72 times the earnings by one estimate and 25 times the earnings by another, when accounting for the fact that Heinz was already a packer for Earth's Best's products (Drrani at Condor Partners, personal communication, 1998). All of these companies purchase ingredients from Latin America.

30. Alexandre Harkaly, Instituto Biodinamico, personal communication, 1998.

31. The information on underutilized species is based in part on National Research Council, *Cost Effectiveness Summary of Studies on Underused Plants and Animals* (Washington, D.C.: National Academy Press, 1993); N. Vietmeyer, "Harmonizing Biodiversity Conservation and Agricultural Development," in J. P. Srivastava, N. J. H. Smith, and D. A. Forno, *Biodiversity and Agricultural Intensification* (Washington, D.C.: World Bank, 1996); L. Luxner, "The South American Leaf," *Aramco World* (November/December 1995), 28–30; B. Rensberger, "Nurturing a Cornucopia of Potential," *Washington Post,* October 20, 1993, 1; T. Aeppel, "Weird Amazon Fish

Hook Trendy Chefs," *Wall Street Journal,* June 18, 1996; K. Schmeider, "Making Jojoba While the Sun Shines," *New York Times,* February 16, 1986; National Research Council, *Making Aquatic Weeds Useful: Some Perspectives for Developing Countries* (Washington, D.C.: National Academy Press, 1987); NRC, *Crocodiles as a Resource for the Tropics* (Washington, D.C.: National Academy Press, 1983); NRC, *Underexploited Tropical Plants with Promising Economic Value* (Washington, D.C.: National Academy Press, 1975); G. Escobar, "Andean Heirlooms," *Washington Post,* January 10, 1996, E1; D. J. Schemo, "Hope for Amazon Rain Forest: New Fruit," *New York Times*, September 24, 1995.

32. FAO food statistics, quoted in "Dwindling Diversity," *Washington Post*, February 15, 1997, A30.

33. R. J. Roberts, "Species Can Be Saved through Farming," *Fish Farming International*, July 1993. For a review of environmental guidelines and practices for aquaculture, see M. Rubino and C. Wilson, *Aquaculture Regulation Guidelines*, Study and conferences cosponsored by the U.S. Departments of Commerce and Agriculture and the Maryland Departments of Agriculture and Natural Resources (Bethesda, Md.: Bluewaters, 1993).

34. D. Aiken, "Bivalve Culture in Chile: Cada vez hay mas y mas ostiones!" *World Aquaculture*, vol. 24, no. 4 (December 1993), 7–19. The author visited scallop projects in Ihle Grande, Brazil.

35. N. Castagnolli, "Status of Aquaculture in Brazil," *World Aquaculture,* vol. 26, no. 4 (December 1995), 35–39; "The Pirarucu—Giant Red-Fish of the Amazon," *The Canopy*, a publication of the Rainforest Alliance, Spring 1994, 3.

36. Several institutions in the state of São Paulo have formed a joint program to offer short-term courses for fish farmers. These include the Centro de Aquicultura da UNESP (Universidade Estadual Paulista), the Instituto de Pescca (Agriculture State Secretary), and CEPTA (Centro de Pesquisa e Treinemento em Aquicultura from the federal Environment Agency). Such efforts, along with graduate courses organized by the Department of Aquaculture of the Universidade de Santa Catarina and the Centro de Aquicultura of UNESP, are expected to stimulate further development of the industry. *World Aquaculture* magazine recently predicted that Brazil would become a leading producer of aquaculture products.

37. M. C. M. Beveridge, L. G. Ross, and L. A. Kelly, "Aquaculture and Biodiversity," *Ambio*, vol. 23, no. 8 (December 1994), 497–502; J. Tobey, J. Clay, and P. Vergne*, The Economic, Environmental, and Social Impacts of Shrimp Farming in Latin America*, University of Rhode Island, Coastal Resources Center, Coastal Management Report 2202 (University of Rhode Island, Narragansett, June 1998).

38. Recent aquaculture textbooks and production manuals contain many best practices to minimize environmental impacts. Also, the journal of the World Aquaculture Society devoted an entire issue to environmental concerns: "Sustainability," *World Aquaculture*, vol. 27, no. 2 (June 1996). The literature also addresses specific environmental issues. See, for example, G. Iwama, "Interactions between Aquaculture and the Environment," *Critical Reviews in Environmental Control*, vol. 21, no. 2 (1991), 177–216; Washington Fish Growers Association, "Best Management Practices for Net Pens," October 1, 1991; C. J. Sinderman, "Strategies for Reducing Risks from Introduction of Aquatic Organisms: A Marine Perspective," *Fisheries,* vol. 11, no. 2, (1986), 10–15. A brief review of best management practices and quality assurance guidelines for marine fish culture may be found in K. L. Main and C. Rosenfeld, eds., *Culture of High-Value Marine Fishes in Asia and the United States* (Honolulu: Oceanic Institute, 1994).

39. Global Aquaculture Alliance news release, September 30, 1997, from the National Fisheries Institute, Arlington, Va.

40. Thomas Harding, past president of IFOAM, and Aldin Hilbrands of Agro Eco Consultancy, Bennekom, the Netherlands (1998), personal communication.

41. Marine Stewardship Council brochures and announcements (1997), WWF UK, and Unilever.

42. "Extracts on the Kyoto Declaration and Plan of Action on the Sustainable Contribution of Fisheries to Food Security," *Infofish International*, vol. 1 (1996), 13–15.

43. FAO statistics, quoted in "Dwindling Diversity."

44. This is confirmed by a review prepared for the FAO by the 1995 Kyoto Conference on the Sustainable Contribution of Fisheries to Food Security, which concluded that even under the most optimistic circumstances, fish supply may not meet demand. The participants' findings indicate that the world demand for food fish is likely to increase from 75–80 million tons in 1994 to 110–20 million tons in 2010. Supply is expected to vary from 74 to 114 million metric tons under worst- and best-case scenarios.

45. FAO Statistics, quoted in "Dwindling Diversity."

46. E. O. Wilson, *Biodiversity*,

47. "Brazil: Trees and the Law," *Economist,* February 7, 1998, 36; J. G. Laarman, *Government Policies Affecting Forests in Latin America*, Inter-American Development Bank, Environment Division, Report ENV-108 (Washington, D.C., March 1997); Dourojeanni, "Public Sector Roles."

48. D. Bryant, D. Nielsen, and B. Tangley, *The Last Frontier Forests* (Washington, D.C.: World Resources Institute, 1997); N. Johnson and B. Cabarle, *Surviving the Cut: Natural Forest Management in the Humid Tropics* (Washington, D.C.: World Resources Institute, February, 1993); R. Crossley, "A Review of Global Forest Management Certification Initiatives: Political and Institutional Aspects," paper prepared for the conference on Economic, Social and Political Issues in Certification of Forest Management, Malaysia, May 12–16, 1996.

49. M. B. Jenkins and E. T. Smith, *The Business of Sustainable Forestry* (Washington, D.C.: Island Press, 1999); J. Polak et al., *Sustaining Profits and Forestry: The Business of Sustainable Forestry* (Chicago: John D. and Catherine T. MacArthur Foundation, 1997); "Light at the End of the Forest: The Forestry Industry's Bumpy Road to Greenery" in *Tomorrow, Global Environmental Business*, no. 2, vol. 5 (April–June, 1995).

50. Polak, et al., *Sustaining Profits and Forestry*. See also Forest Stewardship Council brochures and Web sites.

51. Polak et al., *Sustaining Profits and Forestry.*

52. Aracruz and Veracruz Florestal, two of Brazil's largest eucalyptus pulp producers, follow these practices.

53. *Tomorrow* (January–February 1998), p. 14.

54. Polak et al., *Sustaining Profits and Forestry.*

55. World Bank/WWF Alliance for Forest Conservation and Sustainable Use, Memorandum of Understanding, April 28, 1998.

56. Polak et al., *Sustaining Profits and Forestry.*

57. C. Brown-Humes, "Survival Strategy: Nordic Countries Are Facing Pressure to Preserve Their Forests," *Financial Times*, July 5, 1995; B. Simon and C. Brown-Humes, "Wood Supply's Stunted Growth" and "Certificates for Swedish Forests," *Financial Times* (February 28, 1996).

58. Logging trends in tropical forests are reviewed by Johnson and Cabarle, *Surviving the Cut*. According to the ITTO, Brazil's exports to Asia and other new markets will probably begin to take off. Export markets are increasingly accepting of lesser-known species, and for many companies, the distances to domestic markets (sometimes up to 1,000–1,500 kilometers) often make export markets more attractive because higher prices can generally be obtained in the international trade.

59. See FAO statistics. For a review of the industry context, see T. Lent et al., "Sustainable Forestry within an Industry Context," Report to the John D. and Catherine T. MacArthur Foundation, January 1997.

60. Lent, "Sustainable Forestry."

61. P. N. Varangis, R. Crossley, and C. A. Primo Braga, *Is There a Commercial Case for Tropical Timber Certification?* World Bank Policy Research Working Paper 1479 (Washington, D.C., June 1995), 22, 23.

62. See Kare Keipi, ed., *Forest Resource Policy in Latin America* (Washington, D.C.: Johns Hopkins University Press, 1999).

63. J. G. Laarman, *Government Policies Affecting Forests in Latin America,* Inter-American Development Bank, Environment Division, Report ENV-108 (Washington, D.C., March 1997).

64. See World Bank, "Pilot Program to Conserve the Brazilian Rain Forest: Report on the Fourth Participants Meeting, Manaus-AM, October 28–30, 1997 (Washington, D.C., January 15, 1998).

65. For a review of buyers' groups, see Crossley, "A Review of Global Forest Management Certification Initiatives."

66. Polak et al., *Sustaining Profits and Forestry.*

67. Gibson Guitars is switching its entire annual production (100,000 guitars) to timbers certified as forest friendly by Rainforest Alliance. See *New York Times*, Sunday Magazine, May 26, 1996, sec. 10. Flora and Fauna International, based in the United Kingdom, has a similar program for a variety of musical instruments.

68. Some examples are Portico, a producer of wood doors in Costa Rica; PIQRO, a Mexican producer of hardwood floors; and Precious Woods, a Swiss company operating in Costa Rica and Brazil. Others were reviewed in a series of business case studies prepared for the MacArthur Foundation and published in Jenkins and Smith, *The Business of Sustainable Forestry.* See also C. Best and M. Jenkins, "Capital Markets and Sustainable Forestry: Opportunities for Investment," John D. and Catherine T. MacArthur Foundation report, 1999.

69. A. Petersen, "The Making of an Herbal Superstar," *Wall Street Journal,* 1998.

70. See M. Nuding, *The Potential of Wildlife Management for Development Cooperation* (Eschborn, Germany: Deutsche Gesellschaft für Technische Zusammenarbeit; GTZ, Eschborn, Germany, 1996).

71. The Body Shop, for example, advertises its purchasing practices.

72. New Hope Natural Media, Inc., *Natural Foods Merchandiser* (June 1999), p 1.

73. J. Clay, "Report on Funding and Investment Opportunities for Income Generating Activities That Could Complement Strategies to Halt Environmental Degradation in the Greater Amazon Basin," Cultural Survival Enterprises report to the Biodiversity Support Program, February 18, 1992; B. L. Axtell and R. M. Fairman, "Minor Oil Crops," FAO Agricultural Service Bulletin 94 (FAO, Rome, 1992).

74. E. J. Richardson Associates, Inc., "Research and Extension Projects for Food and Food-Related Products," Consultancy 007/BIRDIII, Instituto Interamericano de Cooperação para Agricultura, Brasilia, Brazil, 1994; also A. B. Anderson, P. H. May, and M. J. Balick, *The Subsidy from Nature: Palm Forests, Peasantry, and the Development on an Amazon Frontier* (New York: Columbia University Press, 1990).

75. J. A. Dixon and J. A. Lampietti, *To See the Forest for the Trees: A Guide to Non-Timber Forest Benefits*, World Bank Environment Department Paper 013 (Washington, D.C., July 1995); D. Stiles, "Tribals and Trade: A Strategy for Cultural and Ecological Survival," *Ambio,* vol. 23, no. 2 (March 1994), 106–11; L. Tangley, *The Tagua Initiative* (Washington, D.C.: Conservation International, 1993).

76. For definitions of ecotourism, see K. Brandon, *Ecotourism and Conservation: A Review of Key Issues* (Washington, D.C.: World Bank, April 1996); H. Ceballos-Lascurain, *Tourism, Ecotourism and Protected Areas* (Gland, Switzerland: IUCN, 1996); S. Blangy and M. E. Wood, "Developing and Implementing Ecotourism Guidelines for Wildlands and Neighboring Communities," in K. Lindberg and D. E. Hawkins, eds., *Ecotourism: A Guide for Planners and Managers* (North Bennington, Vt.: Ecotourism Society, 1993), 32–34.

77. See M. P. Wells, "Economic Perspectives on Nature Tourism, Conservation and Development," World Bank Environmental Economics Series draft paper, August 1997; G. Wall, "Is Ecotourism Sustainable?" *Environmental Management,* vol. 21, no. 4 (1997), 483–91; J. P. Sterba, "People and Pollution Threaten World's Last Best Diving Sites," *Wall Street Journal*, May 10, 1996. Also see continuing Internet interchanges on the impacts of tourism on the Galapagos Islands.

78. "Ecotourism: A Good Trip?" *Economist*, August 30, 1997, 48–49.

79. "Ecotourism: A Good Trip?"

80. See Wells, "Economic Perspectives on Nature Tourism." For a review of research projects, see K. Lindberg and J. Enriquez, "An Analysis of Ecotourism's Economic Contribution to Conservation and Development in Belize," vol. 1: Summary Report, World Wildlife Fund and Belize Ministry of Tourism and Environment, 1994; "Ecotourism and Environmental Linkages in Peru: A Framework for Action," Executive Summary, Government of Peru and the World Bank, October 1995.

81. World Travel and Tourism Council statistics from 1995, cited in Brandon, *Ecotourism and Conservation*.

82. S. Graham, *Adventure Travel in Latin America* (Berkeley, Calif.: Wilderness Press); W. Leitch, *South America's National Parks* (Seattle, Wash.: Mountaineers, 1990); J. Wade, "Selling Paradise," *U.S./Latin Trade*, December 1995.

83. Instituto Costarricense de Turismo statistics, quoted in D. Southgate, *Alternatives for Habitat Protection and Rural Income Generation*, Inter-American Development Bank, Environment Division Report ENV-107 (Washington, D.C., March 1997).

84. See several articles on Amazonia, Brazil, Ecuador, Costa Rica, and Argentina in Proceedings of the 1993 World Congress on Adventure Travel and Ecotourism, Manaus, Brazil, 1993.

4

Financing Needs

The demand for environmental products, the urgency of the biodiversity crisis, and the capital needs of small and medium-sized biodiversity companies provide a compelling rationale for attracting capital to biodiversity enterprises. The market review in Chapter 3 and the list of businesses in the Appendix show that markets for biodiversity products are thriving, especially in Latin America. Up to now, biodiversity enterprises in the region have been financed largely by traditional sources: family savings, cash flow reinvested from existing businesses, trade finance, advance payments or loans on product, bilateral and development bank financing, and some traditional bank financing. Although investors and banks are channeling small amounts of capital in the region's biodiversity sectors, there is insufficient longer-term equity and debt to respond to the capital needs and market potential of projects in these sectors—and to get these businesses to grow fast enough to make a positive contribution to biodiversity conservation.

This chapter discusses both the financing constraints and ways to accelerate the implementation of biodiversity businesses, through new sources of long-term financing and by combining financial and biodiversity objectives.

Financing Constraints

Small and medium-sized enterprises (valued at up to $10 million) often have difficulty obtaining long-term finance. Of course, some ventures have no trouble obtaining working capital or trade financing once they are up and running. For example, many farmers and processors supplying the natural foods market are able to establish financial arrangements with buyers from North America, Europe, and Japan. And conservation projects and microenterprises can tap the more than US$1 billion in funds available from foundations, trusts, local governments, and multilateral and bilateral institutions. But these funding sources cannot fill the long-term capital needs of growing commercial businesses.

These obstacles are greatest for enterprises seeking debt and equity financing to start up, expand, convert to sustainable practices, or move into value-added processing. With the exception of microenterprises and a handful of large projects, biodiversity ventures in Latin America typically are seeking a blend of equity and debt in the range of US$100,000 to US$5 million. Because most small and medium-sized enterprises in Latin America are family owned, savings and cash flow from existing operations are reinvested in the business. Many have access to short-term borrowing from local and international banks and from purchasers of product (trade finance). However, they are seldom able to obtain long-term capital. The reasons are several:

- Most biodiversity businesses are too small for standard institutional financing. There are only a few large projects in the US$10–50 million bracket.
- Local bank debt is scarce and interest rates often prohibitively high.
- Potential investors tend to view such ventures as high-risk, costly transactions, especially

given the small size of the projects, the difficulties surrounding biodiversity issues, and the lack of public policy aimed at conservation (e.g., land tenure reform, zoning, forest protection).

- Local banks and other investors are unfamiliar with these sectors. There is still little reliable information on returns on investment in biodiversity sectors: case histories are sparse, and few if any analysts follow these sectors. The handful of private equity funds operating in the region are just beginning to make investments—returns are still three to five years away.
- Bilateral agencies and foundations focus on NGOs and microenterprises. Although government and bilateral agencies are making some investments in biodiversity enterprises, the total amounts are still small and the funds can be difficult to tap. Private sector companies usually fall outside the parameters or target programs of foundations.
- Most investment funds in Latin America concentrate on listed securities or larger unlisted infrastructure projects.
- The family-owned structure of many biodiversity companies does not readily lend itself to joint ventures or outside ownership. For one thing, accounting standards vary by country. For another, these ventures seldom give thought to exit strategies for investors and may not have access to liquid capital markets. Therefore, companies may need coaching in structuring exit vehicles such as acquisition/sale to other investors or a larger company, share buyback, profit and revenue sharing, public offerings, and employee and management buyouts.
- Many companies seeking financing in these sectors need assistance in developing their business. Few know how to prepare business, marketing, certification, community relations, and monitoring plans; how to establish links with marketing and technology partners; how to obtain grant or soft loan funds for pilot projects or site engineering; or how to obtain necessary government approvals. Except in the area of organic agriculture, many entrepreneurs in Latin America (as elsewhere in the world) are unaware of the potential advantages of employing certifiable sustainable practices, the management and production practices required for certification, and the market potential of such products.

Box 4.1. Potential Investment Returns in Biodiversity Businesses in Latin America

Few investment analysts follow biodiversity-linked sectors, so little reliable information is available on returns to investment there. However, IFC, consultants to IFC, and the fund managers of Terra Capital Fund have gathered anecdotal information on potential returns from the review of business plans and meetings with entrepreneurs. Successful and promising businesses studied appear to provide a range of solid returns on investment. Certain sectors, such as agriculture, NTFPs, and ecotourism, are more likely to generate early cash flows (in two to four years after start-up operations), while forestry plantations require a longer investment period to realize returns. Businesses producing value-added products from selective-harvest forestry and organic agriculture appear to offer the highest, most reliable returns, with most agriculture projects (organic coffee, beef, cashews, fruits, and cotton) showing returns or projected returns of 10–30%, and forestry indicating returns of 10–20%. Some ecotourism deals also look promising, and the projects analyzed have projected internal rates of return (IRRs) as high as 20–30%. Again, these are projected returns for successful projects: many projects simply fail or fail to reach expectations. As the sector develops, returns for larger projects may approach those now being reached in the natural foods industry in North America.

Attracting New Sources of Long-Term Investment

Of the many financing constraints, the largest challenge for most biodiversity businesses lies in obtaining long-term capital. However, the tide may be turning: now that biodiversity firms are beginning to show profits, private investors and larger companies are paying more attention to the possibilities in those sectors. Also, a decade of modest investment in biodiversity businesses has begun to create the infrastructure needed to support increased investment in the sector. Such infrastructure consists in part of regional and international networks of technical expertise in sustainable forestry and agriculture and NTFPs. A greater flow of microlending and private capital in support of

pilot projects and infrastructure will help to lower market-entry barriers to new enterprises. Institutional investors would find opportunities in the natural foods industry especially interesting.

Greater amounts of investment could come from various sources of capital, especially in the private sector: private equity funds targeted at biodiversity, institutional investors, corporate investors, the International Finance Corporation, multilateral and bilateral organizations, and the development community in general.

Private Equity Funds Targeted at Biodiversity

Water and wastewater treatment, renewable energy, and natural foods are attracting some attention from venture capitalists. Two such groups—Ventana (based in the United States and Mexico) and the Global Environment Fund (based in the United States and not to be confused with the international Global Environment Facility)—are making water, wastewater treatment, and renewable energy investments in emerging markets. Trefoil Natural Foods/Shamrock Capital (California), Frontenac (Chicago, Illinois), and Shansby Group, Venture Strategy Group, and Rosewood Capital (all in San Francisco, California) are investing in U.S. natural foods companies, although some may consider investments in emerging markets.[1] By and large, private equity funds may not be predisposed to consider biodiversity investments or understand the types of technologies and risks involved.

However, a few existing funds in Latin America are making investments that touch on biodiversity. These funds combine private and institutional money with multilateral and bilateral government investment. Environmental Enterprises Assistance Fund, a nonprofit venture fund with offices in Arlington, Virginia, and San Jose, Costa Rica, manages Corporación Financiera Ambiental, a US$10 million fund for Central America raised from the Multilateral Investment Fund, the Swiss government, and a few other investors. Over the past few years, EEAF has made more than 25 investments in renewable energy, organic agriculture, environmental technologies, and forestry. Triodos, a Dutch bank and venture fund manager, makes investments in small and medium-sized projects in Europe and in developing countries, largely in organic agriculture and the wind and solar energy industries. Triodos receives its funds from a variety of investors, including the Dutch government, Dutch "green" funds,[2] and the national lottery.

Box 4.2. Terra Capital Fund

Terra Capital Fund, a biodiversity investment fund for Latin America, was developed by IFC and is managed by a consortium composed of A2R, Inc. of São Paulo, Brazil; Environmental Enterprises Assistance Fund of Arlington, Virginia; and Sustainable Development Inc. of Rio de Janeiro, Brazil. The fund will invest with others in medium-sized projects in Latin America. Target sectors are sustainable agriculture, sustainable forestry, and ecotourism. The fund began operations in October 1998 with an initial capitalization of US$15 million. Investors include IFC, the Calvert Group, Jeremy Grantham, Banco Axial (owned by Pierre Landolt), the Swiss government, the Multilateral Investment Fund, and the John D. and Catherine T. MacArthur Foundation. Brazilian pension funds are considering an investment in the fund. A US$5 million GEF grant to the fund manager will cover the incremental biodiversity-related costs over and above the costs of running a typical fund (for extra biodiversity review work, monitoring, advisers).

Institutional Investors

Institutional investors include banks managing pools of money, pension funds, insurance companies, university and foundation endowments, and institutional money managers. Several German, Swiss, and Dutch banks and a few U.S. and U.K. mutual funds now manage "green" funds or funds that invest in companies that meet environmental screening criteria. Most of these funds invest in listed securities (large companies listed on stock markets) rather than in unlisted smaller private companies. However, a few are beginning to consider and invest in biodiversity projects. The following investments were made in the mid- to late 1990s.

These are:

- A Swiss company, Precious Woods, raised an estimated US$40 million largely from Swiss institutional investors for sustainable forestry operations in Costa Rica and Brazil.
- A U.S. company, Sustainable Forest Systems, raised about US$12 million for certified forestry operations in Paraguay from institutional investors in the United States.[3]
- Another U.S. consortium, Savia (or Trillium) raised US$100 million for a planned sustainable forestry operation in Chile and Argentina that subsequently did not proceed.[4]
- A2R, Inc. of Brazil and Grantham, Mayo, Van Otterloo & Co., a fund management company based in Boston, recently formed a forestry fund to invest up to US$100 million in sawmills in Brazil that will handle certified wood.[5]

Box 4.3. Carbon Offsets

Several pilot projects have been established in which power generation utility, energy, and automobile companies in countries of the Organization for Economic Cooperation and Development have invested in plantation or forest management projects to "buy" credits for CO_2 sequestration to offset their carbon dioxide emissions—or to demonstrate the concept of carbon offsets or sequestration. The forest preservation or reforestation activity also has a biodiversity benefit. Specific examples include wind energy and reforestation in Costa Rica, an electric power company's commitment to double the size of a national park in Bolivia, and a recent US$15 million grant by Peugeot for reforestation of native species in Brazil. Although there is some uncertainty about the eligibility of forestry projects under the Kyoto Protocol, if the protocol comes into force, it is expected to create enhanced opportunities for carbon sequestration projects.

Sources: "Costa Rica: Your Pollution, Our Forests," *Economist*, June 27, 1998, p. 36; "Double the Park, Cut the Carbon," *Nature Conservancy*, March/April 1997, p. 30; Pro-Natura International's Fall 1998 Newsletter, Paris, France. See also M. Totten, *Getting It Right: Emerging Markets for Storing Carbon in Forests* (Washington, D.C.: World Resources Institute, 1999).

About seven companies in North America manage forestry funds for institutional investors with US$7.5 billion under management. Most invest in North American plantations, although some include plantations in New Zealand and Chile. A few of these and several other groups are developing international funds and seeking investments in Latin America.[6]

Corporate Investors

In the agricultural sector, organic farmers have turned to marketing and processing companies for short-term finance in the form of advance payments on crops, financing of working capital, or supply purchase agreements. Larger organic processing plants (valued at US$10 million to US$25 million) may be constructed in the next few years for sugar, soybeans/grains, and fruits and fruit pulp. Joint ventures and marketing or technology partnerships with large companies are a likely source of funds for projects in the biodiversity business sectors. Large forestry companies may be considering sustainable forest operations in Latin America in the range of US$10 million to US$20 million.

International Finance Corporation

Many potential biodiversity ventures are considered too small or risky for direct IFC cofinancing. Beyond dedicated biodiversity funds such as Terra Capital Fund (see Box 4.2), IFC can support this sector through more conventional private equity funds or other intermediaries that receive IFC investments. IFC is participating in about 100 private equity or venture capital funds. Some of these are in Latin America. All are looking for viable businesses, and some will consider start-ups. For example, the Chiapas Fund in Mexico invests in agricultural ventures that could include biodiversity-friendly enterprises. IFC also has several regional project development facilities or business development units, some of which work in collaboration with special funds targeted at smaller businesses in places such as Africa, the Mekong Delta, the South Pacific. These funds and facilities have invested in or assisted ecotourism and smaller-scale agricultural enterprises.

Box 4.4. IFC/GEF Small- and Medium-Scale Enterprise Program

IFC is managing the IFC/GEF Small- and Medium-Scale Enterprise Program with US$20.8 million from the GEF. Loans of up to US$1 million are advanced to financial intermediaries including NGOs and private companies, which in turn lend to or invest in enterprises in this category. Although the loans to the intermediaries are subsidized to account for high risks and monitoring and evaluation work, the intermediary takes the credit risk. Loans related to biodiversity have been made to a forestry NGO in Costa Rica, an organic berry farm in Poland, a game reserve in Zimbabwe, and an international NGO for forestry and ecotourism projects in Papua, New Guinea.

Multilateral and Bilateral Organizations

Several investment programs supported by other multilateral agencies are open to biodiversity investment proposals. Examples from this group are the Multilateral Investment Fund managed by the Inter-American Development Bank; Fundación Bolivia Exporta, with $35 million in funds from the World Bank and the Dutch and Swiss governments for private sector projects in Bolivia; and Corporación Andina de Fomento (CAF, the Andean Development Corp.). The IDB and the Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) have sponsored workshops in recent years to help them identify ways to invest in biodiversity conservation.[7]

The Development Community

Starting in the early 1980s, the development community recognized the need for economically self-sustaining projects. Many government, bilateral, and multilateral funds now target enterprise creation linked to conservation. Their assistance consists of a combination of technical support, grants, and low-interest loans. For example, bilateral agencies finance small agriculture and forestry projects. The World Bank, using funds from the GEF, has worked with governments, NGOs, and foundations to launch national environmental trust funds that support revenue-generating projects in and bordering on national parks. U.S. foundations—including Rockefeller Brothers, MacArthur, Ford, and Heinz—make grants to, and project-related investments in, environmental enterprises.[8] They often play a critical role in supporting initiatives during their early stages and leveraging other grant and private sector funds.

Combining Financial and Biodiversity Objectives

As just indicated, biodiversity enterprises do have a potential pool of long-term capital to tap, in both the public and private sectors. A key challenge is how to meet both financial and biodiversity objectives in the investment projects. On one hand, the "pure" financial investor may be interested in maximizing returns on investment (and perhaps building brand name and obtaining shelf space in supermarkets for products). On the other hand, some public sector investors or foundations may seek to maximize biodiversity conservation benefits. Some private and public sector investors will hope to meet both objectives. For example, an investor in a certified organic agriculture or forestry project will not only look for a good return on investment but also want to see biodiversity benefits or evidence of best practice in terms of environmental criteria.

For purely financial investors, of course, the financial objective will always win out over the biodiversity objective. However, even investors who have an interest in biodiversity will at least want the project to make a decent return on investment—otherwise the enterprise will go out of business and the biodiversity benefit of the project may be lost.

Ways to Meet Both Objectives

There are ways to maximize both financial and biodiversity objectives:

- Select projects in which the financial and biodiversity objectives reinforce each other. Selecting ones with products that require environ-

Table 4.1. Financing Needs: Opportunities and Challenges

Sector	Range of Deal Size	Financial and Biodiversity Investment Criteria	Factors Affecting Development of Market	Problems/Challenges
Sustainable agriculture	$ 150 K to $25 M	Existence of domestic and international markets; access to technical and marketing expertise; provides alternatives to destructive practices; certification; demonstration value.	Availability of training/expertise; marketing infrastructure; availability of targeted capital; speed of market conversion to organics in Europe and the United States.	Lack of risk capital; lack of grants to reduce project development risk; smaller growers need basic infrastructure (processing, cooling, etc.), technical assistance, and better knowledge of markets.
Sustainable forestry	$ 500 K to $50 M	Forest management plan and certification; access to value-added processing; sustainable forestry experts on staff; marketing plan.	Speed of market adoption of sustainable forestry products; forest management plans adopted in Latin America; availability of and access to certification services; availability of funds for sustainable forest management training.	Forest management has long payback periods; many operations lack value-adding capacity; many projects lack marketing skills and adequate business planning.
Ecotourism	$ 500 K to $25 M	Adherence to best standards (building design, renewable energy, local materials, water efficiency, waste treatment); carrying capacity study monitoring plan; reinvestment in biodiversity protection; local population benefits.	Development of industry standards/guidelines; growth of nature tourism; health of global economies; development and access to sources of finance.	Sparse industry standards/guidelines; some operators lack knowledge/training; no certification of operations available; biodiversity impact not monitored; carrying capacity of sites not known; industry vulnerable to recession/overcrowding; insufficient funding sources.
Nontimber forest products	$ 100 K to $5 M	Access to market infrastructure; land use planning, monitoring of biodiversity impact; value added close to source; product diversification; local population benefits; technical evaluation of sustainability.	Development of local and regional markets; price stability; improvement of process and technologies and transportation; infrastructure; strengthening linkages to international markets; better access to research and information.	Volatile markets and price fluctuations; uncontrolled extraction, lack of research, rudimentary processing; underdeveloped links to markets; poor transport; local management often lacks business experience.

mental certification for market acceptance is one step in this direction. Businesses that receive environmental certification are required to follow best practices that include biodiversity considerations. Note that some environmental certifications do not necessarily imply biodiversity-friendly practices (recall the example of the forest cut for organic coffee).

- Stipulate that a certain biodiversity objective must be met as a prerequisite for access to a site (e.g., for ecotourism or low-impact certified forestry).
- Seek partnerships between the private sector, NGOs, and the government. Business ventures backed in this way are more likely to emphasize both financial and biodiversity objectives. For example, a private food processing/marketing company, private landowners, and either NGOs or government agencies that own large amounts of rangeland in the United States, Brazil, or Argentina could join forces to raise and market "natural" or certified organic beef under best practices that sustain the biodiversity functions of the rangeland. Another example might be an ecotourism venture in the Yucatan region of Mexico designed by hoteliers in cooperation with local universities, governments, communities, and NGOs.
- Obtain grants, low-interest loans, loan guarantees from public sector agencies and foundations to cover the extra costs and risks of achieving the biodiversity objective (the GEF incremental cost/risk approach, further described in the next section).
- For investors with specific social or strategic objectives, consider accepting a less-than-market rate of return on investment to achieve biodiversity goals.

Use of Public and Concessional Funds

Adding small amounts of public money to a private sector project or transaction is one way to leverage private sector capital for biodiversity objectives. Such projects might merit concessional funds on various grounds: the costs and risks of development may be high, the sectors may be in their infancy, the entrepreneur may be unfamiliar with the financing sources in the relevant sectors, research may be costly and extensive due diligence required to meet biodiversity objectives. These arguments are similar to the ones used to achieve other public policy objectives (e.g., to promote entrepreneurs in the countries of the former Soviet Union, to create jobs in disadvantaged areas, or to assist regions emerging from civil strife).

When considering the use of concessional funds in private sector enterprises, it is essential to apply those funds in a way that supports the biodiversity objective but minimizes—or preferably avoids—market distortions. In using GEF funds to promote biodiversity businesses, for instance, IFC seeks to target the GEF funds at particular barriers or incremental costs, to use nongrant financing where possible (e.g., low-interest loans or guarantees), to maximize the leverage of the GEF (and IFC) resources, to focus on commercial or near-commercial projects (ones that have a strong market or financial rationale), and to cofinance with GEF when possible.[9]

Some so-called strategic investors and investors with social and environmental objectives may be willing to accept slightly lower returns. However, equity funds targeted at biodiversity sectors seeking returns of 15–20% (rather than the 30–35% typical of commercial investment funds) must structure their investments for expected returns on investment of 25–35% so as to yield a total fund return of 20% (high returns for a few successful investments net of fund expenses and poorly performing investments). Funds with investments from multilateral and bilateral institutions and foundations may be willing to accept lower returns in return for achieving development and conservation objectives.

Notes

1. K. Murphy, "There's Big Green in Organic Food," *Business Week*, October 6, 1997, 170.

2. T. van Bellegem, "Green Investment Funds in the Netherlands," paper presented at the Tenth Session of the Global Biodiversity Forum, Bratislava, Slovakia, May 1–3, 1998.

3. Jeffrey Atkins, President, Sustainable Forest Systems, personal communication, 1997.

4. "Chilean Forestry Project Gets Government's 2nd OK," *Wood Technology, March 1998,* p. 10.

5. John Forgach, AR2, Inc., personal communication, February 11, 2000.

6. The largest funds are Hancock Timber Resources Group, Resources Investments International (in the United States, New Zealand, and Chile), Xylem Investments, Wachovia, Prudential, and Forest Investment Associates. Hancock's investments are not certified by the Forest Stewardship Council, but Hancock insists that the managers of its forestry investments follow best environmental practice. Forestry funds/investments are historically considered a low risk, with steady real returns of 6–15%. The National Council of Real Estate Investment Funds publishes an index for institutional forestry investments that is dominated by Hancock's funds. See also D. Starkman, "Hancock Timber Trees to Solve Its Knotty Problem," *Wall Street Journal,* February 11, 2000, p. B4.

7. G. Nolet and S. Carrizosa, eds., *Investing in Biodiversity: Workshop Proceedings,* Inter-American Development Bank, Environment Division Report ENV-111 (Washington, D.C., September 1977); Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ), *Biologische Vielfalt erhalten! Eine Aufgabe der Entwicklungszusammenarbeit*, GTZ Report 402 (Eschborn, Germany, 1995).

8. In mid-1999, the Nature Conservancy launched EcoEnterprises Fund, a $10 million fund, with $5 million from the Multilateral Investment Fund to provide capital and technical assistance to its NGO partners in Latin America to start revenue-generating activities.

9. See D. Younger and M. C. Rubino, *Private Capital for the Global Environment*, IFC Environmental Projects Unit Working Paper, forthcoming.

5
Moving Forward

To reiterate a point made throughout this discussion, biodiversity businesses offer entrepreneurs and investors alike significant opportunities for economic gain while performing a valuable service to humankind. A few questions remain to be answered, however, before much larger amounts of money are invested in such enterprises. The critical question for conservationists is: Can these businesses expand faster and thereby act more quickly to stem biodiversity losses? A key question for investors is: Can the market growth of the various biodiversity sectors be sustained or increased? This chapter provides a few brief observations about current conditions in the market that may help point the way forward.

The Business Response

Entrepreneurs are responding vigorously to market demand: the rapid growth of natural foods, ecotourism, and sustainable forestry and the numbers and variety of businesses identified in the Terra Capital Fund feasibility study attest to this response.

Reaching Mainstream Markets

Biodiversity business sectors are still small in relation to the overall market in which they operate, although they have made considerable headway in recent years. Natural foods have entered the "mainstream" food sector in North America and Europe. Supermarkets now feature organic produce, and companies that deal in such products are listed on stock exchanges. Certification and environmental labeling for wood products are gaining rapid acceptance by producers and retailers in Europe. As the North American, European, and Japanese food and forest products markets seek out supplies in emerging markets, some producers in Latin America are likely to continue to respond to market opportunity and seek certification. Genuine ecotourism remains a tiny percentage of the overall tourism market.

Investment Interest

Biodiversity businesses are attracting traditional and new sources of investment. Traditional sources include the money invested by agribusiness and institutional investors into the natural foods industry in North America and Europe during the past five years. This investment is beginning to spill over to Latin America as the companies financed by these investments expand and seek reliable and larger sources of supply. New sources of investment are led by a few innovative investment or venture capital funds such as Terra Capital Fund, Triodos, and Corporación Financiera Ambiental. Despite these initiatives, biodiversity investment opportunities remain largely unknown to many at international and local banks, institutional investment companies and funds, and multilateral agencies.

Certification

The recognition and success of certification vary by industry. Certified organic agriculture has been

well established for more than 20 years and has become the most widely accepted indicator of a potentially biodiversity-friendly agricultural product. The forestry industry and concerned NGOs have established certification and best-practice initiatives. So far, those most receptive to certification appear to be the primary producers and buyers of raw and processed wood products, rather than end-use consumers. A hurdle for ecotourism is that almost all nature tourism is advertised as ecotourism, whether or not the business contributes to biodiversity conservation. However, tourism organizations have identified best practices, and businesses teaming up with NGOs may begin to educate consumers about the differences between ecotourism and nature tourism.

Public Policy and Public-Private Partnerships

Several initiatives will help to promote business solutions to biodiversity conservation:

- The Forest Market Transformation Initiative, sponsored by the MacArthur Foundation and the World Bank during the mid-1990s, created Forest Trends in 1998, a nonprofit group with three years of funding to promote private sector sustainable forestry projects. Other measures likely to encourage sustainable forestry and forestry conservation are the alliance between the World Wildlife Fund and the World Bank, the meetings of forestry company chief executives convened by the World Bank, and the creation of major forest reserves by the government of Brazil. In an ideal world, the earth's remaining primary forests would be protected as biodiversity reserves, with limited selective harvesting of specialized woods not available from plantation forests.
- Several large ecotourism, organic agriculture, and multiproduct businesses that combine private sector and NGO partners are in the design stage and may come to fruition in Latin America and elsewhere. The multiproduct businesses seek to conserve large landholdings or large areas of land by working with landowners and local communities in setting goals for projects that combine forestry, NTFPs, bioprospecting, ecotourism, and sustainable agriculture.
- The government of Brazil is designing laws and regulations for domestic biodiversity prospecting and started the Bioamazônia, a public-private program that will invite private sector partners to develop and use the biodiversity and genetic resources of the Amazon. Bioamazônia is overseen by PROBEM (Programa Brasiliero de Ecologia Molecular).
- Programs seeking to conserve the Mesoamerican Biological Corridor, a network of reserves and national parks from Mexico through Panama, have received World Bank, GEF, and bilateral funding during the past decade. These programs are beginning to engage the private sector in conservation efforts.
- Business schools (e.g., INCAE in Costa Rica), hands-on training universities (e.g., Earth College in Costa Rica), and small business training courses (e.g., sponsored by the Multilateral Investment Fund) include sustainable development and biodiversity conservation components in their training materials.
- Various industries, in concert with NGOs, are formulating new initiatives that seek to promote best management practices for shrimp farming, reef fishing, and the aquarium trade.

The Way Forward

The biodiversity businesses described in this report are pioneers in the field. To those who follow in their wake, they demonstrate both the rewards of entrepreneurship and the lessons of experience. Above all, they provide evidence that business activities can actually conserve and make sustainable use of biodiversity. Events of the past few years suggest that the growth of the industry's various sectors may accelerate and thereby help biodiversity enterprises meet conservation and market development objectives.

Appendix: Examples of Biodiversity Business Opportunities

Sources of Information: Methodology

Between 1994 and 1998 IFC collected information on biodiversity-linked businesses in Latin America. The project began in 1994 with a feasibility study (sponsored by IFC and the Heinz Endowments) and was extended in the next three years by IFC in conjunction with the development of the Terra Capital Fund (the biodiversity fund for Latin America). The resulting database on biodiversity-based industries is complemented by information from the IFC/GEF Small- and Medium-Scale Enterprise Program on project opportunities in Latin America. The examples of deal flow provided here also draw on work sponsored by the John D. and Catherine T. MacArthur Foundation and conducted by EA Capital.

IFC and the Terra Capital Fund manager identified more than 100 ventures that might meet both the financial return and biodiversity criteria of Terra Capital Fund. Of these projects, about 20 were reviewed in great detail. For other businesses, only partial information was gathered.

The information in this appendix is presented for illustrative purposes only. Some of it is now out of date and its reliability uncertain. Because some of the information was confidential, details about some projects are not given or the location or other features are omitted.

Project Characteristics

Consumer demand for environmentally sensitive products has given rise to new industries that service every level of the product cycle or value chain, from the supply of raw materials to processing and servicing operations, to the manufacture of the final product and retail sale. The new companies within these industries set, certify, and audit environmental standards; provide specialized engineering and design services; and develop environmental technology.

These companies differ in size and have their roots in a variety of endeavors: noncommercial development projects that spin off viable businesses; successful microenterprise projects in need of private investment; small and medium-sized businesses in start-up or expansion phases; larger businesses that want to convert to sustainable practices; cooperatives seeking links with processing and marketing companies; and service companies that certify business operations and market sustainable products.

The size of the enterprises examined ranged from US$250,000 to US$10 million. A few larger businesses were identified in ecotourism (multisite ventures worth up to US$25 million), sustainable forestry (US$10 million to $50 million), and organic agriculture (processing plants for oils or sugar worth US$10 million to US$25 million). The great-

est number of opportunities were identified in the sustainable agriculture sector. A significant number exist in forestry and ecotourism and a smaller number in nontimber forest products. The study team found a diverse and growing number of project developers, business incubators, entrepreneurs, and NGOs that could be formed into a deal referral system. Financiers and entrepreneurs will be able to tap these networks to locate a growing supply of projects over time.

Sustainable Agriculture

Brazil

Organic and Shade-Grown Coffee. Several medium- to large-sized coffee growers in Brazil have converted or are considering converting to certified organic production. Industry experts report attractive returns on investment for organic coffee in Brazil and note that Japanese trading companies are buying or establishing organic coffee farms in Brazil. Smaller operations may also emerge, along the lines of two U.S. organic coffee marketing and distribution companies that have established joint ventures with coffee cooperatives and roasting facilities in Mexico, Peru, and elsewhere. The U.S. marketing companies each have several million dollars in annual sales. Several NGOs have published reports demonstrating the biodiversity benefits of shade-grown and organic coffee: most notably, they extend natural forest, conserve animal habitat, use low or no chemical inputs, and recycle waste products.

Other Organic Agriculture. Sugar, fruit pulp, soybeans, cashews, beef, cotton, palm oil, and palmito products are among the organic agricultural products in demand, primarily for export to specialty and niche markets in Europe, the United States, and Japan. Organic certifiers in Brazil report that about twenty midsized agricultural operations are certified, with many more considering certification. A large Brazilian trading company with palm oil, rubber, and cattle operations is planning organic production for part of its production.

Organic Sugar. A large sugar producer is seeking to convert 300,000 hectares of cattle-grazing land to organic sugar and wants to build a dedicated mill to process the sugar. Cattle ranching and organic sugar production make an interesting combination with several symbiotic connections.

Argentina

Organic Agriculture. In 1996 Argentina's Ministry of Agriculture issued a report devoting a page to each of 23 mid- to large-size companies producing and exporting certified organic products. These companies produced apples, pears, beef, soybean, corn, sunflowers, and olive oil. In 1996 their operations covered about 150,000 hectares, which was up from 10,000 hectares in 1992. Several companies are seeking long-term investment capital for expansion.

Organic Beef. Two groups in Argentina process organic beef, each composed of several ranches. Their combined sales amounted to more than US$10 million in 1996. A third ranch has about US$500,000 in sales. One of the processing facilities is seeking US$15 million to expand its ranching operations.

Paraguay

Organic Sugar. Two medium-sized organic sugar producers export their high-quality crop to U.S. or European juice and organic food manufacturers. Both may consider seeking expansion capital and joint venture partners.

Bolivia

Organic Cacao. Approximately 60% of the output of a marketing and processing cooperative, which represents 840 cacao growers, is certified organic. Part of its production is combined with certified organic raw sugar from Jamaica and made into certified chocolate products in Germany.

Organic Soybeans. A Latin American producer plans to develop 5,000 hectares of organic soy-

beans on existing agricultural land in Bolivia. The property is buffered by natural forests.

Peru

Native Cotton. With annual sales of several million U.S. dollars, one Peruvian company recovers certified organic, naturally grown, and colored cotton fiber from peasant farmers. Through its joint venture partner, which has several textile mills, the company has access to technical and marketing expertise and sales distribution channels in Europe, the United States, and Japan.

Ecuador

Organic Lettuces and Flowers. This cooperative, initially funded with a bilateral grant, produces mini-lettuces for gourmet salads sold on the local market in Quito. Its sales are now growing at more than 100% a year. It is planning an expansion into edible flowers for export.

Organic Bananas. About 500 hectares of bananas have already been converted to organic production. This family-owned business seeks to develop an additional 500-hectare plantation nearby.

Chile

Agricultural Inputs. This project will commercialize leading-edge, organic, and biotechnological techniques and equipment for producing biofertilizers and biopesticides. Much of the technology was specifically designed to be managed by semiskilled workers at the village level. Target customers include larger export farms and cooperatives that are converting to organic production methods.

Underutilized Species and Other Agriculture

Castor Oil Production. With the recent development of a technique for mechanically harvesting castor seeds, castor production has returned to Brazil. A Brazilian company is moving from pilot to full-scale production and the processing of castor oil for food and industrial applications (with phased investments in several million dollar increments). In addition to producing oils, the company has proprietary technology for resins (used in the telecommunications industry) and for foam and plastic substitutes (used for automobile parts).

Amazon Fruit Processing. There are at least 48 native Amazonian fruits with commercial potential.[1] Research institutes and entrepreneurs are providing farmers with seedlings to plant in greater concentrations than would occur in the wild. In 1995, a Brazilian NGO that had studied these fruits and worked with local farmers in the northwest state of Rondonia sold its fruit pulp–processing facility to Congelado, a small Brazilian company specializing in frozen dinners. The company, once featured in the *New York Times,* planned to invest US$1.2 million in equipment to sterilize and vacuum-pack the fruit pulp for sales in the Mercosur region and exports to the United States and Europe.[2]

Vacuum-Processed Storage. A new process using European technology and licensed to a company in Brazil stores grain in vacuum-sealed storage bags. Grain can be stored in this way for up to five years without loss of quality or spoilage. By increasing agricultural efficiency, the technology may reduce the need for agricultural expansion into forestlands.

Andean Countries

Alpaca. Several companies are reintroducing native alpaca in the Andean countries. Some of the wool is sent to clothing manufacturers in Italy.

Aquaculture

Brazil

Amazonian Fish. In the 1970s, research began on several overfished Amazonian and Pantanal species, including tambaqui, matrinxa, pirarucu

(a freshwater cod), pacu, and pintado (a native catfish). In recent years, the number of growers and hatcheries (both large and small) has begun to increase as the production technology has matured. Several hybrids are also grown. Most of the fish is sold in local Brazilian markets, although one exporter is flying frozen filets from Manaus to the United States (still mostly wild caught fish).

Aquaculture Expansion. An established Brazilian company with significant aquaculture experience plans to expand its production of native species and invest in food and processing plants and a cold storage unit.

Pacu, Cashew, and Teak Production. A company with 4,000 hectares of teak (FSC certified) on its 10,000-hectare property is seeking to add certified organic cashew and pacu aquaculture to the business to generate near-term revenues. The cashew trees will provide nuts for export and feed for pacu production.

Scallop Aquaculture. Native scallops and other mollusks and local finfish have been overfished in the Ilha Grande archipelago. Two pilot projects and university research are studying the possibility of farming these species and repopulating depleted native stocks using methods developed in Chile and elsewhere. Privately held hatcheries plan to supply small scallops to fishermen for growout on a contract basis and to larger growout facilities. All of the operations would be linked by a coordinated marketing campaign and backed by an industry-supported university research facility.

Sustainable Forestry

Argentina and Chile

Sustainable Harvesting Operation. Forestal Trillium Ltda., a subsidiary of Savia International of Bellingham, Washington, owns more than 400,000 hectares of woodlands in Tierra del Fuego. The company plans to selectively harvest lenga and other species, prepare several environmental impact statements, and seek FSC certification.[3]

Bolivia

Sawmill Operator. The company manages a sawmill with a processing plant. It owns 700,000 hectares of tropical woodlands and is launching a sustainable harvesting program.

Brazil

Precious Woods. A Swiss company is starting an operation on 50,000 hectares of forest, with 30,000 hectares set aside as a genetic reserve. The company raised US$25–40 million from European pension funds, private investors, and local landowners and seeks additional financing for a processing plant and harvesting equipment. Precious Woods also has operations in Costa Rica.

Integrated Manufacturing of Certified Wood Products. There is talk of combining the following companies into one operation: a company that produces flooring, window frames, and doors; another with a sawmill and milling plant; and a third company that could be a source of certified wood.

Manufacture of Finished Wood Products. An established company produces high-quality wood products, primarily doors and windows (120,000 cubic meters annually), and is selectively harvesting and reforesting 20,000 hectares of tropical forest. The company is seeking to expand to 250,000 hectares of production.

Integrated Sustainable Forestry Company. The company owns 350,000 hectares of tropical rainforest and is interested in developing an integrated sustainable harvesting system, including sawmill and industrialization units.

Integrated Sustainable Forestry Project. The owner of 220,000 hectares of forestland, bordered by a major roadway, wants to develop an integrated certified sustainable forestry project that includes a sawmill, value-added products, and trading operations.

Veneer and Plywood Manufacturer. One of the largest sawmill companies in Amazônia (it produces veneer and plywood from tropical softwoods) is for sale. It harvests and replants its own 250,000-hectare property.

Paraguay

Sustainable Forestry. A two-year-old start-up company purchased low-priced forestlands (20,000 hectares to start) to harvest, replant, and process mixed species of hardwoods (mostly in secondary forest). The company raised capital from U.S. forestry and institutional investors, has established a milling operation, and plans to expand by working with other landowners and purchasing additional land. The company is also harvesting and exporting yerba mate (a tea).

Venezuela

Forestry Concession. This privately financed, environmentally conscious concessionaire conducts harvesting operations over very long cycles (40 years) in a 185,000-hectare tract of forestland. The operator has funded research on the protection of endemic biodiversity in concession forestry.

Flooring Manufacturer. The company produces tropical wood flooring and has recently installed an oriented strand board plant. It owns 132,000 hectares of forestland and is interested in developing a sustainable harvesting system.

Mexico

Mexico has several community-based forestry operations that have received FSC certification. These *ejidos* (cooperatives) supply wood to flooring, charcoal, and other manufacturers.[4]

Laminated-Flooring Manufacturer. This six-year-old laminated-flooring manufacturer sells in the local market and exports to the United States. The company is a major purchaser of wood (largely secondary species) from a successful community-based sustainable forestry program that has been operating for more than a decade on 500,000 hectares of threatened forest in the Yucatan peninsula and supports 80,000 people. After receiving a recent cash infusion from Mexican and U.S. investors, the flooring manufacturer teamed up with a U.S. marketing and sales company and revamped its production line and quality control to meet U.S. market standards. Sales are expected to grow rapidly if market acceptance of secondary species is established.

Honduras

Forestry Cooperative. This indigenous community forestry program on 50,000 hectares has received financial and technical support from international aid agencies. It produces timber that is sold to local value-adding companies. Furniture produced from this wood is sold to major U.S. and U.K. furniture retailers, such as Smith & Hawken.

Central America

Portico. This certified, vertically integrated door manufacturer owns and manages thousands of hectares of rainforest between two national parks. It exports to North America, where it has a significant percentage of the upscale solid door market.

Nontimber Forest Products

Brazil

Rubber Products. The company purchases processed rubber from tappers and indigenous groups in the Amazon and then manufactures and sells simulated leather book covers (for diaries), rubber bags, and clothing to retail stores in Brazil, the United States, and Europe. It is seeking financing to expand its sources of supply.

Palm Heart Processing. Located in the Amazon, an established producer with a large landholding of native forest selectively harvests fruit from a species of palmito that regenerates and produces subsequent crops. Another proposed venture seeks to purchase palm hearts from the local population for processing on a river barge and at an industrial factory. The canned palm hearts would be sold to the United States and Europe.

Pro-Natura International operates a large sustainable development project in Juruena, Brazil. With GEF and private sector funds, Pro-Natura and local residents are developing production and value-added processing for several NTFPs for the domestic and international markets. Total investment sought over a five-year period is US$8.5 million.

Bolivia

Latex Factory. Located in the Pando region of the Bolivian rainforest, the company manages its own concession of wild and plantation rubber trees. The rubber is processed into sheets that are sold to the tire and shoe industries.

Brazil Nut Factory. This factory in the Bolivian Amazon Basin purchases Brazil nuts from local collectors and markets them to the United States and Europe. The company is seeking additional financing.

Nature-Based Tourism or Ecotourism

Brazil

Rainforest Hotel. Brazilian architects, teamed up with an international hotel management company, have proposed to build a 200-room luxury hotel near Belem on a very large property. The undeveloped part of the property would be managed by an international NGO. A portion of the profits would benefit a foundation responsible for conservation and education activities at the site and in the local area.

Rio Negro Hotel Expansion. An NGO is seeking a business partner to complete a US$7 million, 100-unit facility on 1,000 hectares of forest along the Rio Negro River. The project is aimed at tourists seeking the "Amazon experience" and scientists. It is designed to have minimal impact on the environment, and 50% of the NGO's share of profits are to go to the local community.

Model Lodge and Training Facility. An international NGO and a regional hotel association are developing a training facility in the Brazilian Amazon for ecotourism operators and staff. A fully operational ecotourism model lodge would be built according to the highest ecotourism standards to provide students from the facility with on-the-job training. The estimated cost is US$2 million to US$5 million.

Pantanal Ecotourism. Several opportunities exist in this region. A Brazilian NGO is working with local ranchers and an international NGO to create a network of ecotourism inns. Ranchers would convert part of their territories to ecotourism lodging and facilities. The project would cost an estimated US$2 million. Also, a large Brazilian construction company is planning a lodge and mixed agriculture/aquaculture production based on sustainable development practices at a large landholding in the Pantanal. Another example is an established ecotourism lodge with about 40 rooms that is profitable only in the dry season. The company may team up with an Atlantic forest lodge and move its staff to the sister lodge for half of the year.

An NGO ecotourism project, with financial and technical assistance from a North American NGO, owns 229,000 acres of forest and has developed a small ecotourism/education operation on the property. It is seeking $3 million to build additional ecotourism sites on the property and expand operations.

Ecuador

Wildlife Reserve Lodge. A local expedition company runs a small ecotourism lodge in an Amazo-

nian rainforest wildlife reserve. The company needs capital to expand its facilities and implement an extensive land management plan.

Ecotourism Projects. An Ecuadorian tourism company is seeking capital for two ecotourism ventures, one in the Ecuadorian Amazon and the other in the Cajas National Park near the city of Cuenca. The projects require a total investment of US$1.2 million.

Costa Rica

Ecotourism Lodge. The company operates an ecotourism lodge and biological research station (with butterfly and tree seedling production) on more than 1,000 hectares of protected rainforest.

Rainforest Aerial Tram. Now in operation for three years, this ski lift with gondolas allows visitors to move through the canopy of a rainforest located 45 minutes by car from San Jose. The World Bank's Multilateral Investment Guarantee Authority provided risk insurance for the venture. The company is considering other sites in the region.

Mexico

At least two tourism/hotel groups are examining the feasibility of multisite ecotourism lodges in the Yucatan Peninsula and elsewhere in Mexico. The local state governments and universities are collaborating on regional tourism plans. One group is a Mexican hotel company. The other, led by North American real estate and hotel investors, intends to develop several ecotourism lodges in Mexico and the Caribbean.

Regional

Proposed Foundation Network. A foundation proposed a US$20 million business to purchase or build and then operate a dozen or more ecotourism lodges in Latin America in association with a major tour operator. Each lodge would be built and operated according to ecotourism standards and would serve as a model for other ecotourism projects.

Notes

1. D. J. Schemo, "Hope for Amazon Rain Forest: New Fruit," *New York Times*, September 12, 1995.

2. Schemo, "Hope for Amazon Rain Forest."

3. An early 1998 status report appears in "Chilean Forestry Project Gets Government's 2nd OK," *Wood Technology*, March 1998, 10.

4. See J. R. Ward and Y. Bihun, "Stewardship of Mexico's Community Forests," a Natural Resources Defense Council paper, April 1998, submitted for publication in a forthcoming book edited by Conservation International.