

Developing Markets For the Ecosystem Services of Forests

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INTRODUCTION

The many valuable ecosystem services provided by forests -- including watershed protection, biodiversity conservation and carbon storage -- are gaining increasing attention from industry and government, as well as private citizens. These individuals are also increasingly aware of the dangers and costs of allowing forest services to be degraded or lost. This degradation can have local impacts, such as floods and landslides, or broader impacts, like global climate change.

This awareness is drawing attention to the economic benefits of healthy forest ecosystems -- benefits that until recently have been taken for granted. Indeed, as human demands increase and natural resources become scarcer, those who bear the costs of degradation -- such as downstream water utilities, local governments, private insurers and society as a whole -- are exploring opportunities to reduce costs by financing forest conservation. At the same time, some forest owners are seeking compensation for the costs of maintaining healthy forests. Interest in reducing costs, increasing incomes and expanding conservation is moving markets for ecosystem services toward center stage in the debate about forest conservation.

The growing prominence of markets comes at a time when traditional models of government financed protected areas and conservation are under strain. Growing public deficits and increasing frustration with governmental inefficiencies are spurring action by a broad range of stakeholders. This action is increasingly backed up by willingness to put finances toward environmental services. Private companies, individuals, Non-Governmental Organizations (NGOs) and communities are all getting involved, driven by the need to reduce costs, capture new income, improve public relations, manage risks and ultimately, to protect current well-being.

Many promising investments and programs already have been established, with more under development (See Box 1). For example, a Costa Rican utility company voluntarily pays into a fund that provides money for private upstream landholders to increase forest cover. This reduces sedimentation, thus providing sufficient water flow for hydro-electricity generation. In Paraguay, AES, an international power company, paid \$2 million to form a protective reserve for one of South America's last remaining areas of undisturbed dense tropical forest. This helps to offset carbon emissions. In Karnataka State, India, farmers have formed a fund with the assistance of an NGO, the Government of India and the Swiss Development Co-operation to help other local farmers with watershed protection activities, such as regenerating and maintaining fallow land.

Often, public authorities -- particularly when faced with budgetary crisis -- require those who most obviously benefit from ecosystem services to provide financing. This is the case in Colombia, where hydroelectric and water utilities are required by law to allocate a fixed percentage of revenues to an ecosystem fund. The fund pays private landowners for watershed management and purchases hydrologically sensitive lands for management by government agencies.

In addition to direct-investment approaches of this nature, some governments are experimenting with new fiscal approaches. In Brazil, a few states have pioneered a new tax allocation system, under which a percentage of state tax goes directly to municipalities that actively protect watershed areas.

Box 1. The Growing Number of Markets for Environmental Services

In a recent global review of emerging markets for forest environmental services, over 280 cases of actual and proposed payments for four sets of environmental services were uncovered. These include 75 deals for carbon sequestration deals, 72 for biodiversity conservation, 61 for watershed protection, 51 for landscape beauty and 28 for sales of “bundled services.” Far from being concentrated in the developed world, these cases were drawn from a range of countries in the Americas, the Caribbean, Europe, Africa, Asia and the Pacific.

While the study suggests impressive expansion in markets, it also highlights the tremendous variety of market structures. Schemes differ according to the number and type of participants involved, the payment mechanisms employed, the degree of competition and their level of maturity. They also often have very different impacts for local and global welfare. These variations reflect local socio-economic and environmental factors, drivers and ultimately local variations in the process of market development.

Source: Landell-Mills, N., J. Bishop, I. Porras. Forthcoming. “Silver bullets or fools’ gold? Developing markets for forest environmental services and the poor”. Instruments for private sector forestry series. IIED, London.

These many innovations are generating important lessons, yet they limited in scale, scope and impact. Given the tremendous social benefit of forest services, and the many private and public stakeholders who would gain – both socially and economically -- from greater protection, it is vital to tap the potential of market approaches.

The purpose of this paper is to help innovators -- be they forest owners, investors, policy makers or those who are suffering the off-site effects of degradation -- understand the basic opportunities and issues posed by direct investment in forest services. The paper complements the work of others who have reviewed innovative tax policies and other fiscal approaches to forest services. It draws on the combined experience of The Katoomba Group, a collection of international experts engaged in developing markets for forest services.

The paper first describes the principle ecosystem services provided by forests and how market approaches can assist in conserving these services. The types of financial mechanisms currently in practice, the ways in which these mechanisms develop and the key questions used to evaluate these markets are then presented. The conclusion provides perspective on the steps needed to fully develop and expand markets for forest services.

BACKGROUND: THE ENVIRONMENTAL SERVICES OF FORESTS

Forests perform significant services that maintain conditions for all life on earth. The environmental services of forests are those ecological processes from which humans directly benefit. Some of the key environmental services-- carbon storage and sequestration, protection of hydrological function and biodiversity conservation-- are described in Boxes 2 - 4 below.

Box 2. Carbon Storage and Sequestration.

Simply by existing, forests keep carbon out of the atmosphere. In addition, forests can be managed to actively sequester even more carbon and lock it up in biomass. Forests contain about 40% of total terrestrial carbon. Around half of the total dried biomass of forests is carbon. Plants absorb carbon through photosynthesis from atmospheric carbon dioxide. Topography, soil and species composition and climate are all factors that influence the rate at which carbon sequestration occurs in forests. As forests grow and develop, the amount of carbon tied up in living and dead biomass increases. Once mature, the biomass of a forest stabilizes. Therefore, the longevity of trees makes them particularly suited to the sequestration and storage of carbon while conversely, forest clearing and degradation accounts for 15 to 30 percent of all carbon emissions to the atmosphere. These simple relationships underpin the emerging investments in forest carbon sequestration. As a result, forests are elemental to national and international efforts to address global climate change.

Box 3. Hydrological Services

Forests have major effects on hydrological processes, although the extent and value of these services varies with each watershed's circumstances. Transactions in hydrological services are, therefore, site-specific. These transactions depend upon local physical, social and environmental characteristics. The three main beneficial hydrological services may be identified:

Flow Regulation. A forest intercepts rainfall and, with a generally large capacity for water absorption and retention, may in some situations help convert irregular precipitation into a more even flow of water from a catchment area. The risk of flooding due to extreme weather can, therefore, be reduced. A forest may also act as a slow-release reservoir, increasing dry-season base flow from a catchment. On the other hand, a forested catchment may yield less total water than a non-forested one. But even in this case, the useable and non-destructive yield can be enhanced.

Maintenance of Water Quality. Rain falling on a forest is intercepted and filtered through a mass of soil and roots. As a result, water flowing from an undisturbed catchment area is generally high-quality. Disturbance to the catchment and changes in land use can lead to sedimentation and nutrient pollution. This can affect water availability and associated benefits, such as fisheries. The quality of water for human consumption, agricultural use and industrial use also can be affected.

Water Table Regulation. Forests can play an important role in water table regulation. Over time, equilibrium develops between vegetation and the water table. Deforesting a catchment may lead to greater infiltration high in the catchment and rising water tables lower down. This may bring salt water nearer to the surface and affect crops and water quality. Conversely, in other watersheds, water table replenishment may be disrupted. Deforestation can lead to falling water tables if denuded land becomes heavily eroded or compacted and water runs off before it can infiltrate.

Box 4. Biodiversity Services

Forests provide some of the most biodiversity-rich ecosystems on earth and are believed to provide habitat for an estimated 90 percent of threatened and endangered species. Forests house myriad examples of genetic diversity within individual species. Similarly, ecosystems within forests adapt to local and landscape-level variations in the environment. Ecosystems become resilient to environmental disturbance and stress by maintaining diversity on all levels.

Biodiversity has intrinsic value as well as providing practical benefits. Medicines, plant derivatives and other non-timber products may form a foundation for the livelihoods of forest-dwelling people. Biodiversity provides the basis for bioprospecting for new medicines. Agricultural systems depend on pollination and gain resilience from naturally occurring biodiversity. Aspects of biodiversity, such as soil building and nutrient cycling, have general and ubiquitous importance. In addition, social value, from recreation to spiritual and cultural benefits, is increasingly recognized as fundamental to human health.

THE RATIONALE FOR MARKET APPROACHES

Forests' great social value and their many environmental services are frequently not realized by forest landholders. This is because these benefits often are experienced some distance from where they are generated, and no mechanisms exist for compensating forest owners for their services. As a result, these off-site services are often described as "externalities" which forest landholders effectively provide for the public free of charge. At the same time, landholders who allow damage to forests, and thus reduce their supply of offsite benefits, are rarely penalized.

Forest conservation advocates support market approaches because it is thought that capturing the financial value of forest services will promote good stewardship and discourage more degrading uses of forests. Market approaches have gained prominence as frustration has increased with regulatory approaches - often thought to be inefficient, expensive and inequitable.

While markets can be powerful mechanisms for improving human welfare, they are not without risks. Market performance depends on numerous site-specific factors, including existing power-relations, degrees of concentration in demand and supply, the supply of information on trading conditions, and the level of transaction costs. With the right conditions, markets can provide a powerful boost to well-being. Where conditions are less favorable, markets may lead to greater degradation, while at the same time reinforcing existing inequities. The emerging challenge is to find the best market tools that, together with the right regulatory framework, will encourage just and efficient forest conservation.

TYPES OF MARKETS AND PAYMENT MECHANISMS

By the very nature of their adaptability, forests and their ecosystems vary greatly. In the same way, market mechanisms will vary according to their particular ecological, social and political context. However, there are several basic types of market approaches, organized here according to their level of public involvement: self-organized private deals, open trading schemes and public payment schemes.

Self-organized private deals.

This approach includes direct, usually closed, transactions between those who benefit from forest services and those who provide them. This includes deals such as voluntary certification and eco-labeling schemes, direct purchases of land and purchases of development rights to land, as well as direct payment schemes between offsite beneficiaries of forest services and landholders responsible for the services. In France, Perrier-Vittel, a company that sells bottled water, pays upstream landowners to use best management practices on their land to ensure that the company has a supply of quality water. Other examples include conservation groups or businesses motivated by corporate conscience or marketing considerations to pay forest holders for conserving biodiversity. Private deals, typically limited in scope and transparency, benefit from clear property rights and enforceable contracts, although clear rights and enforcement mechanisms are not always necessary. In most cases, little other public involvement is warranted.

Open trading schemes.

This approach is used when a government defines an environmental service commodity to be traded and devises regulations to create demand. In New South Wales, Australia, for instance, the government is piloting proposals for salinity credit trading rooted in broader basin-wide salinity targets. Based on these targets, the government has allocated licenses to dischargers of salinity. The idea is that those wishing to exceed their salinity quota can do so if they purchase salinity credits from those who have taken action to reduce salinity, e.g. by protecting and managing native vegetation. Other examples include tradable development rights pioneered in urban areas of the U.S., the trading of wetland mitigation credits and emerging nutrient trading schemes in some U.S. states.

The most prominent example of open trading is the emerging national and international carbon trading market. Rooted in the Kyoto Protocol signed in 1997, carbon trading has evolved from a marginal and largely voluntary exercise to a mainstream mechanism for reaching local and international emission reduction targets. Despite a recent decision by the U.S. to renounce its commitment to Kyoto, the treaty has stimulated a number of national and regional trading initiatives. In the August 3, 2001, *Washington Post*, a CO₂ trader was quoted as saying that he believes the CO₂ market could be worth tens of billions of dollars by the end of the decade. Forests are a key tool for reducing and storing carbon and trading in forest-based carbon offsets is likely to grow.¹ Any market-based system of trading credits requires a transparent framework, accurate accounting and verification systems.

Public payment schemes.

This approach is used when a government provides the institutional foundation for a program and directly invests in it as well. Examples include the U.S. Conservation and Wetland Reserve Programs, wherein the government pays farmers for managing lands in ways that reduce soil erosion and runoff. In 1998, in response to the Yangtze River floods as well as concern over soil erosion and deforestation, the Chinese government began to plan a Forest Benefit Compensation Fund to be financed by the government and private sector beneficiaries in upper basin areas. Public payment schemes can be administered by purely public agencies or hybrid partnerships with the civil and private sectors. This approach involves both indirect subsidies and direct payments to forest landowners. Prices paid by governments are often determined by political or budgetary considerations, rather than strict economic evaluation of the environmental benefits involved.

¹ As part of the political settlement reached in COP6 in Bonn, a number of limits were placed on the use of forest-based carbon offsets in achieving national emission reduction targets. For details on these see the Pew Centre on Global Climate Change July 2001.

THE PROCESS OF DEVELOPING MARKETS AND INSTRUMENTS FOR SERVICES

Developing markets for forest services is, in many senses, similar to developing any new market. However, the process differs in some key aspects. It is similar in that entrepreneurship, local constraints and opportunity will decide the speed and extent to which a market is developed. Because most forest services are currently treated as free goods, it is perhaps most different in that developing a market often requires converting these freely-accessed goods and services into commodities and property. This is inherently a political process, whereby different stakeholders' rights and responsibilities are questioned, new rules are established, and new entitlements are established. This process occurs in three broad phases (see Diagram 1).

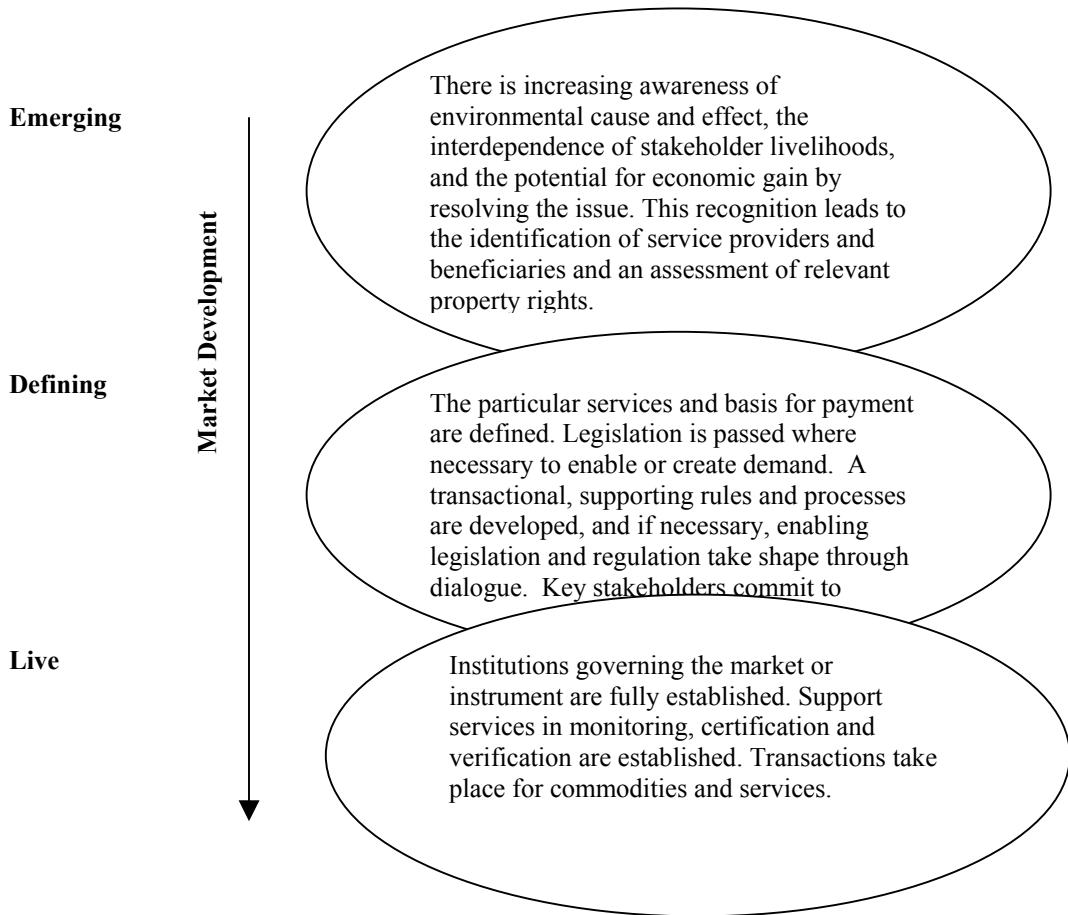
In the first phase, the linkages between forest actions and their consequences are gaining attention. In all cases, an entrepreneur operating either in the public or private sector, and operating as an individual or an entity, shows leadership and mobilizes action by informing stakeholders of the existing problems and opportunities. This action generates willingness to pay for protection from the problems and provides a basis for interested stakeholders entering into negotiations.

In the second phase, the structure is defined. Supporting rules and processes begin to emerge. Except in purely private deals, drafting regulations requires a political process. The regulations define the service, settle the particular rights and duties of the stakeholders and provide a platform for negotiating payments.

In the final phase, the market becomes live. Transactions take place and money changes hands. Service contracts and agreements are established, along with supporting institutions, such as accounting standards, monitoring and certification mechanisms.

The apparent neatness of this scheme is intended for illustrative purposes only. In reality, many stakeholders intervene and interact on various activities within the different phases. Moreover the process is iterative, progressing at different speeds in different contexts, and in some cases involving setbacks.

Diagram 1: Phases of Development of Markets and Instruments for Forest Services



KEY QUESTIONS IN DEVELOPING NEW MARKETS

Experience shows that developing new markets and market-based instruments that add financial value to forests is complex. Interested parties must be identified and they must adopt precise roles in transactions. These transactions must be developed by negotiation and supported by rules, contracts and methods of verification. Despite the diversity of contexts and economic opportunities, innovators face many common issues when considering the development of new markets. A preliminary list of these issues follows.

What environmental services are provided?

A key step in market development involves identifying the ecological conditions that provide direct and demonstrable benefits to people. Better management of the forests may improve the quantity, quality or integrity of the existing services already provided—or it may provide new services altogether. Market development can be accelerated if there is a perception that a service is becoming scarce and thus more valuable. This could apply to habitat loss or declining water quality. Action can be driven by the costs of alternatives or the consequences of service failure. Ultimately, the specific service that is marketed will depend on the particular needs of the buyer. For example, an Australian airline might feel that its public image is served best by funding protection of kangaroo habitat. With respect to watershed protection services, hydropower companies may be interested in controlling sedimentation, while water supply companies may be more interested in reducing nitrogen and phosphorus pollution.

What is the economic value of the environmental service?

To generate willingness to pay for specific environmental services, it is critical that beneficiaries recognise the value of environmental services for their welfare. Impacts may be direct, e.g. the provision of clean drinking water, or they may be indirect, e.g. the reduction of sedimentation and improved hydropower efficiency leading to cheaper and more regular electricity supplies. A number of methods exist for estimating the economic value of environmental services.

Contingent valuation surveys are an increasingly common method involving questionnaires asking beneficiaries their willingness to pay for the continued delivery of a specific service or their willingness to accept compensation for their loss of the service. Another method involves estimating the cost of replacing the particular service, assuming this is possible.

What is the cultural, legal and regulatory context?

Developing a new market instrument for a particular service involves a unique set of stakeholders and governance structures. It also must correspond to that local ecosystem. Most markets, with its unique regulatory, fiscal, and legal context, will require substantial creativity, political leadership and willingness by stakeholders to consider new approaches. As knowledge develops in many cases, continued adaptation will also be needed.

What are the rights and responsibilities of stakeholders?

Property rights are particularly important. Societies differ in how they handle the legal and customary rights of stakeholders in forests. These property rights are often insecure, overlapping and contested, and they rarely explicitly address forest services. If rights over services are not previously decided, developing a market will entail assigning or clarifying them. For example, do landowners have a responsibility to protect forest services or a right to be compensated for providing them? Special attention is required to ensure that the less powerful sectors of society do not lose opportunities and access to resources. Market developers must be fully cognizant of existing power relations, vested interests and the implications of their proposals.

Who are the potential buyers and sellers?

The use of market tools to restore, protect or enhance an environmental service would be impossible without sellers able to deliver the service and buyers financially able to pay. After determining ownership or property rights, the next question must be whether that person is willing to sell. Equally important is the existence of funds sufficient to finance regular delivery of the service. In addition, beneficiaries may be unwilling to pay for a service, such as clean water, which they may consider a right and to which they have always had access.

Can the service be measured and monitored?

Services must be defined in order to enable transactions. A service can be defined in terms of a particular commodity, or simply on the basis of assumed land value. For example, carbon credits can be used to offset emissions or biodiversity credits can be used to offset development.

Hydrological services can be defined in terms of water quality indicators or stream flow reliability. Depending on the quantity, quality or uniqueness of a forest service, it may be difficult to adequately define a commodity or determine a payment level.

What support services are required to enable the market?

In many cases, there is a need for new institutions, ranging from private sector contracts to public entities, to facilitate payment for services. Also, markets require structures for financing, verification, monitoring, accounting and certification. Other necessary structures include business advisory services, planning devices and consultants, independent environmental advisory groups and capacity building. Due to the risks involved in any emerging market, insurance companies and banks can play a critical role by bolstering the security of transactions.

Who benefits?

Sharing the benefits of market creation is important for equity reasons, but it also is critical to the success or failure of payment systems. Where new markets negatively impact particular stakeholder groups, the stakeholders in question will have an interest in undermining its viability. Depending on who these groups are, and how much power they have, the additional risks introduced by inequitable benefit-sharing are potentially significant and may lead to market failure.

MAKING PROGRESS AND MAKING DEALS

While there are many innovative deals and programs in the world, trading in environmental services remains a nascent and marginal affair. The players are just beginning to grasp the potential ways in which markets can help protect forest services and improve well-being. Innovative investments and programs should be pursued by all parties -- forest holders looking for compensation, private investors looking to lower costs or reduce risks, community groups seeking to ensure continued supplies of natural capital and governments looking out for the public good. Pursuing this agenda entails gaining knowledge about market approaches, building institutions to facilitate them and making deals – forging ahead with innovative investments and programs.

Gaining Knowledge

A better understanding of some key dimensions of forest services will facilitate the development of new mechanisms.

- *Biophysical relationships* - It is vital to advance scientific understanding of the biophysical relationships between forest management activities, the flow of services from forests and the resulting impacts off-site. Better data, modeling and analysis will increase confidence and decrease uncertainty about service delivery.
- *Risk management* - It is equally important to understand and develop a range of financial instruments to deal with the uncertainty of these markets. This will most likely entail the creative application of existing instruments such as reinsurance, and guarantees -- and the creation of completely new instruments.
- *Property rights definition* - The role of property rights and regulations is another critical area for development and learning. For example, how can markets be constructed to provide additional incentive for conservation without contradicting existing regulations and without providing “perverse incentives” for poor land use? Lessons from currently emerging experiences will no doubt prove helpful to innovators everywhere.
- *Spreading benefits* - The role of equity and participation in markets requires additional study. How can mechanisms achieve the outcomes desired by investors, while also ensuring equitable treatment of relevant stakeholders? What social standards or criteria should be put in place to ensure adequate participation? Are there particular mechanisms that can be used to achieve poverty alleviation as well as conservation outcomes?
- *Comparing options* - Finally, it is critical to understand the different market mechanisms, the conditions in which one might be favored over another and the success of existing instruments and institutions. Describing innovative experiences and “lessons learned” to business and conservation audiences will improve and accelerate the adoption of market approaches.

Building Institutions

To function efficiently, effectively and equitably, all markets require enabling institutions, such as support services, common auditing procedures and contracts. Because marketing forest

services is an embryonic field, enabling institutions are only beginning to be developed. Stakeholders may adapt some of these institutions from models established in other areas, but it also may be necessary to construct some institutions specifically for the forest services market. Three institutions lie at the core of market development -- assessment methodologies, registries and certification standards.

- *Assessment methodologies* - Standard measurement tools are necessary because they will ensure transparency and repeatability -- essential qualities for market development. For example, Winrock International, an NGO, has been working with a variety of organizations on carbon inventory and monitoring protocols. Similar work for hydrological and biological services is underway by State Forests of New South Wales, Australia. These efforts require more support in order to be fully developed and adopted as credible, standard approaches by market players.
- *Property Rights & Registries* - The value of property rights is largely dependent on the existence of formal and unified registries.² Recording ownership of property rights with a single authority is critical for reducing transaction risks. Additionally, a registry contains individually serialized records of scientifically verified and measured environmental services. In addition to guaranteeing ownership, a registry can assure potential buyers that credible measuring and monitoring have taken place in a transparent scientific manner. Registries can assure buyers that no double counting had taken place. By developing documentary records of their achievements and establishing title to such services, owners of forests will be more likely to receive value from these services and less dependent on timber for revenue. In Australia, the Catchment Ecosystem Services Investment Center is developing steps to assist with brokering environmental services deals. Initial steps include creating a registry and developing criteria for environmental services. In the U.S., the GHG RegistrySM has been designed to facilitate the development of a robust GHG trading market. It is modelled on the U.S. EPA's Allowance Tracking System (ATS) for the SO2 (Acid Rain) program.
- *Certification* - Certification is a voluntary procedure involving an independent third party that evaluates performance using specific criteria. The Forest Stewardship Council, an accrediting organization, has established an international system to certify forest management using social, environmental and economic criteria. But this system is limited to certifying sustainable management for forest products such as timber, not services. It is urgently important to develop principles and criteria for certifying the management of forest services.

Making Deals

Developing markets means invoking a wide variety of tools and understanding the flexibility of each. Innovators located in areas with weak public institutions may find that self-organized private deals are the most effective. Those in highly regulated environments may find that the additional effort to set up a trading system is more than compensated by dramatically increased efficiency in reaching goals. Where public institutions play an important role, public payment schemes are more likely to work.

There is no substitute for experience, and learning-by-doing is one of the best ways to gain that experience. The existing stock of knowledge has come from those innovators who have forged ahead despite uncertainty and lack of precedent. Business leaders, NGOs and governments should encourage innovation within their own organizations -- and in collaboration with other sectors. Those who innovate will be recognized as leaders in the broader global community.

² See De Soto, H. 2000. "The Mystery of Capital: Why Capitalism Succeeds in the West, but Fails Everywhere Else" for a powerful explanation of the importance of formal property rights systems.