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Investment in the sustainable management of natural resources: emerging opportunities and policies

Note by the secretariat

Summary

Governments of the region have shown interest in, and commitment to, green growth approaches. Increased investments in sustainable natural resource management are an integral aspect of green growth strategies, but policymakers face several challenges in securing such investments. The present document outlines how different stakeholders can become investors and partners in sustainable natural resource management. Experiences from the region that show the positive and significant economic impact of investment in sustainable natural resource management are highlighted. The document shows that practical market-based policy approaches can help to internalize ecological prices in national economies, as well as provide a more environmentally sustainable basis for economic activity, and so promote green growth.

The document emphasizes that investment policies and mechanisms must be elevated to a national and regional policy level to be able to deliver a fundamental change in the incentives for, and impacts of, investment in sustainable natural resource management. This requires local as well as regional and possibly global policies to address the problem in complementary, and where possible, integrated ways. The arguments and potentials for regional and international cooperation to address the limitations of sub-national approaches to global environmental challenges are illustrated

Contents

I. Introduction

1. Governments in the region have shown interest in, and commitment to, green growth approaches, of which investments in sustainable natural resource management are an integral aspect. The present document is intended to address the question: how can investments in sustainable natural resource management support inclusive and sustainable development when taking into account local imperatives, constraints and global demands?[1]

2. The present document discusses how different stakeholders can be considered potential investors in sustainable natural resource management, and highlights policy instruments that can be used to engage these stakeholders directly and indirectly as investors. “Payments for ecosystem services” (PES) is highlighted as one of the policy instruments that are gaining increased attention.

3. Investment policies and mechanisms at the national and regional levels should effect fundamental changes in the incentives for investment in sustainable natural resource management. This requires appreciation of the significance of ecosystem services, the policy options available, and

[1] The present document is based on a technical background paper prepared by Graciela Chichilnisky, Director, Columbia Consortium for Risk Management and Professor of Economics and Statistics, Columbia University, New York, United States of America.

the need for local as well as regional and perhaps global policies to address the problem in complementary, and where possible, integrated ways. The document concludes by highlighting the arguments and potentials for regional and international cooperation and market solutions. Innovative proposals that have been made in other forums are outlined to support governments in the region in exploring potential avenues for action.

II. Natural capital and ecosystem services

4. Developing nations are emerging in a period of rapid globalization. The Asia-Pacific region is now recognized as an engine of growth for the world economy. In an era of globalization, voracious international and domestic markets for natural resources mean important environmental pressures.

5. Asia-Pacific economies are the fastest growing in the world and include some of the world's largest exporters of timber, fibre and other natural products. Important changes in land use and ecosystems are taking place, and the region is at the centre of one of the largest biodiversity extinction events. Land use change that takes place without careful consideration of the long-term environmental and social impacts threatens the supply of ecosystem services that are the basis for human activity.

6. These ecosystem services provide a fundamental link between the economic sphere of human activity and the biosphere. The average annual contribution of these ecosystem services to global economies and societies globally has been estimated at $33 trillion. These services include providing food, fibre, water, regulating the climate and water supplies, cultural services that are recreational and spiritual and educational, and supporting services such as carbon sequestration.[2]

7. Natural resources and the ecosystem services that they provide, are an important form of capital for economic activities and may thus be termed "natural capital." As examples, water-intensive industries, agriculture, as well as water and hydropower producers depend on natural "infrastructure" such as well-protected watersheds, wetlands and other land-based elements of the hydrological system that provide a regular flow of water of adequate quality and quantity. Tourism operators depend on the scenic and recreational "infrastructure" provided by natural landscapes. However, while commercial activities capture significant economic benefits from natural resources, they do not usually appreciate or contribute to meeting the costs of the sustainable management of these ecosystems.

8. The services that these ecosystems provide are in increasing demand as economies and populations in the region grow. However, the degradation of ecosystems continues because of a lack of explicit policy focus on the economic benefits provided. The United Nations Environment Programme has launched The Economics of Ecosystems and Biodiversity (TEEB) programme to study the economics of

[2] World Resources Institute, *Millennium Ecosystem Assessment: Ecosystems and Human Well-being: Synthesis* (Washington, D.C., Island Press, 2005). Available online at www.millenniumassessment.org.

biodiversity loss. A 2009 TEEB report[3] highlights the values of ecosystems. The analysis shows that coral reefs provide a range of economically important services: natural hazard management (up to $189,000/hectare/year), fisheries (up to $3,818/ha/year), genetic material and bio-prospecting (up to $57,000/ha/year), and tourism (up to $1 million/ha/year). The values are site-specific. A further example is provided by a coastal wetland in northern Sri Lanka which, through its function of attenuating floods, provides an economic contribution of $1,907/ha/year, and through its function of industrial and domestic wastewater treatment, contributed $654/ha/year to the economy.

9. The work of the TEEB and other organizations has highlighted the inextricable link between poverty and ecosystems and biodiversity. As an example, up to 84 per cent of households depend on the biodiversity of the Ream National Park in Cambodia for their basic subsistence and income. The park provides a net annual value of about $1.24 million for 30,000 local people, or an average of $233 for every household in an area where the median annual family income is only $316 and a third of families earn less than $200 per year.[4]

10. Sustainable natural resource management provides economic benefits for both households and businesses. Preliminary work by the TEEB, still to be confirmed by further research and analysis, indicate that investments in sustainable management of ecosystems have high rates of return over the long term, ranging from 7 to 79 per cent.[5] These economic benefits are often spread over multiple stakeholders and take different forms. Governments clearly have a greater role to play in maintaining the ecosystem service benefits, which are important to rural communities and for disaster mitigation. On the other hand, Governments should have much less direct responsibility for maintaining ecosystem service benefits for commercial operations.

11. As there are no markets for the ecosystem services, the economic benefits of the sustainable management of natural resources are not realized. Reaping the benefits of investment in sustainable natural resource management on a wide scale requires political commitment and vision, as well as Government leadership backed by good science and practical policy approaches. As Governments meet at the Conference of Parties of the Convention on Biological Diversity, to be held in Nagoya, Japan, in 2010, inspiration for greater action on commitments to biodiversity protection during the International Year of Biodiversity is provided by the case of Suncheon City, Republic of Korea, which is described below.

III. Challenges and strategic approaches

12. Governments in the region are currently the most important investors in sustainable management of natural resources. Different

[3] TEEB, *The Economics of Ecosystems and Biodiversity for National and International Policy Makers – Summary: Responding to the Value of Nature*, 2009.

[4] GMS/BCI Strategic Framework, cited in an ADB draft paper on natural capital investment, June 2010.

[5] Preliminary results presented by Haripriya Gunimeda of the TEEB at the ASEAN Conference on Biodiversity, Singapore, 21-23 October 2009.

investment modalities are employed - national budgets, land use zoning policies and regulations, direct management and rehabilitation, and the establishment of protected areas. Indeed, many stakeholders will hold the view that maintaining ecosystem services is the responsibility of national Governments.

13. However, the increasing interest of governments in engaging other stakeholders as investors may be attributable to several factors, including increased demand for ecosystem services, such as flood attenuation. Rising opportunity costs of sustainable management and continuing demands on national budgets (especially in developing countries) make sustainable management of natural resources increasingly difficult to achieve, from both national budgetary and local job creation perspectives.

14. As privatization and decentralization processes continue, and economic activity expands, it is also important to note that that a growing proportion of the economic benefit of natural resource management is captured by private entities (such as tourism operators or bottled water manufacturers) or local governments. However, the ecosystem services on which these entities depend are provided free of charge.

15. Market externalities are costs that are not recognized by existing market prices – "ecological prices" are not paid by consumers or beneficiaries. One widely discussed issue has been the reform of national systems of economic accounting to include natural capital as a way to measure sustainable economic development. Although there is significant work based on standardized methodologies, it is difficult to standardize these values across nations or over long periods of time as environmental challenges evolve.

16. According to one expert, markets that better reflect the values of ecosystem services create new market prices, change the notion of economic value in GDP and so improve decision-making.[6] The carbon market of the Kyoto Protocol has had the effect of re-valuing natural assets, such as the gas content of the atmosphere, and recognizes the limitations of the capacity of global environmental systems to absorb greenhouse gases resulting from fossil fuel use and other economic activity. This, in turn, changes the market value of renewable energy relative to fossil fuel energy, and of goods and services produced using energy.[7] Markets for reducing emissions from deforestation and forest degradation (REDD) can also potentially increase the economic value of forested lands in the same way.

17. Policymakers are challenged to: (a) identify ecosystem services that hold important existing or potential national or local value, as well as

[6] G. Chichilnisky, "Investment in natural capital", draft technical background paper for ESCAP for the sixth Ministerial Conference on Environment and Development in Asia and the Pacific (unpublished).

[7] G. Chichilnisky and K. Sheeran, *Saving Kyoto* (London, New Holland Publishers, 2009); G. Chichilnisky, "The Greening of the Bretton Woods", *Financial Times*, 10 January 1996, p. 8.; G. Chichilnisky, "Global Payments for Ecosystem Services: Principles and Practice", in Thomas Koellner (Ed.), *Ecosystem Services and Global Trade of Natural Resources* (Routledge, 2010); G. Chichilnisky, "Managing the Global Commons: Principles and Practice", European Environmental Agency, 2010 (forthcoming).

international value; (b) increase the effectiveness of government investments; (c) identify specific opportunities for engaging beneficiaries of sustainably managed natural resources as partners, where necessary; and (d) capture opportunities from international demand.

A. Identifying ecosystem services that hold important national or local value

18. Specific ecosystem values vary from place to place, and from country to country. In a country with high rainfall or monsoonal climate prone to flooding, the disaster mitigating protective function of forests in sloping areas will be critical. In Singapore, ecosystem service concepts are maximized, with the landscape used as part of an island-wide water-capture infrastructure. National development objectives can be supported through strategic investments in sustainable natural resource management in several ways, as illustrated in table 1.

Table 1

National policy objectives and strategic objectives for investment in sustainable natural resource management

National policy objective	Strategic objectives
Water and energy (hydropower) security	• Maintain watershed protection to secure the provision of water of adequate quantity and quality throughout the year
Tourism development	• Maintain scenic beauty, environmental quality, biodiversity • Ensure that water of good quality and quantity is available
Climate change mitigation and adaptation	• Reduce GHG emissions from land use and associated change • Increase and improve carbon sequestration • Enhance natural coastal protection (ecosystems such as mangroves and tidal flats)
Rural livelihoods and poverty alleviation	• Increase income from non-wood forest products • Increase income directly through agreements for sustainable natural resource management

19. As climate change proceeds and accelerates, ecosystem-based adaptation is also emerging as an important climate change response. The benefits of proactive investments in ecosystem services that mitigate future costs are being recognized. Viet Nam is spending more than $1 million on planting mangrove systems to protect its coast from pressures due to rising sea levels and extreme weather events. It is estimated that this will save $7 million per year in coastal infrastructure maintenance costs.[8]

[8] European Communities. *The Economics of Ecosystems and Biodiversity: An Interim Report* (2009).

20. Viet Nam's national pilot policy on payments for forest environmental services, described in a subsequent section, has been identified by the Government as a key response to climate change, given the susceptibility of the country to both floods and drought and the predicted impacts of climate change. In this case, Viet Nam's investment in sustainable management of forests is also an investment in mitigating climate risks, and a basis for ecosystem-based adaptation efforts.

21. The case of Suncheon City, Republic of Korea, which identified its biodiversity wetlands as an important source of natural capital, is outlined in box 1.

Box 1

Investment in sustainable natural resource management as an engine of growth: Suncheon City, Republic of Korea

Located in a region known for its petrochemical plants and steel mills, Suncheon City was left behind in the industrialization race but decided to follow a different growth-path. Starting in the late 1990s, the city administration turned its undeveloped tidal flats into the largest sanctuary for black-hooded cranes in the world, and also into a competitive advantage for the city. As a result of concerted efforts by the city government and its citizens, Suncheon Bay was designated as a wetland of international importance by the Ramsar Convention on Wetlands in 2006 and is one of the five largest coastal Ramsar-designated sites in the world. Additional investment in complementary infrastructure facilitated the arrival of more than 2.3 million visitors in 2009, a dramatic increase from just 0.1 million in 2002. More than $79 million was generated in 2009 and, by the end of 2009, some 6,400 jobs had been created in a city of just over 200,000 people. Such success did not come easily. Plans to restore the Suncheon Bay eco-system met strong resistance from business and land owners whose private interests were restricted as commercial areas were relocated out of the Bay and rice fields were turned into a reserve for migratory birds. Strong leadership by a mayor convinced that the rich and vibrant Suncheon Bay eco-system could be a driver of growth was the critical factor in turning initial resistance into support and eventually into political success.

B. Increasing the effectiveness of government interventions

22. As previously mentioned, Governments are currently the most important investors in sustainable management of natural resources, through national budgets and various policies — land use zoning policies and regulations, direct management and rehabilitation. In addition, they establish protected areas.

23. Strengthening environmental governance will be essential. Enforcement and implementation of management plans, laws and regulations remains a challenge. Regulatory action, such as logging moratoriums, land use planning and establishment of protected areas, can be complemented by incentives for those who manage lands, to respect regulations and to compensate for opportunity costs of sustainable management.

24. Planning and implementation at the ecosystem level are needed. Confining solutions within national borders belies the transboundary nature of the region's critical ecosystems, including coral reefs, forests, wetlands, mountain areas and dry zones. Well-defined networks of protected areas linked through biodiversity corridors may be a key strategy for managing the development potential of those systems. Under the Biodiversity Conservation Corridors Initiative in the Greater Mekong

Subregion, networks of protected areas are linked through biodiversity corridors. The potential for sustainable financing for this land management strategy is being explored through mechanisms that promote PES.

25. Participating in multilateral environmental agreements remains important for making the vital link between national and global action. Planners at the regional and local levels must better link global and national goals with municipal action.

C. Identifying opportunities for engaging beneficiaries of sustainably managed natural resources as investors

26. Potential investors in ecosystem services may be categorized as "direct" and "indirect" beneficiaries.[9] Direct beneficiaries are usually commercial entities which capture economic benefit from goods and services provided. Indirect beneficiaries receive economic benefit through commercial entities, as shown in table 2.

Table 2

Beneficiaries of sustainable management of forests

Forest ecosystem service	Direct beneficiaries/users	Indirect beneficiaries/users
Hydrological services	• Water utilities • Hydropower producers	• Intensive water users – all economic sectors and households • Hydropower users – all economic sectors and households
Scenic/landscape beauty	• Enterprises providing eco-tourism and nature-based tourism-related services	• Tourists
Biodiversity support	• Bioprospecting interests • International conservation interests • Enterprises providing eco-tourism and nature-based tourism-related services	• Drug purchasers • Individuals • Tourists
Climate regulation services	• Investors in carbon markets • Carbon offset intermediaries • Greenhouse gas emitters • Energy-intensive industries	• Carbon offset purchasers • Non-hydropower, non-renewable energy users in all sectors • Global community

27. Governments can use a range of policy tools to engage these parties as investors, as shown in table 3.

28. The ability of a wide range of potential voluntary buyers to invest in PES is limited in this region by the lack of appropriate mechanisms to

[9] Based on joint research by ESCAP and the Institut du développement durable et des relations internationales (see www.iddri.org).

receive and use such investments.[10] However, one scheme in Lombok, Indonesia, has been able to secure regular investments from household and commercial water users. This arrangement has found a sustainable source of financing, willingness to pay from even low-income beneficiaries of forest ecosystem services (water provision in this case) and the backing and policy support needed from new district government regulations.

Table 3

Investment modalities and policy support from governments for investments in sustainable natural resource management

Modality	Governments	Companies and other institutions (Direct beneficiaries)	Consumers (Indirect beneficiaries)
Investments	• Direct budget allocations • Establishment of protected areas • Community forest arrangements and financial incentives	• Land purchase • PES financing • Carbon offsets • Co-management approaches with communities • Eco-efficient production and consumption (lower environmental impact)	• Carbon offsets • Green fees (water, electricity) – through PES arrangements • Price premiums for natural products or nature-based products (for example, coffee)
Policy support required from governments	--	• Tax breaks • Establishment of payments for ecosystem services policy and mechanisms • Establishment of biodiversity banks • Securitization (environment bonds) • Green tax and budget reform	• Tax breaks • Eco-labelling and other information policy tools • Support for establishment of payments for ecosystem services policy and mechanisms • Green tax and budget reform

29. In addition to these policy tools, subsidy and tax reform is an important way to provide better market signals regarding the use of natural resources. Governments spend an estimated $1 trillion annually in subsidies for agriculture, fisheries, energy, transport and other sectors combined.[11] While many subsidies are intended to support poverty reduction efforts and make key resources and economic inputs available to low-income consumers, there is significant room for tax and subsidy reform to encourage more socially and environmentally supportive investments.

[10] In Costa Rica, by contrast, individual and business contributions to the fund that provides payments for commitments to forest management are received from various sectors, facilitated by flexible payment modalities and corporate incentives, including tax and certificates.

[11] TEEB, *The Economics of Ecosystems and Biodiversity for National and International Policy Makers – Summary: Responding to the Value of Nature*, 2009.

30. An example exists in the Islamic Republic of Iran, where, under a subsidy law ratified in 2009, energy prices will be reformed, and the savings on the subsidies (estimated at $10 billion) will be used for social security and industrial expansion.[12] In Indonesia, a similar approach was taken, with savings on energy subsidies used in pro-poor cash transfers. In Costa Rica, a percentage of the fuel tax is used to make payments for forest protection and management. In this way, energy users make an indirect investment in forest protection, which has multiple benefits, including the carbon sequestration functions of forests.

31. The willingness of the private sector to invest in sustainable natural resource management may be higher than expected. In the Philippines, a study of 25 government and privately owned companies demonstrated that 84 per cent of the companies were convinced of the business case for investments in ecosystem services.[13] Ecosystem degradation can pose a number of risks to corporate performance: operational, regulatory, legal, financial and reputational as well as market- and production-related.[14] As an example, research in Viet Nam shows that the Da Nhim hydropower plant would lose $3.75 million per year in added operating and plant costs if 45,000 hectares of pine forests were converted to agricultural purposes.[15]

D. Capturing opportunities from international co-investors

32. The Asia-Pacific region is home to globally important and transboundary ecosystems and biodiversity resources. A subglobal assessment conducted by the Millennium Assessment in the Mekong wetlands identified more than 280 medically important plant species, of which 150 are still in regular use. Medicinal plants have generally declined in availability due to overharvesting and loss of habitats.[16] The demand for ecosystem services has both international and national/local dimensions. Carbon sequestration and biodiversity protection are global ecosystem services. Biomass production and water regulation are considered local or regional services, but a large proportion of goods produced in agriculture, forestry, fisheries and mining are traded internationally and make an important contribution to global food security and economic activity. Ecosystem services therefore require local, regional and global action.

33. Co-investments between governments in the region will be an important approach to investments in such transboundary resources—

[12] Address by the representative of the Islamic Republic of Iran at the sixty-sixth session of the Commission.

[13] Grace B. Villamor, Meine van Noordwijk, Flordeliz Agra and Delia Catacutan, “Buyers’ perspectives on environmental services (ES) and commoditization as an approach to liberate ES markets in the Philippines”, ICRAF Working Paper, Number 51, 2007.

[14] World Resources Institute (2009). *Corporate Ecosystem Services Review*, http://www.wri.org/publication/corporate-ecosystem-services-review.

[15] James Peters, “Ecosystem services in ASEAN and the GMS: biodiversity conservation and challenges and responses in moving from theory to implementation”, presented at the ASEAN Conference on Biodiversity, Singapore, 20 August 2009.

[16] See note 2.

international cooperation can secure the flow of ecosystems services which have both national and international economic and socio-cultural significance. The Coral Triangle Initiative covers ocean ecosystems at the epicentre of the world's coral reef diversity and is supported by high-level political commitment from the Governments of Indonesia, Malaysia, Papua New Guinea, the Philippines, Solomon Islands and Thailand. It is geared towards "safeguarding the region's marine and coastal biological resources for the sustainable growth and prosperity of current and future generations."[17] Under the auspices of the North-East Asia Subregional Programme on Environmental Cooperation, a transboundary protected area is being designed. Networks of protected areas will be established through the cooperation of the countries of the Greater Mekong Subregion (the Biodiversity Conservation Corridors Initiative) and Brunei Darussalam, Malaysia and Indonesia (the Heart of Borneo Initiative).

34. International investors (donors, companies and individuals) have shown themselves to be willing to make international investments in the benefits of biodiversity protection and carbon sequestration, and to provide partial support to the initiatives described above. Several Governments from the region, as members of the Coalition of Rainforest Nations,[18] have been among the leaders in promoting international investment in the carbon sequestration services provided by regional forests that are hoped to provide "large, cheap and quick reductions in global greenhouse gas emissions".[19]

35. Carbon emission reductions generated through REDD are being sold on voluntary carbon markets thus, they are financing investments in sustainable forest management and protection.[20] Concepts of REDD have evolved. Under the right conditions, so-called REDD+ investments provide a unique opportunity to address both climate change and rural poverty while protecting fragile ecosystems, conserving biodiversity and sustaining resource-dependent livelihoods.[21]

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[17] See http://www.cti-secretariat.net.

[18] The Rainforest Coalition (www.rainforestcoalition.org) functions as an intergovernmental organization, with a secretariat at Columbia University in New York City, that seeks to facilitate consensus "on issues related to domestic and international frameworks for rainforest management, biodiversity conservation and climate stability". Members from Asia and the Pacific include: Bangladesh, Fiji, Indonesia, Malaysia, Papua New Guinea, Samoa, Solomon Islands and Thailand.

[19] A. Angelsen, with M. Brockhaus, M. Kanninen, E. Sills, W.D. Sunderlin and S. Wertz-Kanounnikoff (eds), *Realising REDD+: National Strategy and Policy Options* (CIFOR, Bogor, Indonesia, 2009).

[20] As separate from the carbon markets that are regulated by intergovernmental agreements.

[21] REDD+ - "policy approaches and positive incentives on issues relating to reducing emissions from deforestation and forest degradation in developing countries; and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries." (UNFCCC Decision 2/CP.13–11). The "plus" sign indicates "enhancement of forest carbon stock, also referred to as forest regeneration and rehabilitation, negative degradation, negative emissions, carbon uptake, carbon removal or just removals." (See note 19).

36. Challenges of capturing international carbon investments include unclear or contested forest ownership, weak governance, corruption and power struggles, lack of data on forest cover and capacity to measure and monitor changes in forest carbon, as well as lack of clarity on the international REDD+ institutional architecture.[22] The work of UN-REDD in helping countries to prepare for a global REDD+ financing mechanism has focused its attention on the necessary pre-conditions for capturing opportunities for these investments.

37. These pre-conditions can be grouped under six "components" of readiness: management of the readiness process; stakeholder engagement; REDD+ implementation framework; national REDD+ strategy; establishment of reference scenarios and national measurement, reporting and verification systems. In UN-REDD partner countries, a country-driven process identifies necessary interventions required to help the country move towards REDD+ readiness, taking account of the comparative advantages of the three participating United Nations agencies in the UN-REDD Programme (FAO, UNDP and UNEP). Various activities are under way in Viet Nam, Indonesia and Cambodia and are being planned in Sri Lanka, Nepal, the Philippines, the Solomon Islands and Papua New Guinea. In Cambodia, for example, preparation of a REDD+ readiness road map has involved establishing a multistakeholder coordination mechanism.[23] The Asian Development Bank (ADB) has allocated $5 million from its climate change fund to finance REDD-related projects.[24]

IV. Exploring market approaches, experiences and potentials

38. There is a growing interest in policy approaches that recognize the monetary value of ecosystems to society. This interest in so-called market-based approaches emerges from the recognition that natural resources and their services are becoming increasingly scarce. That recognition became evident following a period of rapid and wide-scale losses of biodiversity related to the use of natural resources after the Bretton Woods institutions were created and the rapid globalization that ensued.[25]

39. Four categories of market approaches have been identified on the basis of existing policy approaches: (a) public payment schemes in which governments decide the priorities for environmental service (ES) investment and provide the major investments; (b) open trading under regulatory cap or floor in which a mandatory minimum or maximum of a specific ecosystem service is defined, as in the case of wetland mitigation banks in the United States or the regulated carbon markets; (c) private and direct deals between ecosystem service beneficiaries and land managers in which land managers are directly compensated for sustaining or enhancing ecosystem services; and (d) eco-labelling in which the

[22] See note 19.

[23] E-mail communication, UN-REDD Regional Coordinator, UNDP, 30 June 2010.

[24] ADB working draft paper on natural capital investment, unpublished, June 2010.

[25] G. Chichilnisky, "The Greening of the Bretton Woods", *Financial Times*, 10 January 1996.

payment for enhanced ecosystem service is embedded in a product that is produced under a management system that enhances or maintains environmental service provision.[26]

40. One of the most important features of market approaches is that, by recognizing the value of ecosystem services in monetary terms, they help to internalize the ecological prices in the real economy, thus supporting "greener" economic growth patterns. Each type of market approach highlighted above contains one or more principles of PES, a policy approach that is being increasingly explored because of the potential for direct and potentially sustainable financing of sustainable natural resource management.

A. Payments for ecosystem services

41. PES have been defined as "a voluntary transaction in which a well defined ES is bought by at least one ES buyer from a minimum of one ES provider, if and only if the provider continues to supply the service".[27] Ideally, PES arrangements will be "realistic, conditional and voluntary".[28]

42. The benefits that PES can bring to the policy table under the right conditions include: flexibility and adaptability, the potential for smart infrastructure investments and cost savings, more effectively developed and enforced land use plans and regulations, and improved livelihoods.[29] PES increases the numbers of stakeholders in sustainable natural resource management by engaging the beneficiaries of ecosystem services as investors, as is shown by the experience of Viet Nam with its work at the provincial and national levels (see box 2). Several cases of PES-like arrangements on a smaller scale may be identified in countries in the region.[30] Each area has its own opportunities and challenges for implementation. The most important challenge is the issue of well-defined and enforceable user or property rights with respect to the ecosystem services generated by sustainable land use. There has been experience, however, with rewarding more sustainable land stewardship with strengthened land tenure.

[26] S. Wertz-Kannounikoff, "Payments for environmental services – A solution for biodiversity conservation?" No. 12/2006, *Ressources Naturelles*, IDDRI, Paris.

[27] As used in the present document, the terms "environmental services" and "ecosystem services" are interchangeable. See S. Wunder, "Payments for environmental services: some nuts and bolts" CIFOR Occasional Paper 42, Center for International Forestry Research, (Bogor, Indonesia, 2005).

[28] Meine van Noordwijk and Beria Leimona, "CES/COS/CIS paradigms for compensation and rewards to enhance environmental services", World Agroforestry Centre (ICRAF), SEA Regional Office, WP0129-10 (2010).

[29] ESCAP, *Innovative Socio-Economic Policy for Improving Environmental Performance: Payments for Ecosystem Services* (*Greening of Economic Growth* Series) (ST/ESCAP/2560).

[30] See the website of the Rewards for, Use of and shared investment in Pro-poor Environmental Services (RUPES) programme of the World Agroforestry Centre (http://rupes.worldagroforestry.org).

Box 2

Pilot policy on payments for ecosystem services - results from Viet Nam

In Viet Nam, a pilot policy for payments for forest ecosystem services (FES), established by Prime Minister's Decision 380/QD-TTg dated 30 April 2008, has established pilot PES sites in Lam Dong and Son La provinces with the core support of the Asia Regional Biodiversity Conservation Programme. Under the policy, forest protection and development and the conservation of forest ecosystems, biodiversity, and forest natural landscapes are considered services for which individuals, businesses and organizations that use and benefit from them must pay the service providers—forest owner organizations and households contracted for forest protection.

After almost two years, the preliminary impact of Decision 380/QD-TTg is evident. At the Lam Dong pilot site, hydropower and water supply plants have made investments in improving water quality and regulating water flow through improved forest management. These investments are projected at a total of VND 98,572,567,000 ($5,171,700) for 2008-2009. These funds have been allocated to make FES payments to participating forest-managing households at a rate of VND 270,000-290,000 ($14-15) per hectare, with an average of 25.4 hectares of forest land managed per household.

The awareness of people in all sectors and at all levels as well as the local people has been raised; forests in areas that received payment for FES have been better protected, with the incidence of illegal logging offences reduced by 50 per cent and poverty rates in the pilot area reduced by 15 per cent. The livelihoods of households involved in forestry have improved. "This has created a high level of consensus among people, the agencies at local level, and especially the payers. They have understood that payment for FES is an investment for the sustainable development of hydropower plants, ecotourism, and clean water supply plants."

Allocations of 203,335 ha of forest have been made to 8,022 households. There has been a high level of participation from ethnic households. The province plans (a) to increase both the forest area allocated for protection and the payment level, (b) to apply information technology to strengthen monitoring, and (c) to refine the mechanisms for managing and utilizing the funds.

Sources: Mr. Hoang Sy Son—Vice Chair of PPC of Lam Dong at the second South-East Regional Workshop on PES in Da Lat, Viet Nam, 21 June 2010. "Speech on the mechanism for payments for forest ecosystem services in Lam Dong."

43. The potential for using PES concepts as a basis for co-investment arrangements has been noted—almost no PES arrangement that has been examined has been ideal, but there is substantial potential for "co-investment in natural capital stewardship".[31] Experiences in Aceh, Indonesia, support this conclusion. There, a water utility has committed to work with communities to reduce the incidence of illegal logging, which is considered the most urgent threat to the watershed. Other types of investment are to be considered later.[32] This is an example of a co-investment approach providing an important entry point for creating trust and commitment to a common goal.

44. According to a publication of the International Institute for Environment and Development, "What all sides need is an opening of policy space…the most important specific policy recommendation is to develop a national-level mandate, institutional guidelines and a clear legal basis for intermediary financial bodies. This would enable other buyers of watershed services, including government departments, to enter the

[31] B. Leimona, Personal communication, 2010. See also note 28

[32] Supported by ESCAP and the World Wide Fund for Nature (WWF) Aceh programme in collaboration with RUPES.

frame. Also important is…fiscal incentives (tax breaks) for the private sector to invest in conservation."[33]

45. Initiatives to support Governments in the region in creating enabling policy environments have so far been focused on the South-East and South Asian subregions.[34] The importance of networking among governments and technical experts, and at the national level, has been noted in capacity-building forums. Challenges noted have included (a) the lack of awareness of the value of ecosystem services and the need to pay; (b) the lack of legal and institutional frameworks; (c) limited capacity to design and implement PES; and (d) lack of financial support and institutional capacity to jump-start PES design and implementation.[35]

B. Bringing markets and international action together

46. For the first time in recorded history, humans are modifying the earth's metabolism: the planet's atmosphere, its water bodies, and the complex web of species that makes life on earth. This requires a new type of economics, and one in which economic success is measured in a way that is consistent with the new scarcities faced.

47. Through the Kyoto Protocol, targeted emission levels and the establishment of a tradable unit of carbon emission reduction, international markets that drive investments in more sustainable use of the planet's resources have already been established. Based on limits on the rights to the use of the planet's atmosphere, one expert proposes that, in the case of other ecosystem services, there is a need for "new approaches that are better defined, at a larger scale and that involve national efforts with legal underpinnings, including property rights on the use of natural resources or its services." That expert stresses that the local problem of the global commons can only be resolved by redressing the institutional framework at the global level.[36]

[33] Munawir and Sonja Vermeulen, *Developing Markets for Watershed Services and Improved Livelihoods: Fair Deals for Watershed Services in Indonesia* (International Institute for Environment and Development (IIED), London, 2007).

[34] RUPES supports national forums that discuss PES policy at the national level. Support for exchanges of experiences between South-East Asian countries is provided by the Asia Regional Biodiversity Conservation Programme, the ADB GMS Environment Operations Centre, the ASEAN Centre for Biodiversity and ESCAP.

[35] James Peters, "Ecosystem services in ASEAN and the GMS: biodiversity conservation and challenges and responses in moving from theory to implementation", presented at the ASEAN Conference on Biodiversity 2009, Singapore, 20 August 2009.

[36] See note 6; see also G. Chichilnisky, "Development and global finance: The case for an international bank for environmental settlements (IBES)", UNESCO/UNDP, Discussion Paper No. 10, September 1996; and G. Chichilnisky and K. Sheeran, *Saving Kyoto* (London; New Holland, 2009).

48. Potential approaches to establishing global systems of tradable rights on the use of global environmental assets have been discussed; three innovative mechanisms[37] are outlined in the annex. These mechanisms are based on principles for the implementation of market-based approaches to investment in sustainable natural resource management at the international level, as identified by the author, and largely consonant with sustainable development principles:

(a) Promoting sustainable use of the earth's resources, water biodiversity and its services, fostering a harmonious relationship between humans and ecosystems;

(b) Using self-funded, market-based mechanisms for their implementation;

(c) Decreasing the wealth gap at the local, regional and global levels, between rich and poor nations, and high and low-income people.

49. The principle of equity is enshrined in Article 4 of the 1992 United Nations Framework Convention on Climate Change and has been critical for the creation of international PES mechanisms, such as the carbon market and the clean development mechanism.[38] A similar blend of equity and efficiency is critical for designing successful solutions that can conserve important global commons, such as ecosystem services.

50. Because of the critical importance of biodiversity and ecosystem services for human survival, new types of markets will become increasingly important over time and may eventually alter the global economy and transform capitalism during the twenty-first century.[39] The potential for bringing markets and international or regional action together may be further explored by countries in the region.

[37] First proposed in G. Chichilnisky, "Development and global finance: The case for an international bank for environmental settlements (IBES), UNESCO/UNDP Discussion Paper No. 10, September 1996.; G. Chichilnisky, "The greening of the Bretton Woods", *Financial Times*, 10 January 1996, p. 8.; G. Chichilnisky, and G. Heal, *Environmental Markets: Equity and Efficiency* (New York, Columbia University Press, 2000).

[38] G. Chichilnisky and G. Heal, *Environmental Markets: Equity and Efficiency* (New York, Columbia University Press, 2000); G. Chichilnisky and K. Sheeran, *Saving Kyoto* (London, New Holland, 2009).

[39] G. Chichilnisky, "Development and global finance: The case for an international bank for environmental settlements (IBES)", UNESCO and UNDP, Office of Development Studies, Discussion Paper No. 10, September 1996.; G. Chichilnisky and G. Heal (eds.), *Environmental Markets: Equity and Efficiency* (New York, Columbia University Press, 2000); G. Chichilnisky and G. Heal, "Economics returns from the biosphere", *Nature*, vol. 391, 12 February 1998, pp. 629-630; G. Chichilnisky, "Global payments for ecosystem services: Principles and practice", in: Thomas Koellner (ed.), *Ecosystem Services and Global Trade of Natural Resources* (Routledge, 2010); G. Chichilnisky, "Managing the Global Commons: Principles and Practice", European Environmental Agency, 2010 (forthcoming).

V. Recommended priority actions

51. The question of investments in sustainable natural resource management presents several challenges for policymakers. The urgency of the issue, the need to engage other stakeholders as investors and the wide range of options for doing so are covered in the present document.

52. One of the first actions is to identify the ecosystems that are most at risk (national, subregional and regional levels) and that have significant socio-economic importance or potential due to the ecosystem services provided. Once this is done, strategies involving beneficiaries of these ecosystems in appropriate ways should be developed using the range of policy options and mechanisms available to policymakers. This can be done at the national, subregional and regional levels.

53. National capacity must be built for developing such strategies and scaling up approaches to investments in sustainable natural resource management to be able to maximize impacts at the national level, as well as for strategic international cooperation arrangements. The region is accumulating a wealth of experience in relation to various natural resource management strategies and financing mechanisms. Informal networks of both practitioners and technical experts and government officials who are able to work together towards more effective investment arrangements have been initiated and require further support.

54. Basic principles should be adopted; the principles of equity and poverty reduction, sustainability (as in the ability to be self-financing on a long-term basis) and sustainable management of natural resources provide good starting points for elaboration of these principles. National, subregional and regional action is also needed in order to better engage international investors. Market approaches that support fundamental changes in the economic value of sustainably managed natural resources should be considered.

Annex

Markets to support investments in sustainable natural resource management

In a technical background paper for ESCAP, G. Chichilnisky illustrates how market approaches based on three fundamental principles of sustainable use, self-financing and equitable poverty reduction might address "local problems of the global commons" in three areas – watershed management, forest management and the loss of indigenous knowledge.

The paper acknowledges that establishing markets around carbon emissions (as is done under the Kyoto Protocol) and ecosystem assets (with reference to biodiversity) represents different challenges. Biodiversity is heterogeneously distributed across the biosphere and is difficult to measure, while the global warming potential of carbon can be more easily measured and a tradable unit established. The first problem in creating a market approach for investment in sustainable natural resource management is therefore to identify a uniform commodity to be traded.

1. A global watershed fund

A global watershed fund could aggregate the services of large numbers of watersheds across a region or the world, into one global financial asset - "global watershed services." This means creating a system of property rights on the use of the global environmental asset (a global "bundle of watersheds") and the attendant markets for these rights. This would be quite different from land tenure rights. Each nation would be required to create rights to use the services of a number of its watersheds—for example, those providing water services to all cities with at least 1 million inhabitants. These would be new property rights—rights that do not exist today.

The first step would be to determine the role of each nation with respect its own watersheds, the second to extend this to an international system of watershed rights, and the third to show how an international agreement might cover costs and produce profits for a watershed solution that (a) is self-supporting, (b) benefits local communities and lower-income groups, and (c) encourages conservation of the asset. The creation of the financial mechanism creates incentives for the conservation of an asset, as mortgages create incentives to conserve the value of homes.

The government would allocate property rights of shares of a newly created corporation—the "watershed corporation"—which would be a public/private commercial venture. The share owners would be entitled to financial benefits from the commercial production of clean, drinkable water under strict legal conditions, or "covenants", that ensure that the corporation would restrict the use of the land in the watershed area to avoid all unsustainably managed agricultural, residential and/or commercial use—namely all uses that could conflict with the production of watersheds services. The "covenants" described above would typically forbid or limit (a) the use of fertilizers and pesticides, limit or forbid (b) other environmental effluents and stress factors that could damage the biodiversity of the watershed, and (c) allow the watershed's biodiversity services to continue unimpeded for purposes of water catchment,

filtration and erosion control, similarly to what was done in New York City for its watershed in the Catskills, in New York State, in the 1990s.

The corporation could be owned and managed by its stockholders, who should include representatives of (a) local communities, (b) the government, (c) the private sector—represented, for example, private investors—and possibly also (d) environmental groups representing the interests of "the future". This is necessary to ensure that local communities and low-income groups participate in and benefit from the commercialization of the watershed services. All the stockholders will share the profits or gains from the corporation. The initial endowments are to be decided by lawmakers in each nation in the context of international agreements as described below.

The corporation could be endowed with the rights to sell water, a profitable business worldwide, and the allocation of property rights to watershed services in each nation would become a very valuable asset that the government could allocate in exchange for demanding covenants for sustainable management. The corporation could sell bonds and equity that are backed by its assets, so as to be self-funded.[40] Furthermore, for equity and efficiency, the government could allocate the property rights to ensure that the public-private watershed corporation contemplated here would have rights to own (and to profit from) the savings created by using ecosystem services, which can be considerable. In the case of New York City, the establishment of a water treatment and filtration plant in the Catskills watershed would have cost about $6 billion, but the watershed, if unimpeded, could perform the filtration at no cost.

The next step would be to explore the participation of the international community in facilitating the national system of watershed corporations mentioned above and, in particular, upholding the three overriding principles of (a) sustainability, (b) self-funding, (c) equity and efficiency.

The international/regional community can provide incentives through an international agreement that would enable each nation to take action to create watershed corporations. There are substantial financial incentives for the "bundling" of watershed corporations and their assets around the world. It is the "law of large numbers" at work; its financial desirability is demonstrated by the existence of successful hedge funds (for example, the Swiss Pictet Water Fund) that specialize in water services investment across many nations. In each nation, the watershed corporation(s) would own substantial and potentially very profitable assets.

Financial assets in the form of bonds and equity can be sold on the global capital markets, and the corporation could create liquidity for its services through initial public offerings and secondary markets.

[40] This is a generalization of what happened in the case of the New York City watershed, where the New York local government sold bonds to pay for the research and development, the purchase of land and the costs of watershed protection in the Catskills.

2. A global forest fund

A second example is a private/public corporation that aggregates the services of large numbers of forests around the world, bundled into a global financial asset—"global prospecting services". The financial mechanism can be structured in several ways. Analogous to the case of the watershed corporation, international agreements are needed in order to reap the benefits of the financial mechanisms proposed. The National Biodiversity Institute of Costa Rica (INBio)-Merck agreement, whereby the pharmaceutical giant paid for bio-prospecting rights and forest conservation, supporting the development of INBio, which is a model for such institutes globally, provides an example of the potential of this approach at the national level.

The first step is to define nation-by-nation limits (or covenants) on the use of forest-based biodiversity. This can be achieved by computing the per capita "forest biodiversity content" of consumption in each nation, based on so-called "forest footprints" (local or national). Such measures exist only in rudimentary form, and it is difficult but not impossible to generalize them and create a standard measure. The next step is to conclude an international agreement on the limits that science will find appropriate to achieve sustainable development, targeting a maximum rate of extinction that is closer to evolutionary standards rather than to exceptional extinction events. Difficult value judgments and international consensus will be needed. An institution that parallels the Intergovernmental Panel on Climate Change (IPCC) could provide input from scientists all over the world to reach such a consensus. Proposals for a "biodiversity version" of IPCC have already been advanced.

In order to align business interests and profit motives, a public-private corporation can be created that national governments would endow with property rights associated with the services of each of their forests' biodiversity, with strict covenants imposing limits or otherwise restricting commercial, agricultural or residential activities as far as they have an impact on sustainable management. The new corporation would own the property rights to the health services derived from the intellectual property obtained from the forests specimens worldwide. As in the case of the watershed corporation described above, the forest corporation could sell bonds and/or equity backed by its assets in global capital markets. To achieve success in global capital markets, it is necessary to aggregate the assets across many nations, as this enhances their value, decreases financial risks and increases their attractiveness to global investors. The global investor would be offered bonds or equity based on the global biodiversity of the world's forests, and their derived health benefits used for commercial purposes. The forest corporation could also become a "public corporation", and offer stocks in secondary capital markets, thus acquiring further liquidity and accessing larger pools of capital.

In addition to being self-funded, the corporation would need an appropriate design so that ownership or stockholding can be allocated appropriately, through international agreements, to (a) governments, (b) local communities and (c) the private sector (private investors). Not only can such forest corporations ensure the sustainable conservation of the asset—namely the forests' biodiversity services—but they can also make substantial profits. Some of these returns will benefit the local

communities that are shareholders, thus upholding the three overriding principles of (a) sustainability, (b) self-funding, (c) equity and efficiency.

3. A database of indigenous knowledge

Indigenous communities around the world are reservoirs of traditional knowledge embodying their wisdom, culture and heritage. Some of this traditional knowledge has become commercially valuable: it produces enormous gain to the pharmaceutical industry since about 60 per cent of all medicines sold around the world derive from natural plants and treatments, generating revenues of more than $100 billion annually. Indigenous knowledge is of great value to humankind; yet, little or none of this commercial value has been realized to date by indigenous people. Indigenous knowledge and heritage are verbally transmitted. As most indigenous groups are displaced from their natural habitats, their people suffer severe economic pressures and their numbers dwindle, and the knowledge that they embody is itself at risk of disappearing.

The globalization process is intensifying these pressures. Traditional indigenous knowledge, with its immense value to humankind, is at risk of disappearing or having its value as intellectual property expropriated. Because indigenous people seldom rely on “private” property, they have no patents or licences and derive little or no gain from the valuable body of medical knowledge created over thousands of years. Without economic incentives, few resources are allocated for the preservation of traditional knowledge or for the collection and recording of the valuable information that their heritage embodies.

How to protect against this risk? A solution to this problem involves use of information and communications technology (ICT) to gather, organize and record digitally (verbally and visually) the body of knowledge and cultural heritage that the world’s indigenous people have produced over the millennia, as well as recording its origins.

This work would provide a basis for indigenous people to establish property rights for their knowledge. This may entail licences or patents. Indigenous people do not rely on “private property” within their own societies, but the property rights that are contemplated, however, are in relation to outsiders using their knowledge. Therefore, this project would not touch or in any way alter the traditional communal rights within indigenous groups. It would view indigenous rights in a new light with favourable commercial implications for indigenous groups. As such, and since the issues are global in nature, it would be likely to require the participation of international organizations to establish and help protect those rights. Appropriate regulation to ensure fair markets and transparency would also be needed.

In addition to preserving traditional knowledge for human benefit, this initiative would have the added benefit of raising awareness of the value of natural places and thus their sustainable management and conservation.