GDN's Next Horizons Essay Contest 2014*
THE FUTURE OF DEVELOPMENT ASSISTANCE
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Winning Entry
"REINVENTING FOREIGN AID IN THE DOMAIN OF NATURAL RESOURCES MANAGEMENT: TOWARDS A GLOBAL FUNDING MECHANISM FOR ECOSYSTEM SERVICES"

Abstract
The degradation of ecosystems is one of the key challenges facing humanity. Ecosystem degradation may lead, for example, to carbon emissions, changes in hydrology (which affect drinking water supply), and loss of biodiversity. Often, the poorest sections of society are most affected by ecosystem degradation. A range of foreign aid mechanisms have been set up to assist developing countries with safeguarding their ecosystems and the services they supply. However, their success has been limited, and new models of foreign aid are needed. This essay describes a potential new model. Once developed and operational, the proposed foreign aid model would serve as a long-term funding, monitoring and compliance mechanism for aid aimed at safeguarding the supply of essential ecosystem services. The model is built upon recent insights into the functioning of markets for ecosystem services and new developments in remote sensing technologies. It would involve the development of an investment vehicle, either as a stand-alone fund or as part of an existing global environmental funding mechanism, to channel funds into areas that provide essential ecosystem services at low opportunity costs. This mechanism would apply market principles to compensate land owners for the costs of conserving global ecosystem services, with detailed monitoring and strict enforcement of agreements. The mechanism would be complementary to existing market mechanisms for sustainable ecosystem management but would differ in its rigid application of market principles, its cost-efficient global monitoring program, a focus on legal enforcement and the global scale at which it operates. The funding mechanism presents a paradigm shift in foreign aid and ecosystem management and would make an essential contribution to sustainable development. The mechanism needs to be tested with a pilot project of around US$ 35 million, along the general lines elaborated in this proposal.

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INTRODUCTION

There have been significant advances in our understanding of the economic benefits provided by ecosystems over the last few decades, including tropical forests, rangelands and wetlands. These benefits have been labeled 'ecosystem services' (MA, 2005; TEEB, 2010) and a broad range of studies have shown the importance of safeguarding these services in order to sustain future welfare (TEEB, 2010). Ecosystem services include the goods supplied by ecosystems such as timber and fish ('provisioning services'), the regulation of climate change, ecological and hydrological processes such as carbon storage or flood control ('regulating services') and the non-material benefits provided by ecosystems such as the opportunities they provide for recreation or cultural practices ('cultural services'). Since many ecosystem services are generated in the form of externalities, land owners tend not to consider the full range of services in their decision making and, as a result, the supply of ecosystem services is in decline in most parts of the planet, particularly in developing countries where land use change is proceeding most rapidly.

Safeguarding the supply of ecosystem services is essential, in particular for the poorest sections of society that tend to depend on natural resources for a relatively large share of their income and that have the fewest adaptation options. At the local level, ecosystem services such as erosion control and the regulation of river water flows are essential for sustaining food production, replenishment of aquifers and drinking water supplies, and mitigating flood risks in urban and rural areas. At the continental level, preserving natural vegetation is essential for maintaining rainfall patterns, as shown for Brazil by Oyama and Nobre (2003), for the Sahel by Foley et al. (2003) and for Eastern Australia by McAlpine et al. (2007). At the global level, the release of carbon from degrading ecosystems is of major concern; emissions from ecosystem degradation currently account for around 10 per cent of total greenhouse gas emissions (IPCC, 2013).

Moreover, reducing these emissions is far cheaper than any other form of mitigation. The cost of avoiding one ton of CO_2 emitted in Indonesian peatlands, for instance, amounts to US$ 2 to 5, whereas the cost of mitigating CO_2 emissions from industrial activities ranges from some US$ 75 to 150 per ton of CO_2, depending on the industrial processes involved and local storage capacity (Hien and Van der Meer, 2012).

If the complete set of ecosystem services is taken into consideration, the economic value of many tropical ecosystems exceeds the value of alternative land uses – in particular, where these ecosystems are inherently fragile because of low soil fertility or irregular rainfall, and therefore, offer limited scope for agriculture (TEEB, 2010). However, the value of ecosystem services often fails to provide an incentive for the sustainable use of these ecosystems because many of the benefits do not materialize at the local level. A closer look at ecosystem services provided by tropical ecosystems reveals that the local benefits from ecosystem services (for example, timber and non-timber forest products) may be considerably lower than the benefits from alternative land uses (for example, palm oil plantations) (Rist et al., 2010; Hien and Van der Meer, 2012). However, adopting a more global perspective that takes into account ecosystem services such as carbon storage, water regulation and biodiversity conservation, changes the picture: in many areas the economic value of the benefits provided by the full suite of forest ecosystem services exceeds the

economic value generated by oil palm and other plantations (MA, 2005; TEEB, 2010). Hence, the economically efficient and sustainable use of natural and semi-natural ecosystems in tropical countries is hampered by a lack of compensation for local people for the ecosystem services they provide, in particular the regulating and cultural services that are relevant at both the local and global level.

Clearly, there are also social and institutional barriers to sustainable and economically-efficient ecosystem management, such as information gaps, land tenure issues and poverty, which, in conjunction with economic incentives, determine how ecosystems are managed. This proposal focuses on the economic arguments, recognizing that the proposed model will not necessarily work in contexts with, for instance, very weak institutions. This is reflected upon in the criteria for the selection of potential pilot sites elaborated later on in this essay.

The disconnect between providers of ecosystem services (often local land owners or users) and the beneficiaries of ecosystem services is widely recognized (Engel et al., 2008). In order to compensate land owners and/or users for the opportunity costs related to continuing the supply of these ecosystem services (for example, by means of preventing deforestation or forest conversion), a range of payment vehicles have been developed, known as 'Payment mechanisms for Ecosystem Services' (PES). There is a growing number of local PES schemes, particularly in Latin America, where dozens of watershed-based PES systems have been established, involving payments from downstream water users to upstream forest owners for maintaining the forests to ensure a regular water supply. Faith in PES as a tool for preserving ecosystem services at different scales is expressed, for example, in the Resource Mobilization Strategy agreed at the Nagoya Conference of Parties (COP10) on the Convention on Biological Diversity. COP10 proposes the establishment of PES as one of the key funding sources for biodiversity conservation. However, the applicability of local PES schemes strongly depends upon the environment – for instance, transaction costs related to establishing and operating a PES may be prohibitively high or local stakeholders may be too poor to pay for ecosystem services they have traditionally received for free (e.g. Wunder, 2007).

On an international scale, the main funding mechanism for mitigating carbon emissions is the Reduced Emissions from Deforestation and forest Degradation (REDD+) initiative that aims to compensate land owners for maintaining the storage of carbon stocks, in particular, the carbon stored in forests. However, in spite of several hundreds of millions of dollars of donor funding for REDD+ projects (Phelps et al., 2010), the global REDD+ market remains relatively small. The transaction volumes of projects that reduce emissions from deforestation and forest degradation amounted to 22.6 million ton of CO_2 in 2013 with a market value of some US$ 94 million. Since there are only a few REDD+ projects that enter the voluntary market each year, the volume of credits fluctuates considerably between years. The price of REDD+ credits decreased from US$ 7.4/tCO2e in 2012 to US$ 4.2/tCO2e in 2013, with a substantial proportion of demand still dependent on donor investments (Forest Trends, 2014).

Even though there has been a gradual expansion of the REDD+ market, progress has generally been slow for three main reasons: (i) legal and administrative barriers, which vary between countries; (ii) a general lack of demand for REDD+ credits; and (iii) the high costs of

monitoring and verification procedures needed for each individual project. The lack of demand for REDD+ credits is a fundamental constraint that is not likely to change in the near future as carbon credits cannot be traded on the world's largest carbon trading market, the EU European Carbon Trading Scheme (ECTS), as well as the fact that the market is completely dependent upon the willingness of companies or government agencies to buy credits from individual project developers on a voluntary basis.

For biodiversity conservation, there are several examples of successful market mechanisms for conserving habitat at the national or state level. The scheme with the highest turnover (around US$ 2 billion per year) is the US Wetland and Stream Mitigation Banking scheme. The scheme involves the purchase of 'offsets' from project developers that are engaged in development activities that result in the degradation or conversion of wetlands, and is driven by federal regulations requiring project developers to offset their impact on wetlands. These offsets represent new areas of wetland that are created or protected in order to compensate wetland losses elsewhere. There are several other biodiversity market mechanisms, in particular in the US and in several Australian states (Alvardo et al., 2014), all of which depend upon regulations that require developers to buy offsets, thereby creating a market demand for credits. Only a few international market mechanisms for biodiversity have been established. One of them is the Malua BioBank,[1] which has had limited success due to a lack of demand for the biodiversity certificates it offers and the challenges posed by monitoring and verification. A potential lack of credibility and high transaction costs are major challenges facing all local-scale biodiversity market projects (Wunder, 2007; Engel et al., 2008).

In addition, PES mechanisms tend to market one specific ecosystem service, whereas in reality ecosystems provide a range of different services each providing economic benefits. In many cases, it is the total of these benefits that provide the economic justification for the sustainable use of the ecosystem – rather than each service in isolation (carbon sequestration, water regulation or biodiversity conservation). In part, this is reflected in the REDD+ market through initiatives such as the 'Gold Standard', which offers a higher carbon price to REDD+ projects that also lead to the protection of biodiversity-rich areas. However, there is, as yet, no integrated, global payment system that simultaneously considers the broad range of ecosystem services.

A NEW MODEL FOR FOREIGN AID IN SUPPORT OF SUSTAINING ECOSYSTEM SERVICES

This essay presents a foreign aid model aimed at addressing a major shortcoming in the current approach to preserving ecosystem services in the foreign aid sector: a failure to secure the supply of ecosystem services that are essential for economic development at the local through to the global level. In particular, this essay presents an outline of a proposal for a 'Global Funding Mechanism for Ecosystem Services', from now on referred to as 'the (funding) mechanism' or the 'Fund'. This mechanism would match supply and demand for ecosystem services on a global scale. It involves a payment mechanism based on long-term contractual arrangements between the Fund and local ecosystem owners and managers,

[1] The Malua Biobank sells biodiversity credits, with each credit representing a specific area of tropical rainforest.

who would be financially compensated for the opportunity costs of preserving the ecosystem and, if appropriate, for rehabilitation and protection from disturbances. In this case, the opportunity costs represent the missed local revenue that could be obtained from converting the ecosystem. The Fund, in return, would obtain a measurable contribution to the preservation of ecosystem services. The Fund would be accompanied by a monitoring and verification mechanism that would apply remote sensing technology to reduce monitoring and verification costs through economies of scale. The Fund will invest globally in projects that generate the highest return in terms of emissions saved or biodiversity conserved, in countries where secure contractual arrangements can be obtained.

In addition to maximizing returns – in other words, securing global ecosystem services – the Fund would include an investment criteria focused on enhancing the supply of ecosystem services to local stakeholders, in particular, indigenous people and poor stakeholders, who would benefit from (i) the maintenance of local ecosystem services required for supporting local agricultural production (for instance, by maintaining irrigation water supply); (ii) the sustained right to use local ecosystems in a sustainable manner (the Fund would reduce the risk of land losses for local and indigenous communities to large scale conversion and land grabbing); and (iii) sharing the benefits from payments made by the Fund. Participation in the funding mechanism's projects will at all times be voluntary, require prior informed consent and will not lead to any reductions in access to the ecosystem for local populations or indigenous communities. There would be no obligation to use land sustainably or, where needed, rehabilitate the ecosystem. Instead, the Fund would offer local land owners financial support to continue using their land in a sustainable way, to counteract the increasing pressure from alternative land uses (for example, from land grabbing for plantation agriculture).

The main added value of the funding mechanism would be as follows:

i. It will develop a credible, global payment mechanism, with high transparency and low transaction costs
ii. The Fund will apply cost-effectiveness as a main investment criterion
iii. The mechanism would not be based on traditional donor-recipient relations but involve a market transaction between the Fund and the supplier of ecosystem services
iv. The Fund would protect its investments with strict enforcement mechanisms
v. In contrast to REDD+, the Fund would not only include forests but also target other ecosystem types for which there is currently no comprehensive payment mechanism
vi. The Fund would be complemented by a global monitoring mechanism based on remote sensing technology, partly eliminating the need for costly project-based monitoring.

As a result, the Fund is expected to be a more attractive investment option compared to current payment schemes for ecosystem services; the main sources of investment are described in the next section. It would help mainstream the safeguarding of ecosystems and ecosystem services in aid budgets and incorporate efforts to contribute to sustainable development and address the environmental impacts of participating companies.

The Fund could be set up independently from existing environmental funding mechanisms, or it could be created within an existing mechanism such as the Global Environment Facility or the Green Climate Fund. In particular, during the pilot phase, the mechanism could be developed and connected to funders more rapidly when embedded in an existing institution. However, given that independent monitoring and verification, and the legal enforcement of contracts, is central to the new funding mechanism, it is important that the mechanism maintains a sufficient degree of independence.

The proposed funding mechanism is timely in view of the increasing global interest in conserving natural capital, from which a wide range of ecosystem services are derived; and a growing recognition that this capital is diminishing rapidly, particularly in developing countries. A broad range of environmental NGOs have issued statements on the need to conserve natural capital and a range of businesses have expressed support for conserving natural capital – for example, the 'Natural Capital Declaration', currently signed by some 30 financial institutions.

THE 'GLOBAL FUNDING MECHANISM FOR ECOSYSTEM SERVICES'

Basic Premises

In natural resource management, donors, national governments and local stakeholders often have very different perspectives. Donors may prioritize sustainable ecosystem use, the protection of biodiversity, the maintenance of globally relevant carbon stocks and a habitable environment in the long-term. In developing countries, these may be a much lower priority. In these countries, national governments may, for example, prioritize large-scale industrial ecosystem use such as logging or conversion to plantations, while local people may favor more sustainable ecosystem use and/or conversion to small-scale agricultural plots (Jansen, 2009; Mayne and Stern, 2013). Nevertheless, in developing countries there is also a growing recognition of the importance of ecosystem services. For instance, in recent years, the Governments of Cameroon, Guyana and Ecuador have indicated that they would be willing to conserve specific carbon-rich, high biodiversity ecosystems in their countries provided that the opportunity costs of not developing these areas are covered by other countries. These requests for support have not been addressed, largely because of a lack of suitable funding mechanism and the difficulties in determining a 'fair' price for ecosystem services conservation.

The proposed approach would align local, national and global interests, by establishing a 'market-conform' payment mechanism for ecosystem services. Market-conform, in this case, means that the mechanism would aim to obtain the highest amount of biodiversity and associated ecosystem services per invested dollar. The Fund would disburse annual payments to local ecosystem managers in return for conserving, and where needed, rehabilitating ecosystems in order to sustain the ecosystem services they provide. Investment sites would be selected on the basis of cost, ecological benefits, levels of risk and positive impacts on local communities, allowing the Fund, once operational, to invest at short notice and obtain a 'fair' price for ecosystem services given the prevailing market

conditions – as determined by the funds received from investors and the offers for ecosystems from land owners.

The operations of the Fund would differ from existing approaches to foreign aid in a number of ways. Principally, the fund would not be an 'aid' project: it would involve contractual agreements between equal partners – in other words, the global Fund and the owner of the ecosystem. The Fund would select areas based on the supply of important ecosystem services (on a national, continental or global scale), including (i) carbon sequestration and storage; (ii) regulation of hydrological cycles (in particular, for maintaining rainfall patterns); (iii) regulation of major/transboundary river flows; and (iv) biodiversity conservation; with the understanding that these areas also provide other important benefits – such as supplying forest products or supporting tourism and recreation. The Fund would enter into legally binding arrangements with land owners and users in order to conserve ecosystems and the services they provide for a period of at least 25 years. The land owner and the Fund would agree on legally binding contracts that would specify both the payment (including amounts and timeframes) and the land owner's obligations in order to conserve and sustainably use the ecosystem. The latter would include the development of a specific biodiversity management plan, a local monitoring and reporting scheme and the investment in measures necessary to maintain the ecosystem in its current condition or rehabilitate the ecosystem where appropriate. The Fund would pay an annual fee to the land owner in return, and would monitor the implementation of the ecosystem management plan. The Fund would be based on a 'market-conform valuation' approach: entering ecosystem conservation agreements on the basis of an evaluation of the price the land owner is willing to accept and the secured supply of global and other ecosystem services in return; in comparison with other land owners offering ecosystems for conservation.

The funding mechanisms, given the need to work at a sufficiently large scale, would not involve direct agreements with smallholders, but would work with large companies and large land-owners or governments directly. It is crucial, however, that if there are smallholders or other people residing in the area under consideration, that they are included in the project design and benefit from the funding mechanism. Working with local stakeholders is critical given that all stakeholders need to benefit from enhanced ecosystem management and because local stakeholders are often important actors in the actual day-to-day management of the ecosystem. Hence, the Fund would develop specific safeguards and benefit-sharing arrangements in order to accommodate multiple stakeholders, including indigenous people, based on the principle of prior informed consent and consensus-based sharing of benefits between the different users of the ecosystem. Importantly, the operations of the Fund would allow continued use of the ecosystem by local communities (for example, collecting products, hunting and harvesting timber for personal use) provided that this does not affect the supply of ecosystem services.

The Fund would, therefore, support local stakeholders in three ways: (i) by ensuring that the areas covered by the Fund are not converted to alternative land uses, such as large-scale plantations (with the associated adverse effects on indigenous people); (ii) by not restricting access for local communities to land (with the exception of land use practices that have a long-term negative impact on the ecosystem); and (iii) by providing additional support to ensure benefit sharing with local communities (in other words, the benefits paid to the land

owner would be shared with these communities). These arrangements will always be context-specific and need to be worked out for each (pilot) project on a case-by-case basis. In areas where there is no local consent and support for the project, the site would not be eligible for project funding.

Given the transaction costs involved in these kinds of agreements, the minimum habitat size required for many species and the sensitivity of ecosystems to disturbances in adjacent areas, the Fund would invest in large, contiguous tracks of lands, with an indicative minimum of around 50-100 km². The Fund would monitor the condition of the ecosystem and the supply of main global ecosystem services: (i) carbon sequestration and storage; (ii) the maintenance of hydrological cycles and river flows; and (iii) biodiversity conservation. Since many other ecosystem services (erosion control, pollination, etc.) would also be preserved if ecosystem condition, biomass and species composition are sustained (Mace et al., 2012), the Fund would contribute to preserving other ecosystem services generated by the area.

The specific characteristics of the Fund are as follows:

1. The Fund would operate on the basis of mutually agreed contracts with a clear business proposition. The land owner will commit themselves to conserve and sustainably use the ecosystems in the areas for which the contract is signed and, in return, the Fund will obtain a measurable contribution to conserving global ecosystem services. There will be no loss of autonomy of any kind for the country involved. However, as with any contract there would be legally binding obligations for all partners specifically the funding mechanism and the land owner. Given the functioning of ecosystems and the need to conserve global ecosystem services in the long term, contracts would be entered for a substantial time period – at least 25 years. Payments would be transferred to land owners on an annual basis, unless there is a breach of contract.

2. Investors in the Fund would obtain a certificate that specifies how many tons of greenhouse gasses would be mitigated, and the impacts on water flows and on biodiversity (using appropriate indicators) as a result of their participation in the funding mechanism. They would commit themselves for a period of 25 years (a one-time donation would be converted to an annual disbursement) and receive regular updates on the status of the specific ecosystems they have invested in: ecosystem condition, the occurrence of disturbances, mitigated greenhouse gas emissions and preserved biodiversity habitat. Areas for which payment schemes elapse after the agreed contractual period (for example, after 25 years) would receive a high priority in terms of finding new funding for ecosystem conservation, provided that the land owner is willing to re-engage with the Fund. After 25 years, prices may be renegotiated.

3. The Fund would not relate gains in ecosystem services supply to baseline land use change scenarios, as in the case of REDD+ (which often excludes the land with the lowest opportunity costs from conservation agreements). Instead, a relatively low price will be paid for land under low levels of threat.

4. Land owners or users would be allowed to use the land within sustainable boundaries. They would be allowed to harvest products on a sustainable basis (properly accounting for all extractions in the ecosystem) provided that (i) land is not converted; (ii) vegetation or fauna is not degraded by overharvesting of resources, based on an agreed ecosystem management plan; (iii) ecosystem restoration measures are implemented where appropriate; (iv) poaching is controlled; (v) hydrological systems are not altered and where needed are restored – for instance, conservation of biodiversity in peatlands requires maintaining a high water level ; and (vi) other disturbances such as fire are controlled, based on an agreed management plan. Specific support would be provided to allow poor stakeholders, including indigenous communities, to participate in the Fund should they wish to do so.

5. There will be strict monitoring and verification of all ecosystem conservation agreements. There will be two types of verification: recently developed remote sensing techniques to monitor all sites on a monthly or bi-monthly basis to detect land cover change – including changes in vegetation cover, changes in hydrology and incidences of fire (as discussed in the section on Monitoring, Reporting and Verification below); and site surveys, in particular for those areas that have been identified by remote sensing monitoring as being of concern. The site surveys will include both an evaluation of the actual implementation of the management plan, including a verification of the extraction accounts, and an in-situ analysis of the state of the ecosystem.

6. External reporting will be fully transparent. A defining characteristic of the Fund will be complete transparency in terms of funding disbursed and outputs achieved. All payments disbursed, as well as remote sensing and survey reports, will be made public via the internet. Projects will be scored and ranked according to their outcomes.

7. Contrary to the majority of current foreign aid development projects, the Fund will strictly enforce agreements using all possible legal means. All contracts need to have clauses specifying consequences of non-compliance, which in principle could include paying back with interest all funds received during the part of the contractual agreement that has passed (including definitions of force majeure, valid legal system, etc.).

8. The Fund will ensure that there will be no adverse impacts from investments on the local population, including indigenous communities. These communities are often dependent upon the ecosystems they manage, often in a sustainable manner, but they do not always have formal ownership of these areas. They would be welcome to enter formal agreements with the Fund if investment conditions are met and would receive support needed to enter such agreements if they were willing to do so. The Fund will include appropriate safeguard measures to ensure that land not owned by local and indigenous communities cannot be brought under contractual agreement with the Fund unless there is explicit, informed consent, including on benefit sharing mechanisms.

Replenishment of the Fund

It is clear that the Fund can only provide a viable, alternative approach to foreign aid and the maintenance of global ecosystem services if the funding mechanism grows over time

and if funds available to invest are frequently replenished. There are three potential sources of funding for the continuation and gradual expansion of the Fund:

1. **Governments wanting an effective use of development aid budgets in return for ensuring the safeguarding of global ecosystem services**. To date, only the Norwegian Government has pledged sums of money in the order of magnitude required for ensuring the conservation of global ecosystem services, in particular, support for arresting deforestation in Brazil, Indonesia and Guyana. In practice, it has proven difficult to identify concrete investment options in forest conservation at a scale commensurate with the funds pledged by Norway.
   Building an approach to identify, implement and monitor large-scale projects aimed at halting ecosystem degradation takes considerable time and requires a structured approach that involves project design, implementation, capacity building, and monitoring, reporting and verification mechanisms. When the Fund can prove the effectiveness of its approach, discussions will be held with aid agencies to determine if, and under which conditions, they would be willing to commit resources to such a funding mechanism.

2. **Businesses willing to invest in ecosystem services for either offset or Corporate Social Responsibility (CSR) purposes**. Connections need to be made with the plantation agriculture, food processing, mining, and oil and gas sectors. These sectors are often responsible for substantial residual environmental impacts as a result of their operations (McFarland, et al., 2015) and are coming under growing pressure from consumers to compensate for such impacts. In general, companies will only invest if there is no reputational or other risk associated with a CSR or offset project. The reputational risk will, therefore, be borne exclusively by the Fund itself. Furthermore, the Fund, through its detailed monitoring, verification and reporting mechanism, would be able to clearly demonstrate the secured benefits obtained from funds provided by the company, particularly in terms of safeguarding global ecosystems. Fund managers should explore if a logo or other marketing instrument can be developed for companies that commit to invest a certain share of their turnover in the Fund, to give these companies the option of using the logo on their product range. Given that the areas and ecosystems to be included in the project represent natural capital, the funding mechanism could explore the possibility of linking with the various natural capital-related initiatives such as the Natural Capital Coalition or the signatories to the National Capital Declaration.

3. **High value individuals with an interest in using part of their wealth in order to ensure the wealth of future generations**. It may be possible that at some stage, the transaction costs of participating in the Fund could be brought down to such a degree that relatively small donations could be accepted and earmarked by the contributor for specific countries or ecosystems targeted for specific uses. This would make it possible to better cater to the interests of individual donors. An option would be for the Fund to explore whether it would be possible to guarantee investors a certain return on their investment, such as a minimum impact on greenhouse gas mitigation or areas of natural ecosystem conserved – effectively taking over the risk of the investment.

Monitoring, Reporting and Verification

A crucial and innovative part of the Fund would be to develop a comprehensive ecosystem monitoring system using the latest remote sensing technology, in particular, the radar and optical Sentinel satellites recently launched by the European Space Agency. These satellites provide high resolution (20 metres depending on the spectral band) and high frequency global coverage (every 1 to 2 weeks depending on latitude). This would allow for a more comprehensive and accurate monitoring program. The proposed approach would involve the development of procedures for the automated downloading and processing of images involving existing but relatively new technologies. Indicators that can be measured with remote sensing techniques include crown cover, standing biomass, incidences of disturbance such as fire or logging and, to a degree, water table levels. From these indicators an assessment can be made of changes in carbon stock and of biological disturbances. The remote sensing technology would be a key tool for monitoring the status of each investment, as well as for selecting new areas for investment (for instance by providing information on baseline trends in ecosystem status, by observing land use change, and by providing information on the opportunity costs of conservation).

The remote sensing survey needs to be complemented by a site-specific monitoring program, including (i) the regular monitoring of key ecosystem specific indicators by the site managers (such as specific ecological quality and keystone[2] and/or conservation flagship species); and (ii) independent verification of the local monitoring program and the ecological quality of the site including carbon storage, hydrological regulation, biodiversity and local ecosystem services. It is important to note that remote sensing images need to be combined with hydrological and/or atmospheric models in order to understand the effects on maintaining rainfall patterns and river flow regulation. Such models are already widely available for many major watersheds. Monitoring reports for each site, involving remote sensing observations of the ecosystem condition and local surveys would all be published on the internet, and quarterly reports summarizing relevant information for specific areas would be distributed to investors in the Fund who have contributed to the conservation of the ecosystem services in these areas. These monitoring and reporting mechanisms would also have a wider relevance for the monitoring of natural capital. This provides an opportunity for examining options for knowledge sharing as well as obtaining co-funding for developing these mechanisms with actors in the domain of natural capital.

ESTABLISHING A GLOBAL FUNDING MECHANISM FOR ECOSYSTEM SERVICES'

Establishing the Fund requires a long-term approach involving state-of-the-art legal, financial management, scientific and communication expertise. This would proceed in three phases:

1. **Inception Phase** (2 years). In the Inception phase, the Fund would hire relevant staff and establish a legal entity for the funding mechanism – in a country with a clear and conducive legal framework for the operation of an international fund and the capacity to enter into legal agreements with a range of developing countries The Fund would be

[2] A keystone species is a plant or animal that plays a unique and crucial role in the way an ecosystem functions

established and investments secured according to strict sustainability standards in order to ensure that, at any time, sufficient revenue is available for all ecosystem investments. In addition, the monitoring and reporting system, using remote sensing technology and automated data processing, would be developed, and several pilot projects would be identified.

2. **Pilot Phase** (2 years). In this phase, the approach would be tested in several (possibly around 5) pilot sites of at least 50-100 km² in different countries. The testing would involve all aspects of normal operations of the Fund including evaluation of the business case for each potential pilot, contractual agreement procedures, monitoring and verification, and field level surveys. Particular attention would be paid to indigenous communities, where they are included in the project. The criteria for selecting pilot sites include the strength of national institutions and the rule of law; the cost of land; levels of threat and biodiversity richness; the provision of globally significant ecosystem services including carbon sequestration and regulation of global water cycles; the willingness of land owners to engage in a pilot project involving compensation as well as restrictions on land use; and support from other land users (for example, indigenous communities), if present. For each pilot project a specific legal agreement has to be set up and signed specifying permitted ecosystem uses and obligations and limitations (for example, on land conversion, monitoring and reporting requirements, consequences of breaching agreements, etc.). In addition, specific elements could be included in the pilot project that would aim to create local benefits based on sustainable ecosystem management, such as from ecotourism or sustainable, certified wood or non-timber forest-product harvesting.

3. **Scaling up and Operational Phase** (indefinite). In this third phase, the Fund will identify and invest in new ecosystem conservation projects and attract additional investors based on the experiences gained in the previous phase. A specific effort will be undertaken to reach out to the private sector, with the aim of obtaining a steady flow of funding in return for the use of a logo indicating the contribution of the company to the Fund. Potentially, the Fund could also engage with donors to facilitate 'traditional' foreign aid projects in project sites – for instance, projects aimed at enhancing the income of local communities through ecotourism.

An approximate, tentative indication of the required budget for the first two phases is as follows: It is estimated that establishing the Fund would require starting capital of around US$ 35 million. Of this, around US$ 25 million would be needed for identifying, evaluating and investing in the five pilot projects, including sustained payments to these five projects over a 25 year time period. Around US$ 5 million would be needed to set up the Fund itself (personnel, office buildings) and the design of the legal and financial management mechanisms that would ensure the availability of funds for annual payments to the participating sites. A further US$ 5 million would be needed to develop the global and local ecosystem monitoring and reporting system, including purchasing of hardware for data storage and processing, developing routines for downloading and processing remote sensing images, and developing a user friendly information management and reporting system.

CONCLUSION

Scientific research has increasingly highlighted the negative impacts of ecosystem degradation, which involves the loss of productive soils, depletion of water supplies and alteration of local and global climate processes, as well as the impacts of this degradation on people. In the course of the coming decades, the impacts on society are likely to be dramatic, in particular for the poorest countries and regions. There is, therefore, an urgent need to develop a long-term, comprehensive and effective mechanism to assist developing countries and local land managers in these countries with sustainable ecosystem use. Current foreign aid and resource management models are not able to ensure that ecosystems providing essential life-support services are sustained.

This essay proposes a funding mechanism to address the ongoing, progressive degradation of ecosystems providing major global ecosystem services and the implications this has for human well-being. Contrary to existing foreign aid mechanisms, the Fund would operate on the basis of a strict application of market principles by selecting, among others, the lowest-risk, highest-return projects generating global and local ecosystem services from a potentially global portfolio. The funding mechanism would operate with a long-term vision, and would enter legal agreements with local land managers. It would operate in a fully transparent manner and it would be accompanied by a comprehensive mechanism to monitor the status of ecosystems worldwide, using the latest remote sensing technology, both to monitor the status of investments and to select new investment opportunities.

The essay also demonstrates that the main preconditions for the establishment of a global funding mechanism in ecosystem services are already in place: (i) there is increasing experience with market mechanisms for ecosystem conservation, including local benefit sharing; (ii) there is a demand for such projects in developing countries as indicated by the willingness of many governments to test such market mechanisms; (iii) recent developments in remote sensing technology and ecosystem services modeling and accounting allow for cost-effective monitoring; and (iv) there is a potential long-term source of funding from businesses and governments provided that a transparent and credible mechanism can be established. If a donor or investor would be interested in financing the setup of the Global Fund for Ecosystem Services, a detailed project proposal needs to be developed, including a detailed plan of activities, budget, etc. This essay provides a starting point for such a pilot project, which would require a budget of around US$ 35 million.

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