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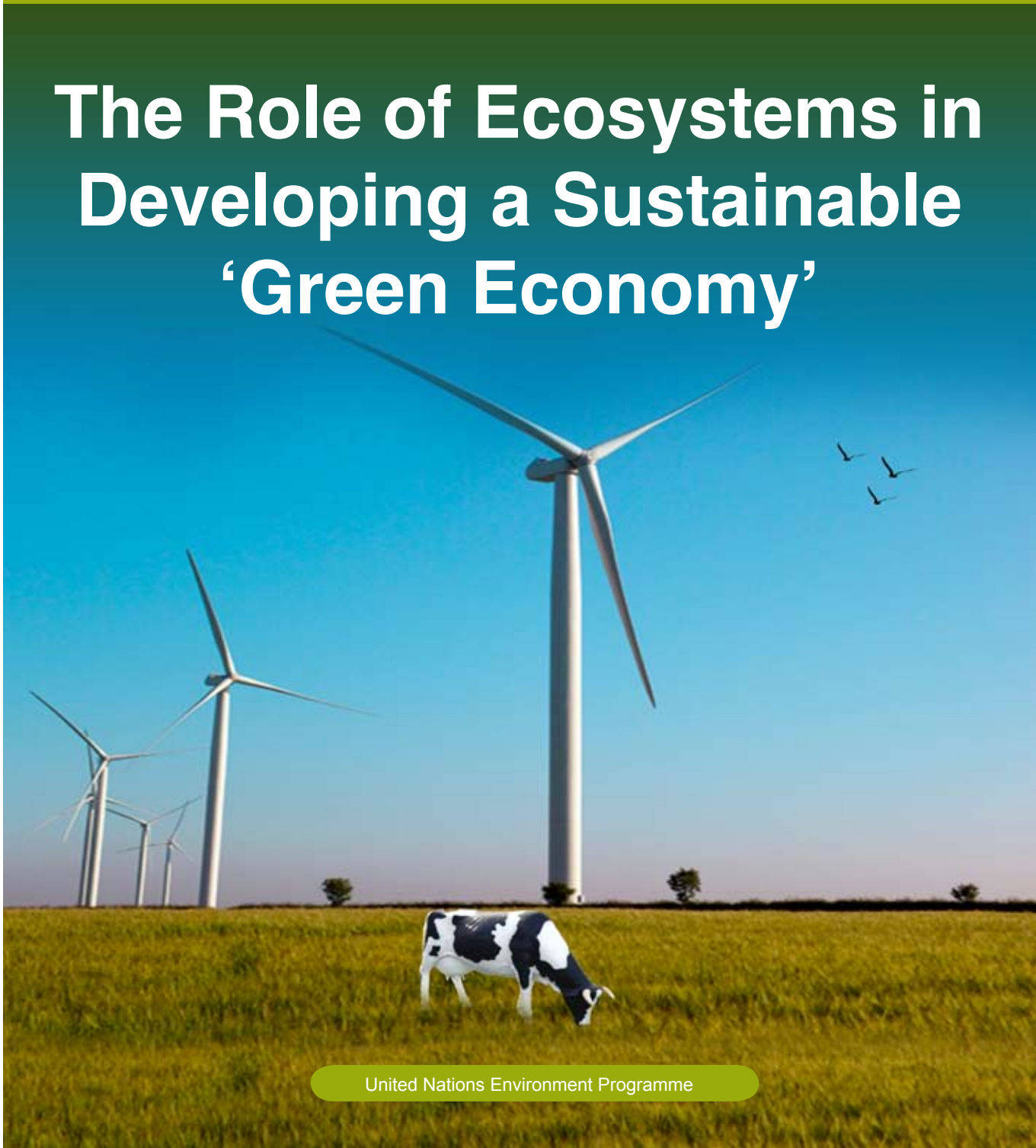
The Role of Ecosystems in Developing a Sustainable 'Green Economy'



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Key Messages

- Ecosystems provide extensive benefits for supporting and enriching people's wellbeing.
- Ecosystem benefits are not adequately valued or accounted for in national accounts and decisions.
- Carefully designed response policies for climate change presents an opportunity to get the valuation process right by investing in both adaptation and mitigation.
- Ecosystem-based adaptation, in particular, can help lead to societal transformational change.
- Embracing and capturing economic values of ecosystem services in mainstream decision making tools and indicators, for example a national income and growth matrix, can help in designing effective policies for sustainable growth and societal well- being.
- Investing in a new development model using small-scale fiscal stimulus that mobilises the untapped potential of local people is imperative for unleashing a low carbon and Green Economy.
- The current economic model driving the world economy is not sustainable. There is therefore a need for a new approach to economic development where ecosystems are the underpinning foundations

Purpose

This Policy Brief details the need for the definition of the "Green Economy[1] " to include the many other benefits our environment provides people including adaptation to climate change, poverty alleviation, and the potential to serve as a basis for a sustainable economic model. This integration can be achieved by including ecosystem-based adaptation (EBA) or nature-based solutions[2] to climate change, valuing the many benefits nature provides to people, and including such values in economic decision-making. Ecosystems underpin all of the resources and goods upon which humans depend and therefore are critical for securing human wellbeing. Investing in ecosystems can bring both local and global benefits providing the dual goals of supporting local communities, helping them cope with and adapt to a changing climate, and helping to mitigate global climate impacts depending on implemented practices.

This brief is aimed at the general public, politicians, businesses and organisations that influence the development of policies and strategies in economics, climate change mitigation and adaptation, poverty alleviation, natural resource use and biodiversity conservation. The aim is to stimulate discussion and debate as to how societies can avoid degrading the natural environment and the wealth of valuable benefits it provides, and instead promote and utilise healthy ecosystems to support a sustainable and more climate-resilient future for people around the world. Coming after the Nagoya Protocol3 milestone agreement, this brief is timely as it will help spur momentum and provide a new roadmap for protecting our biodiversity and ecosystems whilst helping to foster a better society-wide understanding and appreciation of their importance in providing the essential life support systems we all depend on.

1 Refers to the process of reconfiguring businesses and infrastructure to deliver better returns on natural, human and economical capital investments, while at the same time reducing greenhouse gas emissions, extracting and using less natural resources, creating less waste and reducing social disparities

2 Use of biodiversity and ecosystem services as part of an overall adaptation strategy to help people and communities adapt to the negative effects of climate change at local, national, regional and global levels

3 http://www.cbd.int/doc/press/2010/pr-2010-10-29-cop-10-en.pdf

Rationale:

Ecosystems, the biodiversity that comprises them and the benefits they provide to people (ecosystem services[4]) are the fundamental units for life support on Earth[5]. They are the foundation for the natural processes of climate regulation and are a vital support for water quality, food security, and flood protection, amongst many others. Currently there are severe pressures on the health of our ecosystems. The drivers of these pressures include climate change, biodiversity loss and resource demands by people. Natural ecosystems are being converted to other uses rapidly, for example over 40% of today's terrestrial surface is now in agriculture[6]. At the same time climate change is posing a further substantial risk to the health of ecosystems and therefore their ability to provide ecosystem services, whilst human population growth and resource use per capita is increasing[7].

Such a combination of environmental, climatic and economic pressures leading to food, water and energy shortages has the potential to be a 'perfect storm'. As any good sailor knows, the way to avoid such a storm is by changing direction and heading for calmer waters while preparing for whatever impacts might arise.

This Policy Brief therefore explores an ecosystem-based set of solutions that human society can use to avoid potential future problems, as well as for coping with and adapting to changes we are already experiencing and will likely continue to experience.

Fundamental to achieving this is to address the way ecosystem benefits are internalised into conventional decision making tools. For example the way ecosystem services are valued and accounted for in the existing economic model and indicators like gross national products (GDP).

Currently, the global economic model and national accounting does not account for all the essential benefits that nature provides to people, especially in the long term leading to the overuse or misuse of natural resources rather than their sustainable and efficient use. Without full valuation of less-tangible natural benefits from ecosystems, use will remain unsustainable and degradation inevitable leading to the potential collapse of important ecosystem functions and services. It is increasingly evident that there is a need to develop an economic model that accurately reflects benefits to people from the environment and the costs associated with ecosystem degradation. Getting this right will help move us toward sustainability.

4 Ecosystem services are defined as 'the capacity of natural processes and components to provide goods and services that satisfy human needs, directly or indirectly (after de Groot 1992 and de Groot et al 2002, Ecological Economics 41). Ecosystem services are the benefits to people from nature – benefits which can only be realized if the capacity of natural processes is retained.

5 http://www.millenniumassessment.org/en/index.aspx

6 Foley et al 2005

7 The Place of Nature in Economic Development. Dasgupta working paper. 2009. http://www.sandeeonline.com/uploads/documents/publication/845_PUB_Working_Paper__38.pdf

Opportunities:

Climate change may be threatening the long term provision of ecosystem goods and services, but it also presents an opportunity to get our global accounting system "right" and truly move towards a sustainable Green Economy. This opportunity presents itself through EBA. An EBA approach offers a means to encourage development of cost efficient policies and strategies that help people cope with the adverse impacts from climate change, through ecosystem management, conservation and restoration. Conserving and managing nature protects the resilience of ecosystems and the valuable benefits they provide society. This is particularly the case for the poorest and most vulnerable people around the world, who strongly depend on natural ecosystems for their livelihoods and who have the least ability to adapt in the face of a changing climate. Care of ecosystems and the benefits they provide can serve as the underpinning foundation on which a sustainable economic model can be developed. One such desired model is the Green Economy. A further opportunity exists in that the Green Economy is one that can evolve by global consensus with the aim of meeting basic human needs of all people. Therefore, the Green Economy, as defined in this brief, has the potential for additional benefits beyond green accounting including benefiting the poor through well-targeted investments.

Ecosystems and why they matter

Ecosystems mitigate Climate Change

Planet Earth is a dynamic geological and biological system. It produces and absorbs carbon and other greenhouse gases through a range of natural cycles and across a wide variety of ecosystems, which has resulted in the past climate patterns. However, human activity has intervened in these natural carbon cycles by:

(1) creating major new sources of carbon emissions from the use of fossil fuels;

(2) releasing carbon through deforestation, forest degradation, agricultural practices, and other land use change; and

(3) destroying or transforming natural ecosystems that capture and store carbon. Put crudely, humans activities are now releasing more carbon to the atmosphere than natural systems can absorb.

Terrestrial and oceanic ecosystems are currently absorbing about half of anthropogenic CO2 emissions (Oceans c. 24%, land c. 30%[8]). Without CO2 sinks, the total CO2 emissions since 1800 would have caused atmospheric CO2 to increase from 280 ppm in pre-industrial times to about 500 ppm now[9]. Today's concentration at Mauna Loa in Hawaii is 387 ppm[10]. But climate change

[8] Cannedell et al 2007. PNAS. See: http://www.pnas.org/content/104/47/18866.full.pdf+html

[9] Raupach et al 2009, The Global Carbon Cycle. In Richardson et al 2009. Synthesis Report. Climate Change: global risks, challenges and decisions Conference, 10-12 march 2009, Copenhagen. See: http://climatecongress.ku.dk/

[10] NOAA. See: http://www.esrl.noaa.gov/gmd/ccgg/trends/

feedbacks and other pressures including land-use change, ocean acidification (due to absorption of CO2[11]), pollution and over-exploitation reduce this capacity. The efficiency of sinks in removing CO2 has decreased by 5% over the last 50 years (about 1% per decade) and will continue to do so in the future. Fifty years ago, for every 1000 kg (1 ton) of CO2 emitted to the atmosphere, natural sinks removed 600 kg. Currently, the sinks are removing only 550 kg for every 1000 kg of CO2 emitted, and this amount is falling[12].

Putting these things together, it can be seen that there are three main components to the global carbon cycle.

- Those emissions due to burning fossil fuels.
- Those emissions from ecosystems, including deforestation and forest degradation.
- There is only one sink: the capacity of global ecosystems to absorb carbon.

This is shown in Figure 1.

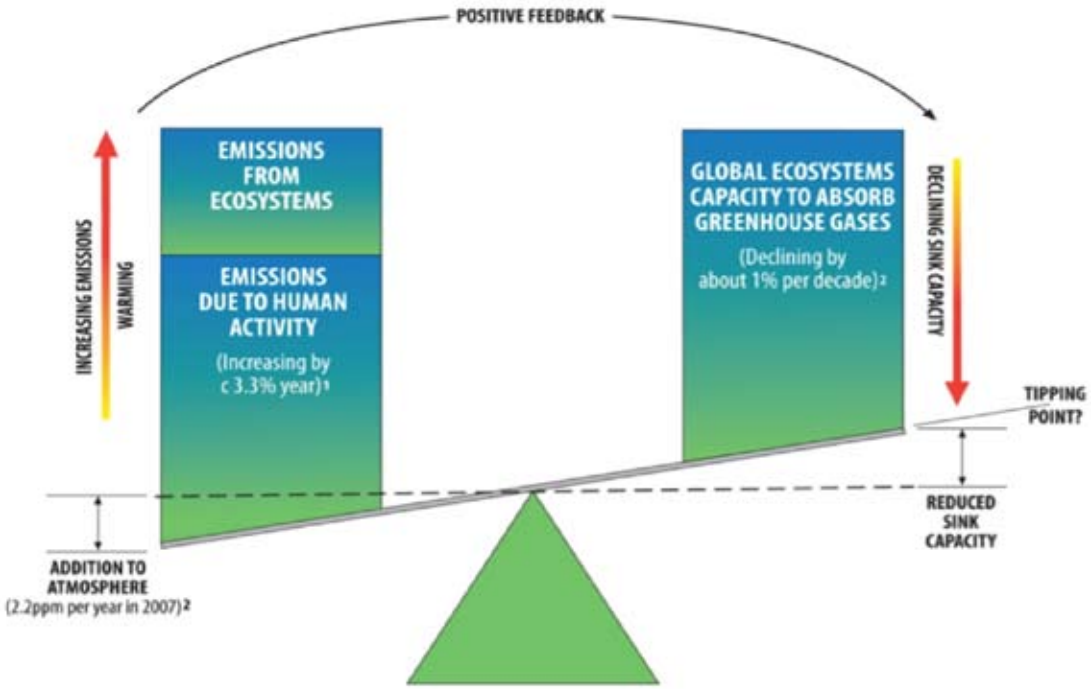


Figure 1. Imbalance of components for climate stabilisation
Global Carbon Budget[13]
(Note proportions of size are not to scale and do not reflect actual values of fluxes)

11 Turley and Scholes 2009, in Richardson et al 2009 (as above) and IPCC AR4 WG I Ch. 5 p403.

12 Global Carbon Project (2008) Carbon budget and trends 2007
See: http://www.globalcarbonproject.org/carbonbudget/07/index.htm

13 Global Carbon Budget. See: http://www.globalcarbonproject.org/carbonbudget/07/index.htm

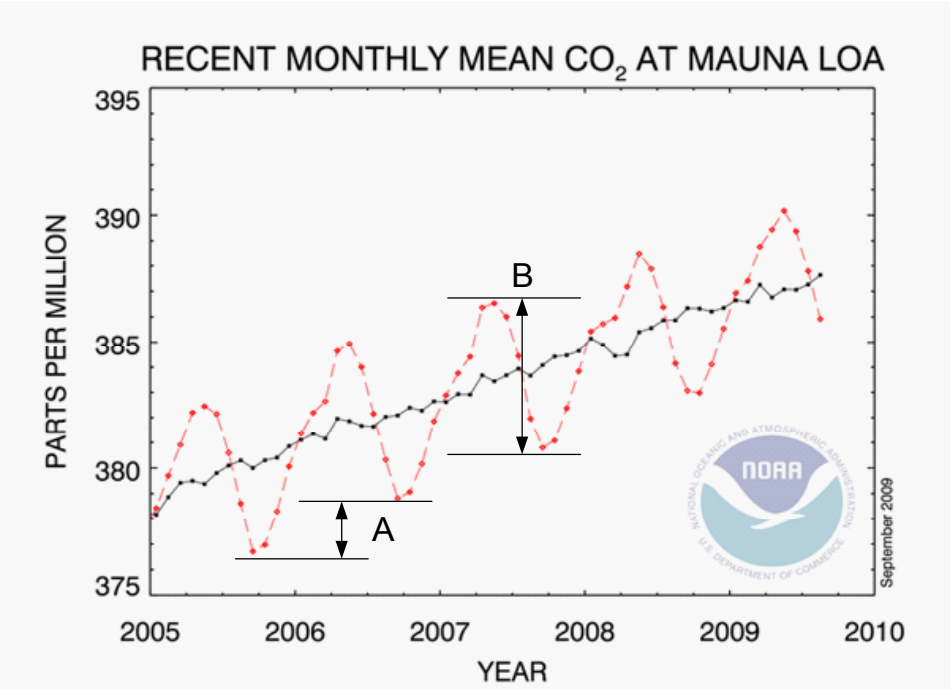


Figure 2. Mean monthly CO2 concentration cycles at Mauna Loa, Hawaii showing seasonal patterns (red line) and trend from moving average corrected for the seasonal cycle (black line). Mean monthly data source: NOAA (http://www.esrl.noaa.gov/gmd/ccgg/trends/).

In Figure 2, dimension A shows the net annual increase in atmospheric CO2 concentration, reflecting the imbalance between total emissions (Human and ecosystems) and ecosystem sink capacity, whilst dimension B shows the decrease in CO2 concentration in one year due to absorption by ecosystems, particularly during the northern hemisphere summer, demonstrating the capacity for ecosystems to absorb large quantities of CO2. From Figure 2 it can be seen that current ecosystem degradation will decrease dimension B (the net effect of the global sink capacity) and enlarge dimension A (the addition of CO2 to the atmospheric pool, coupled with increased CO2 emissions from fossil fuels). Conversely, an increase in ecosystem sink capacity (enlarging B) will help negate the imbalance arising in A. Coupled with Human emissions reductions then A can be minimised or even made to be negative. This can lead to an atmospheric CO2 concentration that results in climate stability.

As Figures 1 and 2 reveal, ecosystems function as the main climate regulators, both in releasing greenhouse gases (sources) and absorbing them (sinks) and in other direct and indirect interactions with the climate, but this is changing.

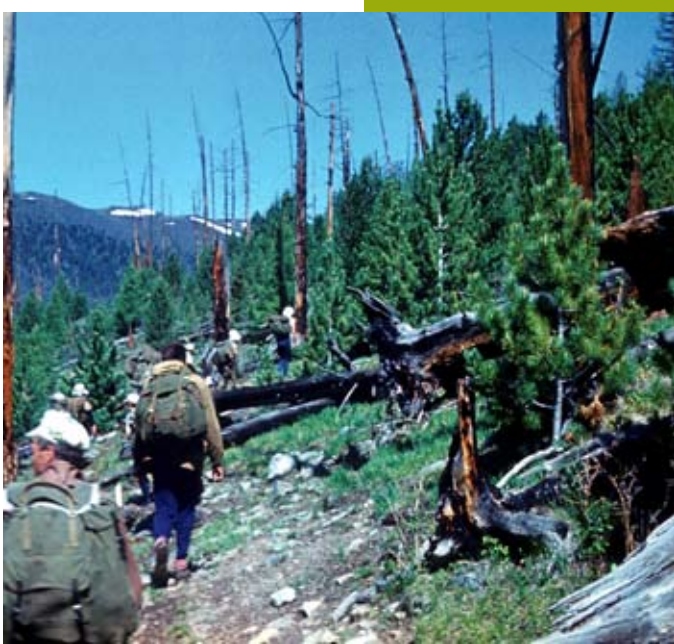
- Ecosystems currently absorb about half of anthropogenic CO2 emissions (Oceans c. 24% and land c. 30%). The remaining amount is the addition to the atmospheric pool.

- But ecosystem absorption capacity is declining by about 1% per decade and is likely to decline more rapidly due to global warming and human impacts.
- At the present time emissions due to human activity are increasing:
- Current estimates put the annual global emissions of CO2 due to human activities at about 10 Giga tons, of which about 1.5 Gt are from land use change (mainly deforestation).
- About 15-17% of global carbon emissions are from deforestation and forest degradation.

The net effect is that there is an increasing imbalance between carbon emissions and absorption capacity of the Earth. Therefore, to achieve climate stabilisation there is a need to manage all three components of the global carbon cycle, not just those resulting from fossil fuel emissions and other human activities. This means managing the carbon sinks, too: the world's oceans, forests, grasslands, soils, and other ecosystems which can uptake and store carbon and in so doing, decreasing another source of emissions. Well managed and adequately protected ecosystems can help mitigate climate change impacts by both reducing emission levels while increasing carbon uptake and storage. Inadequate ecosystem protection has lead to degradation and therefore a decline in various ecosystem services whilst reducing the ability of ecosystems to regulate our climate.

Ecosystems provide valuable adaptation mechanisms

Regardless of how much we reduce our use of fossil fuels, there will be shifts in climatic conditions which will affect people and ecosystems by about 0.7 degrees C from IPCC AR4. Investing in nature-based solutions through EBA gives people a proven and potentially cost-effective means to cope with climate change. The ability of natural ecosystems to provide multiple benefits makes their protection, restoration, and management an ideal objective for not only mitigating climate impacts but also adapting to them. Ecosystems and the benefits they provide (e.g. climate regulation, food security, freshwater supply, disaster risk reduction) are fundamental to supporting people's livelihoods and other life on Earth. Ecosystems play an unequivocal and increasingly important role in both ecosystem-based mitigation (carbon sequestration and storage), as described previously and ecosystem-based adaptation (i.e. nature-based societal adaptation to climate change impacts).



Potential examples of the benefits of such nature based solutions are varied though many remain unmeasured and unquantified:

- Naturally connected floodplains and riparian ecosystems can provide flood protection for millions of people who are likely to experience increased flood risk
- Forest protection and reforestation can provide clean water and reduced flood risk.
- Deep-rooted, nitrogen fixing plants can naturally replenish soil nutrients in agricultural systems helping maintain access to food supplies. These same plants can help filter sediments and nutrients keeping our waters clean and available for human consumption while enhancing carbon sinks.
- Mangrove forests provide protection services from coastal erosion and protect human lives in the face of severe storms while providing nurseries for fish which can feed coastal populations of people
- Coral and Shellfish reefs provide protection from storm surges and are a source of food and economic resources.
- Well managed and conserved grasslands provide forage for livestock while storing carbon in above- and below ground biomass.

Ecosystems support people's well-being and can alleviate poverty

Maintaining a healthy natural resource base is critical for the benefit of all people, especially the rural poor. Over 2 billion (usually rural) people live on less than $2 per day, many of whom depend on natural resources for their well-being. Conserving natural resources can, therefore, have significant positive gains for these peoples' well-being. For example:

- Those who fish or farm for subsistence requires natural resources to survive. Sustainable harvest and production practices can help ensure longer-term access to these products.
- The poor have the least ability to change if and when their way of life is threatened – i.e. least ability to relocate, change land use, alter income source, etc. Conservation or sustainable use of natural ecosystems can help buffer potential climate impacts through helping ensure provision of key services such as water purification or soil stabilization making people less likely to have to relocate.
- The poor are the most likely to lack basic shelter and sanitation needs and therefore those most impacted by weather and changing weather patterns. Maintaining and protecting particular ecosystems can provide protection services, as mentioned previously, for vulnerable populations.

As demonstrated in these examples, ecosystems can play a pivotal role in climate adaptation

through service provision. Ecosystem services are often beneficial at a local level and/or a small-scale so conservation and restoring natural ecosystems can help the poor who directly depend on such benefit and buffer them from impacts due to climate and weather changes.

In other words, those people depending most directly on natural ecosystems for their livelihoods are also those who will experience the most immediate benefits from service provision, but, importantly, therefore, they are also those that stand to lose the most from their destruction. Moreover, these people are less likely to have the means to use technological and infrastructure-based adaptation solutions and must rely more heavily on ecosystem -based solutions. Ideally, EBA solutions would be coupled with mitigation solutions (e.g. buffering agricultural lands via reforestation) thereby providing both local and global benefits. Such dual goals will help mainstream planning for, financing, and implementing climate change projects, at a national and global level, that can mitigate global warming impacts and support the poor.

The Need: The Green Economy

For all of these reasons ecosystem-based mitigation and adaptation needs to be an integral part of the 16th Conference of Parties (COP 16) negotiations of the UN Framework Convention on Climate Change in Cancun in December 2010 and beyond. A five-fold solution is proposed:

- Decrease fossil fuel based and other greenhouse gas emissions.
- Reduce deforestation and degradation of forests and and other ecosystems to expand natural carbon sinks.
- Promote ecosystem-based adaptation across all sectors.
- Develop strategies to extract growth and employment from the ecosystem restoration based activities (social forestry, coastal zone management, land reclamation to name a few).
- Centralise nature based solutions within all areas of economic policy development.

In addition, using nature as a solution for mitigation and adaptation yields benefits beyond just reducing impacts from climate change-benefits that need to be valued. The development of the Green Economy can be seen as a method to do this.

Creating a Green Economy

Simply put, the Green Economy can be considered synonymous to a 'sustainable' economy that ensures economic systems conserve natural resources through balancing growth and equity. This conservation and management of ecosystems provides a long-term benefit for people while allowing for sustainable growth. The Green Economy balances natural resource values with other values, and takes into account the loss in value of ecosystem services due to environmental impacts. These requirements for the need for greater valuation of ecosystem services fit well with other aspirations of the Green Economy in respect of clean, renewable energy.

The Green Economy provides a chance to "get the balance sheet right" by accounting for both the current and future value of the benefit ecosystems provide to people. When a watershed is deforested it is the value of the timber and the cost to harvest that timber that is generally accounted for in the price, not the clean water no longer being produced by the watershed or the carbon no longer being sequestered by the trees. For example, according to the Economics of Ecosystems and Biodiversity (TEEB) report , the extractable value of Cameroon's tropical forests, in the order of $700 per hectare per year (for timber, fuel wood and non-timber products), is less than the forests' climate and flood benefits, which add up to about $900-$2,300 per hectare per year. A Green Economy could explicitly put a value on these ecosystem services and ensure that when environmental degradation occurs, the true cost to society and people around the world is accounted for.

We do not have market prices for all of the processes and services ecosystems provide, but we have some basic starting points for some key ones such as carbon sequestration, clean water production, flood protection, grassland forage. What is still needed, though being advanced everyday by various research efforts and at the national level in some countries, is a means to include full ecosystem values in the prices, i.e. through estimating avoided costs associated with conservation and having those reflected in the market value. Through time we will find ways to translate this into values that can be incorporated into long-term measure of value, wealth and well-being. The essence of the Green Economy is that it recognises the sum total of all ecosystems services and how they collectively provide the complete life system support we need.

Ecosystems and a Sustainable Economic Model

How can any form of global level economic activity be conducted if our ecosystems deteriorate beyond the threshold of the current life support capacity? Anthropogenic climate change is seen by many (e.g. Stern Report) as the worst case of market failure. It can also be argued that ecosystem health deterioration is another form of market failure.

Therefore, regardless of how the Green Economy (or any other economic model) develops, the fundamental goal must be that natural ecosystems are maintained in a suitably healthy condition. We need to ensure that our ecosystems are protected and/or managed appropriately so as to provide the ecosystem services we rely on. Prime examples include the ability of ecosystems to support food and water security, and protection from flooding and erosion. It is widely recognised that continuous economic growth is unstable due to resource limitations. Likewise no growth may be unstable due to economic collapse. The challenge for the immediate future is therefore to develop a process of societal transformational change to an economic model that achieves a balance between growth and conservation in order to have inherent stability and sustainability. The key message here is that in order to make the necessary transformational changes, whatever they may be, we need to have healthy ecosystems to ensure the provision of our basic requirements.

The state of the ecosystems and the services they provide can thus be used to establish a true Green Economy – one that accurately assess benefits and costs where we can create a relationship that will allow us to evaluate tradeoffs. This can help us identify when is it more beneficial to restore ecosystem health for sustainable development than it is to advance greater technological solutions, and when it might be best to use a combination of both approaches. Ecosystem services provide a framework for assessing the efficacy of ecosystem-based adaptation and mitigation approaches.

Living within environmental limits: basis for Sustainability

To achieve the Green Economy and long-term sustainability, human society has to adapt to living within the constraints of the global life support capacity that ecosystems provide. This does not mean no use, but rather appropriate use based on a more thorough and accurate assessment of costs and benefit. Forests, grasslands, freshwater, marine and other natural ecosystems provide a range of services that are not recognized in economic accounting systems, but are vital to human welfare, including water flow and water quality regulation, flood control, pollination, decontamination, carbon sequestration, soil conservation, nutrient and hydrological cycling. These are all public goods and services. The challenge is therefore to devise an economic and policy framework whereby

ecosystems are either appropriately valued in monetary terms or a comparable system of value is devised to more appropriately measure the ramifications of ecosystem degradation. In reality, a mix of approaches is more feasible and likely to achieve goals for climate change mitigation and adaptation leading to long term sustainability. Given the multitude of ecosystem types, human cultural connections with them and the complexity of inter-relationships within and between ecosystems (over time and spatial scale), a single solution is unlikely. Instead, solutions need to be developed that are tailored to the particular issue, guided by local and national communities and priorities, but based on global level objectives.

The benefits of Valuing Nature

The TEEB report concluded that "Natural resources are economic assets, whether or not they enter the marketplace. However, conventional measures of national economic performance and wealth, such as GDP and Standard National Accounts, fail to reflect natural capital stocks or flows of ecosystem services, contributing to the economic invisibility of nature". According to the report, the services that the world's forests, wetlands, coral reefs, and marine ecosystems provide is around $2 to 4.5 trillion per year, every year.

It has been recognized that a standing natural forest, particularly rainforests, may have more value to the world for their ability to absorb carbon dioxide emissions. It will cost between $17.2 to $33 billion to protect the forests and cut emissions by 2.7 gigatons of carbon dioxide a year. But it is estimated that the benefits of action is $37 trillion, in present value terms. But it's more than just forests and watersheds. Coral reefs protect coastlines from storms, nourish schools of fish, and provide the backbone for tourism and local economic development. Take away the reefs and everyone will be poorer for it. Economic activities that deplete natural capital are by definition unsustainable and therefore should not be credited in a measure of sustainable economic welfare since they limit the next generation's prospects.

Valuing nature is a very useful tool that governments, from the local level to the global, can use to make much smarter decisions that will help promote economic development while protecting the natural services that we cannot afford to lose. In addition, supporting the effort to more fully understand and quantify nature's values can help advance a science of new metrics capable of inspiring more sustainable policy choices. A further challenge is influencing public opinion and providing information and education as to why our environment needs increased consideration in government policy making. Under the past economic models, conservation was seen as a luxury, not

a necessity. Under the current economic climate and associated austerity, luxuries may be seen as the first objectives for reduced public spending. However, given the evidence presented here, it is clear that environmental protection and appropriate management is not a luxury, but an essential foundation for life support. A wider and deeper understanding by society of the roles ecosystems have will facilitate uptake of new policies to achieve the necessary environmental valuation and protection.

How do we get to a Green Economy?

The development of the Green Economy, by its nature of being targeted to achieve society wide equity through consensus building, requires both top-down and bottom-up strategies. The combination of these two, in conjunction with society wide understanding of the importance of our environment, helps ensure processes of inclusion and direction with common purposes.

For bottom-up approaches, effective green growth requires an enabling environment. A key lesson from decades of development experience is the importance of creating appropriate policies and effective institutions at all levels to support people-centred, sustainable development. This lesson is important to apply to ecosystem conservation and management to help achieve the Green Economy, particularly given the significant overlap between the Green Economy, development and achievement of the Millennium |Development Goals. Granting the citizens resource rights, representation in governance processes, participation rights and fair access to markets and natural resources can build the resilience of communities and help them to shift towards a sustainable economy while at the same time adapting to the changing climate. Such direct input will also allow for development of compensation systems that adequately reward people who, through the sustainable use, provide benefits to other natural resource users from other communities through to the entire global community. Using small-scale approaches that decentralizes the distribution of ecosystems by the local communities is quite vital as this approach ensures quick implementation using local capacity, have short turnover periods. Such approaches could potentially stimulate spontaneous self-uptake, rather than supply-driven uptakes, and could trigger a lot of benefits in the entire region.

For example, in Togo through a UNEP/UNDP Programme called Climate Change Adaptation and Development (CC DARE), using small-scale fiscal stimulus action, a small dam was rehabilitated for harvesting rainwater and has improved access to water for the local communities and also expanded rural livelihood activities, e.g. Market gardening, brick construction and fisheries, besides uses for domestic and agro-pastoral consumption. The co-benefits of the project action

in having year-round water supply to the surrounding ecosystem include natural regeneration and restoration of biodiversity serving as medicinal products for the households and dietary supplements for local communities. A similar example is in the Seychelles whereby water adaptation though water harvesting in schools has enabled cost reduction of up to 250 $USD on the monthly water bills. Following the successful implementation of the cases study and the direct and co-benefits, a Bill is being formulated that will be tabled to the national assembly to include rainwater harvesting systems in the national building stock.

The merits of the small-scale approaches are evident in the engagement of local users in ecosystems management, keeping the implementation process simple, and thus making them more efficient, more effective, more equitable, and more environmentally sustainable than the usual top-down practices. The use of practical interventions in the form of projects has been shown to play a crucial role in unpacking complex concepts, building capacity, and developing appropriate tools for up-scaling the interventions to a local government or national level. Success has to do with the beneficial value (in the eyes of the national government) of the project and their relevance to the local situation. Experience shows that small but well-timed and targeted interventions can have significant impacts in, for example, moving policies forward or spurring development of larger efforts. If successfully executed, such interventions have the potential to inform polices and contribute information and data valuable for the assessment processes. This is vital as we need scientific impact measures to know how our actions affect nature and the services it can provide.

Considering strategies for top-down approaches, the key for national governments is to appropriately signal the intention to uptake environmental protection policies and provide financial support for ecosystem based adaptation, along with support for clean, renewable energy based technological solutions. These signals are vital in order to attract private investment and help achieve a global scale 'level playing field', that is, all nations are working towards the same objectives. The challenge is to persuade commerce and industry to take a more active, positive role in contributing to the development of environmental sustainability solutions, on the basis that it is in their own interest to ensure a sustainable society.

It is important that the mix of bottom-up and top-down strategies are structured in a co-ordinated way so as to be complementary and 'meet' in a seamless fashion. The 'remit' therefore for the Green Economy must also ensure that clear global level objectives are set out in order to provide common targets on which the mix of strategies can work towards.

The way Forward/Recommendations

- Governments should recognize, acknowledge and devise ways to capture full value of the ecosystems towards a sustainable Green Economy.
- Recognise the global 'public good' of ecosystem interactions and ecosystem services which transcend national boundaries.
- Encourage funding for national and local level projects that strengthen strategies and interventions to enhance ecosystem resilience and help build adaptation capacity in human systems.
- Adopt the policies and incentives structures based on a sound economic rationale to enable communities to more fully benefit from nature on their door steps.
- Foster the sharing of best practices across regions and continent.
- Develop education, training and communication capabilities.
- Emphasize strategies that promote:
    - » Legally-designated and effectively managed protected areas.
    - » Integrated sustainable resource use from ecosystems.
- Support research and action on:
    - » Climate-ecosystems interactions and feedbacks.
    - » Ecosystem processes and functions.
    - » Valuation and accounting of ecosystem services and its integration with mainstream indicators.
    - » Development of climate modelling that includes ecosystem feedbacks.
    - » Encourage innovative responses like the Payment for Ecosystem Services (PES) and nurture the necessary institutional arrangements.

Conclusions

Developing policies and economic strategies that place ecosystems and the services they provide at the centre of future economic development and climate change mitigation and adaptation efforts will result in multiple positive benefits to all people globally. An ecosystems approach is an essential part of the 'tool kit' to tackle climate change and to progress towards long-term economic sustainability. The greatest challenge for governments and global leaders is to adjust national and international economies in line with mitigation and adaptation efforts whilst maintaining financial and social stability. Use of the climate regulation capacity and other life support services of ecosystems can help economies, financial institutions and societal behaviour to make those adjustments in a transition towards a green low carbon economy. Embracing the action agenda set out in this paper will provide the enabling conditions to release this local potential, in partnership with national and global efforts, to succeed in crafting their own solutions to the environmental challenges we all face today.

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