UNEP

UNEP POLICY SERIES

ECOSYSTEM MANAGEMENT

POLICY BRIEF 6 - 2011

Restoring the natural foundation to sustain a Green Economy

A century-long journey for Ecosystem Management

INTERNATIONAL ECOSYSTEM MANAGEMENT PARTNERSHIP (IEMP)

This paper was drafted by the following:

Jian Liu, Director, IEMP UNEP

Richard Munang, Policy Advisor, Climate Change Adaptation, DEPI UNEP

Mike Rivington, Research Fellow, James Hutton Institute, UK

Jessica Thompson, Climate Change Specialist, Private Sector VPP Office IADB

Paul van Gardingen, Director, Ecosystem Services for Poverty Alleviation Programme (ESPA)

Dhanush Dinesh, Programme Assistant, IEMP UNEP

REVIEW EDITORS:

Ibrahim Thiaw, Director DEPI UNEP

David Osborn, Coordinator, Ecosystem Management Programme, DEPI, UNEP

ACKNOWLEDGMENT

We are grateful to all colleagues for their additions and comments on different versions of this paper. We are highly appreciative for the financial and in-kind support from the Chinese Academy of Science (CAS) to UNEP-IEMP which led the drafting of this paper.

Table of Contents

Executive Summary

The Biosphere II Experiment[1], started in 1991, tried and failed to generate sufficient breathable air, drinkable water and adequate food for just eight people, despite an expenditure of US$200 million. Even the most advanced space programmes such as those of NASA have to rely on very basic supplies from the Earth for astronauts to survive. In contrast, the Earth ecosystem performs those functions every day for 7 billion of us, demonstrating its priceless and irreplaceable role as the sole life supporting system of humans and as the natural capital of economy. It is obvious that a Green Economy, defined[2] by United Nations Environment Programme (UNEP) as one that results in "*improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities",* is more likely to be realised if built on a baseline foundation of a healthy, fully functional and resilient ecosystems.

Even the most advanced space programmes such as those of NASA have to rely on the very basic supplies from the Earth for astronauts to survive. In sharp contrast, the Earth ecosystem performs those functions every day for 7 billion of us, demonstrating its priceless and irreplaceable role as the sole life supporting system of humans and as the natural capital of economy.

In the new millennium, many ecosystems are facing mounting pressures from rapid population growth, economic development, climate change, biodiversity loss and environment pollution, indicating that the natural foundation of a Green Economy is being eroded away. To restore this natural foundation for a Green Economy, this paper recommends that the Ecosystem Management Approach, defined as "*an integrated process to conserve and improve ecosystem health that sustains ecosystem services for human well-being,"* play a critical role.

The Ecosystem Management Approach concept has evolved in the last 40 years since 1972, from the early purpose of ecosystem conservation and pollution control (i.e. Stockholm Declaration in 1972) to a much broader applicability in decision-making processes for sustainable development (i.e. Rio Declaration in 1992). The most recent applications of the Ecosystem Management Approach include Ecosystem-Based Adaptation (EBA) and Reducing Emissions from Deforestation and forest Degradation (REDD+), both of which have received worldwide attention. In 2010, the UN General Assembly made '*…a green economy in the context of sustainable development and poverty eradication…*' one of the two main themes of the next Earth Summit (Rio+20), to be organized in June 2012. It is a new development path that is based on sustainability principles and ecological economics. The purpose of this paper is to contribute to the success of Rio+20 through demonstrating the key role that Ecosystem Management has in underpinning the Green Economy and illustrating the advantages of this approach. In the paper we review the evolution of Ecosystem Management in the past 40 years, and project its increasing role in improving the natural foundation for a Green Economy development in the next 60 years after Rio+20 towards 2070. Taken together, the endeavour is 'a journey of a century'. The paper focuses on what to do in the transition period of the next 20 years after Rio+20.

1 See Box 1…

2 UNEP Green Economy Report. See: http://www.unep.org/greeneconomy/Home/tabid/29770/

Key findings

1. Natural ecosystems provide the life-support systems for humans, and the natural foundation for a sustainable green economy, yet their health is under increasing threat.

- Cutting-edge science has proven that ecosystems provide the essential 'life-support systems' we all depend on.
- Recent economic analysis of ecosystems revealed that ecosystems provide the natural capital and lay the foundation for the development of a Green Economy.
- There is mounting evidence that many ecosystems are in various states of degradation and face unprecedented pressures from unsustainable exploitation, unplanned or poorly planned development, invasive species, climate change and population growth. This will not only jeopardise economic development, but also impose increasing threats to the survival of human beings, with the poor being most vulnerable.

2. The Ecosystem Management Approach plays a critical role in addressing substantial challenges of Green Economy development, including promoting the sustainable use of natural capital and providing cost-effective environmentally-friendly approaches

- As an integral part of Green Economy development, Ecosystem Management is essential to ensure a sustainable flow of ecosystem goods and services, whilst also maintaining healthy and fully functional ecosystems.
- It is critical to ensure that Ecosystem Management meets the needs of the poor, especially those in developing countries who are highly dependent on ecosystem goods and services and are most vulnerable to ecosystem degradation.
- Ecosystem Management can help retain the balance between economic growth, societal development and ecosystem health to ensure long-term sustainability.

As an integral part of Green Economy development, Ecosystem Management is essential to ensure a sustainable flow of ecosystem goods and services, whilst also maintaining healthy and fully functional ecosystems.

Placing a value on ecosystem services through mechanisms that facilitate investment in ecosystems and at the same time benefitting local people and the private sector who are rewarded for good environmental stewardship.

3. There are already scientific, economic and political means and emerging champions in promoting the role of Ecosystem Management Approach in the Green Economy development, yet they need to be institutionalized and supported.

- Methods and tools for assessment, valuation of, and payment for ecosystem services have been developed to help improve the current economic model.
- In the transition to a Green Economy, policymakers should ensure that the full range of goods and services provided by ecosystems, including those which are currently non-monetised, are fully integrated in decision making and public policy.
- New systems of governance of global public goods and new institutional structures will be required to link ecosystem services with a Green Economy, because the generation of, and benefits derived from, ecosystem services frequently crosses political and geographic borders.
- Many market mechanisms have been piloted which would engage the private sector and harness market forces

4. Green Economy development will help improve ecosystem health and sustain its functionality.

- Placing a value on ecosystem services through mechanisms that facilitate investment in ecosystems will at the same time benefit local people and the private sector who are rewarded for good environmental stewardship.
- Developing a Green Economy within ecosystem capacity, can be planned by better understanding of the science of ecosystems.

5. Challenges and opportunities in applying Ecosystem Management Approach in the Green Economy development remain.

- Ecosystem services are not valued within the current economic model.
- Current governance and institutional structures have been inadequate in preventing the decline in ecosystem health.
- There is a need for urgency: the rate of developing solutions is far too slow to keep up with the rate of degradation.
- Equity: there is need for a balanced sharing of benefits, including among different groups of stakeholders and generations.

- Ecosystem Management is both a local task and one determined by higher level decisions and policies and legal frameworks. There must be concerted coordination of top-down and bottom-up approaches.

6. The interactions between Ecosystem Management and Green Economy development are multi-faceted and mutually supportive, which provides the basis for enhanced synergies in pursuing global sustainability (Figure 1).

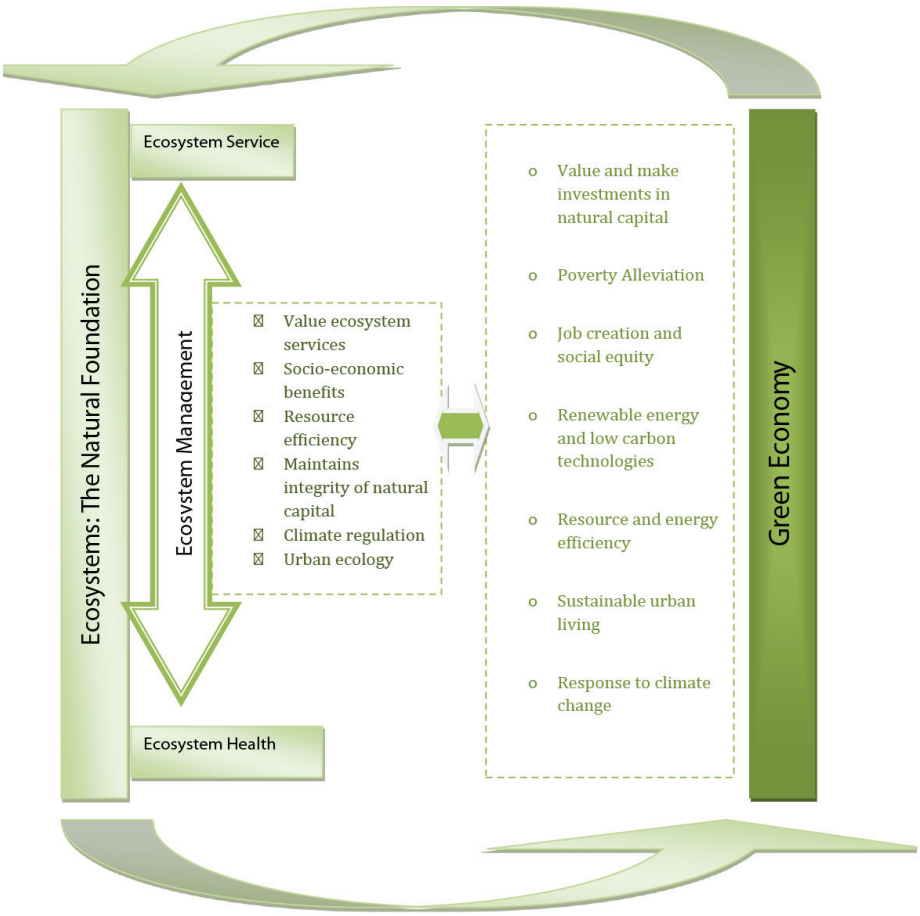


Figure 1: Multi-faceted interactions between Ecosystem Management and the Green Economy.

In the transition to a Green Economy, policymakers need to ensure that the full range of goods and services provided by ecosystems, including those which are currently non-monetised, are fully integrated in decision making and public policy.

Valuation and environmental accounting can help us improve the economic structure and decision making that has led us to jeopardize our own survival through resource destruction.

Key Recommendations:

- Deliberate and targeted application of the Ecosystem Management Approach will be essential to ensure a sustainable flow of ecosystem goods and services whilst maintaining healthy and fully functional ecosystems as a necessary part of the development of the Green Economy. During this transition it will be critical to ensure that Ecosystem Management meets the needs of the poor, especially those in developing countries who have high relative dependencies on ecosystem goods and services and are most vulnerable to changes induced by environmental degradation, climate and societal change.
- Given the constraints in the transition to the Green Economy, and while still keeping in mind the urgency of the matter, it is important to focus on what is incrementally achievable in order to move forward.
- In the transition to the Green Economy, policymakers need to ensure that the full range of goods and services provided by ecosystems, (including those which are non-monetised) are fully integrated in decision making and public policy.
- Valuation and environmental accounting can help us improve the economic structure and decision making that has led us to jeopardize our own survival through non-rational use of resources.
- New systems of governance of global public goods and institutional structures will be required to link ecosystem services into the Green Economy because the generation of, and benefits derived from, ecosystem services frequently cut across political and geographic borders.
- Efforts and funds focused on the transition can be amplified by building market mechanisms and leveraging the private sector in order to increase resources and expertise available

1. Introduction

The Earth's natural ecosystems have provided clean water, fertile soils, fresh air, and biodiverse terrestrial and aquatic natural resources, allowing for the development of human civilization. They form the foundation of natural capital for Green Economy development. However, the health of the Earth's ecosystems that provide this essential 'life support', or ecosystem goods and services, on which we all depend, is being severely degraded, due to compounded pressures of rapid population growth, economic development, environmental change and climate change. In 2011, the world population has already passed the 7 billion mark. This situation is expected to grow worse as the per capita consumption of ecosystem goods services has grown at a much faster rate than population, i.e. per capita water consumption is rising twice as fast as world population growth[3] . The World Economic Forum (WEF) suggests that "*A combination of increasing scarcity of some natural resources, climate change and growth in global population to 9 billion by 2050 are creating the conditions for a 'perfect storm'*". This means that the Earth's degrading ecosystems would have to carry yet an additional 2 billion people. Ecosystem goods and services are not only threatened by the growing population but also by increasing consumption rates, especially in developing countries with high growth rates. Without secure, healthy and fully functional ecosystems, all sections of society, rich and poor, will face substantial risk in the future.

The WEF (and others[4]) stress that humanity's ecological footprint is 50% higher than the Earth's ability to support it. The conventional model of development that has propelled the growth of nations in the last two centuries is now recognized for its unsustainable nature. Gross Domestic Product (GDP), the conventional measure of economic growth, urgently needs to be re-examined insofar as its use as an index of well being, as it does not capture the needs of sustainable consumption, sustainable use of natural capital and conservation of ecosystems . Based on current indicators, the current growth model of economics is proving to not be sustainable and alternative development models should be explored[5]. Recent reports, including the Stern Review on the economics of climate change, indicate quite clearly that the Earth's abilities to provide for the needs of humanity is limited and countries are faced with dire economic and natural consequences for their inability to sustainably manage their ecosystems[6]

New systems of governance of global public goods and institutional structures will be required to link ecosystem services into the Green Economy because the generation of, and benefits derived from, ecosystem services frequently cut across political and geographic borders.

3 United Nations Department of Economic and Social Affairs, "Population Facts," Fact Sheet, New York, November 2010: http://www.un.org/esa/population/publications/popfacts/popfacts_2010-6.pdf, Accessed 4/20/11

4 Living Planet Report 2010: biodiversity, biocapacity and development. WWF Report. See: http://wwf.panda.org/about_our_earth/all_publications/living_planet_report/2010_lpr/

5 Daly, H.E. 2010. From a Failed-Growth Economy to a Steady-State Economy. Solutions Journal http://www.thesolutionsjournal.com/node/556

6 Stern, N. (2006) Stern Review of the Economics of Climate Change. Cambridge University Press,

Without fully reflecting the value of natural assets in economic systems and actions, and sharing the benefits of ecosystems more equitably, human interaction with them will remain unsustainable and degradation is likely to accelerate, leading to the potential collapse of important ecosystem functions and services and the loss of important species. This threatens the security of all sectors of society, regardless of political ideologies, cultures and stages of development. Amongst all stakeholder groups, it is the poor in developing countries that are most vulnerable to these threats.

History has taught us that failure to understand and appreciate the value of nature has led to the downfall of civilizations[7]. Since the industrial revolution, depletion of natural resources and degradation of ecosystems has negatively affected the global environment. The Rio Summit in 1992 introduced the concept of sustainable development with a landmark agreement of Agenda 21, which led to the three multilateral environment conventions: the Convention on Biological Diversity (CBD), the United Nations Framework Convention on Climate Change (UNFCCC) and the United Nations Convention to Combat Desertification (UNCCD). Yet, economic crises, such as the Asia Economic Crisis in 1997 and the Great Recession in 2008, as well as natural disasters including those caused by global warming and loss of ecosystem services, reminded us that we need smarter and more practical ways to secure our future.

Yet, economic crises, such as the Asia Economic Crisis in 1997 and the Great Recession in 2008, as well as natural disasters including those caused by global warming and loss of ecosystem services, reminded us that we need smarter and more practical ways to secure our future.

More than at any time in our past, there is now an imperative to develop sustainable economic models and political processes with a common language of comprehensive ecosystem valuation that is acceptable to a diverse range of political systems and cultures, and sustainably manages ecosystems to ensure the long-term delivery of the vital ecosystem services. Thus the challenge is to create a political and economic environment that enables society to achieve a balance of societal needs and Earth's ecosystems capacity, through a process of rapid introduction of stimulus to promote the transformational change to a sustainable Green Economy.

The United Nations Conference on Sustainable Development (UNCSD), the "Rio+20", which is to take place in Rio de Janeiro on 4-6 June 2012, will cover two themes: a) a green economy in the context of sustainable development and poverty eradication; and b) the institutional framework for sustainable development. It will provide a unique opportunity to:

- Recognize Earth's ecosystems as the natural foundation for all life on the Earth;
- Reform the economic models for wealth creation, to focus increasingly on the value of ecosystem goods and services and natural capital;

7 Cambridge.
Diamond. J., 2005. Collapse: How Societies Choose to Fail or Succeed. Viking, New York. ISBN: 0670033375

- Enhance international environmental governance;
- Develop mechanisms to enforce environmental laws, conventions and protocols; and
- Galvanize political will to make policy and build capacity, particularly of vulnerable societies

Green Economy[8] is a new development path that is based on sustainability and ecological economics. Compared with previous development paths, the uniqueness of a Green Economy is that it can directly turn natural capital into economic value whilst maintaining it, and conduct total cost accounting. In this way, natural capital can be included in social systems, requiring consumers and other beneficiaries of ecosystem services to pay for the benefits received and damage caused, along the lines of the polluter pays principle. By increasing and growing natural capital, the long term capacity of the global economic system to produce value and serve civilization will be increased. The Ecosystem Management Approach is"*an integrated process to conserve and improve ecosystem health that sustains ecosystem services for human well-being,*" and is recommended in this paper as the critical approach to restore the natural foundation of human wellbeing.

This paper aims to provide advice to policy makers for integrating Ecosystems Management into a Green Economy, which will not only contribute to the success of Rio+20, but guide economic development in the decades to come.

As "Rio+20" will be focusing on, *inter alia*, green economy in the context of sustainable development and poverty alleviation, it provides a unique opportunity to highlight how ecosystem management can support the greening of economies.

2. A short history: Understanding the dynamics of ecosystem and economic interactions and recognizing the role of ecosystems.

Adam Smith, considered the father of modern economics, in his book *The Wealth of Nations* (1776), described the market system as acting as an "invisible hand" which leads people to unintentionally promote society's interests while pursuing their own. Classical economics, whereby the pursuit of unlimited personal enrichment benefits society, has ever since been the major economic model of wealth development in most countries, yet it has only partially been helpful in addressing social and environmental problems.

Approximately 200 years later, the Club of Rome released in 1972 its report "**The Limits to Growth**" which sent shock waves around the world by arguing that the very basis of classical economics, infinite growth, was unsustainable. The purpose of the

8 UNEP Green Economy Report. See: http://www.unep.org/greeneconomy/Home/tabid/29770/Default.aspx

UNEP defines a Green Economy as one that results in *'improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities'.*

report was not to make specific predictions, but to explore how exponential growth interacts with finite resources. The authors looked into the future and sounded alarm. Their book gained worldwide attention and became the cornerstone of a global debate on how to achieve a sustainable future.

From **Charles Darwin's** *On the Origin of Species*, published in 1859 and Mendel's *Laws of Inheritance* in 1863 to the countless experiments and research about the principles, structure and function of ecosystems and biodiversity, science has provedtime and again that ecosystems are the natural foundation of all life on the Earth. A physical representation of this is the experiment conducted in early 1990' in the US, called ***Biosphere II*** (Box 1).

Box 1. Biosphere II

In 1991, a small group of scientists was sealed inside Biosphere II, a 3.14 acre glass and metal dome containing man-made ecosystems, in Oracle, Arizona, United States of America. Two years later, when the radical attempt to replicate the Earth's main ecosystems in miniature ended, the engineered environment was dying. The interned researchers had survived only because fresh air had been pumped in and reserve food used. Despite US$200 million worth of elaborate equipment, Biosphere II had failed to generate breathable air, drinkable water, and adequate food for just eight people. Yet our planet Earth (sometimes referred to as Biosphere I), restlessly performs those functions every day for 7 billion of us. The Biosphere II experiment also serves as a poignant reminder of the need for the global society to have a shared vision for the future with agreement built on consensus about how we live on Earth: Biosphere II was closed after acrimonious disagreement among the people involved about how it should be managed, what the objectives were and matters of ownership. Closure of Biosphere I is not an option. Therefore the lessons learned from Biosphere II must be that we need to co-operate in developing solutions with a shared objective to preserve the Earth's essential life support systems.

Rachel Carson's book ***Silent Spring,*** published in 1962, documented detrimental effects of pesticides on the environment, particularly on birds. It has been widely credited with helping launch the environmental movement, including the Stockholm and Rio declarations in 1972 and 1992 respectively (Box 2).

Box 2. Selected Principles of the Stockholm and Rio Declarations

Stockholm Declaration (1972): "...man has acquired the power to transform his environment in countless ways and on an unprecedented scale.... " The protection and improvement of the human environment is a major issue which affects the well-being of peoples and economic development throughout the world; it is the urgent desire of the peoples of the whole world and the duty of all Governments". Principle 2: The natural resources of the earth, including the air, water, land, flora and fauna and especially representative samples of natural ecosystems, must be safeguarded for the benefit of present and future generations through careful planning or management, as appropriate.

Rio declaration (1992) Principle 7: States shall cooperate in a spirit of global partnership to conserve, protect and restore the health and integrity of the Earth's ecosystem. In view of the different contributions to global environmental degradation, States have common but differentiated responsibilities.

In 2008, UNEP launched the ***Green Economy Initiative to Get the Global Markets Back to Work,*** through mobilizing and re-focusing the global economy towards investments in clean technologies and 'natural' infrastructure for real growth, combating climate change and triggering an employment boom in the 21st century. Now governments through the General Assembly of the United Nations have affirmed that the Green Economy is the main theme of Rio+20.

3. Promoting the Green Economy as a new development path towards sustainability, including improving the health and functionality of ecosystems.

The Green Economy is designed to promote economic progress with positive social outcomes in a way that does not push our ecological footprint beyond planetary boundaries. In its simplest expression, a Green Economy is resource efficient, socially inclusive and seeks to ensure environmental security by maintaining resilient ecosystems. Growth in income and employment should be driven by public and private investments that at the same time reduce environmental risks, enhance energy and resource efficiency, and conserve biodiversity and ecosystem services.

From Charles Darwin's *On the Origin of Species*, published in 1859 and Mendel's *Laws of Inheritance* in 1863 to the countless experiments and research about the principles, structure and function of ecosystems and biodiversity, science proves time and again that ecosystems are the natural foundation of all life on the Earth.

In 2008, UNEP launched the *Green Economy Initiative to Get the Global Markets Back to Work,* through mobilizing and re-focusing the global economy towards investments in clean technologies and 'natural' infrastructure for real growth, combating climate change and triggering an employment boom in the 21st century.

Such a transition must take place through implementing **incremental changes**, based on the context and situation of each country.

This initiative seeks to address many of our needs (such as food, water, energy security, health, education, and environmental protection including climate change mitigation and adaptation) within a new economic model that explicitly addresses sustainability, equity and human wellbeing. Moving towards a Green Economy represents a necessary transition from a society living off nature's capital, to one living off nature's interest. As this paper argues, Ecosystem Management is integral to the Green Economy.

To establish a Green Economy, we will have to live within the constraints implied by the need to maintain ecosystem health and integrity. This goal implies deep changes in the way that we do business, produce and consume goods, run economies and make decisions.

The Green Economy Report demonstrates that "*a transition to a green economy is possible by investing 2% of global GDP per year (currently about US $1.3 trillion) between now and 2050 in a green transformation of key sectors, including agriculture, buildings, energy, fisheries, forests, manufacturing, tourism, transport, water and waste management. However, such investments must be spurred by national and international policy reforms*" [9].

Two crucial first steps needed are:

- The development of governance and institutional structures capable of enabling objectives for a Green Economy to be met; and
- Society as a whole recognizing the boundaries, imposed by ecosystem service capacity, within which we can operate.

Central to this is the need to raise awareness across all sections of society to help people understand the need for a transition to the Green Economy. Challenges remain on how to create a political and economic environment that enables us to balance our needs and the Earth's ecosystems capacity, through a process of a transformational change to a Green Economy. To do so forces us to ask key questions and face issues that have direct relevance to maintaining ecosystem services:

- Are we capable of moving from an economic model predicated on consumption-based wealth creation to one based on sustaining wellbeing? This challenges our

9 UNEP. Toward a Green Economy – Pathways to Sustainable Development and Poverty Eradication(http://www.unep.org/greeneconomy/online Sept. 28, 2011)

ideologies, aspirations and expectations of what it means to be a member of the global society.

  - » Whilst this appears to be a generic philosophical question, it is central to Ecosystem Management; it addresses the need for balancing between societal expectations and what the Earth's ecosystems can deliver.
  - » The looming environmental crises and consequences of current development pathways forces us to re-evaluate what we aspire to and calls into question the value of wealth creation as opposed to sustaining wellbeing.
  - » Therefore how we can redefine our expectations and aspirations? How do we find a balance between our expectations of wellbeing and the need to raise living standards of the poor and remain within tolerance thresholds of the Earth?

- Are we willing to re-define what constitutes wellbeing to enable an equitable distribution of ecosystem services now and for future generations?
- If we are capable and willing to shift to a wellbeing-based sustainable economy, what global, regional, national and local governance and institutional structures, policies, legal frameworks, incentives and strategies will enable and encourage such a transformational change?
- How can we build consensus on what a Green Economy will look like?
- Crucially, but bearing in mind the need to alleviate poverty and raise living standards of the world's poor, how do we avoid a "Jevon's Paradox"[10] situation with natural capital, where a successful growth in the economy and progress towards equity, albeit based on sustainable green principles, leads unintentionally to greater net overall consumption drawing down our natural capital?

These issues reflect the explicit and intricate inter-relationships between human society and the future of our environment. Without answering the key questions above and acknowledging the importance and relevance of developing society-wide solutions, it is unlikely that environmental protection efforts and economic stimulus alone will be able sustain the Earth's ecosystem.

To establish a Green Economy, we will have to live within the constraints implied by the need to maintain ecosystem health and integrity. This goal implies deep changes in the way that we do business, produce and consume goods, run economies and make decisions.

10 This is the economic concept that greater efficiency of resource use leads to an overall increase in the use of that resource. The question here is posed as a warning of the need to avoid perverse outcomes from efforts to be more efficient in utilising natural resources.

4. How does Ecosystem Management secure the natural foundation for a Green Economy?

4.1. What is the Ecosystem Management approach?

In order to best achieve the objectives of the Green Economy, it is necessary to utilize appropriate concepts, approaches, strategies and tools. The Ecosystem Management approach encompasses what is required in order to set the foundations on which a Green Economy is based. As stated earlier, the Ecosystem Management approach can be defined as "*an integrated process to conserve and improve ecosystem health that sustains ecosystem services for human well-being*". The International Union for Conservation of Nature[11] defines it as "*a process that integrates ecological, socio-economic, and institutional factors into comprehensive analysis and action in order to sustain and enhance the quality of ecosystems to meet current and future needs*". The Convention on Biological Diversity describes it as "*a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way*".[12]

The Green Economy Report demonstrates that "*a transition to a green economy is possible by investing 2% of global GDP per year (currently about US $1.3 trillion) between now and 2050 in a green transformation of key sectors, including agriculture, buildings, energy, fisheries, forests, manufacturing, tourism, transport, water and waste management*

The approach represents a development from earlier concepts of sustainable natural resource management, and genetic, species and ecosystem conservation[13] to a much broader, holistic concept that includes biophysical, social, economic and political considerations to support sustainable development. The interaction of humans with ecosystems creates socio-ecological systems, from global to local spatial scales; therefore human activities must be recognized as an integral component of ecosystems.[14] Hence, any management must incorporate the human dimension.

4.2. Ecosystem Management ensures balanced, sustainable ecosystem services for Green Economy development

Ecosystem Management places particular emphasis on integrating our needs with conservation practice, and recognizes the inter-connectivity between ecological, social-cultural, economic and institutional structures when developing solutions. It fosters community ownership of problem management efforts to maintain ecosystem services. It uses many different tools and media (such as governance structures and stakeholder engagement, policies and protocols, strategies and practices), guided

11 International Union for Conservation of Nature. See: http://iucn.org/
12 Convention on Biological Diversity, COP 5 Decision V/6
13 i.e. Grumbine 1997. Reflections of "What is Ecosystem Management?". Conservation Biology 11.
14 Millennium Ecosystem Assessment, Ecosystems and Human Wellbeing: a framework for assessment. 2003.

by principles[15] that help define the management framework. It is based on cross-cutting and apolitical principles that can be applied across a wide range of scales. The approach is increasingly being written into international agreements[16], forming the basis for Declarations from Global Forums[17], and being the preferred option of many organizations.[18]

Protocols within Ecosystem Management include:

- The use of sound inter-disciplinary science to inform management decisions.
- The use of risk and uncertainty assessments, considering the threats, vulnerability and exposure, sensitivity and adaptive capacity of socio-ecological systems, and identifying adaptation responses that can minimize potential risks.
- The need to be adaptive to maintain ecological integrity whilst responding to change and new insights.
- Building stakeholder and rights holder consensus to address potentially conflicting interests and trade-offs (i.e. land conversion to agriculture and loss of ecosystem services).
- Importantly is an over-arching strategy to integrate each individual protocol.

Text Box 3:

The Millennium Ecosystem Assessment (MEA) grouped ecosystem services into four broad categories: *regulating*, including the control of climate and disease; *supporting*, such as photosynthesis, nutrient and water cycling and crop pollination; *provisioning*, such as the production of food and water; and *cultural*, covering spiritual and recreational benefits. Of these it is the *supporting* and *regulating* services that underpin the supply of the others. These services have fundamental biological, physical and chemical processes that form the foundation of life on Earth. Therefore, the preservation of these processes are at the heart of Ecosystem Management objectives.

Ecosystem Management places particular emphasis on integrating our needs with conservation practice, and recognizes the inter-connectivity between ecological, social-cultural, economic and institutional structures when developing solutions.

15 For example from 1995, the Convention on Biological Diversity: 12 Principles. See: http://www.cbd.int/ecosystem/principles.shtml

16 E.g. The Reykjavik Declaration on Responsible Fisheries in the Marine Ecosystem 2001.

17 E.g The Manado Ocean Declaration 2009, the Bamako Declaration by African Environment Ministers on Environmental Sustainable Development 2010, the Nagoya Declaration on Biodiversity in Development Cooperation 2010.

18 E.g. IUCN, WWF, TNC

In order to best achieve the objectives of the Green Economy, it is necessary to utilize appropriate concepts, approaches, strategies and tools.

The Ecosystem Management approach must satisfy multiple objectives whilst ensuring the sustainable provision of goods services. For example, the approach incorporates the consideration of multiple land uses thus enabling the integration of multiple objectives and identification of priorities. However, these goals and objectives cannot be met solely through independent sectoral initiatives, as the problems and their solutions are closely inter-linked and contain complex trade-offs (i.e. the need to produce more food whilst not expanding agricultural areas and with reduced inputs). Such trade-offs exist across a range of spatial and temporal scales and cut across many social and cultural considerations.

An essential element in finding the balance between our needs and ecosystem capacity is understanding ecosystem resilience. The Resilience Alliance[19] defines this as "*The capacity of an ecosystem to tolerate disturbance without collapsing into a qualitatively different state that is controlled by a different set of processes*". In other words, how much degradation can an ecosystem tolerate before its health becomes irreparable? A resilient ecosystem can withstand shocks and rebuild itself when necessary. Maintaining biological diversity, at gene, species and community (functional groups of organisms) levels is an essential part of keeping within resilience tolerance limits.

5. Promoting synergies of a Green Economy and Ecosystem Management

Increasing volatility in financial and commodity markets due to resource supply interruptions, resource conflicts, and interruptions in the provision of ecosystem goods and services all form strong signals that we are reaching the limits of natural resources and ecosystems. These signals are forcing recognition of the Earth's ecosystems as a foundation for the global economy and for human life systems. The question of living in a way that strengthens instead of undermines our ecosystems is increasingly a question not of luxury but of survival.

To ensure investments in healthy ecosystems capable of sustaining a vibrant human population, we have to make fundamental changes to our policies (and implement them) and economic systems. The link between limitless growth and resource extraction, as well as externalization of human and environmental costs must be broken. We will need to move toward a system where prosperity, progress and wellbeing of people enhances, instead of undermines the functions and processes of our ecosystems. Transitioning to a Green Economy firmly rooted in Ecosystem Management principles implies changing the way we do business, make policy, and

19 See: http://www.resalliance.org/index.php/resilience

see the natural world. The challenges of making this change are tremendous, but the process provides many great opportunities to create a sustainable future. Barriers and solutions are discussed by category in the following passages.

5.1. Economic approaches

From an economic perspective, living within the limits of healthy ecosystems and reinforcing their value will naturally support the most important aspects of a Green Economy: sustainable economic progress; reduced pollution; and poverty alleviation. All business operations and thus ultimately the human welfare that they support rely on ecosystem services. Ecosystem Management seeks to go beyond extracting only what is a sustainable amount of goods and services, to take a **view of maintaining the overall integrity of the asset** that we depend on, as a primary priority, and then looking after meeting our needs secondly, within the dictated parameters.

An essential element in finding the balance between our needs and ecosystem capacity is understanding ecosystem resilience.

How to integrate Ecosystem Management in the Green Economy?

In order to take advantage of Ecosystem Management benefits in the Green Economy, its processes should be integrated in decision making higher levels (i.e. national, regional or global) to support resource use rationalization at the local level. Planning should recognize the many values that ecosystems convey to the economy and society such that the full costs and benefits of the uses of ecosystems can be considered, rather than just the values that enter the market in the form of commodities. This approach, discussed in the TEEB reports,[20] can correct today's misallocation of capital investment and allow for more rational assessments of true trade-offs in resource use.

Nicholas Stern's review[21] revealed the enormous costs of adapting to climate change. Mitigating now is more cost effective, although the costs of necessary mitigation increase measures the longer we wait. In the case of ecosystems, an analogy can be drawn here to the costs of climate change: the cost of ecosystem restoration (if this is indeed possible) will increase the more we allow them to degrade.

Economic valuation can reveal paths toward more efficient resource use. But this is just the first step. Policies and market signals must be adjusted to discourage and penalize destructive practices. Decisions made from a proper value assessment must be translated into incentives that influence the behaviour of individuals and

20 The Economics of Ecosystems and Biodiversity (TEEB). See http://www.teebweb.org/Home/tabid/924/Default.aspx

21 The Economics of Climate Change: the Stern Review. 2007. Nicholas Stern, Cambridge University Press.

In order to take advantage of Ecosystem Management benefits in the Green Economy, its processes should be integrated in decision making higher levels (i.e. national, regional or global) to support resource use rationalization at the local level.

businesses. In the language of TEEB, **recognizing and demonstrating value must be next translated into creating incentives and price signals** to capture value (TEEB, 2010). Such an approach must be utilized in conjunction with policies to correct for market failures to address urgent issues of poverty and inequity. Putting in place these incentives will be met with various barriers which are discussed below.

Market Mechanisms and the Private Sector

Governments can support Ecosystem Management by ensuring that market signals accurately reflect the value of natural assets both in isolation, eg timber in a forest, and as part of a collective interacting system, i.e. on ecosystem. The private sector represents a necessary technical and financial partner in the transition to a Green Economy. While they are relatively small in absolute terms compared to the global economy (2% of global GDP as recommended by the Green Economy Report), tremendous investment are required in moving toward a more sustainable economy. It is impossible for the public sector to finance these all on its balance sheet, so the private sector (including small scale/subsistence economic actors) should be engaged. Policymakers must seek to improve the investment climate for sustainable activities in order to encourage private sector investments. This can have the double benefit of improving public welfare as it will allow poor citizens to care for their own needs. The following steps needs to be implemented:

- End negative incentives. One way to improve market signals that potentially represents a huge cost saving is ending harmful subsidies. Many policy instruments currently support destructive or inefficient business-as-usual policies through subsidies which should be reduced or eliminated, i.e. US$700 billion per year is spent on petroleum subsidies, and ethanol support policies make it more profitable to clear land for soy than leave forests standing.
- Provide for enabling conditions. While enabling conditions should be sought in targeted sectors, governments should not overlook the huge impact of basic conditions for doing business, such as legal frameworks, taxes, clear regulations, labour policies, necessary physical infrastructure, research and development, and skilled workforce and clear and enforceable property rights.
- Set and enforce regulations. Laws and regulations need to be designed to prohibit and penalize unsustainable activities, require sustainable procurement, or create markets for ecosystem services. They force land and resource users to incorporate environmental costs or benefits into their accounting systems and financial analyses, and thereby recognize the value of ecosystems.

5.2. Non-economic approaches

Making Policy: There is a need for strong governance and institutional structures at the global level to guide policy making at regional, national and local levels, as an overarching strategy to work towards global objectives whilst accounting for different political systems.

- There is a need for an improved balance and greater integration between traditional economists and ecological economists within governmental advisory departments.
- Decisions on policies need to explicitly consider the environmental and social impacts of different options.

Political Economy: Due to political, legislative, institutional, and fiscal constraints, policymakers must be realistic and economical in their implementation of Ecosystem Management and steps toward a Green Economy. Certain steps can be taken to optimize impacts within these limits.

- Policy makers should seek **incremental change** that builds momentum in the right direction, lays the groundwork for future improvements, and can be taken within the limits of national or regional contexts.
- Governments should not and cannot bear the full costs of change. Policies should be focused on **creating an enabling environment for the private sector** (including small-scale business and communities) to provide market-based sustainable solutions and **essentially co-finance the transition to a Green Economy**. By enabling and supporting the private sector and establishing the right incentives (as well as appropriate regulations) countries can attain vastly greater efficiency and catalytic impact with a given amount of funds, as well as leveraging the ability of markets to be innovative and set proper prices, to manage a given development challenge.
- **Win-win solutions** whereby greater efficiency is reached through better planning should be prioritized as they represent the "low hanging fruit". In many situations, with just a little investment in changing practices all or almost all participants can benefit in financial savings or improved quality of life.

Information, Knowledge and Research. Countries should support Earth observation and information systems that provide coordinated, comprehensive and sustained information for decisions and actions. Support should be provided to public

Governments can support Ecosystem Management by ensuring that market signals accurately reflect the value of natural assets. The private sector represents a necessary technical and financial partner in the transition to a Green Economy.

There is a need for strong governance and institutional structures at the global level to guide policy making at regional, national and local levels, as an overarching strategy to work towards global objectives whilst accounting for different political systems.

institutions, as well as private providers in this field, and many opportunities lie in cooperation between public and private in this arena. Specific interventions can include:

- Support to public, academic and scientific institutions to:
    - Conduct monitoring, and collect and analyse data on ecosystem health, ecological processes, socio-economics, financial interactions etc.
    - Increase support to further research on ecosystem functioning; and
    - Enhance data accessibility through networks and hosting.
- Economic studies to investigate behavioural change and what are economic, social, and financial trade-offs.

Technology and Costs. Sustainable business models, practices and technologies are sometimes less proven in the market, bear higher risks and are potentially more costly, at least initially. In financial terms, this implies a challenge with embedded issues in risk, incentives, capacity building and technology.

Governments can increase technology development and investment in certain sectors through strategic and catalytic investments in the public and private sectors through:

- funding research and design in key areas related to Ecosystem Management, or providing incentives in order to leverage market-sourced innovation.
- incentives such as concessional funds, guarantees, or purchasing agreements to encourage investment by the private sector in desired sectors, such as clean energy or resilient agriculture. This will result directly in increased investments, but also in catalytic change if the incentives are structured right: capacity building, changed practices, demonstration effects, and development or improvement of new technologies. Demonstrating and supporting new sectors will decrease their risk, thereby reducing capital cost and unlocking flows of investment.
- Strategic capacity building should take place in public and private institutions in targeted sectors (this will be very context specific).

Education and Capacity Building.

Capacity-building is a clear case for investment:

- For the public, environmental education is important to generate public support and changes in behaviour (economic actors).
    - Initiatives like certification and product labelling enable consumers to

make informed and more responsible choices.

- Ecological conservation should be seen as a necessity and not a luxury.
- Societies need to appreciate the role of ecosystems in order to support sustainable policies.

- Capacity building should equip economic actors to engage in more sustainable activities and livelihoods:
  - This applies at all scales but is variable depending on levels of consumption. High consumption countries need to build capacity to reduce resource use, develop recycling and minimise waste, It is important for low income groups that depend directly on ecosystems to have their capacity increased to utilise resources sustainably, for they are the most at risk and may be compelled to destroy resource bases (e.g. through deforestation) if no other solutions are available.
  - Companies that profit from natural resource extraction require increased education and support to change their practices and find their way toward business models that strengthen instead of harm the environment.
  - Public institutions will need substantial strengthening; in many cases the issue of Ecosystem Management is cross-cutting and new mandates or departments will need to be created in order to consider multiple interactions. New entities in governments charged with mainstreaming Ecosystem Management need to be equipped with sufficient mandate and technical capacity.

Sustainable business models, practices and technologies are sometimes less proven in the market, bear higher risks and are potentially more costly, at least initially. In financial terms, this implies a challenge with embedded issues in risk, incentives, capacity building and technology.

Public institutions will need substantial strengthening; in many cases the issue of Ecosystem Management is cross-cutting and new mandates or departments will need to be created in order to consider multiple interactions.

6. The hope in the mist of a global economic and ecological crisis models are emerging.

Numerous examples exist of promising initiatives in Ecosystems Management. Their scale and level of support is presently too small to address the mounting challenges they seek to address. There is an urgent need for much greater and long-term financial support and to institutionalise the overall Ecosystem Management approach. This will facilitate even greater up-take of the approach on the ground and internalise it within economic development and political processes. Across all these initiatives there is a need for co-ordination and sharing of best practises as we learn how best to apply the Ecosystem Management approach.

As the pressures on ecosystems are expected to increase in the future, there is clearly a need to invest in the resilience of those ecosystems and for much stronger governance and institutional structures. These structures must be substantial enough, equipped with the appropriate level of power and influence, and adequately supported to ensure the necessary changes toward the transition to a Green Economy are achieved. As argued here previous governance and institutional structures have achieved only limited success in preventing ecosystem degradation and in improving human wellbeing.

7. Conclusions and recommendations

This paper has highlighted a range of solutions using the Ecosystem Management approach to tackle the many pressures we are facing. Considering the fundamental basis for life on Earth, it is inconceivable that we can progress without maintaining the health of Earth's diverse ecosystems. It thus falls to all people, as individuals, communities, the private sector and representatives of nations, to face up to the challenges ahead and utilise the best available solutions with commitment and understanding, to ensure a stable transition to a Green Economy. We therefore recommend the following:

- Expanded and accelerated Ecosystem Management will be essential to ensure a sustainable flow of ecosystem goods and services whilst maintaining healthy and fully functional ecosystems as a necessary part of the development of the Green Economy. During this transition it will be critical to ensure that Ecosystem Management meets the needs of the poor, especially those in developing countries

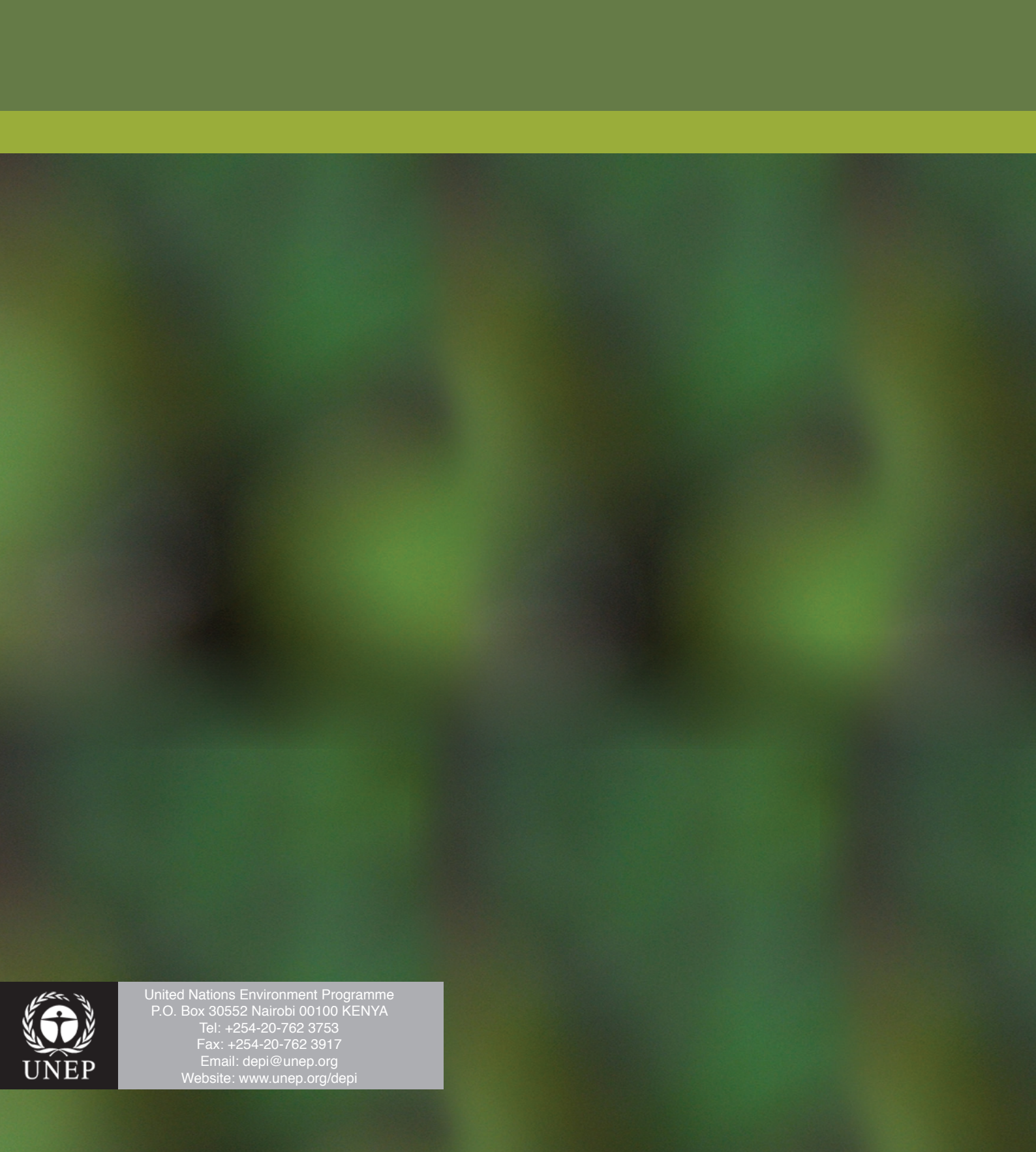
who have high relative dependencies on ecosystem goods and services and are most vulnerable to changes induced by environmental degradation, climate and societal change.

- Given the constraints in the transition to the Green Economy, and while still keeping in mind the urgency of the matter, it is important to focus on what is incrementally achievable in order to move forward.
- In the transition to the Green Economy, policymakers need to ensure that the full range of goods and services provided by ecosystems, (including those which are non-monetised) are fully integrated in decision making and public policy.
- Valuation and environmental accounting can help us improve the economic structure and decision making that has led us to jeopardize our own survival through resource destruction.
- New systems of governance of global public goods and institutional structures will be required to link ecosystem services into the Green Economy because the generation of, and benefits derived from, ecosystem services frequently cut across political and geographic borders.

We are now halfway through the 'century-long journey' of Ecosystem Management. The remaining challenge is to develop it to its full potential at a considerably greater rate so that it can become the central mechanism to ensure the safe maintenance of the natural foundation for life on Earth.

As the pressures on ecosystems is expected to increase in the future, there is clearly a need for much stronger governance and institutional structures.

We are now halfway through the 'century-long journey' of Ecosystem Management. The remaining challenge is to develop it to its full potential at a considerably greater rate so that it can become the central mechanism to ensure the safe maintenance of the natural foundation for life on Earth.



United Nations Environment Programme
P.O. Box 30552 Nairobi 00100 KENYA
Tel: +254-20-762 3753
Fax: +254-20-762 3917
Email: depi@unep.org
Website: www.unep.org/depi