

Implementing Green Economy Policies through Ecosystem Management

A Call for Action in a Post Rio+20 Era

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Summary

This paper has been prepared for the Xiamen Forum on Ecosystem Management and Green Economy¹ to be held on 6 September 2012 in Xiamen, China. The overall goal of the forum is to contribute to the implementation of green economy policies through promoting the central role of ecosystem management, called by the United Nations Conference on Sustainable Development (UNCSD) that took place in Rio de Janeiro, Brazil in June 2012 (Rio+20).

Based on the call from Rio+20 “*to further mainstream sustainable development at all levels integrating economic, social and environmental aspects and recognizing their interlinkages, so as to achieve sustainable development in all its dimensions,*” we proposed an over-arching framework within which a paradigm shift has started from balancing to integrating the three dimensions of sustainable development: economic, social and environmental. We further analyzed in detail the specific issues including enhancement of environmental pillar, the role of green economy policies and ecosystem management, eco-investment, eco-cities, south-south cooperation and innovation of science and technology. The following are the key findings of these analyses:

1. The environmental pillar can be strengthened by engaging all relevant stakeholders.
2. Green economy supports integration of the three dimensions of sustainable development.
3. Ecosystem management plays a central role in implementation of green economy policies.
4. Increasing eco-investment is the basis for sound ecosystem management.
5. Eco-city, a place where ecosystem management interacts with green economy intensively.
6. South-South Cooperation, an emerging dimension for shaping the green economy.
7. Innovation in science and technology, a vital component of ecosystem management and green economy.

Based on these findings, recommendations are made to call for implementation of green economy policies, and corresponding questions are asked for consideration by all delegates:

1 **Ecosystem Management**, “an integrated process to conserve and improve ecosystem health that sustains ecosystem services for human well-being” (UNEP 2009)

A **Green Economy** is defined by UNEP as one that results in ‘improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities’.

1. The over-arching framework of integrating the three dimensions of sustainable development shall be given priority in the High level political forum called for by the Rio+20 once it is established.

Question 1: Has the world come to the point of forging an overarching framework to harmonize the three dimensions of sustainable development?

2. The environmental pillar is strengthened by both upgrading UNEP and establishment of The World Environment Forum.

Question 2: Given the agreement at Rio+20 to upgrade UNEP with a global membership, what are the most effective mechanisms to advocate for the environmental pillar and to engage all relevant stakeholders?

3. Ecosystem management and green economy are suggested to be applied in an integrated manner in support of integration of the three dimensions of sustainable development.

Question 3: Are green economy and ecosystem management the only contributors to the synergies of economic, social and environmental dimensions for sustainable development, if not, what are the other factors?

4. Increasing eco-investment and the number of eco-cities are recommended as the two main approaches, amongst others, for implementation of green economy policies and application of ecosystem approaches and their integration thereof.

Question 4: How can eco-investment and eco-city approaches be scaled up in a post Rio+20 era?

5. South-South Cooperation deserves adequate attention for implementing green economy policies, given the sheer and increasing volume of material, personnel, monetary and information flows across developing countries

Question 5: Why is South-South Cooperation still a complement to North-South Cooperation?

6. Science and technology should be recognized as the source of innovation for global sustainability in a post Rio+20 era.

Question 6: How much have the current science and technology been used for promoting global sustainability?

General question: What key messages do you want to deliver from this forum to governments, and in what way?

This paper includes an introduction, an analysis of the 7 key issues that contribute to integration of the three pillars of sustainable development, conclusions, and recommendations.

Introduction

a paradigm shift from “balancing” to “integrating” the three dimensions of sustainable development and an over-arching framework in a post -Rio+20 era.

The Heads of States and Governments at Rio+20 renewed their “commitment to sustainable development, and to ensure the promotion of economically, socially and environmentally sustainable future for our planet and for present and future generations (Para 1).” Furthermore, the world leaders acknowledged “the need to further mainstream sustainable development at all levels integrating economic, social and environmental aspects and recognizing their interlinkages, so as to achieve sustainable development in all its dimensions (Para 3),” and committed “to work together to promote sustained and inclusive economic growth, social development, environmental protection and thereby to benefit all (Para 6).” These statements clearly demonstrate the shared vision and political commitment at the highest level possible to achieving integration of the three mutually supportive dimensions of sustainable development: economic, social, and environmental well-being.

The common vision by world leaders on sustainable development has its origin in a concept developed at the Stockholm Conference on Human Environment in 1972, as well as the practices and progress made towards such a path in the past 40 years. To achieve this vision, the world must strive for a paradigm shift by moving away from “balancing” or “making trade-offs” between the three dimensions (environment, society and economy) of sustainable development. The shift should aim at integrating the three dimensions into an over-arching framework within which Rio+20 principles can be implemented to ensure their sustainability.

Figures 1 a-c show a paradigm shift with regard to sustainable development since 1972 when the need “to ensure that development is compatible with the need to protect and improve environment (Principle 13, Stockholm Declaration 1972)”. According to the most recent paradigm (Figure 1c), the economy is viewed to function within a society, which, in turn, functions within the environment (natural and human environment). Thus, sustainable development should be regarded as the full integration of these three dimensions into one entity and creating synergies to ensure their sustainability, rather than just the mechanical “balancing” or “trade-offs” between/among them.

We regard Rio+20 as a starting point for integration of the three dimensions. The first 20 years after Rio+20 is a critical period during which alternative paths, approaches, and tools must play an increasingly important role in the integration the three dimensions of sustainable development. We propose that full integration of the dimensions be realized within this period.

As an over-arching framework, Figure 2 shows that the environment, that is, earth’s ecosystems,

should be regarded as a self- sustained system, providing the foundation for sustaining the society and economy. The current situation, however, is that the rapid socio-economic development not only poses threats to the environment through, for example, broken thresholds of biodiversity loss, nitrogen and phosphorous cycles and climate change (Rockstrom et al. 2009) , but also to the overall sustainable development. Therefore, an urgent action is needed to address these threats. Green economy cuts in as a broker to integrate the three dimensions of sustainable development.

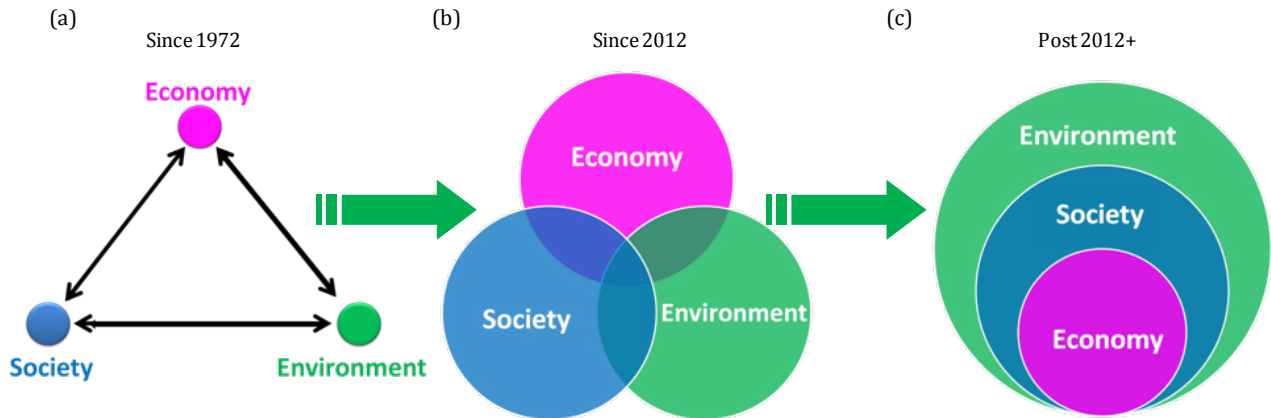


Figure 1 A paradigm shift from “balancing” (a) to “interacting” (b), and finally to “integrating” the three dimensions of sustainable development into one entity (c).

This paper analyzes seven key issues which, when adequately addressed, can make important contributions to an integration of the three dimensions of sustainable development. The key specific issues are: the environmental pillar, green economy, ecosystem management, eco-investment, eco-cities, south-south cooperation, and innovation of science and technology.

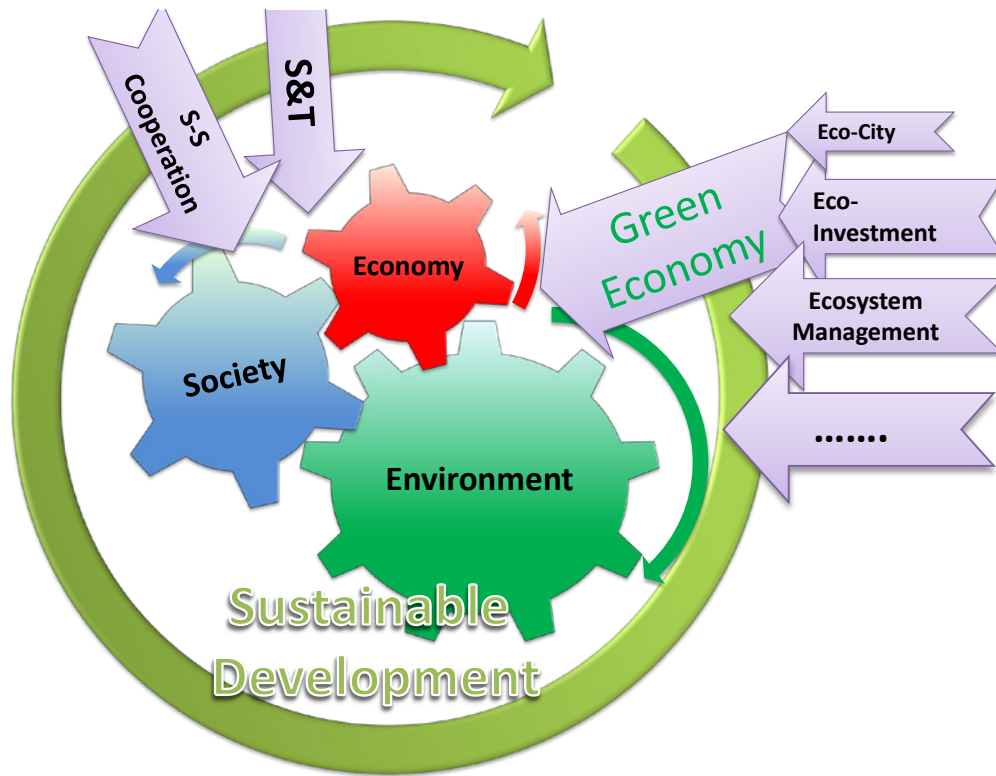


Figure 2: Overarching framework of integrating three dimensions of sustainable development.

The seven key issues

1. The environmental pillar can be strengthened by engaging all relevant stakeholders

Despite 40 years of theory and practice, the environmental dimension of sustainable development remains the weakest compared to the other two dimensions, especially the economic dimension. To this end, world leaders at Rio+20 “*reaffirmed the need to strengthen international environmental governance within the context of the institutional framework for sustainable development, in order to promote a balanced integration of the economic, social and environmental dimensions of sustainable development as well as coordination within the UN system (Para 87).*”

In addition, world leaders at Rio+20 “*are committed to strengthening the role of the United Nations Environment Programme as the leading global environmental authority that sets the global environmental agenda, that promotes the coherent implementation of the environmental dimension of sustainable development within the United Nations system and that serves as an authoritative advocate for the global environment,*” “*invite the United Nations General Assembly, ..., to adopt a Resolution strengthening and upgrading UNEP*”, including through the establishment of universal membership in the Governing Council of UNEP, and active participation of all relevant stakeholders (Para 88)...

In the current governance structure of UNEP, advocacy for the environment has been mostly done by ministers and their representatives during the Global Ministers Environment Forum (GMEF). In the near future, when UNEP is given universal membership in its Governing Council, its decision-making power will be greatly enhanced, yet its advocating power declined as there will be no longer a GMEF when environment ministers of all UN members states become members of the UNEP Governing Council. It is therefore proposed to initiate a better advocating platform, **The World Environment Forum (TWEF)**.

Once established, TWEF will serve as a world-wide advocating/engagement platform for enhancing the environmental dimension and its integration with the social and economic dimensions of sustainable development through broad public participation, active engagement of the public and private sectors as well as the science community. It would engage business, political, academic and other leaders of society including heads of governments/states who would provide more powerful

advocacy for the environmental pillar than only environment ministers. It would complement and support the mandate of the UNEP as an intergovernmental decision-making body.

This proposal is not a hypothesis. The delicate multi-faceted interaction between the World Trade Organization (WTO) and World Economic Forum (WEF) tells a successful story of collaboration between decision-making and advocacy bodies. The Ministerial Conference of WTO is a decision-making body which brings together all members of the WTO and takes decisions on all matters under any of the multilateral trade agreements. WEF is one of the most influential elite groupings which engage leaders from government, business, academia and the arts to “improve the state of the world.” WTO issues feature often on the agenda of its annual summit (Davos) and have informally influenced WTO decision-making through discussions regarding global trade issues. At the beginning of the 1980s, WEF played a major role in launching the Uruguay Round, which was the predecessor of WTO. The WEF’s Global Enabling Trade Report series focuses on measuring whether economies have in place the necessary attributes for enabling trade and where improvements are most needed. In 2005, a report at Davos even proposed strengthening the role of the WTO Secretariat and increasing both its funding and power.

2. Green economy supports the integration of the three dimensions of sustainable development

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. It is a sustainable economy and society that values and makes investments in natural capital, alleviates poverty through job creation and social equity, has renewable energy and low carbon technologies with resource and energy efficiency, sustainable urban living and has response to climate change (UNEP, 2011).

In the Rio+20 Outcome “The Future We Want,” there are 19 paragraphs devoted to the recognition of the importance of green economy and various aspects of implementing green economy policies. First and foremost, world leaders at Rio+20 recognized “green economy in the context of sustainable development and poverty eradication as one of the important tools available for achieving sustainable development and that it could provide options for policy making...” They emphasized “that it should contribute to eradicating poverty as well as sustained economic growth, enhancing social inclusion, improving human welfare and creating opportunities for employment and decent work for all, while maintaining a healthy functioning of the Earth’s ecosystems.”

Obviously, the world reached consensus that implementation of green economy policies provides a new route towards integrating and integrating the three dimensions of sustainable development. It is a new development path that is based on sustainability science and ecological economics.

What is more, compared with previous development paths, the uniqueness of a Green Economy is that it can directly turn the natural capital into economic value whilst conserving it, and conduct total cost accounting. Of course one may argue that ecosystem services are priceless as it provides basis for human civilization. Nonetheless, in terms of national planning and accounting, the natural capital can be included into the social system, requiring the users of ecosystem services to pay for the benefits gained and damage caused. This will immensely increase the proportion of environmental dimension. The Rio+20 Outcome resonated this conclusion by acknowledging that green economy “*will enhance our ability to manage natural resources sustainably and with lower negative environmental impacts, increase resource efficiency and reduce waste,*” and by “*recognizing that urgent action on unsustainable patterns of production and consumption where they occur remains fundamental in addressing environmental sustainability, and promoting conservation and sustainable use of biodiversity and ecosystems, regeneration of natural resources, and the promotion of sustained, inclusive and equitable global growth.*”

3. Ecosystem management plays a central role in implementation of green economy policies

UNEP defines ecosystem management as “an integrated process to conserve and improve ecosystem health that sustains ecosystem services for human well-being” (UNEP 2009). This working definition is the result of the evolution of the concept of ecosystem management since the Stockholm Conference on the Human Environment in 1972, which states that “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” (Principle 2).

Fourty year later, the centrality of ecosystems and biodiversity to sustainable development was fully recognized by world leaders in the Rio+20 Outcome “The Future We Want”. The document listed approx 30 paragraphs (more than 10% of the 283 paragraphs of the whole document) around the theme of ecosystem resilience and its link to people’s livelihoods, especially the poor. For instance, paragraph 4 reaffirmed “*the need to achieve sustainable development by: promoting integrated and sustainable management of natural resources and ecosystems that supports, inter alia,*

economic, social and human development while facilitating ecosystem conservation, regeneration and restoration and resilience in the face of new and emerging challenges.”

However, from recognition of the importance of ecosystem services and biodiversity to sound ecosystem management in support of implementing green economy policies and promoting integration of three dimensions of sustainable development, there needs to be a clear understanding of the role of ecosystem management in the development of green economy and their multi-faceted and mutually supportive interlinkages.

Ecosystem Management and Green Economy development are mutually supportive and multi-faceted, which provides the basis for enhanced synergies in pursuing global sustainability. Ecosystem management ensures ecosystem health and sustained delivery of various ecosystem services to secure various aspects of a green economy, including, but not limited to investment in natural capital, poverty alleviation, job creation and social equity, resource and energy efficiency, and response to climate change. Figure 3 illustrates the numerous pathways to promote the role of ecosystem management in the transition to green economy, including:

Valuation and investments in Natural Capital: Ecosystem management approach integrates current state of ecosystems and availability of its service when developing valuation schemes and promotes ecosystem services payment (e.g. environmentally adjusted water tariffs).

Poverty Alleviation: Most of the rural poor especially in Africa and in other parts of the world live with less than 1USD per day. For this to be improved they must be very innovative everyday in sustaining resource use and livelihood security. This is possible thanks to services provided by local ecosystems such as food, medicine, timber and fisheries production.

Create jobs and social equity: ecosystem management ensures sustainable supply of both non-market and market products to local communities, thus contributing significantly to local employment and economic activity, particularly in developing countries.

Promote renewable energy and low carbon technologies: Ecosystems provide the raw material for renewable energy like biomass, for example, indigenous bio-energy species such as *Lophira lanceolata* in Africa.

Resource and energy efficiency: An ecosystem management approach such as community forestry based on indigenous species ensures local resources availability, livelihood security, conservation and sustained use.

Sustainable urban living: The ecosystem management approach can be used for better planning and conservation of urban green spaces thus maintaining a high quality of life including public health.

Response to climate change: Impact of climate change especially on Africa, will be severe because of adverse direct effects, high agricultural dependency, and limited capacity to adapt (Collier et al., 2008). Ecosystem management promotes integration of indigenous species (e.g., shea and baobab trees in Africa) into formal production systems through Ecosystem Based Adaptation as a new, green, adaptation approach to respond to climate change for developing countries.

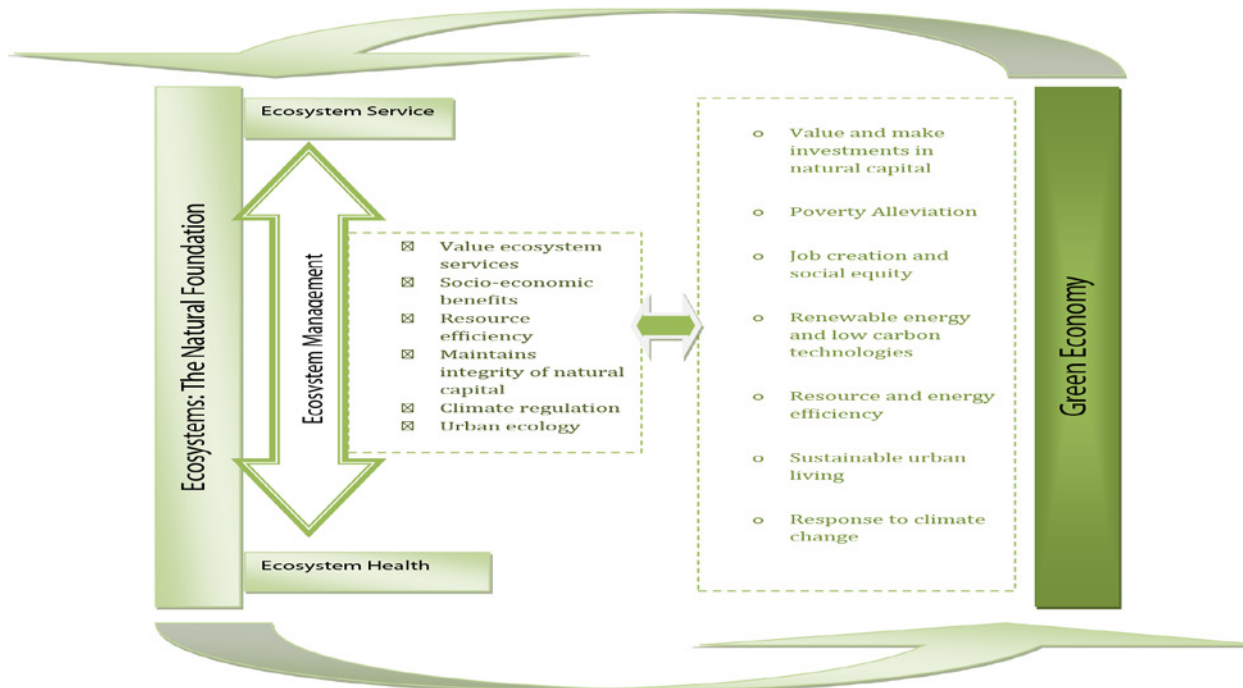


Figure 3: Dynamics of multi-faceted and mutually supportive interlinkages between ecosystem management and green economy (UNEP-IEMP, 2011).

4. Increasing eco-investment is the basis for sound ecosystem management

Close to 30 paragraphs of a document “The Future We Want” lay emphasis on the role of ecosystem management in implementing green economy policies and promoting a integration of the three dimensions of sustainable development. However, not a single mention is made of how best to invest in ecosystem conservation and restoration measures in the document. This is in sharp contrast to the fact that current investments in nature are insufficient to effectively cope with the increasing

magnitude of ecosystem degradation and to ensure sound ecosystem management for human well-being and economic development. A 2-year UNEP study on The Economics of Ecosystems and Biodiversity (TEEB) estimated the damage done to the natural world by human activity in 2008 was between US\$2 trillion and US\$4.5 trillion (the lower estimate is roughly equivalent to the entire annual economic output of the UK or Italy). A second study, for the UN-backed Principles for Responsible Investment (PRI), estimated the cost was US\$6.6 trillion, or 11% of global economic output. Often, environmental consideration has had to give way to the pursuit of unsustainable economic development or short-term economic gains (at all costs). This has occurred not only in developing countries, but also in developed countries, especially during the financial crisis and economic downturn.

According to the Millennium Ecosystem Assessment, the increasing and often irreversible degradation of the world's ecosystems and their services as well as the loss in biodiversity is alarming (MEA, 2005). More than 60% of global natural capital including fish stocks, water resources, and forestry has already been destroyed or severely exploited resulting in a decrease in agricultural production, and higher greenhouse gas (GHG) emissions. This severe degradation of natural capital assets significantly endangers human well-being and economic development. By taking forests as an example, people worldwide depend on this ecosystem for commodity production, for reducing GHG emissions through carbon storage, while it also provides habitat for over 80% of diverse land species (UNEP 2011). Similarly, marine ecosystems are essential sources of seafood for over a billion people; provide raw materials for industries, and regulate climate change impacts (Worm et al. 2009).

Eco-investment in this paper is defined as *“all capital flows that benefits the restoration and conservation of the Earth’s ecosystem services for human well-being..”* They build upon a strong linkage between Ecology (ecosystems) and the Economy (households and livelihoods) at multiple scales and are governed by institutional frameworks and various incentive mechanisms. Eco-investments complement and augment other policy instruments and management measures from a ‘business as usual’ (BAU) scenario by targeting three major transitional pathways. These include: i) ecosystem restoration (e.g. natural habitat protection, tree planting, breeding and seeding programs); ii) market incentives (e.g. green subsidies, payments for ecosystem services (PES), eco-certification); and iii) institutional capacity (e.g. regulations, monitoring and control, research and development (R&D), private and international partnerships, and environmental funds). Each of the three pathways entails various funding mechanisms across numerous ecosystems and economic sectors. The combination of the three diverse pathways and their respective mechanisms were revealed as successful eco-investments in the Chinese ‘Grain to Green’ policy reform (Tallis et al. 2008). In Canada and the USA, defining property rights for user groups and international conventions were key institutional mechanisms for sustaining the Pacific Halibut fisheries (Sumaila et al. 2012). Similar initiatives and partnerships are emerging in Latin America especially for water funds in securing quality drinking water, catchment protection, and sustained science in environmental monitoring (Tallis et al. 2008).

The UNEP Report "Towards a Green Economy" provides a strong argument for governments and the private sector² to invest in natural and human capital in alleviating poverty, restoring ecosystems, creating more jobs, and reducing a dependency on fossil fuels (UNEP 2011). "Investing in nature can be a cost effective strategy to lift people out of poverty and propel sustainable development" (UNEP-IEMP 2011: 10). Eco-investments can be a catalysts for a green economy, through private sector investments such as in technological innovation, public expenditure in R&D, stakeholder partnerships in greening global supply chains. According to TEEB (2010), sales in ecologically- friendly and certified organic products including food and non-food products have increased exponentially in the past two decades, amounting to billions of USD. Eco-investments are also opportunities for international cooperation on global environmental challenges and leveraging international funding and support either through South-South partnerships or through multilateral environmental agreements. The UN-REDD program, for instance, is an example of international partnership with huge transfirmational impact in ecosystem management but also faces social and political challenges (Angelsen et al. 2012).

According to recent estimations by UNEP (2011), about 0.5% of global GDP (325 billion USD) is required for start up investments in natural capital sectors that will yield benefits in restoring renewable resources such as forestry, alleviating poverty and enhancing GDP per capita, and reducing both water and energy use.

Policy reforms are indispensable for facilitating the necessary investment shifts. This includes abolishing perverse incentives (e.g. harmful subsidies in the energy and fisheries sector) as well as creating new market and non-market based incentives (e.g. green subsidies, price guarantees, trading schemes). Regulatory reforms that establish long term investment security and the corresponding re-allocation of public funds to more eco-friendly industries and activities may consequently also leverage increased private sector investments. The latter is a highly valuable source of technical and financial capital but still widely untapped for ecosystem management measures (UNEP 2011).

The scaling up of eco-investments is imperative for effective ecosystem management and changes in human behaviour towards stewardship. This is graphically expressed in Figure 4 where further ecological degradation is prevented by refraining from harvesting renewable resources beyond the maximum sustainable yield reference point. This argument provides a strong imperative on why eco-investments are necessary and how they could be scaled up and replicated in meeting the synergetic needs of ecosystem conservation and economic development.

2 The private sector includes industry and community groups, as well as individuals as defined by UNEP (2011).

These eco-investments are governed by three interacting pathways determined by institutions, markets and ecosystem protection respectively. For scaling up eco-investments, the creation of incentives, cross-sectoral partnerships and innovation are key requirements. In order to attain a green economy, concrete measures in the domains of policy reforms, regulations and capacity building need to be immediately conducted including internalizing the environmental cost or negative externalities into the costing equation to reflect the true cost of socio-economic development.

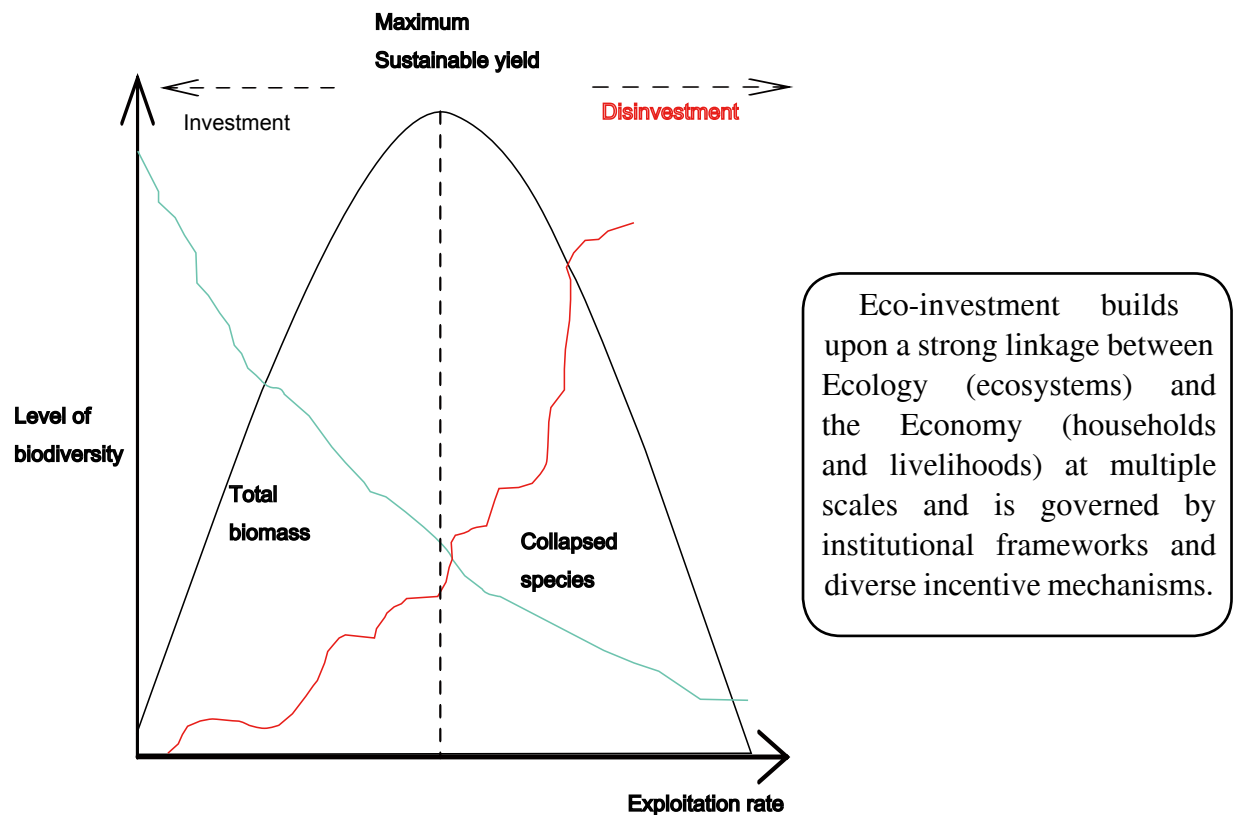


Fig 4: Investing in natural capital through conservation and sustainable harvesting (Adapted from Worm et al. 2009)

5. Eco-city, a place where ecosystem management interacts with green economy intensively

“The Future We Want” document recognized “that the world’s population is projected to exceed nine billion by 2050 with an estimated two thirds living in cities (Para 21),” and highlighted the major issues and reaffirms the political commitments relating to sustainable cities and urban settlements (paragraphs 134 to 137). It recognizes that “if well planned and developed including through integrated planning and management approaches, cities can promote economically, socially and environmentally sustainable societies”. Thus, there is a need “for a holistic approach to urban development and human settlements that provides for affordable housing and infrastructure and prioritizes slum upgrading and urban regeneration.” Further, there is the need “for conservation as appropriate of the natural and cultural heritage of human settlements, the revitalization of historic districts, and the rehabilitation of city centers (Para 134).”

World leaders at the Rio+20 committed “to promote an integrated approach to planning and building sustainable cities and urban settlements, including through supporting local authorities, increasing public awareness and enhancing participation of urban residents, including the poor, in decision making.” They also committed “to promote sustainable development” “the importance of considering disaster risk reduction, resilience and climate risks in urban planning, and the efforts of cities to balance development with rural regions (Para 135).” Implementing these commitments at local and landscape levels needs an innovative approach to apply principles of both ecosystem management and green economy in an integrated manner. This is where the concept of Eco-city comes into play to accomplish the challenging tasks listed above.

The concept of Eco-city has been in existence since early 1990’s. The concept was originally defined as an ecologically healthy human settlement modeled on the self-sustaining resilient structure and function of natural ecosystems and living organisms. The definition has since evolved such that different stakeholders define eco-city differently. For instance, to address climate change, an eco-city can be defined as a low-carbon city. For nature conservation, an eco-city is one with adequate areas of nature reserve.

To meet the increasing and unprecedented challenge of urbanization process, this paper defines an **Eco-city** as a one that applies both ecosystem management and green economy principles in an integrated manner to harmonise the three dimensions of sustainable development for their sustainability. This is not a hypothesis, but a concept with concrete examples even from developing countries.

Box 1: Xiamen, a national eco-city in China

The people of Xiamen treat their ecological environment as an important asset that enhances the competitiveness of the city. In the past 30 years, the following changes took place in Xiamen: GDP increased from RMB 0.74 billion to 253.58 billion, built-up area expanded by about 19 times, and the resident population grew by about 10 times. Despite experiencing fast growth of human population and built-up area, quality of the environment in Xiamen has been kept in good condition. In the 2009 Chinese City Competition Ability Report, Xiamen ranks 6th among all Chinese cities and its ecological environment ranks 4th. The good practices in Xiamen include:

- **Using the ecological function zoning to plan the development of economy and society.**

Xiamen has been facing serious conflicts between the limit of environmental capacity and the fast growing economy. The unbearable environmental pollution in the city in the 1990's raised the public awareness of the value of environment. The Yuandang Lake restoration with an investment of 300 million RMB resulted in an increase in the value of real estate up to 3 billion RMB. This became the turning point in the development of Xiamen, in which the term 'eco-city' caught the attention of decision makers of Xiamen. In 2000, Xiamen government issued the policy document "Xiamen Planning of Ecological Function Area", and announced scientific planning of ecological function areas to guide the industry planning. In 2002, Xiamen gradually formed the formal policy document "Xiamen Eco-city Construction Planning". At present, Xiamen has formed fourteen industrial areas with a clear division of function. Ecological function zoning has become the critical basis of industrial planning.

- **Concept of green economy leads Xiamen into the low consumption, low pollution, and high efficiency development road.**

Based on green economy concept and relevant criteria, a new investment proposal in the industrial district must go through seven thresholds: direction of industry, content of science and technology, intensity of the input, efficiency of output, environmental impact, employment opportunities, and resource consumption. In recent years, Xiamen rejected more than 10 projects, worth nearly 1.5 billion RMB, because these projects are high energy-consuming and discharge high levels of pollutants.

UNEP has been promoting use of eco-city approaches to assist countries in addressing urban environmental issues in an integrated approach. Important initiatives of UNEP include (but are not limited to these): its support to the Cities Alliance, the Global Initiative for Resource Efficient Cities launched at Rio + 20, and its outreach to Local Authorities through its Major Groups and Stakeholder initiative. Meanwhile, the Convention on Biological Diversity (CBD) adopted the Plan of Action on Sub-national Governments, Cities and Local Authorities and launched the Global Partnership on Sub-national and Local Action on Biodiversity, the publication of the "Cities and Biodiversity

Outlook".

Urbanization has already attained 50% (since 2007, more than half of the world's people live in cities), but its effects on the global ecological footprint are more significant today in emerging economies and large urbanizing countries like China and India, where an estimated 650 million people will migrate from rural to urban environments within 20 years (2010-2030). The Chinese Academy of Sciences, as a host of the UNEP- International Ecosystem Management Partnership (UNEP-IEMP), is optimally positioned to identify, modulate and assist in the dissemination of best practices in China. UNEP-IEMP and its partners are, therefore, called to promote the concept of eco-cities, identify and disseminate best practices in sub-national and local action for the environment, recognize excellence in eco-cities and encourage cooperative platforms between all levels of governance, with an emphasis in steeply urbanizing countries, to de-couple increases in urban quality of life from unsustainable levels of consumption and pollution.

6. South-South Cooperation, an emerging dimension for shaping the green economy

“The Future We Want” “reiterated support for South-South cooperation, as well as triangular cooperation, which provides much needed additional resources to the implementation of development programmes.” It noted “the positive experiences in some countries, including in developing countries, in adopting green economy policies ... and welcome the voluntary exchange of experiences as well as capacity building in the different areas of sustainable development” (paragraph 64). “ It further noted” that the voluntary sharing of knowledge, experience and best practices can enhance the implementation of actions to achieve the 3 objectives of Rio+20 (paragraph 104).”

South-South co-operation originally refers to technical and economic cooperation among countries of the developing world (Africa, developing Asia, Latin America, and Middle East). For an increasing number of countries of the South—and indeed the North—Green Economy is emerging as a potential catalytic focus for embedding sustainability within their economies as it will enhance the ability of developing countries to manage natural resources providing the basis for their livelihoods and development. Here South-South cooperation has a critical role to play, as it seeks to capitalize on shared expertise, knowledge, and South-specific technologies that have the potential to generate the skills and resources necessary to fuel sustainable economies.

Although “The Future We Want” was not able to adequately address the importance of South-South

Cooperation, a clear global mandate in support of South-South Cooperation is emerging over the years as its scope has expanded beyond government-to-government exchanges to include businesses as well as civil society, educational institutions, multilateral financial mechanisms, regional banks and research centers, on a broad range of economic, social, and environmental issues.

A UN report in 2009 noted “*South-South merchandise trade grew from \$577 billion in 1995 to more than \$2 trillion in 2006, and accounted for 20 per cent of world trade in 2007.*” The emerging economies, Brazil, China, India, South Africa and many others are playing an increasingly important role in driving the South-Cooperation initiative not only in terms of their bilateral trade and investments, but also their investment and trade with, and aid to other developing countries, especially least developed countries.

China-Africa Cooperation is a typical example, taking various forms, such as aid, technical cooperation, investment and trade. China is currently Africa’s largest trading partner followed by EU and US. In 2008, China-Africa bilateral trade volume exceeded US\$100 billion, approximately half of which were China’s exports to Africa and the other half were imports from Africa. India-Africa Cooperation is catching up. A decade ago, the trade between India and Africa was only US\$ 3 billion, and in 2011, this has amounted to US\$62 billion. Now both sides have decided to revise bilateral trade upwards to USD 90 billion in the next three years. China’s cooperation with Latin America and Caribbean is even more promising. Chinese Premier Wen Jiabao proposed in his last visit to Latin America in June 2012 to establish a China-Latin America cooperation forum, and that both sides should strive to increase trade volume to \$400 billion within five years. Examples of regional cooperation is represented by the recent launch by the Latin American Development Bank (CAF) of a Regional Innovation Initiative for the Development of Renewable Energy Generation and Energy Efficiency Technologies.

These examples demonstrate the increasingly significant role of South-South Cooperation for economic development of all developing countries. The increasing scale of South-South Cooperation has not only complemented the traditional North-South Cooperation in many different ways, but has also laid a solid foundation for further cooperation on promoting green economy development in developing countries. Nonetheless, South-South Cooperation is still in its initial stage, more promising opportunities are ahead of us, not only through expansion of trade and investment, but also enhancement of the environmental dimension.

Box 2: China, sixty years of lessons and experiences on ecosystem management

As the world's largest developing country, China is facing great challenges in meeting increasing social and economic demands with limited natural resources and ecosystem services. Over the past 60 years, there is a paradigm shift with regard to policies and practices on ecosystem management in China. A review on such a shift discloses experiences and lessons that may be shared with other developing countries.

Since 1949, China has experienced three main phases in the evolution of its policies affecting ecosystem management. During Phase I (1949-1978), grain production-oriented policies led to not only serious ecosystem degradation and loss, but also malnutrition and hunger. Phase II (1978-1998) was characterized by a transition from grain production-oriented policy to natural ecosystem conservation. During this phase, the government began to rectify the past damage to natural ecosystems with efforts to meet the basic food demand of its people. That was the period when people had enough to eat with reasonable increase of income while restoration of degraded ecosystems got started. However, it was not until 1998 when the catastrophic floods caused huge losses of lives and properties along the Yangtze and Songhua Rivers that a major turning point came into play for ecosystem management in China. During Phase III (1998-present), a series of major national programmes have been carried out to support the strategy of ecosystem restoration and conservation for sustainability. Examples include the Grain for Green Programme, the Natural Forest Protection Programme and the Returning Farmland to Lake Programme.

These analysis show some aspects of good practice in ecosystem management in China could be references for other developing countries:

- 1) Political leadership and commitment are important for achieving positive land use change and sustainable ecosystem management. Full ecological benefits including ecosystem services cannot be achieved by short term programmes. Long-term policies and investments are required.
- 2) Household-focused policies, including land tenure and market-based incentives, such as appropriate subsidies of grain and cash payments to farmers, can be effective tools for ecosystem management. Longer tenure and subsidy arrangements may be needed to sustain ecological benefits. Ecosystems cannot be well managed if other related policies—including land tenure, food security, regional development, and urbanization policies—are not supportive.
- 3) Finding the right balance between the demands for different land uses and the provision of ecosystem services must be the top priority for future ecosystem management. Different ecosystem services are closely interrelated and there may be significant trade-offs, but co-benefits can also be attained through good planning and recognition of the opportunity for synergies.

This does not in any way mean that South-South Cooperation is not without challenges, it is quite on the opposite. Rio+20 identified that “*eradicating poverty is the greatest global challenge facing the world today...*” We need to devise an avenue to make sure South-South Cooperation contributes increasingly to poverty alleviation.

World’s population has passed its 7th billion mark in 2011 and is projected to exceed 9 billion by 2050 with an estimated two thirds living in cities. These will largely occur in developing countries. We need to take this into account in the future framework of South-South Cooperation and increase our efforts to prepare for increasing needs of food, water, energy and shelter, to mention but a few, with a decoupling approach to alleviate the pressure on the limited natural resources and ecosystem services.

Rio+20 also recognized that “*many people, especially the poor,*” with more emphasis on - the poor living mostly in developing countries, “*depend directly on ecosystem for their livelihoods...*” It is paramount that activities in South-South Cooperation improve, and not degrade our ecosystems which are the foundation of our sustainability.

The call from Rio+20 “*for the continued and focused implementation of the UNEP Bali Strategic Plan for Technology Support and Capacity Building*”. The Bali Strategic Plan serves as an umbrella framework for “coherent, coordinated and effective delivery of environmental capacity-building and technical support activities” in response to well-defined country priorities and needs. The plan which establishes South-South cooperation as the primary implementation mechanism for the achievement of capacity building objectives, has been agreed upon by the UNEP Governing Council at its 23rd Session on in 2005 in Nairobi. Synergetically, the Convention on Biological Diversity (CBD) also promotes South-South and triangular cooperation as complementary to North-South arrangements. On 17 October 2010, just before the 10th Conference of the Parties of the CBD in Nagoya, Japan, the Group of 77 and China have adopted a Multi-Year Plan of Action on South-South cooperation on Biodiversity for Development, and the CBD’s 193 Parties subsequently welcomed this Plan through decision X/23. UNEP’s Division of Regional Cooperation and the Secretariat of the CBD are collaborating in a joint strategy on this subject.

Against this background, UNEP continues to make internal strategic and structural adjustments to better respond to the evolving perceptions about South-South Cooperation and its place in the development arena. To this end, and stemming out of the mandate of the Bali Strategic Plan, UNEP continues to engage and actively promote systematic incorporation of South-South approaches in the implementation of its biennial programmes of work. UNEP has created an information-sharing South-South Cooperation Exchange Mechanism to serve as a portal for innovative approaches, transparency, and dynamic collaboration across sectors, actors, and regions of the Global South. The mechanism, which was launched at the UN General Assembly High-level Committee on South-

South Cooperation in May 2012 is designed to enhance UNEP's ability to deliver environmental capacity building and technology support activities in developing countries and regions of the South.

7. Innovation of science and technology, a vital component of ecosystem anagement and green economy

“The Future We Want” recognized “*the important contribution of the scientific and technological community to sustainable development*”. World leaders “*are committed to working with and fostering collaboration among academic, scientific and technological community, in particular in developing countries, to close the technological gap between developing and developed countries, strengthen the science-policy interface as well as to foster international research collaboration on sustainable development* (Para 48).” The critical role of technology in promoting innovation, in particular in developing countries were well recognized, and governments were invited “*to create enabling frameworks that foster environmentally sound technology, research and development in support of green economy* (Para 72).”

Both ecosystem management and development of a green economy are knowledge and technology intensive processes. There needs to be a deep understanding of ecosystem services, their evaluation and trade-offs in regards to planning and decision-making for ecosystem management. There also needs to be an understanding of the economics and ecology of various sectors of the economy, society and the environment where green economy policy is to be implemented. These need targeted research, capacity building and awareness-raising. In implementing both ecosystem and green economy principles on the ground, technologies especially those cost-effective and environmentally sound technologies are in high demand.

Monitoring the state of the Earth's ecosystems, understanding the ecological processes and predicting ecosystem functions are essential for sound ecosystem management. This requires integrated cross-disiplinary networks such as the Chinese Ecosystem Research Network (CERN)³ . Considering the global importance of ecosystem management, there is also the need for establishing an intergovernmental body to improve the science-policy interface such as the Intergovernmental

3 The Chinese Ecosystem Research Network (CERN) was established in 1988 by the Chinese Academy of Sciences. Over the past 20 years, CERN has become a coordinated, comprehensive and sustained scientific and technological facility that undertakes monitoring, research, demonstration, capacity building, data sharing and policy support.

Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)⁴ . Developing countries share common challenges related to ecosystem management, including capacity, knowledge and information constraints. Therefore, there is a need for these countries to learn from each other and the UNEP International Ecosystem Management Partnership (UNEP-IEMP)⁵ provides such an opportunity.

Conclusions and recommendations

Rio+20 provided an opportunity to accelerate the integration and integration of the three dimensions, economic, social and environmental, of sustainable development in the next 20 years and beyond. This paper selected a number of key issues, well recognized and committed, or less recognized and committed by the world leaders during the Rio+20 Conference, that are important to building synergies of the three dimensions for their sustainability. The paper started with an a paradigm shift from balancing to integrating the three dimensions of sustainable development and an overarching framework. It further analyzed in detail key issues that can make important contribution to integration of the three dimensions, including enhancement of environmental pillar, the role of green economy policies and ecosystem management, eco-investment, eco-cities, south-south cooperation and innovation of science and technology. It concluded with the following statements:

1. Based on the call from Rio+20 “*to further mainstream sustainable development at all levels integrating economic, social and environmental aspects and recognizing their interlinkages, so as to achieve sustainable development in all its dimensions (Para 3),*” we proposed **an overarching framework within which a paradigm shift has started from balancing to integrating the three dimensions of sustainable development**. The selected key issues listed below when addressed adequately will contribute to this process.
2. The **environment pillar** can be strengthened by engaging all relevant stakeholders, including initiation of a more powerful advocating platform, The World Environment Forum (TWEF).

4 Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) aims at strengthening the science-policy interface for biodiversity and ecosystem services for the conservation and sustainable use of biodiversity, long-term human well-being and sustainable development.

5 The International Ecosystem Management Partnership (IEMP) is defined by its co-sponsoring organizations the United Nations Environment Programme (UNEP) and the Chinese Academy of Sciences (CAS), as the “China-based International Programme focusing on science and policy interface on issues of ecosystem management in all developing countries.” It is the first UNEP initiative of this kind in the South and for the South.

3. **Green Economy** supports the integration of the three dimensions of sustainable development. Analysis shows that the world reached consensus that implementation of green economy policies provides a new route towards integrating and integrating the three dimensions of sustainable development. It is a new development path that is based on sustainability and ecological economics.
4. **Ecosystem Management** plays a central role in implementation of green economy policies. Ecosystem Management and Green Economy development are mutually supportive and multi-faceted, which provides the basis for enhanced synergies in pursuing global sustainability. Ecosystem management ensures ecosystem health and sustained delivery of various ecosystem services to secure various aspects of a green economy, including, but not limited to investment in natural capital, poverty alleviation, job creation and social equity, resource and energy efficiency and response to climate change.
5. Increasing **eco-investment** is the basis for sound ecosystem management. Eco-investment build upon a strong linkage between Ecology (ecosystems) and the Economy (households and livelihoods) at multiple scales and are governed by institutional frameworks and various incentive mechanisms. Eco-investments complement and augment other policy instruments and management measures from a 'business as usual' (BAU) scenario by targeting three major transitional pathways. UNEP (2011) estimated that about 0.5% of global GDP (325 billion USD) is required for adequate eco-investments in natural capital.
6. **Eco-city** is a place where ecosystem management interacts with green economy intensively. To meet the increasing and unprecedented challenge of urbanization process in which six billion people will live in cities by 2050, this paper defines an Eco-city as a one that applies both ecosystem management and green economy principles in an integrated manner to harmonise the three dimensions of sustainable development for its sustainability.
7. **South-South Cooperation**, an emerging dimension for shaping the green economy. Although Rio+20 were not able to adequately recognize the increasing importance of South-South Cooperation, the given examples demonstrate the increasingly significant role of South-South Cooperation for economic development of all developing countries. The increasing scale of South-South Cooperation has not only complemented the traditional North-South Cooperation in many different ways, but has also laid a solid foundation for further cooperation on promoting green economy development in developing countries.
8. **Innovation of science and technology** is a vital component of ecosystem management and green economy. Both ecosystem management and development of a green economy are knowledge and technology intensive process. There needs to understand ecosystem services, their evaluation and trade-offs when coming to planning and decision-making for ecosystem management. There also needs to understand the economics and ecology of various sectors of the economy, society and the environment when green economy policy is to be implemented.

The following recommendations are made based on the above conclusions:

1. The over-arching framework of integrating the three dimensions of sustainable development shall be given priority in the High level political forum called for by the Rio+20 once it is established (Para 84 to86).
2. The environmental pillar is strengthened by both upgrading UNEP and establishment of The World Environment Forum.
3. Ecosystem management and green economy are suggested to be applied in an integrated manner in support of integration of the three dimensions of sustainable development. There are still gaps of both methods and tools to support their synergies.
4. Increasing eco-investment and the number of eco-cities are recommended as the two main approaches, amongst others, for implementation of green economy policies and application of ecosystem approaches and their integration thereof.
5. South-South Cooperation deserves adequate attention for implementing green economy policies, given the sheer and increasing volume of material, personnel, monetary and information flows across developing countries.
6. Science and technology should be recognized as the source of innovation for global sustainability in a post Rio+20 era.

References

- Angelsen, A.; Brockhaus, M.; Sunderlin, *et al* (eds), 2012. Analysing REDD+: Challenges and choices. CIFOR, Bogor, Indonesia.
- Collier, P.; Conway, G.; Venables, T., (2008). Climate change and Africa. *Oxford Review of Economic Policy*. 24(2): 337-353.
- MEA, 2005. Ecosystems and Human Well-being: Synthesis. Island Press, Washington, DC.
- Rockstrom, J.; Will S.; Kevin N., *et al*. (2009). A safe operating space for humanity. *Nature*. 461(7263): 472-475.
- Sumaila UR, Cheung W, Dyck A, *et al*. (2012) Benefits of Rebuilding Global Marine Fisheries Outweigh Costs. *PLoS ONE* 7(7): e40542. doi:10.1371/journal.pone.0040542

- Tallis H.; K., Peter; M. Michelle *et al.* (2008). An ecosystem services framework to support both practical conservation and economic development. *Proceedings of the National Academy of Sciences*. 105(18): 9457-9464.
- TEEB, 2010. The TEEB Synthesis Report Mainstreaming the Economics of Nature: A synthesis of the approach. www.teebweb.org
- UNCTAD, 2009, Globalization for development: the international trade perspective, UNCTAD, <http://unctad.org/>
- UNEP, 2009. The Role of Ecosystem Management in Climate Change Adaptation and Disaster Risk Reduction. United Nations Environment Programme, Nairobi.
- UNEP, 2011. Toward a Green Economy: Pathways to Sustainable Development and Poverty Eradication. www.unep.org/greeneconomy.
- UNEP-IEMP, 2011. Restoring the natural foundation to sustain a Green Economy: A century-long journey for Ecosystem Management, UNEP Policy Series.
- Worm B.; Hilborn R.; Baum J. *et al.*, 2009. Rebuilding Global Fisheries. *Science*. 325 (5940): 578-585.



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