

# Scientific and Technical Advisory Panel



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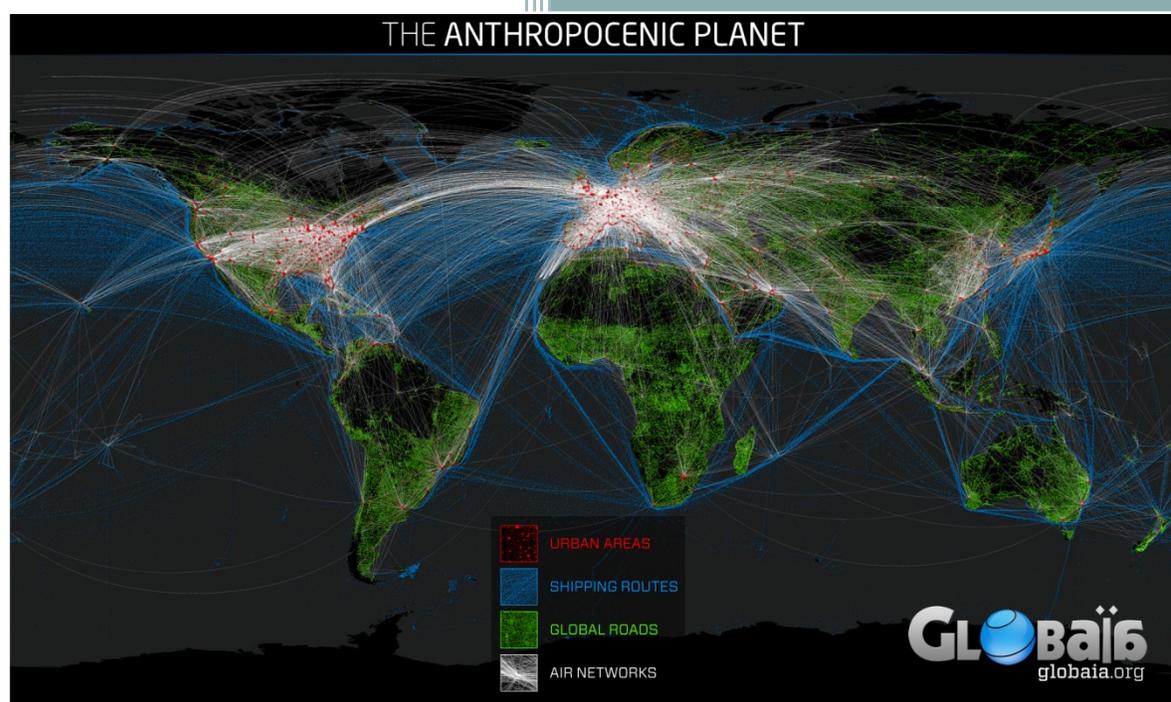
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First Meeting for the Sixth Replenishment of the GEF Trust Fund  
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## **ENHANCING THE GEF'S CONTRIBUTION TO SUSTAINABLE DEVELOPMENT**

(Submitted by the Scientific and Technical Advisory Panel)

## Enhancing the GEF's Contribution to Sustainable Development



Scientific and Technical Advisory  
Panel of the Global Environment  
Facility

Working Paper / March 2013

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## Executive Summary

The GEF's mandate is the delivery of global environmental benefits. STAP's articulation of the GEF's current mission is to:

***Secure the sustainable delivery of global environmental benefits through investments in collective action to sustain Earth's life-support systems, resulting in improved human well-being and social equity***

Key Messages to consider for GEF 6 and beyond:

To improve the GEF's delivery of Global Environment Benefits in GEF 6 and beyond, a novel conceptual framework is proposed by STAP to ***improve the relevance and effectiveness of the GEF as a champion of global commons in delivering support to the emerging post-2015 global sustainable development agenda***. A cross-cutting approach is recommended to facilitate collaboration within and between GEF focal areas to help promote synergies and cost-effectiveness, complementing ongoing development of the GEF-6 focal area strategies. The benefits of taking such an approach will be:

- *Improved focal area synergies leading to GEF projects having greater and sustained impacts;*
- *Improved targeting of issues at the environment/development nexus to enhance broader developmental benefits;*
- *Maximize value from engagement, leading to enhanced financial efficiency (achieving more with less);*

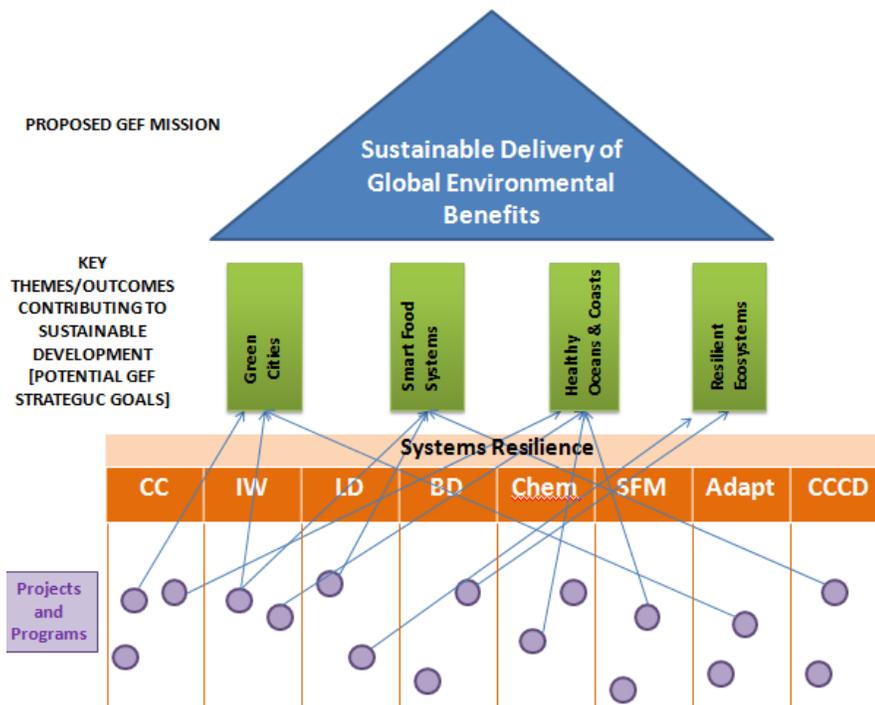
To achieve this, the GEF should consider two key areas:-

- 1) **Integration across space and domains.** This refers to national/ regional/global integration, as well as recognition of the need to address issues across environmental and socioeconomic domains.
- 2) **Integration in project and programme design.** The GEF should continue to focus on the design and delivery elements of innovative programs and policies, and pilot innovative project design. It should encourage early adoption and demonstration of projects and programs that overcome focal area silos and build synergies that are conducive for sustainable development.

STAP proposes the following synergistic themes that could become the outcomes of future GEF programs which address the key environmental challenges of sustainable development:

1. **Green Cities**
2. **Smart Food Systems**
3. **Healthy Oceans and Coasts**
4. **Resilient Ecosystems**

These themes can be integrated into the emerging GEF-6 Programmatic Framework as in Figure 1:



**Figure 1 – Simplified illustration of the proposed conceptual framework. Building on the foundation of the five GEF-5 focal areas and other programs, the four overarching themes create a structure that links delivery of global environmental benefits with sustainable development objectives. The GEF focal areas will continue to operate as at present (shown by the Projects - circles without arrows). In addition, the groups of arrows pointing to one of the four themes exemplify a new specific systemic project. For example one Green City project might encompass climate change mitigation, water and adaptation, whereas another Green City project might encompass water, biodiversity, chemicals and adaptation.<sup>1</sup>**

Addressing this challenge requires operationalizing the concept of environmentally sustainable development in a manner that promotes synergies between the GEF’s role as financial mechanism to the Multilateral Environmental Agreements (MEAs), and as a key organization in the space of global and regional environment and development finance. The GEF’s niche includes working with developing countries and economies in transition to address the inter-connected global challenges of climate change, food, water, energy, land-use and waste, that are central to sustainable development – through actions to support, maintain and enhance Earth’s life support systems.

<sup>1</sup> Note: For clarity, the figure does not show all links between projects, programs and themes. CC – Climate change focal area; IW – International waters focal area; LD – Land degradation focal area; BD – Biodiversity focal area; Chem – Chemicals focal area; SFM - Sustainable forest management/REDD+ focal area; Adapt – Climate adaptation (LDCF/SCCF); CCCD cross-cutting capacity development

Figure 1 highlights the role of the cross focal area themes that can be used to link delivery of global environment benefits with sustainable development objectives. Further, it highlights the overall aim of embedding resilience into all activities of the GEF. Building resilience to climate change can help sustain GEF investments, through enhancing the adaptive capacity of bio-physical resources such as forests, soils, water, as well as local communities subject to climate variability – thereby mitigating effects of future climate change.

Projects and programs within single or several focal areas should remain the foundation of GEF operations. Overall delivery, however, would be focused towards achieving one or more broader outcomes. This approach could stimulate innovative design of projects and programs, including across regions, whilst providing incentives for designing multifocal area projects and programs in a bottom-up approach. For this to happen, GEF would need to develop a conceptual framework for project design that builds on the current multi-focal area approaches. This would transform into programs and projects that work at the systemic level, with aggregate objectives and indicators. Expected benefits accruing from this approach are to:

- *Better communicate GEF systemic impacts to the rest of the world;*
- *Provide opportunities for private sector engagement to give greater financial leverage and enhance GEF's catalytic role for systemic change;*
- *Promote innovation to enhance impact and scale-up of outcomes for systemic change; and*
- *Improve evidence-based design and implementation to enhance learning and effectiveness of systemic interventions.*

This proposal would support the GEF in fulfilling its obligations to individual MEAs. The framework will encourage GEF partnerships to focus their efforts towards achieving outcomes *within* focal areas as well as through collaboration *across* focal areas.

STAP recognises that this systemic approach would need careful consideration of GEF's operational modalities, and encourages the GEF to consider piloting such integrated projects.

## I. Introduction

During the last century, the cumulative impacts to Earth systems from resource use, production and waste flows associated with growing human populations have reached such dangerously high levels that scientists have suggested that humanity is now the single largest driving force of global change in this era<sup>2</sup>. The collective actions of human societies are altering significantly the Earth's physical and biogeochemical processes<sup>3</sup> at planetary scale. In the case of climate change, biodiversity loss, and changes to the global nitrogen cycle – Earth system boundaries have already been reached or surpassed<sup>4</sup>. These environmental pressures are undermining economic and social systems, negating many of the concrete gains that have been made in addressing global poverty and development challenges.

Recognizing the limited success of current measures to address ecosystem degradation, the international community is turning its attention to revitalizing the sustainable development agenda capturing the value of multiple services provided by ecosystems. Food security, poverty alleviation, access to clean water and energy and health will no doubt remain central in formulating post-2015 sustainable development goals. These goals will be reliant on multiple flows of goods and services from ecological and biogeochemical processes. Indeed, these flows underpin our economies and societies. The interconnectedness between these flows and human activities is now conceptually well understood. Degradation or disruption in these flows are no longer isolated environmental issues – they now threaten the wellbeing of communities and society, and in some areas are having multiplying effects with a direct impact on human security.

The Global Environment Facility (GEF), a partnership between 182 countries, international agencies, civil society and private sector, is well-placed to address global environmental issues while supporting national sustainable development initiatives. The GEF can and should contribute to generating global environmental benefits, while at the same time supporting developmental outcomes and promoting resilience to negative environmental change. Indeed, it may be argued that an approach that explicitly recognizes and seeks multiple developmental benefits is likely to prove valuable for achieving GEF's core mandate for global environmental benefits. Addressing these issues in a coherent, comprehensive fashion is both conceptually and operationally demanding. This paper suggests a framework through which this challenge could be met in GEF-6 and within the 2020 Strategy.

STAP's articulation of the GEF's current mission is:

***To secure the sustainable delivery of global environmental benefits through investments in collective action to sustain Earth's life-support systems, resulting in improved human well-being and social equity***

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<sup>2</sup> Zalasiewicz *et al.* 2011. The Anthropocene: a new epoch of geological time? *Phil. Trans. R. Soc. A*, 369:835–841.

<sup>3</sup> <http://www.un.org/wcm/content/site/chronicle/home/archive/issues2012/thefuturewewant/managingthewaterlandenergyxexus>

<sup>4</sup> Rockström *et al.* 2009. A safe operating space for humanity. *Nature*, DOI: [10.1038/461472a](https://doi.org/10.1038/461472a)

This paper proposes a conceptual framework for a more effective GEF as a champion of global commons to promote synergies and cost-effectiveness within and between GEF Focal Areas and linkages with the emerging post-2015 sustainable development agenda<sup>5</sup>. It considers the case for facilitating collaboration between focal areas to provide a cross-cutting approach to tackling the key challenges in sustainable development. It is intended to complement the development of GEF focal area strategies, in which STAP Panel Members are directly involved along with numerous outside experts. The emerging focal area (FA) strategies represent comprehensive, well-grounded programs which the Panel believes will result in concrete achievements on the ground – and which incorporate numerous advances over GEF-5. Rather, this paper considers the case for facilitating collaboration between focal areas to provide a cross-cutting approach to tackling the key challenges in sustainable development.

The goal of the conceptual framework proposed is:

***Improve the relevance and effectiveness of the GEF as a champion of global commons in delivering support to the global sustainable development agenda.***

The Panel suggests that a strategy to achieve this goal could include the following main elements with their associated benefits as follows:

- *Improved focal area synergies leading to GEF projects having greater and sustained impacts;*
- *Improved targeting of issues at the environment/development nexus to enhance broader developmental benefits;*
- *Maximize value from engagement, leading to enhanced financial efficiency (achieving more with less);*
- *Better communicate GEF systemic impacts to the rest of the world;*
- *Provide opportunities for private sector engagement to give greater financial leverage and enhance GEF's catalytic role for systemic change;*
- *Promote innovation to enhance impact and scale-up of outcomes for systemic change; and*
- *Improved evidence-based design and implementation to enhance learning and effectiveness of systemic interventions.*

## **II. Promoting Innovation in the GEF**

The most successful companies bring together people, processes, and technology and look beyond their walls for expertise and new ideas. The ability to find, create, and capitalize on new product and service ideas sets the most successful companies apart, especially in complex, fast-moving global markets. Innovation occurs when ideas are successfully *introduced* and *commercialized*. In addition to productivity gains, innovation also results in improved responsiveness to customer demands, lower turnaround times, reduced waste levels, higher product quality, capacity for a wider product range, along with streamlined relationships with suppliers and customers. Successful innovation requires openness to new ideas and technologies, with novel approaches to ***design*** and ***engineering***.

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<sup>5</sup> [http://www.un.org/en/development/desa/policy/untaskteam\\_undf/untt\\_report.pdf](http://www.un.org/en/development/desa/policy/untaskteam_undf/untt_report.pdf)

Innovation is an outcome of effective knowledge management, the process by which organizations generate value from their intellectual and knowledge-based assets in an effort to develop solutions and best practices. Recognizing challenges and opportunities to bring innovation into the GEF, and the importance of supporting innovation through an effective knowledge management framework, the GEF CEO outlined a vision for innovation in the GEF Partnership:

*“The GEF was born with a **mission to support innovation**, and must remain a strong promoter of innovation for global environmental benefits. It must use its resources and network to introduce innovation in the design of programs and policies in a manner that **encourages early adoption and scaling up**. To be credible, the GEF must always operate from a position of technical excellence and world-class experience. It is vital that the GEF be strengthened **to rise to the forefront of knowledge management** pertaining to the stewardship of the global environmental goods.”*

The above makes a powerful case for the GEF to focus on two key elements of innovation: design and delivery. “Innovation in the design of programs and policies in a manner that encourages early adoption and scaling up” could be translated into GEF projects and programs that support testing of innovative ideas, their demonstration and deployment, such that they become ready for a wider adoption and scaling up. Those ideas with potential for systemic change are the ones that overcome focal area silos and build synergies that are conducive for sustainable development. GEF has a specific role to mitigate risk associated with the support for innovative ideas before they become adopted globally. Innovative delivery on the ground should make effective use of the partnerships and their extensive knowledge from GEF agencies, the private sector, and research institutions. Similar to the private sector where innovation translates into cutting edge design and engineering, in the GEF context innovation could mean bridging enhanced design of policies, projects and programs with innovative delivery on the ground. As a global institution working with multiple public sector entities, GEF can leverage and support governments to develop environments and incentives that can foster innovation in the field of environmental protection and development. Using the extensive expertise of its agencies and partners, relatively modest GEF catalytic funding can support innovative solutions to global commons problems, making significant contribution to national competitiveness. Two objectives are proposed in this context:

- 1. Enhance the design of GEF policies, projects, and programs to encourage testing of innovative ideas, their demonstration and deployment for further adoption and scaling-up;**
- 2. Improve delivery on the ground by utilizing knowledge and networks of the GEF partnership (this would include the private sector and greater reliance on GEF-relevant targeted/applied research).**

Both are mutually reinforcing and imply a flexible approach for new ideas. The table below breaks down these goals and offers some potential solutions how these challenges to innovation might be addressed.

**Table 1. Potential ways to promote innovation into the GEF**

<b>Innovation and Learning Objectives</b>	<b>Recommended GEF Response</b>
<b>1. Create access to knowledge (Goals 1 and 2)</b>	
Showcase new research and innovative practices	Introduce effective knowledge sharing platforms with a focus on the four identified overarching themes/outcomes (Green Cities, Smart Agricultural and Food Systems, Healthy Oceans and Coasts, Resilient Ecosystems)
Expand GEF collaboration and include partners that drive innovation	Partnering with organizations that are driven by innovative solutions, such as research institutions, the private sector, or foundations
Create criteria for innovation	Develop criteria for identifying and framing innovation in the GEF context
<b>2. Mainstream ideas into design (Goal 1)</b>	
Bridge innovative ideas, processes/technologies with GEF practices	Introduce effective Knowledge Management Strategy <sup>6</sup> and knowledge sharing platforms
Enhance generation of global benefits and returns on investment through improved project design	Introduce experimental project design for additional production of credible evidence on what works under what conditions <sup>7</sup>
<b>3. Promote new ways to do business (Goal 2)</b>	
Create incentives for break-through technologies/ideas that bring systemic change across the four identified themes: Green Cities, Healthy Coasts, Resilient Ecosystems, and Smart Food	Create separate funding window to promote applied R&D within the GEF [Revised Targeted Research Policy <sup>8</sup> ]
Leverage know-how within the GEF partnership	Develop systemic knowledge exchange mechanisms (knowledge sharing platforms)
Create incentives to conduct applied R&D for the benefits of the GEF	Create separate funding window to promote R&D within the GEF [Revised Targeted Research Policy]
Help develop, demonstrate, and deploy new ideas	Create separate funding window to promote R&D within the GEF [Revised Targeted Research Policy] Consider co-investing with the venture capital
Scale-up via tapping into local expertise	Consider co-investing into regional applied research institutions, as regional clustering of innovation has been shown to an effective means of disseminating and embedding technological and economic innovation <sup>9</sup> .
Ensure results-based financing	Support performance-based financing

<sup>6</sup> GEF/C.40/Inf.03

<sup>7</sup> Ferraro, Paul J. (2012). Experimental Project Designs in the Global Environment Facility: Designing projects to create evidence and catalyze investments to secure global environmental benefits. A STAP Advisory Document. Global Environment Facility, Washington, D.C. <http://stapgef.org/experimental-project-designs>

<sup>8</sup> GEF/STAP/C.43/Inf.02

<sup>9</sup> Eg. "Firm clustering and innovation: determinants and effects".(2001) Leon A.G. Oerlemans , Marius T.H. Meeus, Frans W.M. Boekema; "The New "Cluster Moment": How Regional Innovation Clusters Can Foster the Next Economy" (2010) <http://www.brookings.edu/research/papers/2010/09/21-clusters-muro-katz>

### III. From Silos to Synergies: The GEF's catalytic role in addressing the inter-linked challenges of environment to development

In "The Future We Want"<sup>10</sup> the UN General Assembly adopted a decision addressing the role of the GEF in the future sustainable development framework, calling on the Facility to enhance "coordination with other instruments and programmes focusing on environmentally sustainable development", while preserving the GEF's mandate to support "country needs for the national implementation of their international environmental commitments". The existing system of international environmental governance, consisting of fragmented multilateral environmental agreements (MEAs) is considered ill-suited to assure global sustainability in the 21<sup>st</sup> century<sup>11</sup>. The GEF's challenge continues to be its ability to deliver on obligations to Conventions while at the same time remaining innovative and a "partner of choice" within a rapidly evolving global framework for development and environmental finance.

Addressing this challenge requires operationalizing the concept of environmentally sustainable development in a manner that promotes synergies between the GEF's role as financial mechanism to the MEAs and as a key organization in the space of global and regional environment and development finance. The answer to this challenge may lie in the conceptualization of "environmentally sustainable development". As noted by a panel of Nobel Laureates:

*"Our predicament can only be redressed by reconnecting human development and global sustainability, moving away from the false dichotomy that places them in opposition. In an interconnected and constrained world, in which we have a symbiotic relationship with the planet, environmental sustainability is a precondition for poverty eradication, economic development, and social justice"*<sup>12</sup>.

***This paper serves to confirm that the GEF's niche includes working with developing countries and economies in transition to address the inter-connected global challenges of climate change, food, water, energy, land-use and waste that are central to sustainable development – through actions to support, maintain and enhance Earth's life support systems.***

#### Climate Change

Climate change caused by increasing GHG emissions in the atmosphere serves as a multiplier in increasing stress on the already precarious state of Earth's life supporting systems. Energy supply chains and energy demand are already being affected by increasing climate variability and temperature extremes. New research projects that sea level could rise between 0.5 to 2m towards the end of this century. Land and water resources in many areas of the world are already stressed, and climate change will have an adverse impact on agricultural productivity in the coming decades. Food insecurity is expected to increase, and climate change could adversely impact net primary productivity and carbon stocks of forests. Terrestrial ecosystems could undergo major changes: there are substantial risks of

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<sup>10</sup> A/RES/66/288 paragraph 265.

<sup>11</sup> The results of the UNEP Foresight Process representing the authoritative ranking of the most important emerging issues related to global environment has given the issue of "Aligning Governance to the Challenges of Global Sustainability" the highest ranking (Rank #1).

<sup>12</sup> The Stockholm Memorandum. 3<sup>rd</sup> Nobel Laureate Symposium on Global Sustainability (at: <http://globalsymposium2011.org/wp-content/uploads/2011/07/memorandum-signed.pdf>)

large-scale restructuring of the global biosphere and forests may shift from being a net carbon sink to a major carbon source.

Although the global community has adopted a goal of limiting warming to 2°C above pre-industrial levels, there is little confidence that this goal will be met. A recent report from UNEP describes the significant gap between the current and anticipated levels of GHG emissions and the levels required for the 2°C target<sup>13</sup>. Of the four Representative Concentration Pathways (RCPs) formulated for the IPCC Fifth Assessment Report, only one (RCP2.6<sup>14</sup>) represents a pathway that could lead to temperature change stabilization at or below 2°C. Global mean temperature rise for the higher RCP's are likely to be in excess of 3 – 4°C. These levels of temperature rise will clearly increase adaptation challenges<sup>15</sup>; indeed, a recent World Bank report questions the possibility of effective adaptation if global warming moves towards 4°C<sup>16</sup>. The GEF program must not only be cognizant of these risks, but address them in a coordinated, coherent fashion<sup>17</sup>.

### The Water/Energy/ Food Nexus

Energy is central to development, and demand is anticipated to at least triple in the 21<sup>st</sup> century<sup>18</sup>. Fossil fuel combustion continues to be the largest source of greenhouse gas emissions. To stabilize GHG concentrations in the atmosphere at a level preventing dangerous interference with the climate system, it is increasingly clear that incremental reductions in GHG emissions are inadequate – that a transformational shift towards sharp “decarbonization” of energy supply and economic systems is required to achieve both a reduction in energy demand and deployment of low-carbon energy systems<sup>19</sup>. Such a transformation can only be achieved by breaking away from single technology and/or single sector approaches towards a focus on systemic approaches<sup>20</sup>. Significant opportunities exist for the GEF in scaling-up mitigation action while producing multiple benefits, for example in *urban areas* where mitigation activities addressing transport, buildings, water supply, waste treatment, food supply and land use zoning can simultaneously increase efficiency in water use, improve public health, and reduce chemical pollution. Similar opportunities exist in managed rural landscapes<sup>21</sup> including the *agri-food supply chain from “field to fork”*<sup>22</sup>.

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<sup>13</sup> UNEP (2012). The Emissions Gap Report 2012, available at: <http://www.unep.org/publications/ebooks/emissionsgap2012/>

<sup>14</sup> In the context of RCP2.6, it is worth noting the caveats of the Evaluation Panel while recommending acceptance of a low (2.6 W/m<sup>2</sup>) forcing pathway as a RCP: “.....the significant technological and institutional challenges that must be met in order to achieve this level of greenhouse gas emission reductions whenever it is used. Finally, setting up an international regime that is viewed as fair and equitable by all nations, and especially by those who are still developing, will be an especially crucial dimension of the institutional dimension of achieving scenarios at the lower end of the radiative forcing spectrum.” There is no indication that these conditions, viewed as essential by the Evaluation Panel for the use of RCP2.6, are being effectively addressed. (<http://www.ipcc.ch/meetings/session30/inf6.pdf>)

<sup>15</sup> [www.ipcc-wg2.gov/SREX/](http://www.ipcc-wg2.gov/SREX/)

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[http://climatechange.worldbank.org/sites/default/files/Turn\\_Down\\_the\\_heat\\_Why\\_a\\_4\\_degree\\_centrigrade\\_warmer\\_world\\_must\\_be\\_avoided.pdf](http://climatechange.worldbank.org/sites/default/files/Turn_Down_the_heat_Why_a_4_degree_centrigrade_warmer_world_must_be_avoided.pdf)

<sup>17</sup> GEF/C.39/Inf.18

<sup>18</sup> [http://www.igbp.net/download/18.705e080613685f74edb8000870/8\\_Energy\\_FINAL\\_LR.pdf](http://www.igbp.net/download/18.705e080613685f74edb8000870/8_Energy_FINAL_LR.pdf)

<sup>19</sup> STAP (2012). Climate Change: A scientific assessment for the GEF. Available at: [http://stagef.org/CC\\_scientific\\_assessment](http://stagef.org/CC_scientific_assessment)

<sup>20</sup> Lindström, A., Granit, J. & Weinberg, J. (2012). Large-scale water storage in the water, energy and food nexus: Perspectives on benefits, risks and best practices. SIWI Paper 21. SIWI, Stockholm and IEA (2012). Technology Roadmap – Hydropower. OECD/IEA 2012.

<sup>21</sup> For the UNFCCC: Agriculture, Forestry and Other Land Use (AFOLU) systems

<sup>22</sup> Lundqvist, J., C. de Fraiture and D. Molden. Saving Water: From Field to Fork – Curbing Losses and Wastage in the Food Chain. SIWI Policy Brief. SIWI, 2008.

Global efforts to attain food security need to be water, land, and energy smart<sup>23</sup>. By 2050, global demand for agricultural production is expected to rise by 70%, coming largely from intensification of existing cultivated land with some exceptions in Sub-Saharan Africa and Latin America<sup>24</sup>. The food sector is heavily dependent on fossil fuels, accounts for a third of global energy consumption and contributes over 20% of GHG emissions<sup>25</sup>. Agriculture currently uses 11% of the world's land surface for crop production, and accounts for 70% of all water withdrawals – largely from underground aquifers, but also streams and lakes. Crises in water quality and quantity occur in a wide variety of temporal and spatial dimensions throughout the world. Demand for fresh water (inland surface waters and groundwater) will continue to increase over the coming decades, while the supply and quality of these resources is expected to decrease<sup>26</sup>. The environmental footprint of changing nutrition preferences in the developing world with the higher share of meat and dairy products in diets is increasing progressively.

Improved water and food management can reduce much of the stress. Approximately one fifth of irrigated land in the developing world has been impacted by waterlogging and/or salinity. If irrigated fields are improperly drained, salt builds up in the soil as water evaporates, reducing soil fertility and productivity. Unnecessary stress on land resources is created by the substantial amount of food wasted at different stages in the production and supply chains<sup>27</sup>. Water, like energy, is central to development. Inadequate water management, along with ecological processes which sustain freshwater systems, may in turn be sources of conflicts. The global agricultural sector faces a challenge of simultaneously improving land management practices while supporting “energy-smart” food that improves the energy intensity of the whole supply-chain, displaces fossil fuel inputs with local renewable energy systems and helps provide energy access for all. This challenge, however, can only be addressed together with support for enhancing resilience of agricultural and food systems to future impacts of climate change.<sup>28</sup>

The challenges of managing human impacts on the world's oceans are increasing. The ecosystem-based management approach and its most recent and innovative manifestation in marine spatial planning has emerged to address cumulative impacts to marine and coastal ecosystems from human activities and climate change and integrate ecological, social, economic and institutional perspectives<sup>29</sup>. Greening the ocean economies in sectors such as fisheries and aquaculture, tourism, energy use and consumption, deep-sea minerals mining, pollution prevention and reduction could only be achieved through the use of integrated approaches aiming to enhance resilience of livelihoods, economies and ecosystems dependent on services provided by oceans and coasts<sup>30</sup>.

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<sup>23</sup> Holger Hoff, Charles Iceland, Johan Kuylenstierna, Dirk Willem te Velde.

<http://www.un.org/wcm/content/site/chronicle/home/archive/issues2012/thefuturewewant/managingthewaterlandenergyxexus>

<sup>24</sup> FAO (2011) The state of the world's land and water resources for food and agriculture (SOLAW) - Managing systems at risk. Food and Agriculture Organization of the United Nations, Rome and Earthscan, London.

<sup>25</sup> <http://www.fao.org/docrep/014/i2454e/i2454e00.pdf>

<sup>26</sup> 2030 Water Resources Group (2009). Charting our Water Future. Economic frameworks to inform decision-making.

<sup>27</sup> About one-third of food produced for human consumption is lost or wasted globally, which amounts to about 1.3 billion tons per year meaning that significant amount of ecosystem services and resources such as water and energy used to produce and deliver this food are used in vain (<http://www.fao.org/docrep/014/mb060e/mb060e00.pdf>).

<sup>28</sup> <http://www.fao.org/docrep/017/i3084e/i3084e.pdf>

<sup>29</sup> Secretariat of the Convention on Biological Diversity and the Scientific and Technical Advisory Panel —GEF (2012).

Marine Spatial Planning in the Context of the Convention on Biological Diversity: A study carried out in response to CBD COP 10 decision X/29, Montreal, Technical Series No. 68, 44 pages.

<sup>30</sup> UNEP, FAO, IMO, UNDP, IUCN, World Fish Center, GRIDArendal, 2012, Green Economy in a Blue World [www.unep.org/greeneconomy](http://www.unep.org/greeneconomy) and [www.unep.org/regionalseas](http://www.unep.org/regionalseas)

## Pollution and Waste

Materials use increased eight-fold during the last century. Urban areas now generate about 1.3 billion tonnes of solid waste per year, which is expected to increase to 2.2 billion tonnes by 2025. Waste generation rates will more than double over the next twenty years in lower income countries<sup>31</sup>. Electrical and electronic equipment represents a new and fast growing hazardous waste stream in both developed and developing countries. Most waste management standards are national or local, but sustainable waste management practices require a “cradle-to-cradle” approach along the entire supply and product chain including such means as extended producer responsibility. Where waste cannot be avoided, recovery of materials through recycling and remanufacturing into usable products or responsible waste-to-energy recovery should be undertaken<sup>32</sup>.

Release of chemicals to the environment from unsustainable consumption and production practices, often associated with inappropriate waste disposal, results in increased risks to ecosystems and humans – along with the proliferation of environmentally harmful chemicals. For example, of the 5.7 Mt of pollutants released or disposed of in North America in 2006, 1.8 Mt were of chemicals considered persistent<sup>33</sup>. In addition to concerns for human and environmental well-being, issues such as increased trans-boundary movements of chemicals through trade or environmental release have also become more prevalent. The number of so-called emerging chemical management issues is on the rise and includes such issues as nutrients, plastics, endocrine disruptors<sup>34</sup>, heavy metals, polycyclic aromatic hydrocarbons and products of open burning, pharmaceuticals and personal care products as well as chemical mixture effects<sup>35</sup>. Pollution of surface fresh and groundwater reserves by a wide range of chemicals have significant impacts on food security and public health and cumulatively on development<sup>36</sup>. Integration and mainstreaming of chemicals management into the sustainable development agenda remains a formidable challenge for the international community. Existing chemicals governance should be strengthened, taking into account that impacts from chemicals throughout their life cycles are widely distributed and their severity depends on the vulnerability of human populations and ecosystems<sup>37</sup>. Pollution and waste avoidance through employment of Information and Communication Technology (ICT) monitoring of releases, promotion of chemicals leasing management techniques, integrated chemicals services and other extended producer responsibility types of service models, and general actions to avoid emissions to water, land and air, must also be championed.<sup>38</sup> It might also be interesting to explore the potential for the GEF to work with private sector partners to help client countries that export chemicals and goods containing chemicals that will be regulated by the European regulation REACH (Registration, Evaluation, Authorisation and Restriction of Chemicals) as its phased implementation continues.<sup>39</sup>

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<sup>31</sup> World Bank (2012). What a waste : a global review of solid waste management. Working Paper.

<sup>32</sup> UNEP Green Economy Report: Waste.

<sup>33</sup> UNEP (2012). “Global Chemicals Outlook: Towards Sound Management of Chemicals.”

<sup>34</sup> State of the Science of Endocrine Disrupting Chemicals – 2012, available at:

<http://www.unep.org/hazardoussubstances/UNEPsWork/StateoftheScience/tabid/105913/Default.aspx>

<sup>35</sup> STAP 2012. GEF Guidance on Emerging Chemicals Management Issues in Developing Countries and Countries with Economies in Transition. A STAP Advisory Document. Global Environment Facility, Washington DC.

<sup>36</sup> UNEP Foresight Process on Emerging Environmental Issues 21 Issues for the 21st Century. Issue “Shortcutting the degradation of inland waters in developing countries” (Issue 012 ranked #15), available at: <http://www.unep.org/publications/ebooks/foresightreport/>

<sup>37</sup> UNEP Year Book 2013. Available at: [http://www.unep.org/pdf/uyb\\_2013.pdf](http://www.unep.org/pdf/uyb_2013.pdf)

<sup>38</sup> UNIDO through its National Cleaner Production Centres has promoted chemicals leasing. Several private sector producers have also done the same as part of their business model (particularly the paint industry)

<sup>39</sup> Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency. REACH entered into force June 2007 with a 10 year phased implementation.

## IV. Towards a GEF Conceptual Framework<sup>40</sup>

As prescribed in the GEF Instrument, operational and technical investments are structured around six focal areas – most relating directly to the MEAs the GEF is serving as a financial mechanism. The current Strategic Goals of the GEF are also formulated with respect to focal area specific responsibilities<sup>41</sup>. Evaluation of the GEF-5 focal area strategies revealed they are not based on a systematic identification of envisaged causal relationships between the strategies' elements as well as the causal chains between GEF activities and expected results<sup>42</sup>. In addition, the GEF-5 focal area strategies did not include a comprehensive approach to leveraging synergies (and managing trade-offs) between focal areas and within multi-focal area activities. The lack of a strategic approach to MFA activities in the GEF is considered to be a central challenge to be overcome in GEF-6. The evaluation suggested a modular approach for the GEF program, based on explicit understanding of how elements from different FA projects and programs could be linked to assure a “complete causal chain towards results”.

The GEF Evaluation Office observed that the GEF's central role as a catalyst to induce systemic change is impeded by the lack of a comprehensive approach to addressing pathways leading to broader adoption through replication, scaling-up, change of market structures, or mainstreaming. The pathways leading to such broader adopted strategies are intrinsically connected to the sustainable development pathways chosen by countries and regions. In order to remain the champion of global environmental benefits or the global commons, recognition of the inter-connectedness of healthy ecosystems and sustainable development should be a central tenet of the GEF Program. STAP concurs that the potential for transformative impact of GEF's activities, contributing to both environmental and development sustainability, has been constrained with the fragmentation of focal area strategies and the lack of a clear, overarching conceptual framework in the GEF Program.

In order to overcome these constraints, a more systemic approach to environment and development challenges is proposed, allowing the GEF to more effectively manage synergies and trade-offs and help ensure limited investments are focused and streamlined into national and regional development strategies – leading to new opportunities for innovation and advancement. STAP is proposing the following hierarchical approach (expressed as outcomes) as a conceptual framework in aligning GEF activities across focal areas with the goals of sustainable development:

- 1. Green Cities**
- 2. Smart Food Systems**
- 3. Healthy Oceans and Coasts**
- 4. Resilient Ecosystems**

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<sup>40</sup> This chapter is both informed and builds on the following key documents: The Future We Want – Rio+20 Outcome Document; GEF Vision 2020; The GEF Instrument; Evaluation of the GEF Focal Area Strategies (GEF/ME/C.43/Inf. 01); GEF-5 Programming Document (GEF/R.5/31); RBM System: Process to ensure the quality of objectives, baselines, and results indicators (GEF/C.40/Inf.9).

<sup>41</sup> In GEF-5, four GEF Strategic Goals were formulated: Strategic Goal 1 - Conserve, sustainably use, and manage biodiversity, ecosystems and natural resources globally, taking into account the anticipated impacts of climate change (BD, LD, IW); Strategic Goal 2 - Reduce global climate change risks by: 1) stabilizing atmospheric GHG concentrations through emission reduction actions (CC-M); and 2) assisting countries to adapt to climate change, including variability (LDCF/SCCF); Strategic Goal 3 - Promote the sound management of chemicals throughout their life-cycle to minimize adverse effects on human health and the global environment (Chemicals); Strategic Goal 4 - Build national and regional capacities and enabling conditions for global environmental protection and sustainable development (goal across all GEF focal areas).

<sup>42</sup> GEF/ME/C.43/Inf. 01

Figures 2 and 3 below illustrate how these themes could be integrated into the GEF strategy in the transition of the GEF Results Chain from GEF-5 to GEF-6.

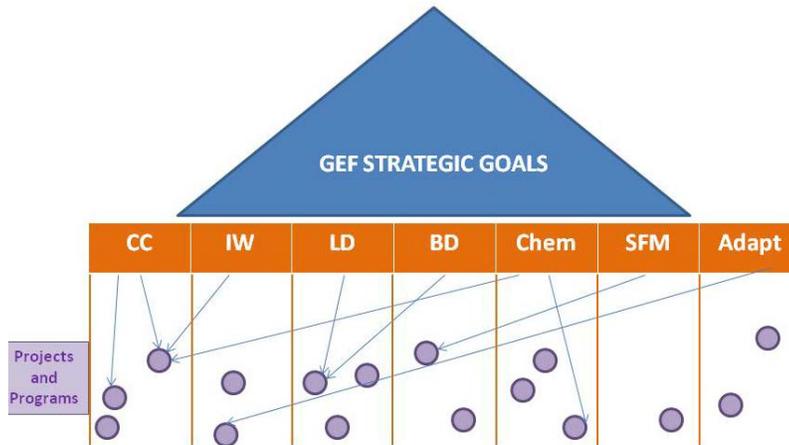


Figure 2 – The existing GEF-5 “business as usual” structure in which projects/programs are developed within focal areas/programs (including SFM) and results are reported within to one or multiple focal areas. Together the focal area activities are intended to contribute to the GEF Strategic Goals.

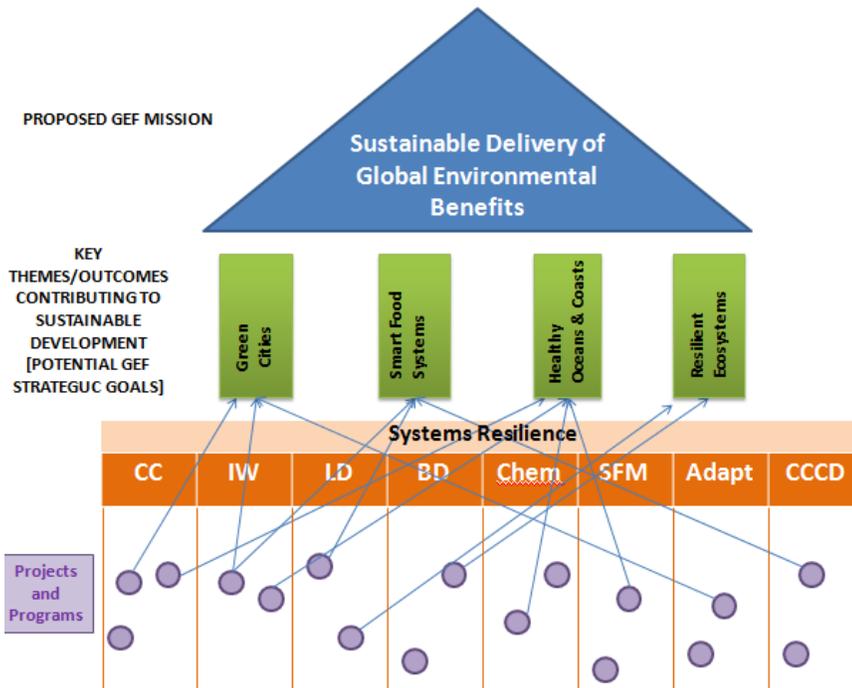


Figure 3 – Simplified illustration of the proposed conceptual framework. Building on the foundation of the five GEF-5 focal areas and other programs, the four overarching themes create a structure that links delivery of global environmental benefits with sustainable development objectives. The GEF focal areas will continue to operate as at present (shown by the Projects - circles without arrows). In addition, the groups of arrows pointing to one of the four themes exemplify a new specific systemic project. For example one Green City project might encompass climate change mitigation, water and adaptation, whereas another Green City project might encompass water, biodiversity, chemicals and adaptation.<sup>43</sup>

<sup>43</sup> Note: For clarity, the figure does not show all links between projects, programs and themes.

STAP recognizes that tackling the issues of energy, water, and food discussed in Section 4 is essential for sustainable development. We assert that these issues are best addressed through coordinated effort in each of these themes. For example, water security is vital for human well-being and prosperity. Attaining this depends on maintaining a healthy and functioning hydrological cycle, reliable infrastructure, developing awareness about water management or security threats, mitigation plans, along with well informed legal regimes, policies and effective governance systems<sup>44</sup>. Water is unique in the way that it connects all natural and social systems, and no sectoral initiative can be ultimately successful without proper consideration of issues related to water quantity and quality. For these reasons, we have deliberately “mainstreamed” freshwater water security issues into the proposed four themes above. If a consensus emerges to elevate “Water Security” to the level of additional fifth theme, however, STAP would concur that such a decision would be justifiable.

### Green Cities

The year 2007 marked a watershed in human history – for the first time, half of the world’s population was living in cities<sup>45</sup>. Urban areas occupy less than 5% of the global landmass, but produce more than 90% of the world’s GDP and more than 70% of global GHGs<sup>46</sup>. There is an urgent need, therefore, to ensure that environmental considerations are properly integrated into urban development decisions. Cities are by far the largest consumers of electricity and transport fuels<sup>47</sup>, resulting in large amounts of chemical and other pollutants, with concomitant increases in contamination of soil, air and water. The use and treatment of materials in construction (e.g. for fire prevention, pest control), increased use of pharmaceuticals and personal care products (PPCPs), use of household chemical products, generation of electronic waste, increased use of convenience articles and plastic packaging are exemplary of increasing environmental stress centred in urban areas.

Cities are by nature centres of intense food and water consumption, impacting land use and ecosystem services, including biodiversity, as well as fisheries and coastal environments (particularly in coastal cities where a third of urban environments are located). Moreover, recent meta-analysis of projected urban land expansion to 2030 indicates that the average rate of expansion in areas within 10 metres above sea-level and within 10 km of terrestrial protected areas was higher than for other areas<sup>48</sup>. In addition, there is little evidence of increased land use efficiency due to fragmentation and lack of coordination amongst governance institutions, which impedes sustainable urban development<sup>49</sup>.

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CC – Climate change focal area; IW – International waters focal area; LD – Land degradation focal area; BD – Biodiversity focal area; Chem – Chemicals focal area; SFM - Sustainable forest management/REDD+ focal area; Adapt – Climate adaptation (LDCF/SCCF); CCCD cross-cutting capacity development

<sup>44</sup> Rio+20 Policy Brief: Water security for a planet under pressure. Available at:

[http://www.planetunderpressure2012.net/pdf/policy\\_watersecurity.pdf](http://www.planetunderpressure2012.net/pdf/policy_watersecurity.pdf)

<sup>45</sup> Liveable Cities, the benefits of urban environmental planning, 2007. A Cities Alliance Study on Good Practices and Useful Tools, Washington DC.

<sup>46</sup> “The Rise and Rise of Urban Expansion”, Michail Fragkias, Karen C Seto, Global Change International Geosphere-Biosphere Programme, Issue 78, March 2010

<sup>47</sup> State of the World’s Cities 2008/2009, UN Habitat, Figure 3.2.1

<sup>48</sup> Seto K C, Sanchez-Rodriguez R. and Fragkias M (2010). Annual Reviews of Environment and Resources 35: 167-194.

<sup>49</sup> Global Change International Geosphere-Biosphere Programme, Issue 78, March 2010

Coastal cities face increasing risk of sea-level rise due to climate change. The IPCC SREX report<sup>50</sup> concluded that much of the recent increase in damage due to extreme weather events is related more to the extent of exposure to these hazards and less to their frequency or intensity. Population densities are increasing in regions with high climate risk. Urbanization is often happening in an unplanned manner, and many urban areas have large areas of built and natural environments which are not climate resilient.

### ***The proposed GEF response and expected outcomes***

There are multiple approaches to support integrated and innovative approaches for greening cities that reduce ecological footprints and improve climate resilience. These include support for:

- city governance frameworks integrating information, energy, water use and materials streams;
- urban design, planning and infrastructure;
- investments in improved and integrated natural resource usage and waste management; and
- improved climate resilience.

These approaches should be applied in a coordinated fashion to maximize impact. The development of urban environmental profiles<sup>51</sup> represents an approach to frame priorities within the above framework. The GEF could support actions informed by these profiles that strengthen food, water, energy and land security issues in urban areas central to human well-being<sup>52</sup>, and some examples of this approach currently exist<sup>53</sup>. Overall, the development of a circular urban metabolism which seeks to integrate information, energy and materials streams and minimizing waste should be seen as the optimal end-result. Low- and zero-carbon energy technologies, local industrial waste management regulations, intensive recycling programs and increased interconnectivity through sustainable public transport systems are priorities currently reflected in the Climate Change – Mitigation and Chemicals windows, while numerous opportunities exist in other focal areas as well.

Considering the aforementioned, and viewing the urban area as a subset of the overall land use management scape, the GEF could work towards supporting urban development that:

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<sup>50</sup> <http://ipcc-wg2.gov/SREX/>

<sup>51</sup> Based on the first Rio summit's Agenda 21 related guidance towards sustainable cities, and considering the issues raised in the UNEP paper '21 Issues for the 21st Century'. See [http://www.unep.org/publications/ebooks/foresightreport/Portals/24175/pdfs/Foresight\\_Report-21\\_Issues\\_for\\_the\\_21st\\_Century.pdf](http://www.unep.org/publications/ebooks/foresightreport/Portals/24175/pdfs/Foresight_Report-21_Issues_for_the_21st_Century.pdf)

<sup>52</sup> for example drawn from Liveable Cities and UN Habitat's State of the Worlds Cities reports.

<sup>53</sup> E.g., Resource usage: Singapore's "Closed Water Loop" which seeks to minimize the need for energy-costly treatment facilities, and increase the maximum amount of clean water for use; Dhaka's Organic Compost programme which integrates information dissemination, education and incentive programs to reduce overall waste and improve human and environmental health. Climate Resilience: the Gujarat State Disaster Management Authority's overlay mapping database is a risk management tool that increases the knowledge-base on potential damage from environmental disasters caused by climate change ; the creation of wetlands, protection of blue forests ecosystems (e.g. mangroves) and the preservation of the coastal environment are the best ways to create a natural buffer zone against sea-level rise and are examples of ecosystem-based adaptation. The Ottawa Greenbelt is an example of creating sustainable reserves in or around cities, which combine biodiversity and environmental protection, provide cities with benefits such as natural carbon sequestration, anti-land erosion barriers, soil revitalization, social and leisure advantages etc.

- successfully combines environmental sustainability and economic solvency by improving ecosystem services valuation and leading in green-tech innovations<sup>54</sup>; and
- lead in climate change resiliency through ecosystem and community adaptation<sup>55</sup>, supporting energy efficiency, use of local renewable energy resources, appropriate chemicals and waste management, promoting efficient buildings sector, and low-carbon sustainable transport.

Paramount is environmentally sustainable provision of food resources to urban centers: proper land use and provisioning and peri-urban agriculture (including LD, IW and BD), protection of fisheries and coastal environments (IW and BD) and enhancing the protection of green areas in cities as well as within urban corridors (LD, CC-M, BD), safe disposal of wastes (IW, BD, CH). Given the current trends of urban development, the GEF might look to protect past and future investments in protected areas of biodiversity by better coordinating confluences of urban development and biodiversity protection.

Significant potential exists for the commitments drawn from the CC-M, FA Strategy to act as the central framework for delivering actions towards the expected outcomes. The results framework for delivering the CC-M Pillar A, Strategic Area 2 could be augmented to build in the eco-city linked actions. With support from BD, IW, CH and LD, the low carbon target can be augmented to address water supply, chemical and waste management, food supply, peri-urban and urban biodiversity and soil conservation. In particular the BD, LD and SFM strategies are currently silent regarding linkages to urban areas.

### Smart Food Systems

Land and water resources are vital to improving food security and reducing poverty. For centuries, farmers have faced challenges to improve their use and management of land and water resources. They have overcome a number of challenges by adapting their practices to more sustainable land and water management practices with institutional, policy and technical support at the international, national, and local level.<sup>56</sup> Nonetheless, farmers currently face distinct complexities due to increased competition over, and declining quality of, land, soil and water resources, increasing demographic pressure on ecosystems, impacts of agricultural chemicals, and climate change effects on the environment.

Food production systems are highly susceptible to climate change. Climate change predictions forecast damage to current farming systems even at a 2° C rise in global mean temperatures.<sup>57</sup> Food security is inherent to agricultural production and the livelihoods of farmers, communities, and developing countries. Food insecurity and poverty are crucially inter-twined and affect large proportions of the world's populations in rural and urban areas, particularly in sub-Saharan Africa and South Asia. Climate change is of particular significance in these regions where many farmers and communities depend on

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<sup>54</sup> Some examples of urban green technology innovations in the energy sector include "solar spays" converting ordinary windows into solar panels, utilizing energy generated by human foot traffic to harness energy, "precision homes" using smart energy management systems, solar light bulbs and many others.

<sup>55</sup> World Bank (2010) Eco<sup>2</sup> Cities: Ecological Cities as Economic Cities. Available at: <http://siteresources.worldbank.org/INTURBANDEVELOPMENT/Resources/336387-1270074782769/Eco2CitiesBookWeb.pdf>

<sup>56</sup> Refer to the International Water Management Institute (IWMI) as one source of information on farmers' experience with integrated land and water resource management.

<sup>57</sup> S.J. Vermeulen et al., 2012.

variable rainfall for subsistence and commercial agriculture, and where poverty may hinder their ability to address climate change risks.

Agriculture is recognized as one of the major contributors to greenhouse gas emissions (GHGs), and as a key driver of deforestation and land-use change.<sup>58</sup> It can also provide opportunities for addressing climate change mitigation and in many countries, provides the highest mitigation potential – above industry or transport.<sup>59</sup> A systemic approach to food production and climate change provides enormous opportunities for achieving food security and improving livelihoods, while lessening the impacts of global environmental challenges.

### ***The proposed GEF response and expected outcomes***

A sustainable land and water management approach can bring about complementarities between food security, ecosystem resilience, climate change adaptation and climate change mitigation, and management of chemicals. Smart agriculture aims to reduce fossil fuel, chemicals and water inputs, as well as GHG emissions, without compromising food security. Its success depends on:

- i. approaches that support farmers' knowledge of technologies and providing better access to climate information at the local and national levels;
- ii. policies that support the links between agricultural production and climate change mitigation and adaptation (e.g. practices that may lead to carbon sequestration and water retention, such as mulching);
- iii. policies linking agricultural production, consumer demand and public health considerations;
- iv. a careful balance of the trade-offs between food production and climate change mitigation responses; and
- v. employment of technology to optimize use of fossil fuels, water, chemicals (e.g., fertigation) and track impacts and the quality of ecosystem services (including the use of information and communications technology (ICT) to monitor environmental parameters and other variables)..

In essence, (climate) smart agriculture "...is a pathway towards development and food security...increasing productivity and incomes; enhancing resilience of livelihoods and ecosystems; reducing and removing GHG emissions from the atmosphere"<sup>60</sup>, as well as promoting the responsible use of chemical inputs.

More precisely, a (climate) smart approach to agriculture entails working across sectors (agriculture, forests, livestock) through a landscape approach, encompassing "...large-scale processes in an integrated and multi-disciplinary fashion, combining natural resources management with environmental and livelihood considerations." Effective management of ecosystems, through stakeholder participation, is inherent to this goal.<sup>61</sup> It recognizes that the root cause of the problem may not be site-specific while

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<sup>58</sup> World Bank, (date unknown).

<sup>59</sup> Ibid.

<sup>60</sup> FAO (date unknown).

<sup>61</sup> FAO, 2012.

identifying externalities and reducing negative impacts. It is possible to reduce the current dependence of food production on high fossil fuel inputs through increased renewable energy uptake and energy efficiency improvements throughout the entire food supply chain, particularly when combined with food production and land use.<sup>62</sup>

Integrated planning is required to create opportunities between these different sectors – and, ultimately, to balance food, water and climate concerns – understanding the trade-offs between these objectives<sup>63</sup>. Options for achieving complementarities between these two, or more, objectives will depend on spatial, temporal, and socioeconomic characteristics, such as the differences between large-scale and small-scale agricultural systems.<sup>64</sup>

A number of examples of approaches that can address the multiple objectives of food security, ecosystem resilience, climate change mitigation and adaptation are proposed:

- 1) Enhancing soil organic matter which has important effects on plant available water, soil biodiversity, chemical inputs (fertilizers) and soil carbon sequestration.<sup>65</sup>
- 2) Avoiding conversion of forests, wetlands and peatlands which are large carbon reservoirs and contribute towards water and climate regulating services.
- 3) Managing sustainable livestock production and paddy rice cultivation to reduce methane emissions, careful use of agro-chemicals and avoiding nitrous oxide emissions
- 4) Achieving food security and climate change mitigation through agricultural intensification practices that do not contribute to methane and nitrous oxide emissions (ie., mulching, cover crops)
- 5) Integrating forest protection and reforestation into agricultural production systems
- 6) Supporting energy end-use conservation, renewable energy, and reduction of GHG emissions throughout the agri-food supply chain.

The GEF land degradation strategy - in concert with the strategies on climate change mitigation, climate change adaptation, international waters, chemicals management, and biodiversity - can build complementarities that achieve sustainable food production while contributing to global environment and development goals.

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<sup>62</sup> STAP (2012). Climate Change: A Scientific Assessment for the GEF. A STAP Information Document by N.H. Ravindranath, R.E. H. Sims, D. Ürgel-Vorsatz, M. Beerepoot, R. K. Chaturvedi, and L. Neretin. Global Environment Facility, Washington, DC.

<sup>63</sup> Intensification of agricultural production may decrease the advancement of the agricultural frontier; thereby, reducing emissions from deforestation. However, agricultural intensification also may lead to a higher use of chemical fertilizers and livestock densities; thereby, potentially contributing to other greenhouse gases, mainly nitrous oxide and methane, respectively.

<sup>64</sup> DeFries, R., Rosenzweig, C. Towards a whole-landscape approach for sustainable land use in the tropics. PNAS, November 16, 2010. Vol.107. No.46.

<sup>65</sup> It is estimated that global soils contain between 1400 and 1600 Pg of C (1 Pg = 10<sup>15</sup>g of C) in the upper metre, whereas the next 1 m of soil contains an additional 500 – 1000 Pg of C. These estimates imply that the soil organic carbon pool is more than two times the size of the atmospheric carbon pool (ca. 800 Pg) and about three times the amount of carbon in vegetation (ca. 550 Pg of C). Govers, et al., 2013. (Upcoming STAP publication “Soil organic carbon management for global benefits: discussion paper.”)

## Healthy Oceans and Coasts

Declining ecological health and economic productivity of the world's oceans and coastal areas can be reversed by shifting to a greener, more sustainable economic paradigm in which human well-being and social equity are improved, while environmental risks and ecological scarcities are reduced. About 40 per cent of the global population lives within 100 km of a coastline (an important factor in food production and livelihoods); often these are the poorest living in areas of high storm-related risks<sup>66</sup>. Fisheries, shipping, power generation and manufacturing industries are also largely concentrated in coastal areas<sup>67</sup>.

Millions live in small island developing states (SIDS), some of which are threatened by sea level rise and which can directly impact upon groundwater quality. The science of aquifers in SIDS is well understood – but this understanding is not necessarily integrated into relevant social, cultural and economic policy frameworks. As a result, innovation in exploitation of aquifers has remained generally dormant with a number of isolated exceptions, such as the public/private build, operate and transfer (BOT) initiative in Trinidad & Tobago<sup>68</sup>. In addition to the need to conjunctively manage surface water and groundwater, saline intrusion, massive losses of coastal habitats from mangroves to sea grasses and the parallel and linked challenge of unsustainable fisheries<sup>69</sup> and their connection with coastal habitats are observed. Human impacts such as unsustainable fishing, water and air pollution, waste disposal, loss of habitats and biodiversity, as well as the increasing impacts of climate change including ocean acidification, are increasingly taking their toll on the health and productivity of the world's oceans.

Coasts, whether associated with SIDS or mainland areas, are the locus for intense and often unsustainable pressure from resource exploitation, development, and pollution with impacts that extend both inland and far offshore. Addressing the drivers of degradation and the targeting of restoration and resilience actions in coastal areas, especially those with dense populations, is likely to directly improve human well-being. The existing IW focal area addresses trans-boundary actions to address large marine ecosystems (LMEs), but less so regarding the broader challenges of land-sea interactions<sup>70</sup>. LMEs could be strengthened by the recognition of needs to protect coastal environments and deliver multiple global environmental benefits in both national and trans-boundary coastal areas. Greening the ocean economies in sectors such as fisheries and aquaculture, tourism, energy use and consumption, deep-sea minerals mining, pollution prevention and reduction through integrated

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<sup>66</sup> UN-Habitat (2007) Global Report on Human Settlements: Enhancing Urban Safety and Security.

<sup>67</sup> UNEP, FAO, IMO, UNDP, IUCN, World Fish Center, GRIDArendal, 2012, Green Economy in a Blue World [www.unep.org/greeneconomy](http://www.unep.org/greeneconomy) and [www.unep.org/regionalseas](http://www.unep.org/regionalseas)

<sup>68</sup> See STAP Workshop on Small Island Developing States Groundwater and Interlinkages, GEF/C.31/Inf.8

<sup>69</sup> About 80% of global fish stocks are fully-, overexploited, depleted or recovering from depletion. Reducing fishing capacity to optimal levels and restoring fish stocks could bring economic gains in order of USD 50 billion per annum (UNEP Green Economy in a Blue World).

<sup>70</sup> There are some exceptions such as the GEF project *Integrating Watershed and Coastal Area Management (IWCAM) in the Small Island Developing States (SIDS)* of the Caribbean aiming at strengthening capacity of the participating countries to implement an integrated approach to the management of watersheds and coastal areas (<http://www.iwcam.org/>)

approaches will lead to the increased resilience of economies and ecosystems dependent on ecosystem services provided by oceans and coasts and as a result improve ocean governance<sup>71</sup>.

### ***The proposed GEF response and expected outcomes***

Ecosystem-based approaches that support actions, on one hand, to reduce the drivers of degradation and maintain or restore the structure and function of coastal and open ocean ecosystems, and on the other that that promote sustainability of ocean use sectors and sustainable livelihoods, could be supported within this theme as a means to achieve sustainability goals, particularly in SIDS and nations whose sustainable development relies heavily on the ecosystem services provided by the coastal zone. Some possible GEF-supported actions additional to those identified in draft GEF-6 focal area strategies could include:

- Support for integrated coastal zone management, marine spatial planning and other area-based conservation tools that build on the optimization of sustainable and equitable use of coastal ecosystem services (both on land and in the sea);
- Supporting SIDS on the path towards greening their economy focusing on the integrated development of the five sectors – small-scale fisheries and aquaculture, water, tourism, energy and solid waste<sup>72</sup>;
- Addressing the management of groundwater and its protection as a cross-cutting issue which may create an entry point for an ecosystem based framework for assisting SIDS leading to outcomes of reduced water supply degradation, better valuation of supply and its integration with surface water management;
- Integrated pollution prevention and control measures applied at programmatic level to coastal-related water supply and solid and liquid waste discharges, use of buffer zones and watercourse protection strips informing design and spatial planning decisions within Integrated Coastal Management systems. These activities could be strongly integrated with the options proposed under the Green Cities theme.
- Support for coastal implementation of the Code of Conduct for Responsible Fisheries for example in coastal aquaculture, integration of fisheries into coastal area management including eco-labelling linked to rights-based approaches and guided by the ecosystem approach to fisheries.

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<sup>71</sup> UNEP, FAO, IMO, UNDP, IUCN, World Fish Center, GRIDArendal, 2012, Green Economy in a Blue World [www.unep.org/greeneconomy](http://www.unep.org/greeneconomy) and [www.unep.org/regionalseas](http://www.unep.org/regionalseas)

<sup>72</sup> UNEP, UN DESA and FAO, 2012, SIDS-FOCUSED Green Economy: An Analysis of Challenges and Opportunities [www.unep.org/greeneconomy](http://www.unep.org/greeneconomy) and [www.unep.org/regionalseas](http://www.unep.org/regionalseas)

## Resilient Ecosystems<sup>73</sup>

Climate change impacts represent an increasing threat to GEF investments. Life support systems<sup>74</sup>, particularly biodiversity, are directly threatened and impact essential services that societies depend upon such as clean water, soils, and food security. In conjunction with social and economic factors, climate change acts as a “stress multiplier” on these systems with related impacts to human well being<sup>75</sup>. The Millennium Ecosystem Assessment warned that loss of species and genetic diversity decreases the resilience of ecosystems to disturbance, which in turn adversely affects the supply of services provided by ecosystems. Building resilience to climate change, on the other hand, can help sustain GEF investments through enhancing the adaptive capacity<sup>76</sup> of bio-physical resources such as forests, soils, water, as well as local communities subject to climate variability – thereby mitigating effects of future climate change.

Ecosystem-based approaches to adaptation provide for the possibility of multiple economic, social, environmental and cultural benefits. Approaches such as forest conservation or restoration of degraded wetlands can also contribute directly to climate change mitigation measures<sup>77</sup>. Actions that promote resilience and ecosystem restoration include institutional and governance arrangements, assessing better use of market incentives, empowering communities to better manage ecosystem services and the development and diffusion of technologies to increase efficient use of these services.

### ***Proposed GEF response and expected outcomes***

All draft GEF-6 focal area strategies contain proposals for actions which collectively address ecosystem restoration and resilience. This theme encompasses an inherently ‘no regrets’ adaption approach as proposed by the IPCC<sup>78</sup>. The CBD defines ecosystem restoration and adaptation as “the use of biodiversity and ecosystem services as part of an overall adaptation strategy to help people to adapt to the adverse effects of climate change<sup>79</sup>”. In addition, this approach has been embedded in Targets 14 and 15 of the Strategic Plan for Biodiversity<sup>80</sup>, incorporating social, environmental and economic components and reinforcing synergies between communities and their environment. The major areas where the GEF could consider coordinated actions encompass agro-ecosystems, selected marine environments, forest and tropical ecosystems, and coastal settlements or cities and other communities that have been found to be especially vulnerable to climate change.

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<sup>73</sup> This chapter is based on the recommendations of the STAP’s advisory document GEF/C.39/Inf.18

<sup>74</sup> Recent evidence of massive dieback in the Amazon - <http://www.nasa.gov/topics/earth/features/earth20130117.html>

<sup>75</sup> Hanson, James (2009). *Storms of my Grand Children*. New York: Bloomsbury Press.

<sup>76</sup> Resilience is a synonym to ‘adaptive capacity’. A society potentially exposed to hazards adapts by resisting or changing the process in order to reach and maintain an acceptable level of functioning and structure. This is determined by the degree to which the social system is capable of organizing itself to increase its capacity for learning from past disasters for better future protection and to improve risk reduction measures. Source: World Bank Adaptation Guidance Notes - <http://beta.worldbank.org/climatechange/content/mainstreaming-adaptation-climate-change-agriculture-and-natural-resources-management-project>

<sup>77</sup> Subsidiary Body for Scientific and Technological Advice, UNFCCC (2011). *Ecosystem-based approaches to adaptation*: UNFCCC/SBSTA/2011/INF.8

<sup>78</sup> IPCC (2012). *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation*

<sup>79</sup> Subsidiary Body on Scientific, Technical and Technological Advice, CBD (2010). *Ad Hoc Technical Expert Group on Biodiversity and Climate Change*: UNEP/CBD/SBSTTA/14/INF/21

<sup>80</sup> Strategic Plan for Biodiversity 2011 – 2020 and the Aichi Targets (<http://www.cbd.int/sp/>)

GEF-6 focal area strategies individually identify many cross-focal programming components directly related to the resilience and/or restoration of ecosystems. In addition, actions that directly support human well-being are more likely to have increased uptake and replication potential. Actions that address ecosystem restoration and resilience could include:

- *Maintaining the integrity of ecosystems* in the long-term through considering long-term shifts in plant and animal distributions, natural disturbance regimes, and precipitation patterns;
- *Reducing the impact of other threats*, such as habitat fragmentation, pollution, alien species, eutrophication, desertification, and acidification;
- *Developing species mixes across landscapes* that reduce spread of fire, pests and invasive species;
- *Implementing forestry management systems* designed for uncertainty: afforestation, reforestation;
- *Providing mosaics* of interconnected terrestrial, freshwater and marine multiple-use reserves;
- *Supporting viable, connected and genetically diverse populations*;
- *Protecting reserves*, including networks with connecting corridors to provide dispersal and migration routes for plants and animals;
- *Consider captive breeding, ex-situ conservation* for plants and translocation programs for vulnerable or sensitive species;
- *Supporting biodiversity activities* with broader objectives for sustainable development;
- *Identifying Farming systems*: mixed farming; livestock systems; multi-cropping; irrigation; new varieties and species;
- *Maintaining Water management*: resource efficient irrigation; water harvesting infrastructure; artificial wetlands;
- *Supporting Land management*: soil and water conservation; forest management; micro-climate influence on crops; soil organic matter management to reduce flooding, drought and erosion;
- *Support services*: agricultural extension; index insurance policies; seasonal climate forecasts;
- *Adaptive fisheries management* will need investment in adaptable technologies and processing chains and the opportunity for alternative livelihoods during difficult times;
- *Amending Building and energy systems codes and standards* to address climate parameters, such as wind, temperature, sea level rise, storm surges, precipitation;
- *Reforestation and restoration within coastal systems* and diversification of community fuelwood systems while reducing use of non-indigenous species resulting in restoration of coastal structure and habitat (benefits: improved connectivity for marine and freshwater life cycles, increased resilience to storm risk and associated water level changes);
- *Complement transboundary investments to rebuild fisheries* with national actions to restore ecological integrity of coastal breeding and feeding sites, target sources of pollution (nutrients and chemical waste) particularly affecting estuaries and coastal watercourses, reduce turbidity and associated land degradation;
- *Targeted research*, where needed, to address specific adaptation needs in order to have comprehensive plans for climate resiliency in restored areas.

As noted above, ecosystem restoration and resilience represents a strong recurring theme across GEF focal areas. However, at present there is no overall framework or strategic focus guiding this effort which may lead innovation, increase impact, or generate greater efficiencies – including the important social and institution considerations involved. Focus in this area within GEF-6 could be framed and coordinated primarily within the NRM cluster of focal areas, with an important contribution from Climate Change Mitigation and Adaptation.