Mainstreaming Biodiversity Conservation.
A Framing Paper for the Scientific and Technical Advisory Panel of the Global Environment Facility

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"The most important lesson of the last ten years is that the objectives of the Convention [on Biological Diversity] will be impossible to meet until consideration of biodiversity is fully integrated into other sectors. The need to mainstream the conservation and sustainable use of biological resources across all sectors of the national economy, the society and the policy-making framework is a complex challenge at the heart of the Convention."

The Hague Ministerial Declaration from COP VI in 2002

Our core message is that there can be no separation between development and environment, as they are co-dependent. Healthy ecosystems are essential to secure human health, food, energy and water, and ultimately sustainable development. It is startling, however, that such ideas have yet to be fully mainstreamed and that their adoption continues to be hampered by tough barriers in the political decision-making process. This is where the GEF comes in as a champion of the global commons.

Dr. Naoko Ishii GEF CEO and Chairperson. 2012. Time for Transformational Change. The Role of The GEF. Vision Statement.

Key Messages

1. With more than 80% of the earth's surface never likely to be managed within Protected Areas, biodiversity conservation interventions across such non-protected landscapes and seascapes are vital. Mainstreaming addresses this need.
2. Mainstreaming biodiversity enjoys priority at the highest levels of international policy (CBD) and conservation investment (GEF).
3. Between 2004 and 2014; GEF will have supported a total of 327 biodiversity mainstreaming projects, totaling US$1,631,684,477 in GEF funding and US$5,249,734,936 in co-financing.
4. Mainstreaming characteristics include: integration/internalization/inclusion of biodiversity goals in development models, policies and programs; modifying that into which it is integrated; simultaneously achieving positive

biodiversity and development outcomes; and modifying human behavior to increase sustainability.

5. Various typologies are used for mainstreaming intervention types, sectors and approaches – varying according to institutional business models – including incorporation of biodiversity and ecosystem service values and sustainability into accounting frameworks; policy and regulatory frameworks; production practices; financing mechanisms; and sustainable use. Other intervention opportunities include behavioral change, ecosystem restoration, ecosystem-based adaptation, and health.
6. Mainstreaming interventions by the GEF are directed at biodiversity and include ecosystem services. The relationship between these two terms is not at all straightforward despite the common assumption that ecosystem services programs conserve biodiversity, and that conserving biodiversity will secure ecosystem services.
7. There is a great deal more written about how and why mainstreaming should be done than about what has been learned from mainstreaming practice – i.e. very limited information available on what works and what doesn't. However, detailed listings of the characteristics that underpin successful projects are emerging from reviews of case studies.
8. There is little evidence that the mainstreaming projects funded through GEF have produced peer-reviewed articles written either by the project implementers or by others. Project implementers – very often the real 'champions' of such projects - are generally not writers.
9. Billons of dollars have been spent on mainstreaming biodiversity outcomes but there is very little robust, credible evidence on the efficacy of these actions.
10. In practice most apparent win-win programs involve trade-offs between desired conservation outcomes and desired social outcomes. Because these trade-offs were not expected and therefore not negotiated for, the results can often be disappointment and blame.
11. The conclusion reached by those interested in assessing the efficacy of PES is that due to a heterogeneity of methods, and lack of clear experimental design and data collection, very little can be concluded about their effectiveness.
12. Greater care needs to be brought to the design, implementation, and assessment of mainstreaming projects and the need to use this learning to inform policy-making.
13. A program of research is needed to measure how program impacts vary by socio-political and bio-physical context, to track economic and environmental impacts jointly, to identify spatial spillover effects to untargeted areas, and to use theories of change to characterize causal mechanisms that can guide the collection of data and the interpretation of results.
14. However, mainstreaming is not a controlled experiment but rather a social experiment in changing the value structures of institutions and individuals with vital consequences for the natural world and the humans who rely on it. As such it may not prove amenable to rigorous tests but it certainly is a field deserving of more systematic inquiry.
15. Mainstreaming is more of an art than a science.

INTRODUCTION

Humans evolved with a keen appreciation of their dependence on natural resources but with little appreciation for the impacts this dependence had on nature. As complex civilizations arose people developed powerful institutions that structured and constrained their behaviors. Many of these institutions and the people they influenced focused directly on commerce, law and government and were not informed by the continued human reliance on nature and ecosystem services.

It was not until the 19th century that it became apparent to many urban-dwelling people that human actions were bringing about broad-scale impacts on nature. This growing realization led to the development of scientific practices to manage species and ecosystems of direct interest to humans, most notably forests for timber and game species for recreation and food. In general these management institutions were effective in ensuring continued streams of goods and services.

However, as the 20th century progressed it became increasingly clear that management practices were having unexpected and negative impacts on the species and ecosystems themselves as well as on other parts of the natural world. Appreciation of these impacts and the need to limit them led to the growth of the protected area approach to conservation – setting aside areas of land and water where human actions were strictly restricted.

For decades the conservation community concentrated on extending and strengthening the protected area estate out of a conviction that this would be sufficient to maintain the earth's biological diversity. However, beginning around the 1980s research showed that protected areas were necessary but not sufficient to maintain biodiversity. Not only did they lose species from within their boundaries, but these boundaries did not prevent encroachment of impacts from outside the protected area such as fire, disease, and poaching. Concern about impacts such as these was exacerbated by a growing understanding of the actual and projected impacts of climate change and the realization that species were going to need to be able to move in order to survive. It became clear that to conserve biodiversity, conservation work had to extend beyond protected areas and into the matrix – the production landscapes and seascapes surrounding protected areas. Work in these areas would require active engagement with the institutions that directly and indirectly governed what happened in these areas, the same institutions that had developed with little to no engagement with the natural world.

To succeed biodiversity conservation was going to require the twin actions of creating and strengthening protected areas and working outside protected areas on the social, political and economic institutions that affect biodiversity. With less than 20% of the earth's surface ever likely to be managed within protected

areas, work outside such areas was vital. This required engagement with national-level policies, production practices, financing mechanisms and sustainable use, amongst others, to incorporate biodiversity conservation and sustainable use into dominant social institutions and to modify their practices so as to internalize environmental costs. This came to be called "mainstreaming."

The Convention on Biological Diversity (CBD) and the Global Environment Facility (GEF) recognized that support of mainstreaming activities was essential. In the ten years between 2004 and 2014 GEF has funded 327 biodiversity mainstreaming projects with US$1,631,684,477 in GEF funding and US$5,249,734,936 in co-financing.

MAINSTREAMING

"Mainstreaming" is often used as a verb by itself. The concept was developed out of the need to influence dominant institutions with the values and practices of those of lesser political influence. Mainstreaming can be directed at incorporation of a variety of issues like climate change (Klein et al. 2007; Roe in press), gender (http://www.un.org/womenwatch/osagi/gendermainstreaming.htm), disaster management (Sudmeier-Rieux et al. 2006), refugee settlement (UNHCR 2002), and education and learning (UNESCO 2009). Mainstreaming can also be a process of layering objectives with calls for mainstreaming integrated issues such as poverty and environment into development planning (UNDP UNEP 2008) or these same twin issues into national forestry legislation (World Bank 2010). That which 'mainstreaming' activities hope to affect is often not clearly specified. When unspecified, it usually seems to refer to economic development policies and practices.

Mainstreaming of biodiversity was developed as a means of addressing the fact that biodiversity and ecosystem service goals are viewed as distinct from, and sometimes even contradictory to, the goals of development and growth. The higher priority put on development goals meant that biodiversity work did not receive the political, social and financial support that it needed to succeed (UNDP and UNEP 2008). Though "mainstreaming" has been called "integrating" biodiversity into development, it has the added meaning of modifying that into which it is integrated – changing the valence of development policies and interventions towards consideration of the values of biodiversity. And as such, there is a strain of mainstreaming directed at integrating poverty alleviation and biodiversity, given strength by the CBD's 2004 call (Decision VII/2) to mainstream biodiversity into poverty reduction strategies (Roe in press).

Modifying the larger development goals by incorporating conservation goals through mainstreaming needs to be understood as good for both development and conservation because economies and societies are dependent on biodiversity for clean water, soils, biomass, food, and other ecosystem goods and services

(TEEB 2013). And likewise they are harmed by factors such as air and water pollution and climate change (Dalal-Clayton and Bass 2009). Natural ecosystems should be seen as a core part of development through providing a valuable and cost-effective way to support the development process, especially for poor people (Kosmus et al. 2012).

Recognizing the great extent to which humans rely on ecosystem services was the major finding of the Millennium Ecosystem Assessment (2005) and led to the development of a program entitled The Economics of Ecosystems and Biodiversity (TEEB) (http://www.teebweb.org/about/). For biodiversity mainstreaming TEEB (2010) has articulated six major targets for integration: economic, trade and development policies; transport, energy and mining activities; agriculture, fisheries, forestry practices; corporate strategies and operations; development policies and planning at local, regional and national levels; and public procurement and private consumption.

Mainstreaming biodiversity then has as its objective to integrate biodiversity conservation and sustainable use principles into policies, plans, programs, and production systems where the primary focus has previously been on production, economic activity, and development, rather than on biodiversity conservation losses or gains (Petersen and Huntley 2005).

The focus of this paper is mainstreaming biodiversity. Biodiversity is defined by the CBD as "the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species, and of ecosystems" (http://www.biodiv.be/biodiversity/about_biodiv/biodiv-what/).

Mainstreaming projects sometimes refer to "mainstreaming conservation" or "mainstreaming environment." The later is most frequently used by development organizations (e.g. Antonio et al. 2012). In order to assess the patterns in use of the term "mainstreaming" in the published literature a February 2013 search of web and journal sources was conducted under "all subjects" (http://www.scirus.com/srsapp/advanced/index.jsp?q1=%22mainstreaming+biodiversity%22). Searching for the term "mainstreaming" showed fewer than 500 annual records between 1991 and 1999 with a steady climb to 9678 records in 2008. This was followed by big annual jumps for the next four years with 2012 showing a count of 163,141. Most of these citations did not modify "mainstreaming" with "conservation", "biodiversity" or "environment." "Mainstreaming conservation" was only counted 116 times in 2012; "mainstreaming biodiversity" only 266 times; and "mainstreaming environment" only 493 times. Clearly most of the time the term "mainstreaming" is used it is by itself or with terms other than these three.

The concept of mainstreaming was included in the Convention on Biological Diversity (CBD) article 6(b) which called on the contracting parties to "integrate, as far as possible and as appropriate, the conservation and sustainable use of biological diversity into relevant sectoral or cross-sectoral plans, programs and policies" (CBD 2003, p. 6). Mainstreaming also contributes toward fulfilling article 10(a), which calls on parties to "integrate consideration of the conservation and sustainable use of biological resources into national decision-making" (CBD 2003, p. 11) (Petersen and Huntley 2005).

Mainstreaming biodiversity has no single agreed-upon definition though most of the definitions are quite similar to that of Petersen and Huntley (2005)[1]:

- "to internalize the goals of biodiversity conservation and the sustainable use of biological resources into economic sectors and development models,

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[1] Other definitions include: "The systematic integration of biodiversity in development processes is called "biodiversity mainstreaming. The overall goal of biodiversity mainstreaming is to have biodiversity principles included at every stage of the policies, plans, programmes and project cycles, regardless whether international organisations, businesses or governments lead the process." (CBD 2010 in Kosmus et al. 2012)

The word "mainstreaming" can be used synonymously with "inclusion." Mainstreaming means integrating or including actions related to conservation and sustainable use of biodiversity in strategies relating to production sectors, such as agriculture, fisheries, forestry, tourism and mining. Mainstreaming might also refer to including biodiversity considerations in poverty reduction plans and national sustainable development plans (GEF, UNEP, CBD 2007).

Internalization or mainstreaming in the context of natural resource management and conservation … is to internalize the goals for safeguarding resources into economic sectors and development models, policies, and programs, and therefore into all human behavior (Cowling et al. 2008)

"Biodiversity mainstreaming is the integration of biodiversity concerns into defined sectors and development aims, through a variety of approaches and mechanisms, so as to achieve combined biodiversity and development outcomes" (Maun Statement on Biodiversity and Development Mainstreaming in Roe in press)

Some mainstreaming definitions, though similar, focus on "environment":

the informed inclusion of relevant environmental concerns into the decisions of institutions that drive national, local and sectoral development policy, rules, plans, investment and action (Dalal-Clayton and Bass 2009).

policies and programmes, and therefore into all human behaviour" (Petersen and Huntley 2005)

Mainstreaming of biodiversity can take place in different settings. It can focus on production landscapes, particularly those where natural resource-based industries such as agriculture, forestry and wildlife are active. It can also be focused on enabling environments at local, national or global levels and including development policy, legislation, land-use planning, finance, taxation, economic incentives, international trade, capacity building, research, and technology. Mainstreaming can be pursued by a wide range of actors from conservation NGOs to industries, governments or even communities (Petersen and Huntley 2005). It can also focus on particular ecosystems (Russi et al. 2013) and a program explicitly designed to mainstream "drylands" was established by UNDP in 2001 (Roe in press).

The primary framework for the CBD is the "ecosystem approach", which is "a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way" (http://www.cbd.int/ecosystem/). Within this context, mainstreaming is often pursued at the landscape scale, incorporating protected areas and production landscapes and seascapes (c.f. Cadman et al. 2010). However, projects can also integrate with different scales including global, regional, and national as well as integrating a geographic focus and a sectoral focus.

The major national-level instrument for delivering mainstreaming is the CBD-mandated national biodiversity strategies and action plan (NBSAPs) (CBD and UNEP 2008). As of 2011 172 of 193 countries had adopted their plans or equivalent instruments. However, national strategies have not been fully effective in addressing the main drivers of biodiversity loss and only a few countries have used their plans as a means of mainstreaming biodiversity. Countries are expected to revise their plans by 2014 including a greater focus on mainstreaming (Prip and Gross 2010; CBD 2010 in UNEP 2012).

MAINSTREAMING BY OTHER NAMES

The concept of mainstreaming is found in many sectors and academic fields. However, the term 'mainstreaming' itself appears to be known largely in the multi-lateral, bi-lateral and aid communities and their associated treaty and implementation bodies. It is not widely used outside these communities and is unknown by many who work on the topic. Programs with very similar objectives and approaches that do not use the term "mainstreaming" include:

- Offsets in general (McKenney and Kiesicker 2010; Pilgrim et al. 2013),
- Business and biodiversity offsets (PricewaterhouseCoopers 2010; BBOP 2012a; 2012b),

- The Equator Principles (http://www.equator-principles.com/index.php/about-ep/about-ep),
- Natural Capital (Daily et al. 2011),
- Green Economy (http://www.unep.org/greeneconomy/; ten Brink et al. 2012),
- Green Accounting and the World Bank (http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/ENVIRONMENT/EXTEEI/0,,contentMDK:20487830~menuPK:1187769~pagePK:148956~piPK:216618~theSitePK:408050,00.html),
- Green Growth and OECD (http://www.oecd.org/greengrowth/oecdworkongreengrowth.htm),
- Netherlands program for ecological engineering called "Building with Nature (van den Hoek et al. 2012); and the U.S. E.P.A. and New York City (http://water.epa.gov/infrastructure/greeninfrastructure/index.cfm; Plan NYC 2012),
- Agri-environmental schemes as practiced in the EU (Pilieninger et al. 2012; Business@Biodiversity 2010),
- The hydropower industry's "sustainability assessment protocol" (Tollefson 2011).
- The United Nations System of Environmental and Economic Accounts (SEEA) - a system for organizing statistical data for the derivation of coherent indicators and descriptive statistics to monitor the interactions between the economy and the environment and the state of the environment to better inform decision-making (https://unstats.un.org/unsd/envaccounting/seea.asp), and
- The Wealth Accounting and the Valuation of Ecosystem Services (WAVES) program of the World Bank that promotes sustainable development by ensuring that the national accounts used to measure and plan for economic growth include the value of natural resources (http://www.wavespartnership.org/waves/about-us). Its implementing partners include Botswana, Colombia, Costa Rica, Madagascar and the Philippines.

There is also a substantial peer-reviewed literature on issues that are an integral part of mainstreaming work, though not called that. These include:

- achieving conservation outcomes through working in production landscapes (e.g. Fischer et al. 2006; Wilson et al. 2010);
- payments to farmers for environmental services (e.g. Baylis et al. 2008);
- payments to communities for wildlife services (e.g. Frost et al. 2008; Dinerstein et al. 2012); and
- integrating poverty-alleviation and ecosystem service delivery (e.g. Working for Water Program: Turpie et al. 2008).

Another field that talks about mainstreaming-like activities for ecosystem services and sustainability but does not use that term is financial services. For

example, Waage and Kester (2013) cite several financial instruments that are incorporating ecosystem services in mainstreaming like ways:

- The Dow Jones Sustainability Index (DJSI) takes into consideration whether or not companies in some industries have processes in place to understand their impacts and dependencies on ecosystem services.
- The International Finance Corporation (IFC) conducts due diligence based on a range of factors, including impacts and dependencies on ecosystem services.
- Seventy-eight global financial institutions referred to as Equator Banks are factoring ecosystem services impacts and dependencies into due diligence practices.
- Forty-one financial institutions, as well as the global Association of Chartered Certified Accountants (ACCA), have signed the Natural Capital Declaration to "demonstrate our commitment to the eventual integration of Natural Capital considerations into private sector reporting, accounting and decision-making, with standardization of measurement and disclosure of Natural Capital use by the private sector."

Two categories of protected area, Categories V and VI, which, though not called as such, have the implementation of mainstreaming as part of their definitions. Category V is reserved for areas where the interaction of people and nature over time has produced an area with distinct character where safeguarding the integrity of this interaction is vital. Category VI protected areas conserve ecosystems and habitats, together with associated cultural values and traditional natural resource management systems (Dudley 2008).

Finally, in an unexpected way protected areas themselves have been proposed for mainstreaming. In a comprehensive review Lopoukhine et al. (2012) present evidence for the role that protected areas can and are playing in adaptation to climate change, crop germplasm conservation, climate services and natural disaster mitigation. Protected areas have also been discussed for their contributions to human health (Stolton and Dudley 2010). All of these would qualify as mainstreaming activities though not discussed as such.

PES, REDD+, ECO-CERTIFICATION AND CLIMATE CHANGE ADAPTATION ARE ALSO MAINSTREAMING

Four significant approaches have captured a great deal of attention that are not usually called "mainstreaming" but meet the definition and are considered by those in the mainstreaming community to be such. These topics are introduced here with a later discussion of what has been learned from implementing some of these approaches. The GEF has examined payment for ecosystem/environmental services (PES) and environmental certification in the context of its mainstreaming work (Wunder 2010 and STAP 2010a) and considers REDD+ to be an example of PES. The four approaches are:

- payment for ecosystem/environmental services (PES),
- reduced emissions from deforestation and degradation (REDD+),
- environmental certification, and
- climate change adaptation.

Payment for Environmental Services

Ecosystem or environmental services are a subset of biodiversity, defined as the direct and indirect contributions of ecosystems to human well-being (TEEB Foundations 2010 in Braat and de Groot 2012). Interest in accounting for ecosystem services in terms of their impact on human endeavor began with the introduction of Environmental Impact Assessments and later Strategic Environmental Assessment. There has been a great deal of attention paid to PES in the last several years and they have been adopted in both high and low income countries (Ferraro 2011).

Though there are a variety of definitions of PES, for the GEF the PES concept has been about arrangements between buyers and sellers of environmental goods and services in which those that pay are fully aware of what it is that they are paying for, and those that sell are proactively and deliberately engaging in resource use practices designed to secure the provision of the services (Wunder 2010). The GEF-5's Biodiversity Focal Area Strategy makes explicit reference to PES as a revenue mechanism to support biodiversity conservation in PAs and to compensate resource managers for off-site ecological benefits associated with biodiversity conservation compatible land-use practices (Wunder 2010). As such PES programs clearly fall into mainstreaming activities.

The practice of PES has included numerous policy prescriptions such as integrating PES into business performance systems with a tool called the Corporate Ecosystem Services Review aimed at integrating PES into such business performance systems as include corporate strategy development procedures, product design guidelines, environmental management systems, environmental impact assessments, environmental and social impact assessments, environmental audits, and sustainability reporting (Hanson et al. 2011). Systematic mainstreaming of ecosystem services has also been suggested for multilateral banks (Ranganathan et al. 2009; and see Waage and Kester (2013) discussed above).

Reduced Emissions from Deforestation and Degradation

REDD, although generally discussed on its own, is considered a form of PES that offers rents to those countries that contribute positively to the balance of forest carbon at a global level (Buttoud 2010). REDD+ is primarily a mechanism for ensuring carbon sequestered in forests stays out of the atmosphere through avoiding deforestation and forest degradation. The concept has undergone major changes including shifting its focus from just carbon to include multiple

objectives and a shift in focus from national-level to sub-national and project levels. After 2005 both protecting biodiversity and reducing poverty were added as REDD+ objectives with even more co-benefits appended later (Angelsen and McNeill 2012).

REDD+ offers a significant promise to deliver biodiversity conservation outcomes, but only if care is taken to ensure projects provide ways to incorporate biodiversity into project design and monitoring (Gardner et al. 2012). As such, REDD+ can be considered a layered mainstreaming program. There are a family of forest carbon payments, of which REDD+ is one. In a recent survey Peters-Stanley and Yin (2012) review other forest carbon activity in compliance carbon markets – including the Kyoto Protocol's Clean Development Mechanism (CDM), the New Zealand Emissions Trading Scheme (NZ ETS), the New South Wales Greenhouse Gas Reduction Scheme (NSW GGAS) and British Columbia's (BC) Carbon Neutral Government directive – as well as voluntary carbon markets including voluntary Over-the-Counter (OTC) market and country-specific voluntary programs worldwide.

Environmental Certification

Sustainable certification, eco-certification, or environmental certification are all terms that refer to initiatives to certify that commercial producers adhere to predefined environmental and social welfare production standards (STAP 2010b). There are hundreds or thousands of different schemes that offer certification from timber to food to cosmetics to beer. All are aimed at mainstreaming biodiversity and ecosystem services in production landscapes and seascapes.

UNEP-WCMC (2011) conducted a review of 36 biodiversity standards in certification schemes across eight industrial sectors of agriculture, biotrade, carbon offset, finance, fisheries, forestry, mining, and tourism. They found a striking lack of similarity in definitions used, components of biodiversity included and approaches required. It is clear that such differences make very difficult comparisons and cross-sector learning (see also Van Dam et al. 2010).

Climate change Adaptation

Climate change adaptation has been the subject of considerable investment and analysis and attention has been paid as to how to mainstream it into development practice (Klein et al. 2007; Kok and de Coninck 2007). Both CBD (http://adaptation.cbd.int) and GEF (http://www.thegef.org/gef/climate_change) have programs to help countries develop adaptations for climate change. Countries are conducting national level reviews of climate adaptation patterns and actions (e.g.: USA: Staudinger et al. 2012; Europe http://climate-adapt.eea.europa.eu ; Australia http://www.csiro.au/Organisation-Structure/Flagships/Climate-Adaptation-Flagship/ClimateAdaptationFlagshipOverview.aspx). Additionally, a variety of

sectors are developing approaches to incorporating climate change adaptation including agriculture, forestry, transportation, water resources, urban planning, coastal zone management, energy and human health (http://www.epa.gov/climatechange/impacts-adaptation/)

Biodiversity has been layered into climate change adaptation and then into development practice through the approach called 'ecosystem based adaptation' (Perez et al. 2010). Examples of ecosystem based adaptation include developing coastal defenses to sea level rise through the maintenance and restoration of coastal vegetation, wetlands, eelgrass beds and coral reefs and conservation and restoration of forests to stabilize slopes and regulate water flows to prevent floods and landslides under heavier and more intense rainfall regimes (Munroe et al. 2011). As pointed out by Munroe et al. (2011) this approach is not novel but builds on traditional practices in natural resource management and agro-ecology that predate policy interest in climate change. Biodiversity can be mainstreamed into all of these sectors through ecosystem-based adaptation. Of particular interest after recent heavily publicized natural disasters are approaches to climate change adaptation such as 'green infrastructure.'

MAINSTREAMING AT THE GEF

Because of its importance in the CBD, mainstreaming became a significant target for support by the Global Environment Facility (GEF). GEF support allowed for the development of many different types of mainstreaming projects in addition to stimulating other agencies and governments to support their own mainstreaming work. Mainstreaming of biodiversity and sustainable use by GEF is supported as one of five objectives to help achieve the GEF-5 goal of the conservation and sustainable use of biodiversity and the maintenance of the ecosystem goods and services that biodiversity provides to society (GEF 2011). Mainstreaming is complementary to GEF direct support for the sustainability of protected areas. This work takes place in landscape and seascape mosaics that include protected areas and a variety of other land and resource uses outside of these protected areas.

Mainstreaming activities supported by the GEF promote measures to help reduce the negative impacts that productive sectors exert on biodiversity. Biodiversity-dependent production sectors and those with large ecological footprints that impact biodiversity-rich areas are targeted including agriculture, fisheries, forestry, tourism, and the major extractive industries of oil and gas, and mining. GEF's strategy to support biodiversity mainstreaming focuses on the role and potential contribution of both the public and private sector.

GEF investments in mainstreaming directly support efforts to meet the Aichi Targets. The principal strategic goal supported by these investments is Strategic Goal A: "Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society" with its four targets. But targets in

all five of the Strategic Goals are relevant to the GEF mainstreaming portfolio (GEF 2012). At the end of this paper is a brief discussion of GEF-6 and its evolving attention to mainstreaming.

Not all possible mainstreaming projects are eligible for GEF support as GEF only provides funding to meet the agreed incremental costs of measures to achieve agreed global environmental benefits. In addition, to be eligible for GEF support a biodiversity mainstreaming project must satisfy the following general criteria, amongst others (for full list see "GEF Secretariat Review for Full/Medium-sized Projects http://www.thegef.org/gef/sites/thegef.org/files/gef_prj_docs/GEFProjectDocuments/Biodiversity/Argentina%20-%20(5112)%20-%20Governance%20Strengthening%20for%20the%20Management%20and%20Pr/5112-2013-02-21-153102-GEFReviewSheetGEF5.pdf

- The participating country is eligible (for definitions of eligibility see: www.thegef.org/gef/country_eligibility) and the project is endorsed by the GEF operational focal point.
- Resources are available for the project,
- The project is consistent with the recipient country's national biodiversity strategy and action plan,
- Global environmental benefits are identified, and
- The project aligns with GEF's biodiversity strategy.

An analysis was done of mainstreaming projects that had been funded by GEF including GEF-3 (2004–2006), GEF-4 (2006-2010) and GEF-5 (2010-2014)[2]. A total of 327 biodiversity mainstreaming projects were funded in this time, totaling US$1,631,684,477 in GEF funding and US$5,249,734,936 in co-

[2] In GEF-4 and GEF-5, biodiversity mainstreaming was a specific objective within the biodiversity strategy under which projects could be classified as "mainstreaming". Projects most commonly focused on agriculture, forestry (including SFM), fisheries, and tourism. For GEF-3, biodiversity projects were categorized as mainstreaming by reviewing each biodiversity project because mainstreaming was not as formally defined in the GEF-3 strategy as it was in GEF-4 and GEF-5.

Complicating this analysis is the fact that not all GEF-5 projects have yet to come back for CEO endorsement (see ** in table) and this results in lower figures for the CEO endorsement phase. In addition, GEF-5 is ongoing thus we cannot directly compare across the three phases. Therefore, to overcome these issues, project values (in dollars) were calculated from the values provided in the PMIS at the PIF stage. Typically, these values are the same or very close to the project value at CEO endorsement or approval. Another strategy to overcome data gaps was to focus on the number of projects or median values rather than their total monetary value.

financing. The median GEF funding per project was US$3,586,364 with a median of US$12,100,000 in co-financing (Table 1).

Table 1

Total					
	Number of Projects	GEF Project Grant PIF stage	CEO endorse/approval	Cofinance PIF stage	Cofinance CEO endorse stage
GEF-3	111	519,960,416	478,074,049	2,229,777,168	2,129,061,915
GEF-4	125	458,982,993	441,220,621	2,193,013,340	2,210,116,917
GEF-5	91	652,741,068	**67,235,960	5,367,180,389	**910,556,104
All	327	1,631,684,477	986,530,630	9,789,970,897	5,249,734,936

Median					
	Number of Projects	GEF Project Grant PIF stage	CEO endorse/approval	Cofinance PIF stage	Cofinance CEO endorse stage
GEF-3	111	3,800,000	5,000,000	9,027,035	12,100,000
GEF-4	125	2,975,000	3,075,681	7,400,000	12,000,000
GEF-5	91	4,400,000	**5,320,000	17,306,603	**20,800,000
All	327	3,586,364	4,000,000	10,277,500	12,100,000

(** Starred values are missing values from >50% of projects and are only for reference.)

The GEF biodiversity mainstreaming portfolio is divided into regions and a global category. The largest number of projects was in Asia (97), closely followed by Latin America and the Caribbean (92) and then Africa (80) (Table 2). Europe and Central Asia had only 36 and the Global region had 22.

Latin America and the Caribbean had the highest overall funding levels. While there were few global projects, they are larger on average because of their work across countries. The highest median projects after Global were in Africa, followed by Latin America and the Caribbean and then Europe and Central Asia. Asia had the smallest median project.

Table 2

	Total				
	Projects	GEF Project Grant PIF stage	CEO endorse/approval	Cofinance PIF stage	Cofinance CEO endorse stage
AFR	80	421,044,976	245,429,568	3,260,231,851	1,539,632,184
Asia	97	426,029,970	257,862,015	3,376,171,191	1,988,454,190
ECA	36	100,229,210	74,001,906	309,927,013	251,362,841
Global	22	172,878,673	116,280,095	549,732,109	316,245,517
LAC	92	511,501,648	292,957,046	2,293,908,733	1,154,040,204
Total	**327**	**1,631,684,477**	**986,530,630**	**9,789,970,897**	**5,249,734,936**

	Median				
	Projects	GEF Project Grant PIF stage	CEO endorse/approval	Cofinance PIF stage	Cofinance CEO endorse stage
AFR	80	3,781,800	4,222,606	9,122,500	13,233,333
Asia	97	3,180,287	3,321,417	10,200,000	10,350,000
ECA	36	2,196,989	3,403,230	5,923,998	12,746,315
Global	22	5,604,279	5,521,942	13,036,000	13,686,436
LAC	92	4,184,749	4,250,000	12,198,327	12,945,725
Total	**327**	**3,586,364**	**4,000,000**	**10,277,500**	**12,100,000**

** Starred values are missing values from >50% of projects and are only for reference.

Examining the GEF biodiversity mainstreaming portfolio at the country level shows that 16 countries have no national or regional mainstreaming projects; 46 countries are involved in one or more regional, but no national mainstreaming projects; 39 countries have one project; 35 countries have 2-4 projects and 15 countries have a total of 122 projects. This latter category includes, in Africa: Cameroon, Kenya, South Africa and Tanzania; in Asia, China, India, Indonesia, Jordan and Vietnam; in Europe and Central Asia: the Russian Federation; and finally, in Latin America and the Caribbean: Argentina, Brazil, Colombia, Ecuador, and Mexico. The four countries with 10 or more projects are China (19), Brazil (12), and India and the Russian Federation tied with 10.

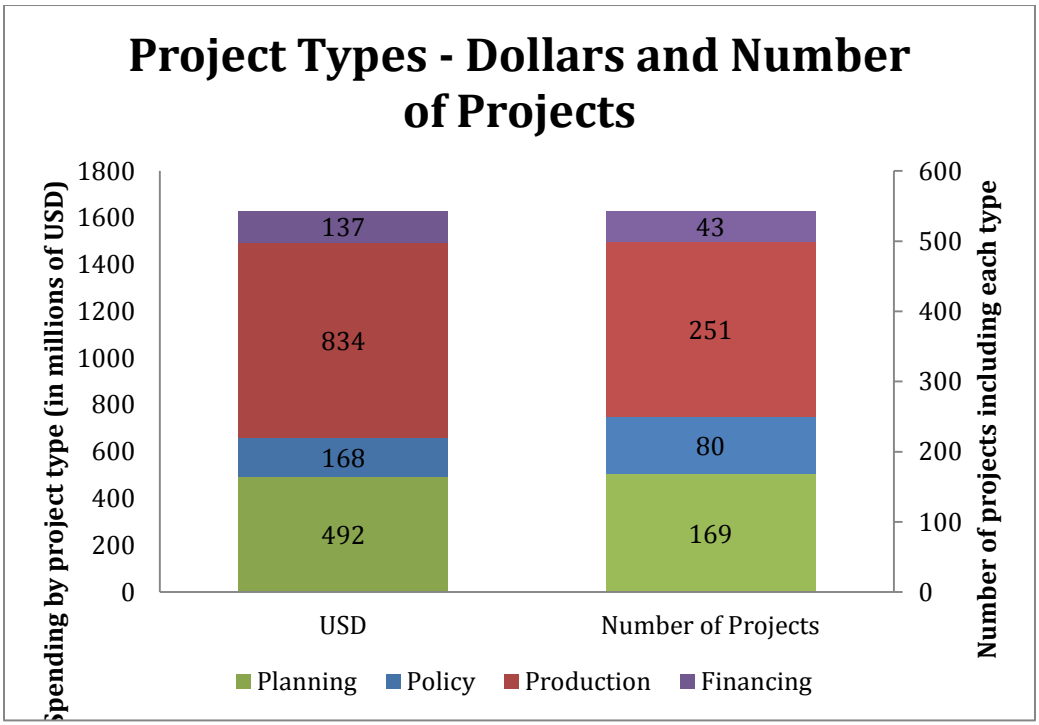
Further analysis of the GEF mainstream portfolio was done looking at "type" and "sector." [3] "Type" was defined as the type(s) of intervention used to create change, and included: Policy – National government (or large state government) policy development or assistance and capacity building; Planning – Sustainable land use planning/management and local capacity building around it; Production – On-the-ground work focused on shifting production practices (agriculture,

[3] A project could, and often did, use multiple types of interventions and work with multiple sectors. Classification was based on the mainstreaming component(s) of the project rather than the project as a whole. There had to be a substantial commitment to activities before a mainstreaming classification was made. Because projects often worked on two or more sectors and two or more types, the analysis of the data becomes more complicated. As a result, analyses of the number of projects that work on sectors or types likely include double counting; therefore, discussion should focus on the patterns rather than the absolute numbers.

forestry, etc.); and Financing – Substantive efforts supporting payments for ecosystem services or REDD.

"Sector" was defined as the practice(s) being changed or systems developed to support mainstreaming, and included: Agriculture; Forestry, Agrobiodiversity; Non-timber forest products (including all wild harvested products); Mining; Oil and Gas; Fisheries; Tourism; PES; REDD; International Certification – Support towards meeting the standards of internationally recognized certification systems (i.e. FSC, MSC, Rainforest Alliance); and National Certification – Support towards meeting standards or developing standards for nationally-based certification systems

Figure 1



Production is the largest project type, both in terms of number of projects and in terms of financing, followed by Planning, Policy and lastly, Financing (Figure 1).

Figure 2

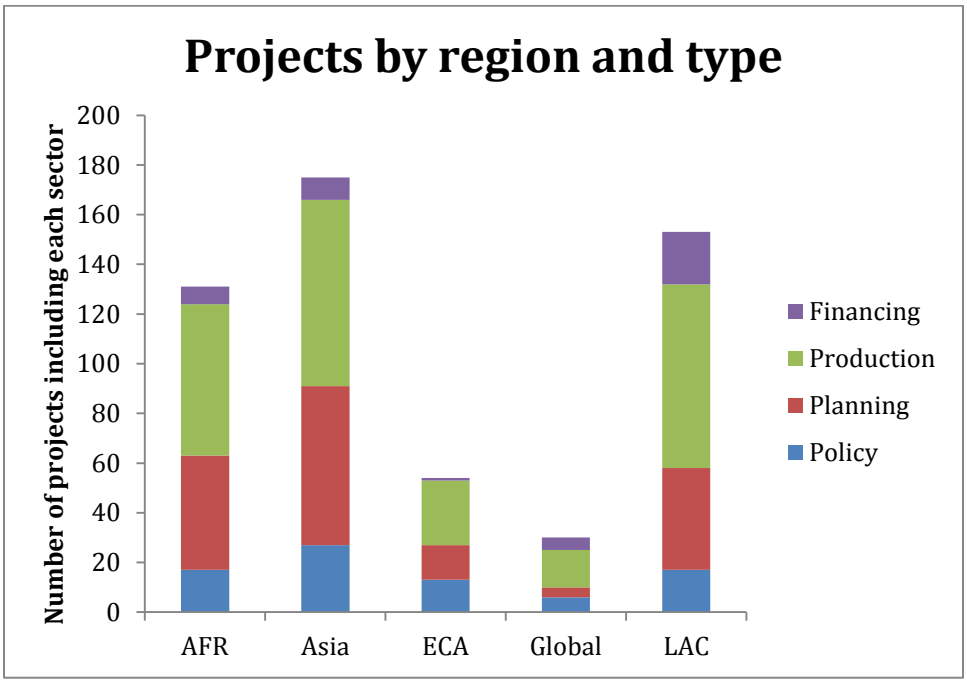


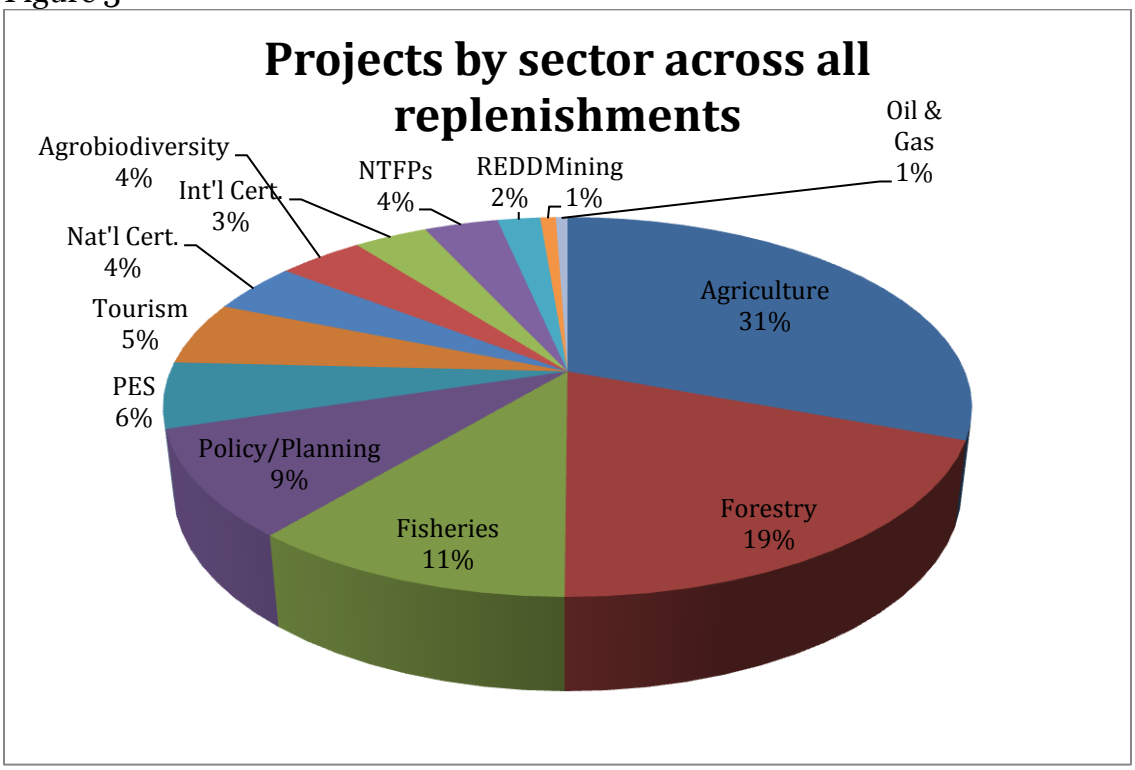
Table 3

Project Type	GEF - 3	GEF - 4	GEF - 5	Total
Planning, Production	32	25	33	**90**
Production	44	32	9	**85**
Planning	11	9	17	**37**
Policy, Production	11	14	9	**34**
Policy, Planning, Production	4	11	5	**20**
Financing	3	9	2	**14**
Production, Financing	1	7	2	**10**
Policy, Planning	5	2	3	**10**
Planning, Production, Financing		4	4	**8**
Policy		6	1	**7**
Policy, Production, Financing		2	2	**4**
Policy, Financing		2	1	**3**
Planning, Financing			2	**2**
Policy, Planning, Financing		1	1	**2**
Knowledge Management		1		**1**

Note: There is no significance to the order in which project types are listed.

Analyzing these data by Region, Asia has the largest number of projects, followed by LAC and Africa. There has been more emphasis on planning in Africa and Asia while there has been more emphasis on financing in LAC (Figure 2; Table 3).

Figure 3



Analyzing the portfolio by sector shows that Agriculture was the sector with the greatest number of projects, followed closely by Forestry, with Fisheries in third. The other eight categories made up only about a third of the total number of projects (Fig. 3).

Examples of current mainstreaming interventions
(N.B.: This section will be expanded with examples from the implementing organizations when submitted)

Current GEF investments in mainstreaming fall into four major categories

1. Promoting the incorporation of valuation of biodiversity and ecosystem services into land-use, sectoral, and spatial planning.

The first category includes activities promoting the real valuation of biodiversity and ecosystem services/environmental infrastructure to strengthen the case for government investment in mainstreaming processes and the inclusion of such natural capital values in national accounting frameworks.

(examples forthcoming)

2. Strengthening policy and regulatory frameworks: Advancing biodiversity-

friendly policies, legislation, regulations and their enforcement

The second category includes activities internalizing the values and roles of biodiversity and ecosystem services/environmental infrastructure into national and sub-national spatial and sector plans, policies and legislation relating to biodiversity values.

(examples forthcoming)

Examples of mainstreaming in the area of plans, policies and legislation outside the GEF portfolio include:

- National level plans and legislation are becoming more common due to the requirement for reporting via national biodiversity strategies and action plans. Pittock et al. (2012) review Australia's experience with national level plans focused on ecosystem services. Uganda has had experience in mainstreaming the environment and natural resources across the government sectors of agriculture, health, water and sanitation, roads and works, justice, law and order, and local government (Keizire and Mugyenyi 2006). Brazil has a national level mainstreaming project (http://www.theredddesk.org/countries/brazil/info/activity/national_biodiversity_mainstreaming_and_institutional_consolidation_project). The Philippines has reviewed its practices in environmental mainstreaming (Antonio et al. 2012), as has Zambia (Aongola et al. 2009) and Vietnam (Bass et al. 2010b). South Africa has had extensive national-level experience mainstreaming biodiversity into land-use planning and decision-making processes and has found that that systematic biodiversity planning has provided a powerful platform for mainstreaming biodiversity in planning and decision- making across a range of sectors including agriculture and other production sectors, urban and rural development, municipal development planning and environmental assessment (Cadman et al. 2010). And the UK has competed a "National Ecosystem Assessment" which is an analysis if the UK's natural environment in terms of the benefits it provides to society and continuing economic prosperity (http://uknea.unep-wcmc.org). The UK's Department of Environment, Food and Rural Affairs runs a program to mainstream biodiversity into EU Policies (jncc.defra.gov.uk/page-5324).

3. Production practice - improving production practice within sectors (agriculture, forestry, fisheries,) in production landscapes and seascapes using certification processes as positive incentive mechanisms.

Environmental Certification is an example of a tool used to mainstream biodiversity into production practice. A STAP study looked at environmental certification projects in the GEF portfolio, projects that certify that commercial producers will adhere to predefined environmental and social welfare production standards, a form of mainstreaming. It found four main threats to eco-

certification effectiveness: i) weak certification standards ii) noncompliance with certification standards; iii) limited participation, which can stem from supply-side or demand-side factors; and iv) adverse self-selection, whereby actors already engaged in, or intending to engage in, innovative or environmentally-friendly practices disproportionally participate in the program (STAP 2010). It also found that very few of the studies have attempted to measure environmental or socioeconomic impacts and conclude that "the evidence base provides, at best, weak evidence for the hypothesis that certification has positive socioeconomic or environmental impacts."

There are numerous examples of mainstreaming work in production practice outside of the GEF portfolio. Examples include:

- tourism (http://www.certificationnetwork.org),
- mining (International Council on Mining and Metals 2006; Thompson et al. 2010),
- oil and gas development (Carter et al. 2008),
- commercial forestry (Primmer 2011; Nasi et al. 2012),
- transportation (e.g. France Nature Environnement and Reseau Ferre de France n.d.),
- infrastructure (Quintero 2007),
- agricultural development (Pagiola et al. 1998; Smith et al. 2012), and
- Watershed payments (Bennett et al. 2013).

(other examples forthcoming)

4. Financing mechanisms: creating incentives through PES schemes

The fourth component supports activities designed to mobilize traditional and innovative biodiversity financing mechanisms, establishing markets for environmental goods and services, including certification, PES, debt-for-nature swaps, supply chains, access to carbon markets and other innovations.

GEF examples

- Payment for Environmental Services: In 2010 Wunder reviewed 42 GEF projects with PES either as the major objective or containing a PES component. Projects were focused in a number of different ways including global level, national level, public-private schemes, and stand-alone agreements between buyers and sellers. He concluded that GEF PES projects have been used as revenue mechanisms to support biodiversity conservation in protected areas and to compensate resource managers for off-site ecological benefits associated with biodiversity conservation compatible land-use practices (Wunder 2010). An additional review by STAP (2010) concludes that the empirical evidence is weak from the portfolio of GEF PES projects to assess the efficacy of this "new paradigm of 'conditional conservation.'"

(other examples forthcoming)

5. *Approaches to mainstreaming that are currently not funded by GEF but that might be considered for future GEF investment include:*

Behavioral change: Mainstreaming in all of its forms and settings will only work if people change their behaviors (c.f. Schultz 2001). Yet recent work shows conclusively that increasing knowledge by itself does not lead to a change in behavior (McKenzie-Mohr et al. 2012). Effective work could be done to assess what means are most effective to promote behavioral change towards biodiversity through methods such as social marketing and community empowerment (c.f. Bolderkijk et al. 2013; Wilhelm-Rechmann & Cowling 2011).

Restoration: The Rio+20 Conference set a target to restore by 2020 150 million ha of disturbed and degraded land globally (Menz et al. 2013). Several countries, including India, Korea, South Africa and Brazil have started major national restoration programs (Aronson and Alexander 2013). Beynas et al. (2009) have shown that ecological restoration can increase flows of biodiversity and ecosystem services – although not to levels of intact sites. Very large-scale restoration projects are taking place such as China's Great Green Wall and Grain for Green programs (http://www.wired.com/wired/archive/11.04/greenwall.html) to restore and maintain ecosystem services (Kolinjivadi and Sunderland 2012). With the rapid changes facing the natural world due to climate change and other factors there is ample mainstreaming opportunities with the potential to improve the condition of both biodiversity and human well-being (Hobbs et al. 2011).

Human health: Increasingly public health and development professionals are appreciating the strong links between human health and biodiversity (Campbell et al. 2012.). In 2012 both the CBD (Bridgewater et al. 2012) and the World Bank (World Bank 2012) called for more work on this dimension of health. More than 60% of human infectious diseases are caused by pathogens shared with wild or domestic animals and emerging zoonoses are a growing threat to global health (Karesh et al. 2012). The pattern of emergence is caused by a combination of globalized trade and human travel, expansion of road networks, conversion of natural ecosystems and intensification of wildlife trade (Karesh et al. 2012) – all sectors that are the object of other mainstreaming activities. Mainstreaming biodiversity into human health and then into development with a layered approach would make mainstreaming of greater importance to achieving some the Millennium Development Goals.

WHAT HAS BEEN LEARNED IN PRACTICING MAINSTREAMING?

There is a great deal more written about how and why mainstreaming should be done than about what has been learned from mainstreaming practice (e.g. Kok et al. 2010). A comprehensive summary is provided based on a 2004 workshop on mainstreaming hosted by STAP and published by GEF in 2005 (Petersen and Huntley 2005). Using material from experience in South Africa (Pierce et al. 2002), a 2004 review of the GEF Biodiversity Program (Dublin and Volonte 2004 in Petersen and Huntley 2005), and the results of the workshop the authors stated that successful mainstreaming projects occurred in situations characterized by:

1. The incorporation of biodiversity considerations into policies governing sectoral activities,
2. The simultaneous achievement of gains in biodiversity and gains in an economic sector (the "win-win" scenario),
3. Sectoral activity being recognized as based on, or dependent on, the sustainable use of biodiversity, and
4. Situations where sectoral activities result in overall gains for biodiversity exceeding biodiversity loss.

They concluded that work on mainstreaming in single sectors needed to be complemented by mainstreaming work in cross-sectoral dimensions like finance and health. Many mainstreaming projects have been directed at the local level (e.g. CBD 2008), yet local decisions are conditioned by national and international policies including development assistance, trade, climate and policies of international financial institutions (Kok et al. 2010).

Looking across a set of mainstreaming projects that report recommendations (Cowling et al. 2008; Aongola et al. 2009; Dalal-Clayton and Bass 2009; Cadman et al. 2010; Bass et al. 2010a; Bass et al. 2010b; Kosmos et al. 2012; Maun Workshop, in Roe in press) a list of facets of successful projects emerges that includes:

- Presence of enabling conditions/prerequisites: democratic and accountable governance, awareness and knowledge, organizational and institutional capacity, scientific knowledge (especially rich GIS systems), political will, enabling policy framework,
- Identification and involvement of all stakeholders in an iterative, inclusive fashion,
- Identification and engagement of leaders or champions for biodiversity, development, finance and civil society,
- Identification of the problem or development issue – focusing on perceived problems and felt needs. Identifying exactly what needs to be mainstreamed and into what?
- Identification of the element of biodiversity that is critical to the development issue (e.g. species, ecosystem service),

- Collection of information to make the "business case" for mainstreaming in a clear and transparent fashion,
- Identifying what risks and opportunities the biodiversity element poses to the development need?
- Identification of the key policy measures and institutions that are essential for regulating the identified problem,
- Looking for windows of opportunity: elements external and internal to the sector that catalyze awareness of the need for mainstreaming and present an opportunity to act,
- Identification of and implementation of a variety of approaches and mechanisms to achieve the mainstreamed biodiversity/development outcomes,
- Using existing implementation frameworks when possible,
- Striving for "pull" rather than "push" approaches,
- Creating a learning and listening process and develop regular means of communication and consultation,
- Allocating time as mainstreaming is a long-term process that must proceed on many tracks,
- Developing and implementing monitoring and evaluation methods that allow learning and modification of actions as the process proceeds, and
- Expecting failures which should be treated as opportunities to learn and improve

Pierce et al. (2002) in a review of mainstreaming in South Africa point out that mainstreaming may either arise gradually or suddenly in response to rapidly emerging enabling conditions. Exemplifying the latter Sandwith observed (jn Marris 2007) that "mainstreaming works well in a revolutionary policy environment, such as South Africa."

The experience with PES in particular is much like that of mainstreaming: much written, many projects started, but very limited information available on what works and what doesn't (Wunder 2010). One review of 36 PES projects (Kissinger et al. 2013) found that market mechanisms were an imperfect way of pricing the value of ecosystem services, particularly in the absence of enabling policies. They also found that national-level programs such as REDD+ and project-level programs differed in their ability to deploy a full range of incentives, policies and regulatory interventions. Most REDD+ projects are in their early stages and therefore not many lessons appear to be available.

A WWF analysis of progress towards the European Union's biodiversity mainstreaming target (2008) found five key problems:

- the limited streamlining of environment into EU external policies,
- limited share of environmental activities in overall development cooperation,
- insufficient harmonisation among bilateral donors and multilateral actors,
- inconsistent use of available instruments to assess environmental impact of different activities, and

- lack of country ownership: environmental stakeholders are often not represented at the negotiating tables where PRSPs, CSPs or bilateral aid programmes are being discussed.

CBD is in the process of developing a 'best practices' guide for mainstreaming (http://www.cbd.int/development/training/guides/) that will provide further advice. In 2009 CBD sought advice from development agencies on biodiversity mainstreaming (CBD 2009). They enumerated a set of challenges (drawn from Roe in press):

- Insufficient evidence (case-studies and success stories) on the advantages of mainstreaming biodiversity to reach development goals;
- Difficulties in the in the formulation of development outcomes incorporating biodiversity in programmes;
- Results-based management is complex since biodiversity benefits are dispersed in space and time while development projects are often funded for a short period of time and decisions at the national level are often based on short term returns;
- Difficulties to raise awareness and to ensure engagement from the private sector;
- Lack of effective measurement of financial flows for biodiversity;
- Lack of systematic utilisation of economic valuation tools - both at the national and at the donor agencies levels;
- Finding biodiversity champions within ministries associated to development sectors or in ministries of finance and planning to make the case for biodiversity's critical input into their sectors;
- Current trends in funding moving away from conservation make mainstreaming activities more difficult to support

What is clear is that there is a very limited peer-reviewed literature on experience from implementing mainstreaming activities. There is little evidence that the mainstreaming projects funded through GEF have produced peer-reviewed articles written either by the project implementers or by others. However, there is no clear way to determine that such articles, or even articles in the gray literature, have been produced.

FURTHER LESSONS: TRADEOFFS, AND THE QUESTION OF PROOF

The conviction that win-win solutions exist in a world of complex biodiversity and social problems is one shared by many conservation initiatives such as integrated conservation and development projects and community-based wildlife management. In a thorough review McShane et al. (2011) conclude that in practice most apparent win-win programs involve trade-offs between desired conservation outcomes and desired social outcomes. Because these trade-offs were not expected and therefore not negotiated for the results can often be disappointment and anger. They advocate for advance discussion and

negotiation that addresses the full range of values and dynamics that shape project outcomes and provide a framework for such engagement.

Most mainstreaming activities are predicated on a belief that they are win-win – a win for development and a win for conservation. This belief is based on the assumption that markets, if properly informed and incentivized will protect biodiversity. Market-based instruments are seen as having great potential by some (Kinzig et al. 2011) but also raise serious concerns for others (Lockie 2013). Development of market based initiatives (MBI) such as pollution taxes, cap-and-trade schemes, eco-certification and payment for ecosystem services are promoted as economically efficient, targeted solutions to difficult coupled environmental and social problems (Lockie 2013). Pirard (2012) provide a useful taxonomy of these MBIs, categorizing them into regulatory price signals, Coasean-type agreements, reverse auctions, tradable permits, direct markets, and voluntary price signals. Their use is based on the assumption that, though markets are arguably the ones that have created many of the problems, it is markets that can provide the solutions.

In the case of mainstreaming it is unclear if use of MBIs will result in support only for those components and attributes of biodiversity that are of direct interest to humans. This represents a major concern and one that is best addressed by pairing mainstreaming approaches with direct support for protected areas.

It is unclear if implementation of mainstreaming projects has faced difficulties similar to other MBIs. However, there is already discussion that PES programs may be headed in that direction. PES programs have increased dramatically in recent years, perhaps because they are the only specific MBI to be mentioned in the COP10 report from Nagoya (Lapeyre et al. 2011). The concept of PES has become the focus of international conferences, new journals and new governmental and non-governmental funding streams. But their implementation has also raised quite a bit of concern that centers around the dangers of reducing the complex and multi-faceted benefits humans derive from ecosystems to a single exchange-value measure (c.f. Muradian et al. 2013).

It is hard to determine what has been learned from PES programs as they have not been subject to careful evaluation (Muradian et al. 2013; and see discussion above). In fact the conclusion reached by those interested in assessing the efficacy of PES is that, unfortunately, due to a heterogeneity of methods, and lack of clear experimental design and data collection, very little can be concluded about their effectiveness (Miteva et al. 2010; Lapeyre et al. 2012).

This concern about PES applies to the family of MBIs as a whole. A review of the field of MBIs led Pirard (2012) to conclude that as a whole they "cannot be said to be cost-efficient, risky, inequitable, or capable of revealing information to reach a social optimum and better environmental management." Furthermore, they are based on a set of unacknowledged "assumptions about the distribution of benefits arising from ecosystem service provision, the rights and duties associated with

resource access, and the fitness for purpose of various policy instruments" Lockie (2013).

A final tradeoff to consider is that between biodiversity and ecosystem services. The relationship between these two concepts is not at all straightforward (Ingram et al. 2012) despite the common assumption that ecosystem services programs must also conserve biodiversity. Biodiversity has key roles to play in underpinning all levels of ecosystem services and can itself be an ecosystem service (Mace et al. 2012). Greater clarity is needed in determining the effects of mainstreaming activities on biodiversity and ecosystem services and possible trade-offs between the two.

It is clear that greater care needs to be brought to the design, implementation, and assessment of mainstreaming projects and the need to use this learning to inform policy-making (Lapeyre et al. 2012). Ferraro (2012) argues that "as one of the largest multilateral donors for environmental programs, the GEF should be a leader in the production of evidence. With multi-nation investments in common environmental policies and programs, the GEF is uniquely placed to generate credible evidence about improving the performance of environmental programs. Such evidence would not only increase the return to GEF investments, but it can also catalyze broader investments and actions by making the connection between environmental investments and the effects of investments clear to general audiences." To advance this agenda Ferraro has proposed a set of experimental project designs that would help enhance the assessment and learning of, and by, GEF projects.

Ferraro's (2012) call is echoed by Miteva and colleagues (2010) who call for a program of research that "seeks to measure how programme impacts vary by socio-political and bio-physical context, to track economic and environmental impacts jointly, to identify spatial spillover effects to untargeted areas, and to use theories of change to characterize causal mechanisms that can guide the collection of data and the interpretation of results." Billons of dollars have been spent on biodiversity outcomes but there is very little robust, credible evidence on the efficacy of these actions (Miteva et al. 2010).

However, mainstreaming is not a controlled experiment but rather a social experiment in changing the value structures of institutions and individuals with vital consequences for the natural world and the humans who rely on it. As such it may not prove amenable to rigorous tests but it certainly is a field deserving of more systematic inquiry.

MAINSTREAMING IN A CHANGING WORLD

Mainstreaming is an approach that is difficult to bound. The general concept of working to inculcate conservation values into development and thereby modify development policy has been pursued for many years under many names. It has

clearly not had the sort of success that was needed as witnessed by the fact that threats to biodiversity are only increasing with interventions not keeping pace (Butchart et al. 2010).

The world is changing rapidly and the conditions in place when many approaches were developed are now, or soon will be, very different. Climate change with its unknown effects is one of the most important changes that conservation and development planners are working hard to address (e.g. Groves et al. 2012). Much of this work is going to have to be done outside protected area boundaries. However, many other new developments are anticipated in the next decades including the rise of synthetic biology (Redford et al. 2013), planting of genetically modified crops, changed markets and business models (Laird and Wynberg 2012).

Change is also happening politically and socially, as exemplified by the rapid transformations in Southern Africa, Eastern Europe and the Middle East. Huntley (2012) describes a process of 'strategic opportunism' that matches unpredictable funding sources and unexpected opportunities to unplanned but fortuitous timing of events. The approach is best exemplified by the Working for Water project (van Wilgen et al. 2012) that took advantage of rapid socio-political change to mobilize a massive mainstreaming program using a tool kit of legal, social and political interventions implemented by a mix of 'mainstreaming champions'. As such the timing and nature of its application is unpredictable – it might be more an art than a science.

GEF-6 and Mainstreaming in the near future

Mainstreaming will continue to play a key role in the GEF-6 replenishment. The Draft GEF-6 Biodiversity strategy (2013) provides a definition for mainstreaming that is consistent with previous GEF definitions:

> a set of actions that internalize the goals of biodiversity conservation and sustainable use into economic development and production sectors that impact biodiversity.

The strategy further lays out the objective of mainstreaming as enabling "biodiversity to persist across the entirety of the landscape and seascape by embedding biodiversity conservation and sustainable use in decision making at all levels of society, and particularly the private sector."

The GEF-6 biodiversity strategy draft, current at the time of writing, is composed of eleven Core Programs that directly contribute to achieving the objective through a continuum of response measures to the drivers of biodiversity loss across the entire landscape and seascape. The Core Programs address habitat loss, overexploitation, and invasive alien species through a combination of direct conservation, threat-reduction, sustainable use, and mainstreaming

interventions. In addition, the strategy addresses the most critical underlying driver of biodiversity loss; the failure to account for the full economic value of ecosystems and biodiversity, through systemic biodiversity mainstreaming approaches that have high potential for far-reaching and sustained impact.

National governments have committed themselves to continuing to work on mainstreaming. The CBD's Strategic Plan for Biodiversity 2011-2020 (https://www.cbd.int/sp/) includes a Strategic Goal to "address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society." And parties to the CBD are in the process of revising their National Biodiversity Strategies and Actions Plans (NBSAPs) – a potentially valuable window of opportunity for promoting mainstreaming and emphasising the opportunities that biodiversity can provide for development (Roe in press).

A recent TEEB study (2013) estimates that major business sectors have unpriced natural capital costs totaling US$7.3 trillion dollars, equating to 13% of global economic output. The majority of these unpriced natural capital costs are from greenhouse gas emissions, water use and land use. We must realize the potential of mainstreaming to bring about full accounting and modify the human behavior entrained by centuries of institutions and markets blind to their reliance on nature. Biodiversity and ecosystem services are not a luxury nor an externality but a vital part of human life on earth.

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