THE ECONOMICS OF LAND DEGRADATION

ELD CAMPUS
Module:

Environmental economics and ecosystem valuation – the rationale behind

www.eld-initiative.org
#ELDsolutions

Main authors/compiled by:
Hannes Etter, Silke Schwedes, Julia Hebbrecht

Reviewed and edited by:
Richard Thomas

This document was published with the support of the Deutsche Gesellschaft
für Internationale Zusammenarbeit (GIZ) GmbH on behalf of the German Federal Ministry
for Economic Cooperation and Development (BMZ)

Photography:
GIZ (front and back cover); Britta Radike/GIZ (pg. 7); Sebastian Koch/GIZ (pg. 12); Klaus Wohlmann/GIZ (pg. 13)

Visual concept: MediaCompany, Bonn Office
Layout: kippconcept gmbh, Bonn
Bonn, September 2019

For further information and feedback please contact:
ELD Secretariat
Mark Schauer
c/o Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
Friedrich-Ebert-Allee 36
53113 Bonn, Germany
E info@eld-initiative.org
I www.eld-initative.org

Suggested citation:

ELD Initiative (2019). ELD Campus.
Module: Environmental economics and ecosystem valuation – the rationale behind.

Available from www.eld-initiative.org

Module:

Environmental economics and ecosystem valuation – the rationale behind

September 2019

www.eld-initiative.org
#ELDsolutions

Abbreviations

EIA	Environmental impact assessment
EUR	Euros
FAO	Food and Agriculture Organisation
GPD	Gross Domestic Product
LUCC	Land Use/Cover Change
MOOC	Massive Open Online Course
SDG	Sustainable Development Goal
SLM	Sustainable Land Management
TEEB	The Economics of Ecosystems and Biodiversity
USD	United States Dollars

Table of contents

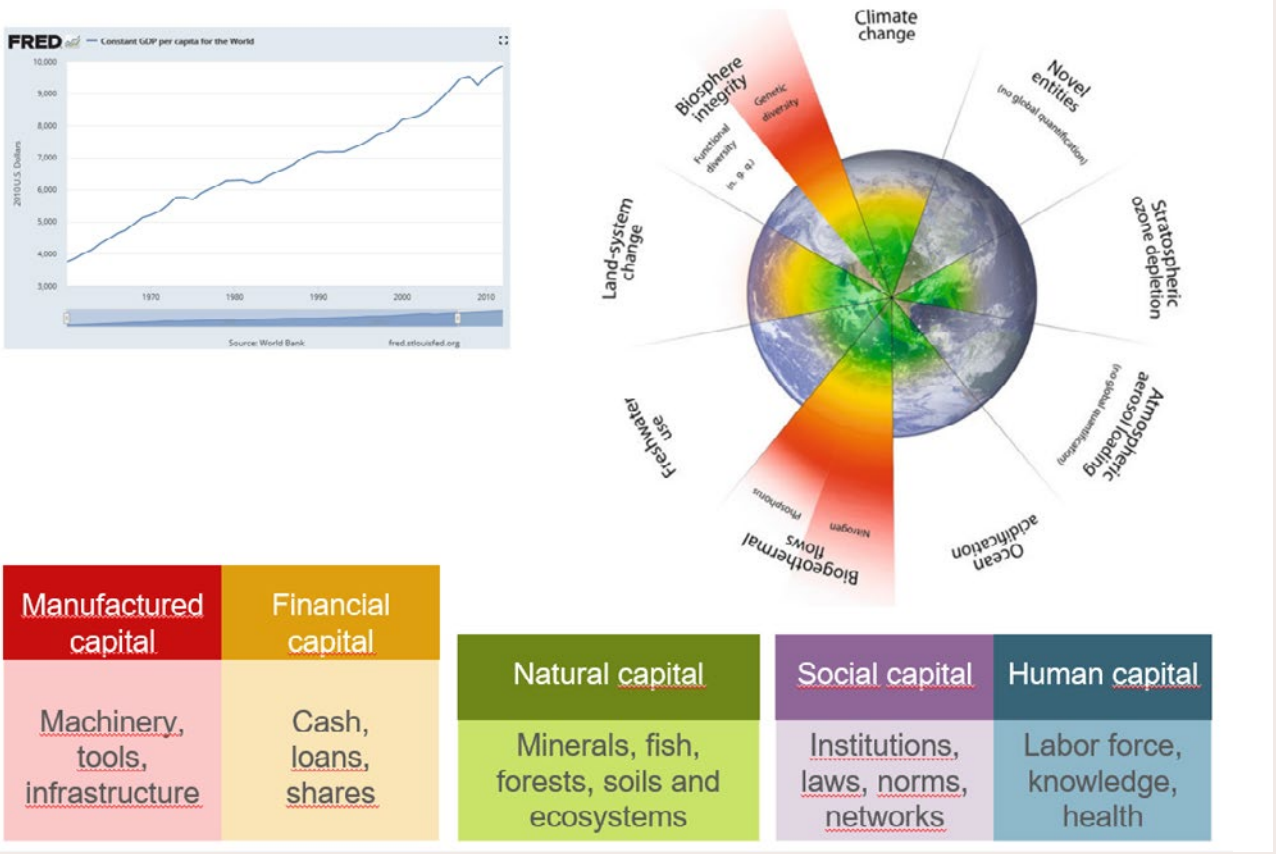
01 Value, wealth and wellbeing – What is the role of nature in economies?

"If you can't measure it, you can't improve it."
P. Drucker

Scientists have long identified land as threatened by degradation. They have warned policy-makers and stakeholders about the negative consequences of overexploiting or destroying land. The previous module has showcased the devastating ecological, but also social impact of continuously degrading land and other natural resources. However, raising awareness on potential consequences has so far not been enough to induce a change in stakeholder behaviour and land is still subject to overexploitation and degradation. This is partly because scientists quantify the changes affecting the ecosystems, but do not quantify how much these changes affect the things people consider valuable in their daily lives. For instance, intensive

FIGURE 1

Limitation of the GDP to measure wellbeing
Sources: Constant GDP per capita for the World (figure on the left, FRED Economic Data); Planetary boundaries (Lewandowski et al. 2018, fig. 2.4)



agricultural production may lead to soil degradation, but may help to create agricultural job opportunities, which is often viewed as desirable in regions where job opportunities are scarce. In this specific example, the negative impacts on land are beneficial to people by creating livelihood opportunities, at least in the short term. The **long-term impacts from destroying the natural resources**, which will also lead to losses of food and jobs, **are often ignored** (Quillérou 2014, Chap 1.1).

An underlying reason for this lies in the general perception of wealth and respective measurement frameworks: In most countries, national progress is defined by the growth of **Gross Domestic Product** (GDP) as the prime development indicator. Originally introduced in the post-World War II setting, where reconstruction and continuous growth was essential to wellbeing, the GDP still serves as one of the most important key performance indicators for a country's state (Dickinson 2011). However, the GDP fails to recognise important aspects of a country's economy, especially the role of nature (see figure 1). Current measurement and management frameworks such as the system of national accounts have been established on the basis of the GDP and ecological degradation remains invisible. Consequently, decision-makers tend to put a stronger emphasis on interventions that can be measured in economic and financial terms.

To overcome this bias, it is necessary to reframe the role of nature in our wellbeing from an economic viewpoint. Economic arguments can help to translate complex processes such as land degradation into the language of decision makers and facilitate the implementation of better land use in policies. This module will therefore introduce the economic perspective of land use.

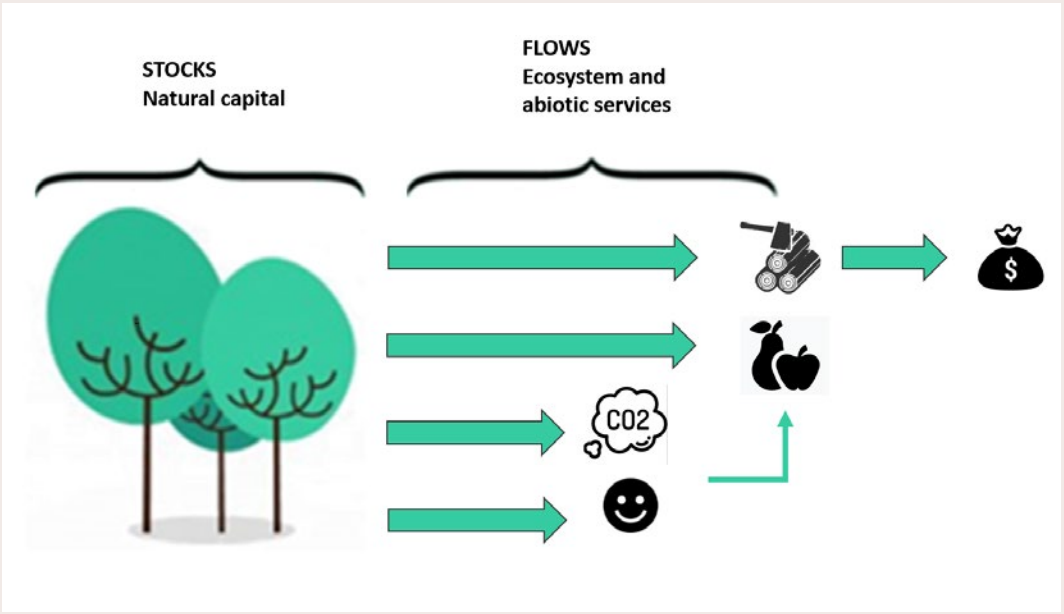
02 Terrestrial natural capital – environmental goods and services from land

Our economic activities are embedded within our natural environment and represent a social-ecological system. Ultimately, all things that we as individuals and society value (i.e. by paying assigned prices or recognise as important to us personally) are relying on a functional natural environment. In order to fully understand and incorporate the importance of nature in our decisions, it is important to derive a holistic and thorough understanding of the different contributions of ecosystems to our society. In order to translate ecological and biological contributions into the realm of economic decision-making, the concept of natural capital has been introduced by environmental economists (see definitions and figure 2).

It is important to clearly distinguish between the assets (stocks) and the flow of benefits. The natural capital as an asset produces the ecosystem services within a given timespan, depending on the quantity and quality of the asset. It is like money in a saving account. The more the amount of money in the account increases, the more interest will be generated within the future. If money is withdrawn and spent, it will reduce the future dividend. Ultimately, these components present a logical structure, which highlights the process behind the creation of economic value by the ecological sphere in the economic sphere.

FIGURE 2

Natural capital ecosystem services
Source: Hannes Etter



What is natural capital? What are natural capital stocks and what are ecosystem services?

Natural capital: The World Forum of Natural Capital defines it as the elements of nature that produce value (directly or indirectly) to people, such as the stock of forests, rivers, land, minerals and oceans.

Natural Capital stocks: "... the land, air, water, living organisms and all formations of the Earth's biosphere that provide us with ecosystem goods and services that are imperative for survival and well-being. Furthermore, it is the basis for all human economic activity." (IISD)

Ecosystem services are "the contributions of ecosystems to benefits used in economic and other human activity" (UN et al 2014). Environmental services can be groundwater recharge, flood control, water purification, timber harvest and aesthetic or cultural benefits.

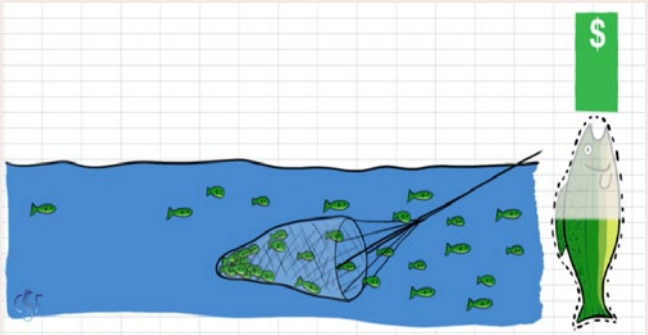
Denoting nature as capital is an **economic metaphor** to **acknowledge the value of nature for economic production and well-being of people**. In economics, capital typically is defined as "a stock that yields a flow of valuable goods or services into the future". Nature – like other forms of capital, e.g. manufactured capital and human capital – provides people with goods and services and is an indispensable factor to production. Particularly in natural resource-based industries, the increasing scarcity of **natural resources** has become a major **limitation to economic activity**. Denoting nature as capital thus **also acknowledges the scarcity of a healthy and functioning environment (figure 3)**.

A forest ecosystem, for example, can be considered a natural capital asset, which is deemed important since it produces wood, which can be sold as building material. The provision of wood can be considered a service and is taken into account when estimating the importance of such forest. However, there are numerous other uses of the same forest, which might not be reflected in the price for the wood resources alone, such as the sequestration of carbon or the opportunity for people, who enjoy hiking through the woods. In order to make a sound management decision, i.e. to replace the forest with a shopping centre that might generate public tax returns, all of the previous services to society should be weighed against the benefits of the alternative use. In order to fully understand the benefits of sustainable land management (SLM), the costs and benefits of the management strategy need to be considered:

Benefits of SLM = Σ (ecosystem services under management scheme) – Σ (input costs of management scheme)

FIGURE 3

Loss of natural capital limits economic activities – examples of overfishing and unsustainable land use

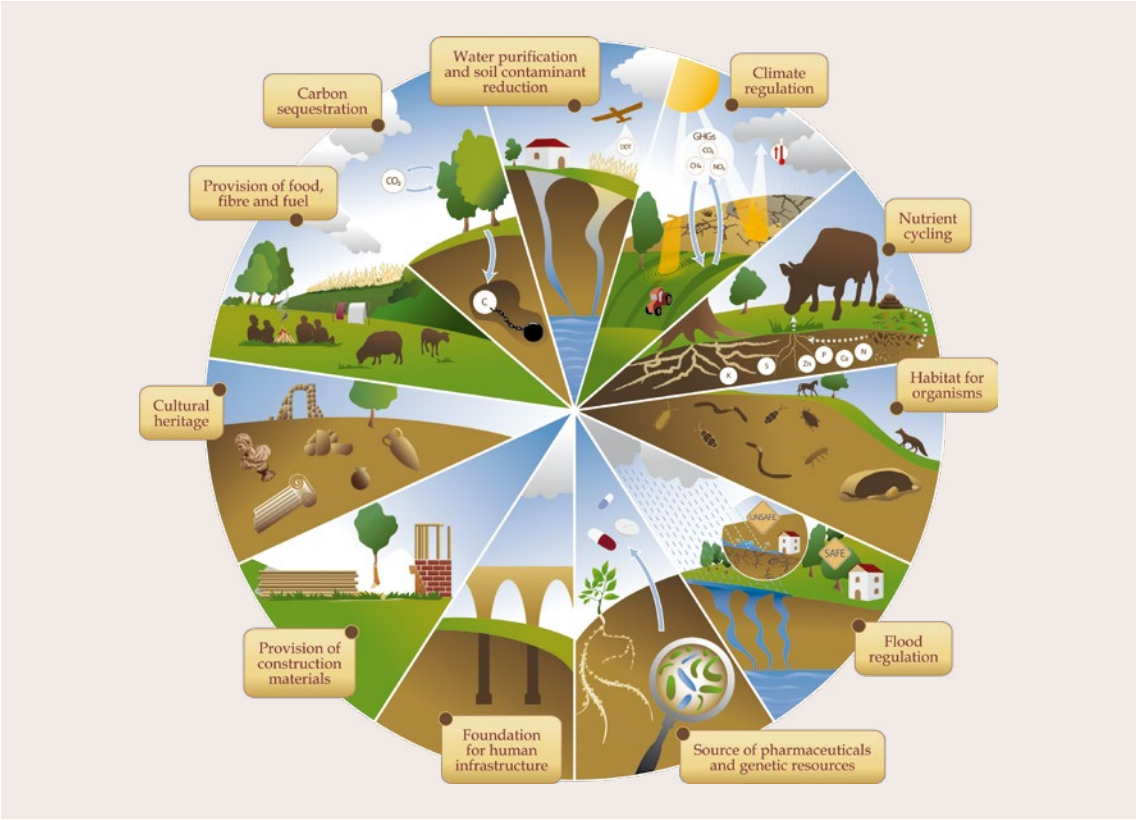


Source: Conservation Strategy Fund, Video 12 "Conducting an Economic Analysis"

Source: GIZ-ValuES

FIGURE 4

Environmental services linked to land
Source: FAO 2015



Land can degrade because of soil erosion, soil nutrient depletion, salinity, overexploitation such as overgrazing or over-extraction of forest timber, or pollution. However, land plays a critical role in food and fibre production, timber production, the recharge of groundwater, flood control, water purification, sustaining wildlife populations for wildlife-based tourism, and additionally have aesthetic and/or cultural values. A full overview of the different land-based ecosystem services provided by soil, the natural capital assets, are displayed in figure 4.

When the land-based natural capital degrades, the functions and related services are reduced, which is associated with different costs. For example, the decrease in water quality from increasing pollution near cities requires water treatment and thus has a cost to society. Likewise, accrued sensitivity to extreme events such as floods requires the construction and maintenance of specific infrastructures. For an economist, land is therefore an environmental good, which provides environmental services that in turn help sustain human life and livelihoods (Quillérou 2014, chap. 1.1).

Understanding the costs and benefits of nature is often complex and hard to communicate. In order to make understandable, a common metric is required, which resonates with the reference systems of different users. Therefore, monetary expressions represent a helpful vehicle to make them comparable. The value expressed in money is measured, as to reflect society's preferences for the environmental goods and services provided. For non-marketed goods and services – i.e. goods and services that are not exchanged on a market – economists have developed valuation methods to estimate their value to society as a whole. These economic values help quantify trade-offs between different goods and services, for instance between agricultural production and game park tourism revenue.

It is important to note that physical and economic benefits from land do not always overlap (an example for a physical benefit is water purification). There are cases where environmental degradation can lead to the creation of new economic activities. In other words, a **loss of physical benefits can be associated with an increase in economic benefits**. For instance, increased water pollution can lead to the development of a water treatment infrastructure and job creation. However, increased water pollution corresponds to a decrease in **natural capital**, but it leads to an increase in **physical capital** (water treatment facilities) and **human capital** (jobs). Another typical conflict occurs in forest systems between increasing wood yields and maintaining biodiversity. In agricultural systems, maximising crop production is often done at the expense of biodiversity, soil and water functions as well as carbon sequestration. When the provision of one ecosystem service is reduced as a consequence of increased use of another, this is referred to as trade-off.

What are trade-offs?

A trade-off is a situational decision that involves diminishing or losing one quality, quantity or property of a set or design in return for gains in other aspects. In simple terms, a trade-off is where one thing increases and another must decrease.

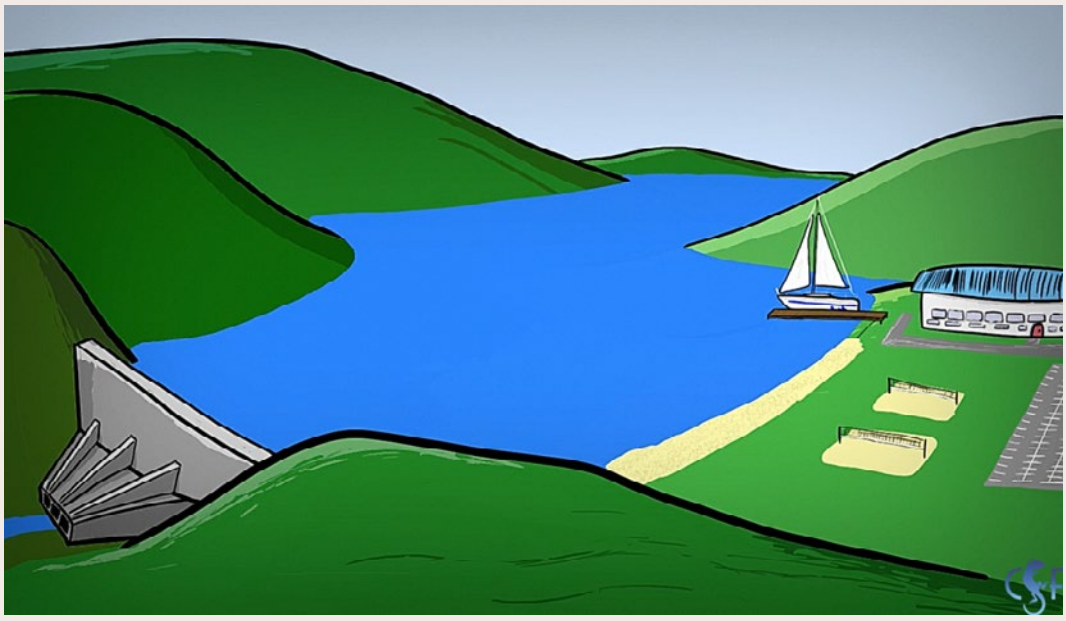
Wikipedia 2019: Trade-off

Navigating the inherent trade-offs between provisioning, regulating, cultural, and supporting ecosystem services, and doing so in a way that does not compromise natural capital needed to provide services in the future, is critical for sustainable resource management.

Cavender-Bares et al. 2015

FIGURE 5

Trade-off between energy production and tourism
Source: Conservation Strategy Fund, Video on „Cost-Benefit Scenarios“



When facing trade-offs, a reasonable approach is to cluster the relationships between the effects on the different ecosystem services into three categories, “trade-off”, “synergy” or “no-effect”. In order to adequately understand the consequences of the trade-offs, a coherent understanding of the sustainability implications is required: If the decrease in natural capital is offset by the increase in physical and/or human capital, some economists consider the system sustainable, because the total level of capital is maintained, even if there is a decrease in natural capital. In the economics literature, keeping the total level of capital (natural, physical and human) constant is referred to as “weak sustainability”, whilst keeping the level of natural capital constant is referred to as “strong sustainability”. It is suggested to focus on decisions that incorporate the strong-sustainability notion in order to follow to precautionary principle and reflect the concept of irreversibility. The destruction of a forest ecosystem for example is difficult to compensate with technical solutions or financial resources. Measuring these trade-offs helps identify the best land use from the point of view of society as a whole and provides a way to arbitrate conflicts. For example, it may not be worth investing in restoring productivity of existing agricultural land, but rather reforest this land and capture revenues from carbon storage or wildlife-based tourism activities.

Hidden benefits or costs (externalities) of land use

"Nowadays people know the price of everything and the value of nothing."

Oscar Wilde

Monetary expressions are widely distributed in our society and the price for goods and services help us to navigate our everyday trade-offs. In economics, a **price is determined by the market as the result of interaction between demand and supply**. Price reflects the value allocated by society to this good or service under specific market conditions. The **economic value of a good or service reflects the preferences that society as a whole has for this good or service**. When talking about economic value, we typically take the perspective of society as a whole, with or without trade, while prices impact more strongly on individual decisions.

However, markets do not always exist or may be imperfect. This leads to a discrepancy between economic value and price. Also, market prices might not reflect the full economic value to society as a whole. When this is the case, economists

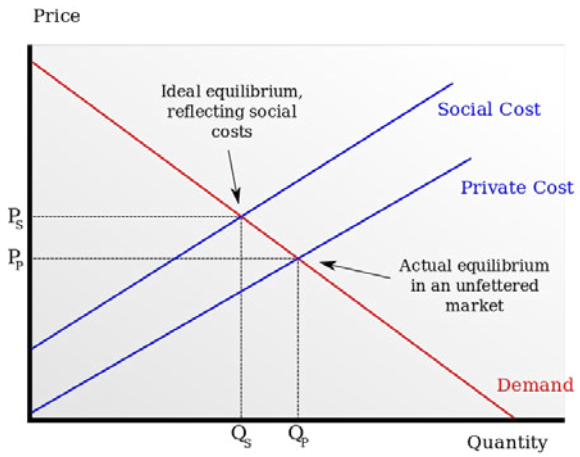
What are externalities?
Which externalities typically occur from (un)sustainable land use?

In general, an externality is defined as the costs suffered from a third party as a result of an economic transaction. In theory, producers of goods, i.e. a farmer, need to consider all of their costs when designing the price for the goods they sell. These include labour costs and prices of other inputs. In economic terms, pollution of the environment would also be a cost. Agricultural production often leads to the deposition of nitrogen in groundwater resources, which reduces the overall quality of the water. However, since water is a public good and not owned by the farmer, the farmer does not need to take this into account for pricing his produce. Therefore, the price will not reflect the overall costs of the production. Consequently, the farmer will be able to sell his product to a lower price with higher quantities, or receive higher revenues as reflected. The costs related to the pollution of water are "externalised" to the society.

FIGURE 6

Demand curve with external costs

Source: Wikipedia 2019 Externality

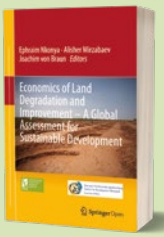


talk about **market failures**. Market failures typically arise because of incomplete information, inefficient property right allocations or what are known as **externalities**. Externalities are often related to environmental goods and result in overexploitation or inadequate management decisions, since the results remain economically invisible.

When estimating the true economic value of land and its services within the framework of an ELD study, the perspective of society as a whole is taken. This view integrates a holistic perspective and thus informs policy-making and enables stakeholders to make the best possible decisions for the entire society and in the long-term.

Externalities can be internalised (i.e., 'corrected for') if all costs and benefits associated with production are borne by the supplier or consumer. This results in increased prices for the service traded when externalities are negative, and decreased prices when externalities are positive. Economic instruments such as taxes and subsidies can be used to correct for externalities and make prices more closely match the 'true' economic value to society as a whole (Quillérou 2014, Chap.1.3).

Several attempts of calculating true costs of land degradation and true value of sustainable land management practices have already been undertaken by the ELD Initiative and other institutions like The Economics of Ecosystems and Biodiversity (TEEB). The results are summarised in the boxes hereafter.

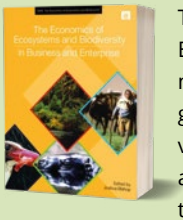


According to a study by Nkonya et al. (2016) land degradation at a global level has a cost of 300 billion USD/yr. This cost results from land use/land cover change (LUCC) and from the use of management practices, which lead to land degradation on cropland and grazing land. The study also highlights that investing into sustainable land management practices can help save costs. Indeed, each dollar invested into land rehabilitation can reach a value of up to five dollars over a period of 30 years (Nkonya et al. 2016, p.1 and p.5).

Source:
https://www.springer.com/us/book/9783319191676

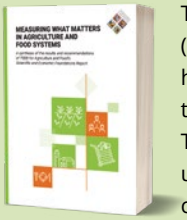
Estimations of the global costs of land degradation were also provided in the ELD The Value of Land report (2015). For this report, a team of experts assessed the costs of ecosystem services losses resulting from land degradation. Based on land degradation datasets from Haberl and from Imhoff and their correlation to data on ecosystem services values for different terrestrial land cover types, the loss of ecosystem services values were estimated to range between 6.3 and USD 15.2 trillion USD/yr. This is equivalent to USD 870 to 1,450 per person within the same time frame (ELD Initiative 2015, Value of Lands, p.50-61 and p.V)

Source:
http://www.eld-initiative.org/index.php?id=111
http://www.eld-initiative.org/fileadmin/pdf/ELD-main-report_en_10_web_72dpi.pdf



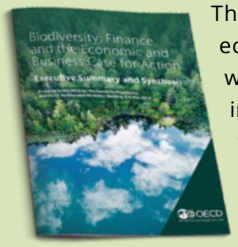
This TEEB in Business and Enterprise 2012 report makes a strong case for integrating biodiversity into private sector business plans and core activities around the globe. The report reveals considerable recent growth in eco-certified products and services, growing consumer concerns for sustainable production, and shows how biodiversity can provide a substantial business opportunity in a market that could be worth USD 2-6 trillion by 2050. It makes seven key recommendations for businesses, and calls on accounting professions and financial reporting bodies to develop common standards to assess biodiversity impacts, and develop new tools for this purpose.

Source:
http://www.teebweb.org/our-publications/teeb-study-reports/business-and-enterprise/



The most recent TEEB report (2018) also sheds light on hidden costs and benefits in the current food system. Today the most commonly used metric to assess agricultural productivity is yield per hectare. However, this metric does not take into account most costs and benefits related to agriculture's impact on the environment, health, and society as a whole. One example are costs related to land degradation. The current system has led to the degradation of 33% of the Earth's surface through erosion, salinization, compaction, acidification, or chemical pollution of soils (TEEB 2018, Promotional Toolkit, p.5-6).

Source:
http://teebweb.org/agrifood/wp-content/uploads/2018/10/Layout_synthesis_sept.pdf



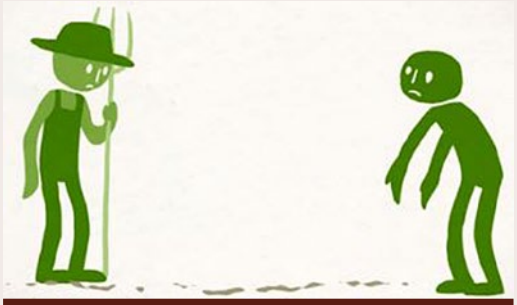
This recent report on the economics of biodiversity was prepared by the OECD in 2019. It highlights the fact that ecosystem services delivered by biodiversity, such as crop pollination, water purification, flood protection and carbon sequestration, are vital to human well-being. Globally, these services are worth an estimated USD 125-140 trillion (US dollars) per year, i.e. more than one and a half times the size of global GDP. The costs of inaction on biodiversity loss are high. Between 1997 and 2011, the world lost an estimated USD 4-20 trillion per year in ecosystem services owing to land-cover change and USD 6-11 trillion per year from land degradation. **The opportunities for restoration are vast. Globally, up to 6 billion hectares of land are degraded (i.e. 20 times the size of France).** Ecosystem restoration can bring species back from the brink of extinction, reverse the trends in ecosystem decline and help overcome major societal challenges, such as climate change, disaster risk and achieving inclusive economic growth. **The benefits of restoration can far exceed the costs**, particularly for inland and coastal wetlands, grasslands and forests. For example, achieving the Bonn Challenge target of restoring 46% of the world's degraded forests could provide USD 7-30 in benefits for every dollar spent. The net benefits depend on the objectives, degree of degradation, and ecosystem type and location, as well as the opportunity costs. In general, preventing the degradation and loss of an ecosystem is more cost-effective than restoring it.

Source:
http://www.oecd.org/environment/resources/biodiversity/Executive-Summary-and-Synthesis-Biodiversity-Finance-and-the-Economic-and-Business-Case-for-Action.pdf

To structure endeavours to analyse the different services from an ecosystem, a range of ecosystem service classifications have been introduced, which will be explained in more detail in the module on identification and selection of ecosystem services. The present module focuses primarily on the benefits of land and the consequences from the degradation of this resource in economic terms. Figure 7 gives a brief summary of the potential benefits related to sustainable use of land-based natural capital.

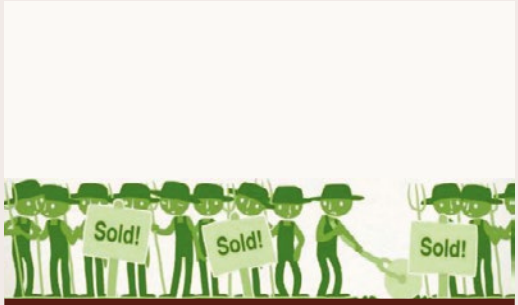
FIGURE 7

Key facts and figures regarding land degradation and benefits from SLM
Source: ELD Initiative 2015, Report for policy and decision makers (p.12)



Lost Production

- **The annual economic losses due to deforestation and land degradation were estimated at EUR 1.5-3.4 trillion in 2008,** equalling 3.3-7.5 per cent of the global GDP in 2008. This includes a startling loss of grain worth USD 1.2 billion annually.
- On a global scale, an estimated annual loss of 75 billion tons of soil from arable land as consequence of degradation is assumed to cost the world – about USD 400 billion per year, with the US alone expected to lose USD 44 billion annually from soil erosion.
- Reaching 95% of potential maximum crop yields (by adopting SLM practices) could deliver up to 2.3 billion tons of additional crop production per year, equivalent to USD 1.4 trillion.



Other ecosystem service losses

- Land degradation is a top driver of deforestation: 13 million hectares of the world's forests continue to be lost each year.
- Changes to the land cover in the past twenty years have reduced the value of the annual flow of ecosystem services by USD 4-20 trillion per year. Global ecosystem services losses because of land degradation are estimated between USD 6.3 and 10.6 trillion per year. This estimated loss of ecosystem services equals to 10 to 17 per cent of global GDP (USD 63 billion in 2010).

Benefits of susteinable land management

- Annually, **USD 75.6 trillion can be gained from transforming global policies** by adoptiong environments that enable SLM.
- **Economic rates of return from 12 to 40%** have been found for a number of projects including soil and water conservation (Niger), farmer-managed irrigation (Mali), forest management (Tanzania), farmer-to-farmer extension (Ethiopia) and valley-bottom irrigation (nothern Nigeria and Niger). Returns of over 40% are on record for small-scale, valley bottom irrigation.

Typical (economic) assessments related to natural capital

The above discussion has shown that there is need to consider natural capital in decision-making on land use. Understanding the relevance of natural resources is a crucial step and the application of natural capital and ecosystem service theories help us to identify the most relevant benefits for our wellbeing. In order to make sustainable trade-offs we can use specific methodological frameworks, which allow the framing and evaluation of the consequences.

Typical tools traditionally used for assessing land use options or consequences of changes in land use with view to inform policy-makers are, for example, land use planning and environmental impact assessment. However, they do not take ecosystem services, and costs and benefits associated to them into account. Also, other forms of assessments have traditionally more focussed on physical rather than monetary changes (see list below). This is now changing with assessments increasingly including a wider range of disciplinary perspectives. Furthermore, SDG 15.9 foresees the integration of ecosystems and biodiversity values into national and local planning, development processes and poverty reduction strategies, and accounts (Quillérou 2014, chap 1.2).

Assessment tools for political decision-making related to land use

Land-use planning aims to effectively balance competitive land uses. It can be based on a formal economic assessment of costs and benefits for different land uses, although in practice a full economic assessment of land uses is seldom undertaken.

Environmental impact assessment is the assessment of the environmental consequences (positive and negative) of a plan, policy, program, or actual projects prior to the decision to move forward with the proposed action. EIAs do not require adherence to a predetermined environmental outcome, but rather they require decision makers to account for environmental values in their decisions and to justify those decisions in light of detailed environmental studies and public comments on the potential environmental impacts.

Damage assessment is linked to litigation and aims to estimate the level of compensation to be provided after environmental damages. This level of compensation can be arbitrarily set from a given level of physical damages or can be estimated from the economic costs of the damage incurred.

Sustainability assessment aims at identifying whether a current activity can be sustained over time or not, i.e. whether the level of physical (and/or monetary) benefits derived from it can be maintained.

Natural resource or capital accounting aims at capturing the depreciation of environmental or natural capital stocks at the country level, complementing more traditional indicators of an economy's health such as the Gross Domestic Product (GDP). Natural resource accounting is now piloted in different countries.

Cost-benefit analysis consists in comparing the costs and benefits of a planned action or project against what would happen if nothing is changed. If physical benefits are considered rather than economic (monetary) benefits against costs, this is called **a cost-effectiveness analysis**.

Multi-criteria analysis is a method that helps choosing between different scenarios from quantitative and qualitative data using a scoring system. Multi-criteria analysis can include economic data, but not exclusively. The scenarios considered in a multi-criteria analysis are explicitly traded-off one against the other to be able to choose the best one.

Cost-benefit analysis and natural resources or capital accounting directly derive from economics. These two methods will be described in more detail below.

Natural capital accounting

Natural capital accounting (and assessment) approaches follow a territorial approach by looking at the natural capital stocks and flows within a given area and how these benefit different stakeholder groups. This can be done from a biophysical point of view, i.e. by estimating the quality and quantity of available forest resources and the provided ecosystem services, or by capturing the economic value that these provide to society.

When incorporating natural capital into a structured economic accounting system, it is possible to obtain a more holistic view of development progress than with standard measures, such as GDP, alone. This is commonly referred to as natural capital accounting. The table hereafter illustrates the difference between natural capital accounting and assessment.

Cost-benefit analysis, integrating environmental services

Cost-benefit analyses (CBA) compare costs and benefits of an 'action' scenario to that of a 'business-as-usual' scenario to assess whether the proposed investment, in this case a land management change, can lead to net benefits. 'Action' scenarios include land management changes that can reduce or remove degradation pressures. Mappings of net benefits for identification of the locations for which land management changes are suitable from an economic perspective. This will lead to the identification of "on-the-ground" actions that are economically desirable.

TABLE 1

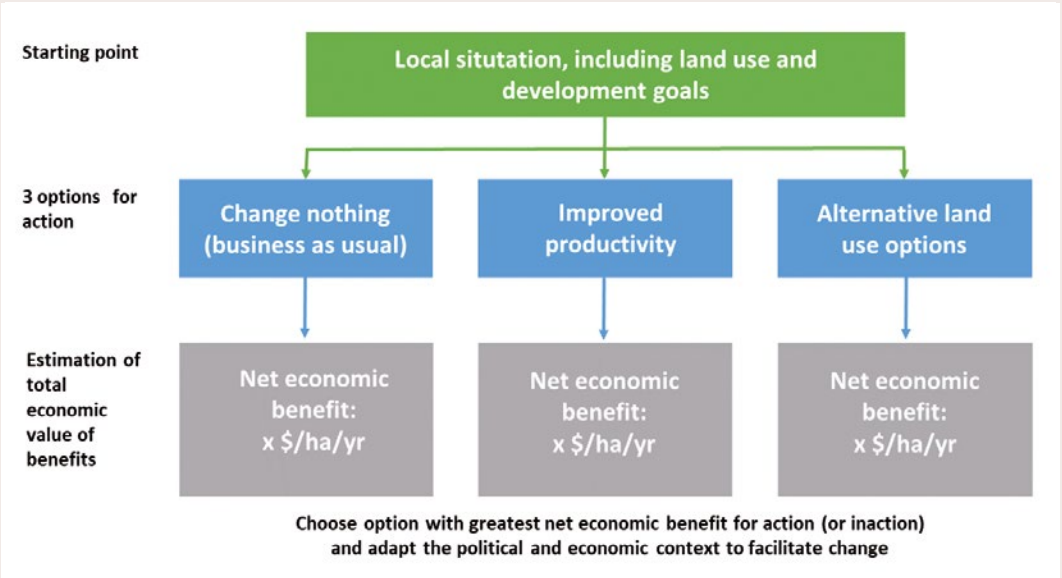
Difference between natural capital accounting and assessment
Source: GIZ internal working group on natural capital accounting

Natural capital accounting	Natural capital assessment
Compatible with the gross domestic product; calculation of a "green" GDP possible	Not compatible with GDP; calculation of a "green" GDP is not possible
Economic evaluation to record the contribution of ecosystems to economic value creation and welfare in the long term	Economic evaluation to facilitate trade-offs of policy alternatives: cost-benefit analyses, evaluation of scenarios
Systematic and comprehensive consideration of ecosystems, ecosystem services and socio-economic environment; physically and monetary	Focus on economic evaluation of ecosystem services, increasingly also beyond purely ecologic assessments
Planned as an international statistical standard	Guides available, but no standardisation
Little experience; currently testing phase	Numerous international best practices

FIGURE 8

Logic of a cost-benefit analysis

Source: Hannes Etter adapted from ELD Initiative 2016



One of the major strengths of cost-benefit analyses is that by quantifying everything homogeneously (in monetary units), it allows for direct comparisons between costs and benefits across different scenarios. This can help provide an idea of the scale of desired implementation (e.g., from a village market to international trade) and to identify the most economically efficient and sustainable practice for a given scientific, political, legal, cultural, or social context. As a result, cost-benefit analyses can be used to simulate the impact of and dimension of economic incentives or policy instruments for sustainable land management. The module on cost-benefit analysis provides an introduction into this tool and guidance on how to apply it.

05 Perspectives of different stakeholders on natural capital

The first two sections described how different actors depend on nature as the source for their wellbeing. It is becoming increasingly clear that **the complexity of natural capital management at all scales requires the integration of many types of knowledge**, from local to generalised, informal to formal, novice to expert, tacit and implicit to explicit, and traditional and local to scientific and universal (Raymond et al. 2010). Integrating insights from these different perspectives to deliver real change on the ground will require collaboration between stakeholders at levels not seen previously.

Therefore, this section will focus on the main stakeholder groups, which can transfer information on natural capital into action: a) the private and financial sector and b) public decision makers.

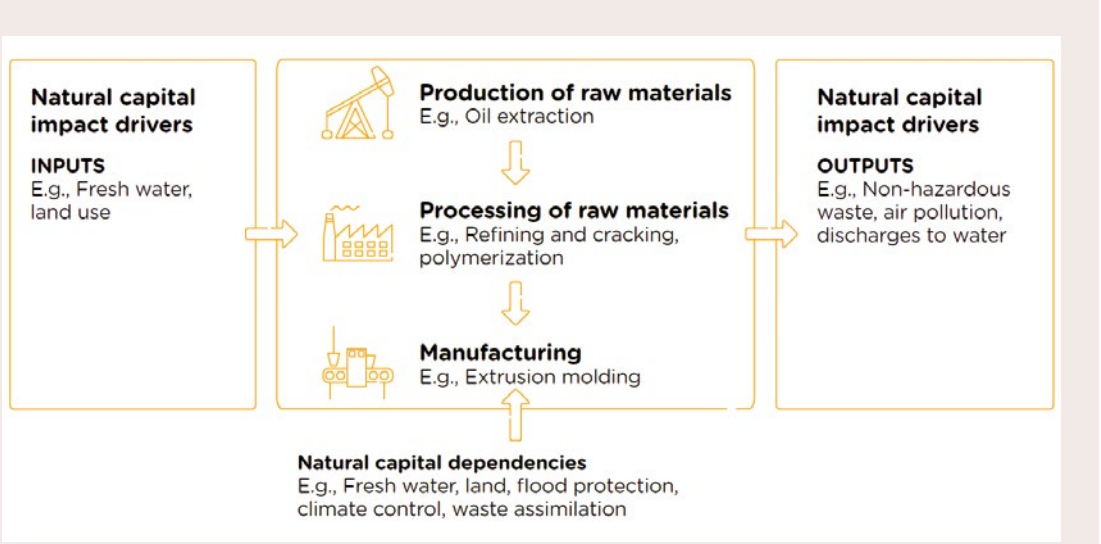
These groups may be considered "stakeholders", defined as those who are affected by or who can affect a decision or issue (Freeman 1984). Stakeholder engagement can be defined as "a process where individuals, groups and organisations choose to take an active role in making decisions that affect them" (Reed, 2008). It is argued that stakeholder engagement may enhance the robustness of decisions designed to reduce the vulnerability of ecosystems and human populations to land degradation (De Vente et al. 2016). In this way, it may be possible to develop response options that are more appropriate to the needs of the society as a whole and can protect the livelihoods and well-being in the long-run (adapted from ELD Initiative 2015, Practitioner's Guide, p.5). For a more thorough guideline on how to address stakeholders and enhance their involvement into projects and governance processes refer to ELD's Initiative 2015 Practitioner's Guide.

The private and financial sectors

Over the last years, more and more stakeholders from the private sector, both small and medium sized enterprises and larger, international corporations are recognising the business case of maintaining and investing in natural capital. This shift has been initiated by success-stories and new approaches for businesses that invest in sustainable land management in their value chains. An important example is the natural capital protocol, which includes a guideline for businesses to account and manage their natural capital (Natural Capital Coalition 2018). Figure 9 outlines the different impacts and dependencies of the private sector on natural capital.

FIGURE 9

Impacts and dependencies of the private sector on natural capital
Source: Natural Capital Coalition 2018



The production and processing industries in particular, are depending on natural resources for sourcing and processing activities along their value chains. Besides increasing their sourcing risks, degradation of the natural capital has now also been identified as a serious threat for sales and permissions to operate. Against this background, the expected returns on investment are high for more at-risk sectors, including food and beverages, construction, utilities, mining, renewable biomass energy, clean and reliable water supplies, etc. At the same time, investments create 'shared value' that equitably benefit all involved in land management. With up to 2 billion hectares of land suitable for restoration/rehabilitation, a reversal of land degrading trends will contribute to multiple benefits while helping to address the great challenges of climate change, biodiversity loss, alleviation of poverty, and hunger. A detailed list of examples for private sector investments in natural capital can be found in table 2.

TABLE 2

A summary of private sector SLM project investment examples

Source: ELD Initiative 2016, Report for the private sector (p.30)

Company size	Reasons for investing in SLM	Project and description	SLM investment options	Existing methods and tools	Risks	Policy context
Farmers and individual small land holders	mproving local livelihoods and adaptation to climate change	CPP Burkina Faso – Sub-programme of the Northern Region – under Partnership Programme for Sustainable Land Management IFAD loan: USD 16,028,000 GEF grant: USD 2,016,000 Duration: 2009–2014	IFAD mix of low-interest loans and grants to support agricultural and rural development program and projects	The program helps farmers to increase their food production, raise their incomes and improve their livelihoods, while also sustainably managing their natural resources and adapting to climate change	– Unequal distribution of funds – Monitoring challenges – Potential for corruption	– UN Millennium Development Goals – Support UNFCCC policies for improved agriculture and forestry in develop-ing countries
Farmers and individual small land holders	Improving local livelihoods and maintain natural resources	GEF grant for a land improve-ment project in Zimbabwe. Amount: SD 50,000 Duration: 2015–2017	Influence the develop-ment of policies on SLM through holistic land and livestock manage-ment of 32 villages and 5,278 people	Additional project objectives are to provide innovative financial mechanisms to provide sustainable livelihoods to small farmers and their communities		The project seeks to influence policy on SLM through holistic land and livestock management activities such as practice of organic farming and rotational grazing
Farmers and individual small land holders	Improving local livelihoods and support sustain-able agriculture	Bill & Melinda Gates Foundation grant of USD 10.4 million to the New Partnership for Africa's Development (NEPAD) and Michigan State University	Five-year program to reduce poverty through improved agricultural practices	Larger group of agricultural development projects being funded by The Bill & Melinda Gates Foundation's Agricultural Development initiative, which partners with small farmers throughout developing world. Grant funds provide resources and technologies to small farmers to implement SLM practices that benefit the land and support agricultural growth	– Technologies and resources are inadequate to support crop yields – Poor weather conditions – drought or flooding – that adversely impacts crop growth despite sustainable techniques and technologies	

Company size	Reasons for investing in SLM	Project and description	SLM investment options	Existing methods and tools	Risks	Policy context
Small Businesses	Improving local livelihoods	Cotton mill in Kiyunga area, Uganda	Investing in technology to improve the cotton mill	Collaborating with local farmers	– Low crop yields can damage local economy	
Small Businesses	Improving local livelihoods and environmental conservation	The World Bank's Ecotourism and Conservation of Desert Biodiversity	World Bank contributed USD 4.2 million since 2010 to contribute to the conservation of desert biodiversity in three recipient targeted national parks in Tunisia	The purpose of the project is to enable conditions for protected areas management, SLM scale-up and ecotourism	– Low-interest as a tourist attraction, yields low revenue for ecotourism	
Medium Businesses	Improving local livelihoods and support sustainable agriculture	US-based brewery – Environmental Stewardship Grants Program	Environmental Stewardship Grants Program to benefit the communities in which they operate. In 2015 the brewery reported that it will donate USD 945,365 to environmental stewardship programs in 38 US states	Among the projects the Environmental Stewardship Grants Program fund is sustainable agriculture and SLM strategies		
Large companies	Improving local livelihoods and long-term investment in sustainable farming	Farmland Principles	TIAA-CREF Asset Management is among the signatories to the Farmland Principles and has a farmland investment approach that is directly aligned its overall investment philosophy: long-term investors working to provide for the financial well-being of its customers and clients decades into the future	Investment portfolio	– Poor return on investment	One of a group of UN Principles for Responsible Investment signatories who developed the Principles for Responsible Investment in Farmland

Company size	Reasons for investing in SLM	Project and description	SLM investment options	Existing methods and tools	Risks	Policy context
Large companies	Improving local livelihoods and maintain natural resources for a sustainable supply chain	Canadian-based coffee maker and restaurant chain – sustainable supply chain	Sources its coffee from small holder farms that tend to be family-run with less than five hectares of land. Committed to deforestation-free, peat-free palm oil sourcing, working with members of the Roundtable on Sustainable Palm Oil		– Risk of shortages in sustainability sourced coffee or palm oil	
Multi-national Corporations	Improving local livelihoods and support sustainable agriculture for a stable supply chain	Beverage company investment small-scale sugarcane farmers in the KwaZulu-Natal region of South Africa	Investments of USD 150,000 to improve their yields and livelihoods while reducing environmental impacts	Implementation of Sustainable Agriculture Guiding Principles and sustainable supply chain management	– Monitoring challenges – Potential for corruption – Maintaining reliable and sustainable supply of resources	Implementation of new Sustainable Agriculture Guiding Principles, GRI 4.0 emphasis on sustainable supply chains
Multi-national Corporations	Land and natural resource preservation	US-based retail company's land use offset program	In partnership with the US National Fish and Wildlife Foundation40, the company created a land offset program. Over 10 years, USD 35 million is committed to purchase and preserve 1 acre of wildlife habitat in the US for every acre of land they develop			Land use offsets is often required for new land use developments in the US. Regulations under the US National Environ- mental Policy Act and California Environmental Quality Act

Public decision makers

Decision makers in governmental institutions from different sectors are influenced by the environment and the impacts of environmental degradation is directly connected to key areas of policy making, such as job creation, food, energy, and water security, migration and urbanisation, climate change mitigation and adaptation, economic competition, and resource conflict (ELD Initiative 2015, *Report for policy and decision makers*). However, the means to achieve these goals are limited. Governments and policy-/decision-makers are thus faced with a multitude of demands on limited resources and require common metrics to compare options and development pathways. Economic valuation can provide answers to questions about the social and economic costs of land degradation and the benefits of greater investments in land based productivity. Providing economic arguments for expenditures on natural capital can help to connect often diametrically positioned sectors, e.g., the environmental, agricultural and finance ministries. With total economic valuation of the land, the logic of investing in sustainable land management and supporting its implementation through policy becomes obvious.

FIGURE 10

Returns from natural capital
Source: Natural Capital Coalition 2018

06 Options for integration of ecosystem services into policies and planning

Governments and policy-/decision-makers play a vital role in conserving and/or enhancing natural capital due to their ability to set the frame for a sustainable development and to create an enabling environment for sustainable land management. The available instruments and options can be broadly divided into regulatory mechanisms and market-based approaches, including price-based instruments (e.g., subsidies, environmental taxes) and quantity-based instruments such as tradable emissions permits, pollution permits, or biodiversity offset schemes. Market facilitation approaches aim to improve existing markets by lowering transaction costs and enhancing information, thereby increasing confidence in market participants, e.g., through 'eco-labelling'. Additionally, new markets can be created, for instance through 'payments for ecosystem services' schemes. Policies can also be developed that work synergistically with international agreements (ELD Initiative 2015, *Report for policy and decision makers*). Further examples for policy instruments can be found in figures 12 and 13.

FIGURE 11

Main areas in which natural capital plays a vital role
Source: ValuES Presentation

Figure 11 showcases the different decision-making realms, in which natural capital plays a vital role and can be implemented through the above and below-mentioned instruments. The implementation of these instruments should take place in an enabling environment that contains careful consideration for the specific context (biophysical, cultural, economic, financial, legal, political, social, and technical.

The ELD Initiative has outlined six different types of enabling conditions for SLM and their requirements (ELD Initiative 2015, *Report for policy and decision makers*):

- Monetary conditions: Mobilising funding
- Fiscal conditions: Removing perverse incentives and establishing favourable ones
- Technical conditions: Identifying appropriate and 'future-proofed' SLM technology
- Legal conditions: Property rights allocation
- Cultural conditions: Understanding traditional norms and gender roles
- Political conditions: Building capacity and establishing good governance

FIGURE 12

Spectrum of incentives to improve productivity and enhance ecosystem services
Source: Convention on Biological Diversity

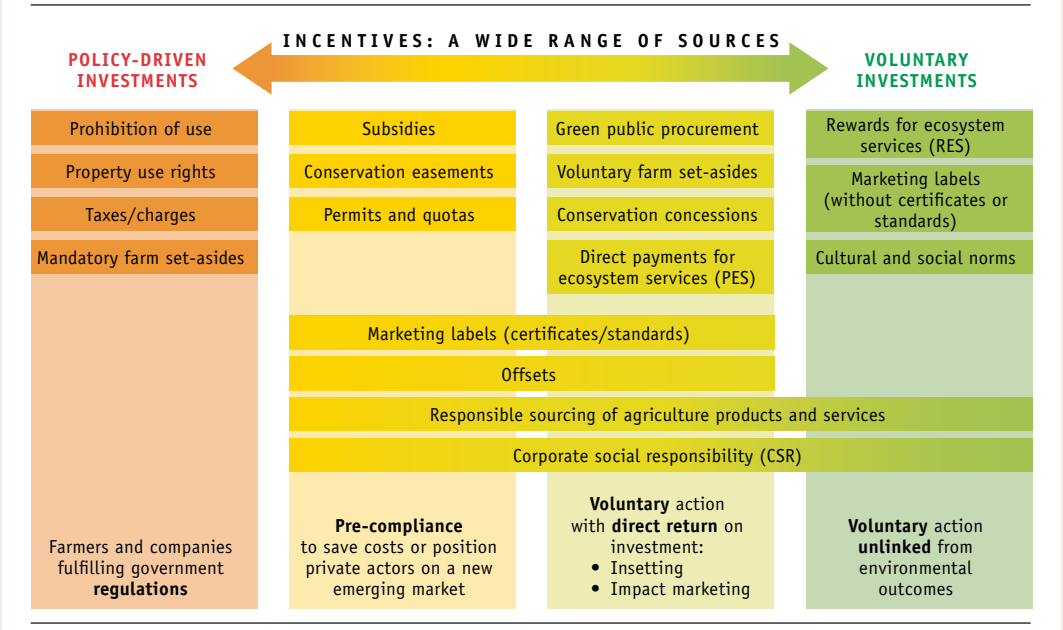


FIGURE 13

Examples of policy instruments to enable the adoption of sustainable land management
Source: ELD Initiative 2015, Report for policy and decision makers (p.15)

- **Bans:** Bans restrict the use of products proven to be harmful for the environment or public health, such as certain pesticides.
- **Conservation banking or offsets:** Conservation offsets aim at compensating for environmental damage caused by land development. Developers can source conservation credits through a market mechanism to offset the loss of ecosystem services at one site, with conservation gains elsewhere.
- **Contract farmland set-asides:** Land owners abandon the right to use parts or all of their farmland to foster the delivery of environmental benefits, and receive a payment in return.
- **Eco-labels and certification:** Eco-labels are a form of sustainability measurement for food and consumer products with the aim to facilitate the purchase of eco-sensitive commodities. Eco-labels result from a standardised certification process controlled by bodies such as the International Organization for Standardization (ISO), FairTrade® Foundation, or Forest Stewardship Council (FSC).
- **Insurance schemes:** In the US, Canada, and India, the governments provide insurance against crop losses due to weather extremes or declines in global commodity prices. If crop yields at the end of a cropping season are lower than a pre-established reference amount, farmers receive compensation.
- **Microfinance:** Microfinance is a specific form of credits that support the establishment of local, small-scale businesses. Micro-credits are provided at a lower interest rate than those offered by traditional banks and have helped to reduce poverty at the individual and village levels in many developing countries such as Bangladesh. In providing for easily accessible start-up capital, micro-credits are a particularly well suited tool to facilitate livelihood diversification.
- **Payments for conservation investments:** Certain investments into sustainable land management are financially rewarded by the government. Agri-environmental measures by the EU are one example.
- **Payments for ecosystem services:** Land owners are rewarded for the provision of certain ecosystem services by the beneficiaries of these services. To this end, ecosystem service providers close a deal either with a private company, the government, or a non-government organisation. Globally, the REDD scheme has gained wide attention in its effort to compensate developing countries for the preservation of forests and the carbon stored therein, as well as for the enhancement of forest carbon stocks ("REDD+").
- **Permanent conservation easements:** Permanent conservation easements are voluntary, legally binding agreements by which certain land usages are prohibited. They serve to protect the ecological or aesthetic values of land. National parks are one example.
- **Taxes and environmental fees:** Environmental taxes and fees aim to raise the cost of production or consumption of environmentally damaging goods so as to limit their demand. One example is the eco-tax on plastic-based products in Europe through which the recycling of plastic is being funded.
- **Trading of emission reductions:** A pollution goal or allowance is set and pollution permits are distributed which can thereafter be traded. Several emissions trading schemes have been established globally (e.g., EU Emissions Trading System), yet with limited success so far.
- **Transferable development rights:** These allow for the development of a certain area of land on the condition that land of a comparable type and quality is restored as a compensation measure.
- **Voluntary carbon offsets:** On a voluntary basis, individuals, governments or companies can purchase carbon offsets to compensate for greenhouse gas emissions caused by electricity use or transportation (e.g., personal air travel).

Further Reading

Videos

What is the price of nature?
http://vimeo.com/16961590 – TEEB "Your Invoice"
http://vimeo.com/20061382 – TEEB "Little Things"
http://www.ted.com/talks/pavan_sukhdev_what_s_the_price_of_nature.html
Let's talk about soil *http://www.youtube.com/watch?v=LrYShHzbmD4*

Literature

Ecosystem Services
A sustainability framework for assessing trade-offs in ES
https://pdfs.semanticscholar.org/44b2/8ad22155c9182ff123d102b41db07fe64382.pdf
A quantitative review of relationships between ecosystem services
https://www.sciencedirect.com/science/article/pii/S1470160X1630019X?via%3Dihub
Payment for Ecosystem Services
http://www.youtube.com/watch?v=gzNWnREZ2xI&feature=c4-overview&list=UUB2PfWp-S9y35IuR3rrn-ZQ
Natural capital accounting
https://www.unep-wcmc.org/system/dataset_file_fields/files/000/000/377/original/Natural_Capital_Report_WEB.pdf?1460119504
http://www.eld-initiative.org/fileadmin/pdf/ELD-UserGuide_07_web.pdf
Natural capital protocol
https://naturalcapitalcoalition.org/natural-capital-2/

References

Cavender-Bares, J., Polasky, S., King, E., and Balvanera, P. (2015). A sustainability framework for assessing trade-offs in ecosystem services. Ecology and Society 20(1): 17. *http://dx.doi.org/10.5751/ES-06917-200117*

Conservation Strategy Fund. Publication and Tools. Econ Video Lessons. Cost-Benefit Analysis.

De Vente, J., Reed, M. S., Stringer, L. C., Valente, S., and Newig, J. (2016). "How does the context and design of participatory decision-making processes affect their outcomes? Evidence from sustainable land management in global drylands". Ecology and Society 21(2):24.

Dickinson, E. (2011). "GDP: a brief history". ForeignPolicy.com. January 3, 2011. *https://foreignpolicy.com/2011/01/03/gdp-a-brief-history/*

ELD Initiative. (2015). Report for policy and decision makers: Reaping economic and environmental benefits from sustainable land management. GIZ: Bonn, Germany. Available from *www.eld-initiative.org*

ELD Initiative (2015). The value of land: Prosperous lands and positive rewards through sustainable land management. Available from *www.eld-initiative.org*

ELD Initiative. (2015). Pathways and options for action and stakeholder engagement, based on the 2015 ELD Massive Open Online Course "Stakeholder Engagement". Practitioner's Guide. GIZ: Bonn, Germany. Available from: *www.eld-initiative.org*

ELD Initiative. (2016). Cornell, A., Weier, J., Stewart, N., Spurgeon, J., Etter, H., Thomas, R., Favretto, N, Chilombo, A., van Duivenbooden, N., van Beek, C., and de Ponti, T. Economics of Land Degradation Initiative: Report for the private sector. Sustainable land management – A business opportunity. GIZ: Bonn, Germany. Available from: *www.eld-initiative.org*

FAO. 2015. "Soil functions". *http://www.fao.org/3/a-ax374e.pdf*

FRED Economic Data. Economic Research. "Constant GDP per Capita for the World". *https://fred.stlouisfed.org/series/NYGDPPCAPKDWLD*

Freeman, R. E. (1984). Strategic management: a stakeholder approach. Cambridge University Press.

Lewandowski, I., Gaudet, N., Lask, J., Maier, J., Tchouga Baho, B., Vargas-Carpintero, R. (2018). Bioeconomy. Context. DOI: 10.1007/978-3-319-68152-8_2.

Natural Capital Coalition. "What is natural capital?" Natural Capital. *https://naturalcapitalcoalition.org/natural-capital-2/*

Natural Capital Coalition. 2018. "Connecting Finance and Natural Capital: A Supplement to the Natural Capital Protocol". (Online) Available at: *www.naturalcapitalcoalition.org*

Nkonya, E., von Braun, J., Mirzabaev, A. (2016). Economics of Land Degradation and Improvement – A Global Assessment for Sustainable Development. Springer Cham Heidelberg New York Dordrecht London.

OECD (2019). Biodiversity: Finance and the Economic and Business Case for Action, report prepared for the G7 Environment Ministers' Meeting, 5-6 May 2019.

Quillérou, E. (2014). "The Economics of Land Degradation. Principles of economic analysis and valuation for sustainable management of land". Materials prepared for the ELD's Massive Open Online Course 2014 by the United Nations University Institute for Water, Environment and Health.

Raymond, C.M., Fazey, I., Reed, M.S., Stringer, L.C., Robinson, G.M., Evely, A.C. (2010). "Integrating local and scientific knowledge for environmental management: From products to processes". Journal of Environmental Management 91: 1766–1777

Reed, M.S. (2008) "Stakeholder participation for environmental management: A literature review". Biological Conservation 141(10): 2417-2431.

The Economics of Ecosystems and Biodiversity (TEEB) (2012). The Economics of Ecosystems and Biodiversity in Business and Enterprise. Edited by Joshua Bishop. Earthscan, London and New York.

The Economics of Ecosystems and Biodiversity (TEEB) (2018). Measuring what matters in agriculture and food systems: a synthesis of the results and recommendations of TEEB for Agriculture and Food's Scientific and Economic Foundations report. Geneva: UN Environment.

The Economics of Ecosystems and Biodiversity (TEEB) (2018). TEEB for Agriculture and Food's Scientific and Economic Foundations report: Promotional Toolkit. Available at: *http://teebweb.org/agrifood/wp-content/uploads/2018/06/TEEBAgriFood_Promo-Kit_3.pdf*

Wikipedia. 2019. "External Costs". Externality. Last assessed July 7, 2019. *https://en.wikipedia.org/wiki/Externality#/media/File:Negative_externality.svg*

Wikipedia. 2019. Trade-off. Last assessed April 20, 2019. *https://en.wikipedia.org/wiki/Trade-off*

For further information and feedback please contact:

ELD Secretariat
Mark Schauer
c/o Deutsche Gesellschaft
für Internationale Zusammenarbeit (GIZ) GmbH
Friedrich-Ebert-Allee 36
53113 Bonn
Germany
E info@eld-initiative.org
I www.eld-initiative.org

This document was published with the support of the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH on behalf of the German Federal Ministry for Economic Cooperation and Development (BMZ)

Photography: Front and back cover © GIZ
Design: kippconcept GmbH, Bonn
Bonn, September 2019

www.eld-initiative.org
#ELDsolutions