THE ECONOMICS OF
LAND DEGRADATION

Economics of Land Degradation Initiative: **Report for policy and decision makers**

Reaping economic and environmental benefits from sustainable land management

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This report draws on and is complementary to the ELD Initiative report, *The Value of Land* (2015). All of the topics discussed below are covered in greater detail in this report, as well as other ELD Initiative publications (*Scientific Interim Report: The rewards of investing in sustainable land management* (2013), *Business Brief: Opportunity lost. Mitigating risk and making the most of your land assets* (2013), *Land degradation. Less favoured lands and the rural poor: A spatial and economic analysis* (2014), *User Guide: A 6+1 step approach to assess the economics of land management* (2015), and additional case studies in Jordan, Mali, Sudan, Ethiopia, and Botswana). All ELD Initiative publications are available at: *www.eld-initiative.org*.

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Report for policy and decision makers

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Acronyms and abbreviations

CGIAR	Consultative Group on International Agricultural Research
ELD	Economics of Land Degradation (Initiative)
EU	European Union
GDP	Gross domestic product
GM	Global Mechanism of the UNCCD
MOOC	Massive Open Online Course
REDD	United Nations Reducing Emissions from Deforestation and Forest Degradation programme
SDG	Sustainable Development Goals
SLM	Sustainable land management
UNCCD	United Nations Convention to Combat Desertification
UNFCCC	United Nations Framework Convention on Climate Change
USD	United States Dollar
WOCAT	World Overview of Conservation Approaches and Techniques

Table of contents

01 Introduction

Considering the figures given in the foreword and found in the literature about the on-going and increasing degradation of land and land-based ecosystems and their productivity, this indicates a pressing need to re-design current policies and clearly defined guidance for future action for sustainable land management. Based on the work of scientists, practitioners, and experts, the ELD Initiative provides a global assessment of the economics of land degradation, and shows that investment in sustainable land management is not only economically rewarding, but crucial for the wellbeing of current and future generations. To foster the integration of the economic value of the ecosystem services provided by land into decision making, the ELD Initiative presents several approaches that policy-/decision-makers can fruitfully build on.

Thus, this report undertaken by the ELD Initiative provides evidence of how increasingly scarce resources can be conserved and presents tools to promote and secure future wealth and human well-being through sustainable land management for policy-/decision-makers. It emphasizes taking long-term benefits into account and focuses on practical solutions, as well as the context in which sustainable land management occurs. The report aims to ensure the returns of sustainable land management (e.g., economic growth, food security, sustainable livelihoods and reduced conflict over natural resources) are realised through the use of robust economic valuation methodologies. The report also highlights that sustainable land management provides additional benefits at the national level through obligations under other multilateral environmental agreements, such as the UN Convention to Combat Desertification (UNCCD), e.g., through achieving land degradation neutrality, the UNFCCC, and the Convention on Biological Diversity (CBD).

While the suggested economic approaches – in particular cost-benefit analyses and total economic valuation – help policy-/decision-makers to take informed decisions against land degradation, the reality of on-the-ground activities and demands must also be considered, in order for sustainable land management to actually be implemented. To this end, this report also provides a range of environmental economic instruments through which the adoption and effective implementation of measures can be potentially incentivised for all involved and affected actors.

As an important note, during the second phase of the ELD Initiative beginning in 2016, the Initiative will be actively supporting policy-/decision-makers through several mechanisms: providing training in economic valuation of ecosystem services; the undertaking of regional, national and sub-national studies on the economics of land degradation; and the provision of national-level scenarios and economic results for ecosystem services. This will include the setup of funding partnerships to support the implementation of best-practice sustainable land management techniques, the extension and creation of partnership networks, capacity building through trainings for policy makers and outreach to universities, as well as the development of an automatised tool-kit for the mainstreaming of the economics of land degradation into policy making. The ELD Initiative encourages all policy-/decision-makers interested in gaining the economic and environmental benefits of sustainable land management to remain integrated with this network.

Why value land?

Difficult and far-reaching choices will need to be made in the future around the use and management of resources. The aforementioned pressures like population increases, higher consumer demands, and climate change, will tax and degrade our natural resource base, especially land and land-based ecosystems. Land degradation puts the livelihoods of billions of people at risk and threatens the future sustainability of the entire planet. Land degradation is not a stand-alone

issue, however, it is closely linked to job creation, food, energy, and water security, migration and urbanisation, climate change mitigation and adaptation, economic competition, and resource conflict.

Governments and policy-/decision-makers are faced with a multitude of demands on limited resources and require common metrics to compare options. These metrics are traditionally calculated in monetary terms. However, since land provides a range of ecosystem services, some of which cannot be easily measured in these terms (e.g., cultural and spiritual values, landscape beauty), it is important that land is given its full value, measured from the point of view of society *as a whole*.

For instance, at the regional level, recent ELD Initiative research undertook a cost-benefit analysis to measure the costs of erosion-induced depletion of soil nutrients on croplands across 42 African countries. It found that nutrient loss costs result in the loss of over 280 million tonnes of cereal ever year. An analysis of the costs of inaction versus the cost of action for controlling soil nutrient loss across the countries found that the benefits of action are about USD 2.83 trillion in purchasing power parity over the next 15 years, or USD 71.8 billion annually for all of the countries put together. Conversely, by taking action against soil erosion and resulting nutrient depletion, the total economy of the combined countries could grow at an average rate of 5.31 per cent annually over the 15 year period instead – quite an opportunity economically, environmentally, and socially for any policy-/decision-maker to grasp[1].

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. These answers will foster long-term win-win scenarios over just short-term gains. When land and accompanying ecosystem services are valued holistically, appropriate policies and finances can be directed towards risk management, land stewardship, and ultimately, sustainable land management.

With the data that comes from robust economic analyses, the bold policy choices about land that are needed in the coming months and years become clear. With total economic valuation of the land, the logic of investing in sustainable land management and supporting its implementation through policy becomes obvious.

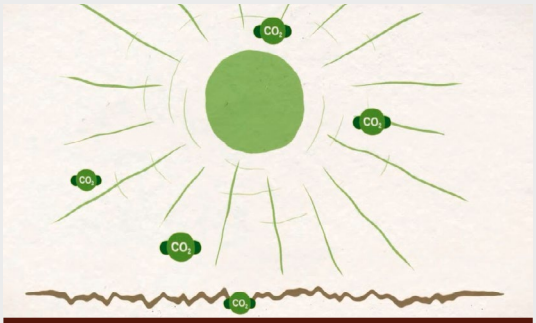
Key facts and figures

Land degradation

- Land degradation negatively affects water availability, poverty, food security, environmental migration, gender rights, deforestation, biodiversity, and climate change.
- About 44 per cent of all cultivated systems worldwide are located within drylands[a].
- **10 to 20 per cent of land globally is already degraded**, about 6 to 12 million square kilometers[a].
- **52 per cent of agricultural land worldwide is moderately or severely affected by soil degradation**[b].
- 65 per cent of dryland areas are rangelands, which are better suited to sustainable grazing than crop production. However, as early as **between 1900 and 1950, approximately 15 per cent of dryland rangelands were converted to cultivated systems**[a].

Food Insecurity

- 44 per cent of global food production takes place in the world's degrading drylands.
- **12 million hectares of soil are lost each year** from desertification and drought alone, whereas 20 million tons of grain could have grown instead[c].
- Over the next 25 years, land degradation could reduce global food productivity by as much as 12 per cent, leading to a **30 per cent increase in world food prices**[c].
- Agricultural **investments of at least USD 30 billion per year are needed now** to feed a globally growing population. Without sustainable land management, that figure is expected to increase[b].
- Predicted climate change impacts on agriculture suggests that public investments of about USD 8 billion will be needed annually between 2010 and 2050 to restore development gains in just nutritional levels (especially for children) to compensate[b].
- Food insecurity will be exacerbated by a **population increase** to ~9.7 billion people in 2050. To feed this global population requires **raising global food production by some 70 per cent between 2005 and 2050**, much of which is expected to come from the intensified cultivation of already used lands, and the conversion of forests, wetlands, grasslands, and other ecosystems into arable land – affecting biodiversity and multiple ecosystem services[d].

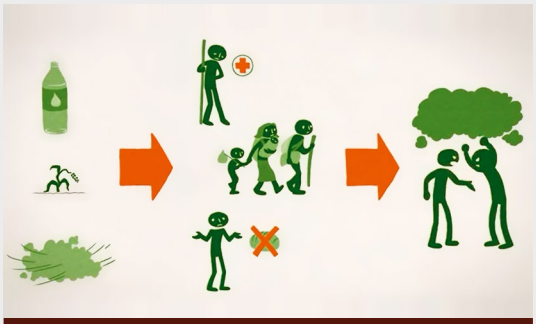


Climate change

- **Soil is the second largest carbon storage next to the oceans**, and soil carbon accounts for one third of global carbon stock. The on-going degradation of land reduces soil's capacity as carbon stock[c].
- Globally, croplands bear a carbon sequestration potential of 0.43 to 0.57 gigatons every year[b].**Agriculture, forestry and other land uses are estimated to be responsible for about one quarter (24 per cent) of anthropogenic GHG emissions**[f]. There is significant potential to reduce these emissions, largely through reduced CO_2 emissions from agriculture, avoiding deforestation and forest degradation, creating net carbon sequestration in soils, and the provision of renewable energy through sustainable land management[b].

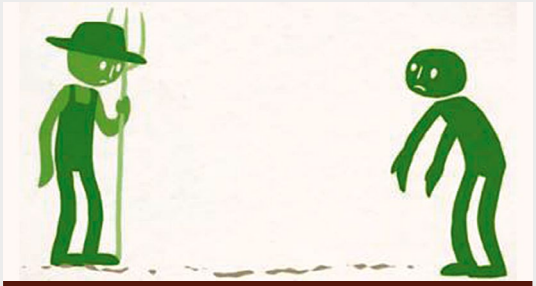
Urbanization

- Although urban systems occupy a relatively small fraction (about 2 per cent) of dryland areas, they con- tain a large and rapidly increasing fraction (nearly 45 per cent) of the dryland population[a].
- **Drought and land degradation lead to migration** from rural lands to urban areas, increasing the pressure on off-site productive land resources and water[c].



Conflict

- Rural migration due to degradation can exacerbate urban sprawl, and can bring about internal and cross-boundary social, ethnic, and political conflicts[a].
- **Land issues have played a major role in at least 27 major conflicts** in Africa since 1990[d].



Lost production

- The **annual economic losses due to deforestation and land degradation were estimated at EUR 1.5–3.4 trillion** in 2008, equaling 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[b].
- 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 USA alone expected to lose USD 44 billion annually from soil erosion[g].
- Reaching 95 per cent 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[b].

Number of People Affected

- In 2000, drylands were home to about 2 billion people on 41 per cent of earth's terrestrial surface, 90 per cent of which living in developing countries[a].
- 700 million people could be displaced by 2030 from water scarcity, with as many as **50 million displaced in the next 10 years from desertification** alone[c].
- People living in degraded drylands suffer from low levels of human well-being and high poverty rates, being further exacerbated by high population growth rates. For example, the population in drylands grew at an average rate of 18.5 per cent during the 1990s – the highest growth rate of any ecosystem considered under the Millennium Ecosystem Assessment[a].

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[c].
- Changes to 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[g].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 is equal 10 to 17 per cent of global GDP (USD 63 billion in 2010)[g].

Benefits of sustainable land management

- Annually, **USD 75.6 trillion can be gained from transforming global policies** by adopting environments that enable sustainable land management[g].
- **Economic rates of return from 12 to 40 per cent** 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 (northern Nigeria and Niger). Returns of over 40 per cent are on record for small-scale, valley bottom irrigation[b].

- A study on the economic importance of drylands in the IGAD region estimated the **ecosystem goods and services derived annually from pastoralism between USD 1,500–4,500 per hectare**[h].
- A large-scale adoption of the traditional Hima pasture management system in Jordan can deliver net benefits to Jordanian society of EUR 172-347 million. Including the benefits of enhanced carbon sequestration, this could amount to EUR 170–387 million of net benefits for the global society – from one region in one country alone[i].
- An applied integrated sustainable land use and reforestation scenario for Sudan, developed by IUCN for the ELD Initiative, shows potential for an additional 10 tons of below and above ground CO_2 equivalent sequestration per hectare annually. The IUCN analysis suggests the avoided damage cost to the global society is in the order of 766 EUR per hectare[j].
- In Mali, the restoration of degraded Kelka forest land by adopting agroforestry practices has been estimated to provide for an **economic return of 500 USD per hectare** over a 25 year time horizon, indicating a **benefit to cost ratio of 5.2:1** at a 10 per cent discount rate[k].
- Regionally, erosion-induced soil nutrient depletion across 42 African countries is estimated to cost 280 million tons of cereals per year under 'business-as-usual, equaling USD 127 billion annually 12.3 per cent of their total combined GDP for 2010–2012. However, **taking action against erosion could generate USD 62.4 billion per year**, with the total economy of the 42 countries combined estimated to grow at an average rate of 5.31 per cent annually[g].

[a] *Millennium Ecosystem Assessment (MA). (2005). Ecosystems and Human Well-Being: Synthesis. Washington, D.C.: Island Press.*

[b] *ELD Initiative. (2015). Facts on the economics of land degradation and climate change. Available from ELD Secretariat (info@eld-initiative.org) by request.*

[c] *United Nations Convention to Combat Desertification (UNCCD). (no date). Dryland soil: sustaining life on earth. Retrieved on [09/09/2015] from [www.unccd.int/Lists/SiteDocumentLibrary/Publications/DrylandsSoilUNCCDBrochureFinal.pdf].*

[d] *Chasek, P., Safriel, U., Shikongo, S., &Fuhrman, V.F. (2015). Operationalizing Zero Net Land Degradation: The next stage in international efforts to combat desertification? Journal of Arid Environments,112: 5–13.*

[e] *United State Agency for International Development (USAID). (2015). Securing land tenure and resource rights. Retrieved on [2015, 09/09] from [www.usaid.gov/land-tenure].*

[f] *International Panel on Climate Change (IPCC). (2014). Agriculture, Forestry and Other Land Use (AFOLU). In: Edenhofer, O., R. Pichs-Madruga,Y. Sokona, E. Farahani, S. Kadner, K. Seyboth, A. Adler, I. Baum, S. Brunner, P. Eickemeier, B. Kriemann, J. Savolainen, S. Schlömer, C. von Stechow, T. Zwickel and J.C. Minx (Eds.). Climate Change 2014:Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge, UK: Cambridge University Press.*

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

[h] *International Union for the Conservation of Nature (IUCN). (2006). Hidden cost is value lost: The economic importance of dryland goods and services in the IGAD region, IUCN Policy Brief. Gland, Switzerland: IUCN.*

[i] *Myint, M.M., &Westerberg, V. (2014). An economic valuation of a large-scale rangeland restoration project through the Hima system in Jordan. Report for the ELD Initiative by International Union for Conservation of Nature, Nairobi,Kenya. Available at: www.eld-initiative.org.*

[j] *Aymeric, R., Myint. M.M., & Westerberg, V. (2015). An economic valuation of sustainable land management through agroforestry in eastern Sudan. Report for the Economics of Land Degradation Initiative by the International Union for Conservation of Nature, Nairobi,Kenya. Available at: www.eld-initiative.org.*

[k] *Sidibé, Y., Myint, M., & Westerberg, V. (2014). An economic valuation of agroforestry and land restoration in the Kelka Forest, Mali. Assessing the socio-economic and environmental dimensions of land degradation. Report for the Economics of Land Degradation Initiative, by International Union for Conservation of Nature, Nairobi, Kenya. Available at: www.eld-initiative.org*

02 Practical guidance: What action is needed?

What are the most effective policy options?

Policies can only be successful if land managers have the means, commitment, and control to restore, maintain, or improve the quality of land. They therefore need to be motivated both economically and politically, and thus to secure the benefits of sustainable land management, policy-/decision-makers have various options to support or incentivise it.

The instruments and options[i] 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 under the European Union (EU) Emissions Trading System; pollution permits; or biodiversity offset schemes[2]. 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. For example, the UN Reducing Emissions from Deforestation and Forest Degradation (REDD) programme offers financial rewards to developing countries for reducing carbon emissions through decreasing logging rates. The program was further amended to also reward forest conservation, sustainable forest management of forests, and the enhancement of forest carbon stocks (REDD+).

Further, attracting private investors to invest in market infrastructure is also an option available to policy-/decision-makers. Land managers have been deterred from adopting more sustainable land use practices, including a lack of market options through which goods can be sold and purchased[3], or a lack of access to capital or technology to make the transition. Non-existing or poorly maintained transport infrastructure likewise limits market-supported land investments considerably, something that can be supported through establishing policies that take these factors into account. Thus, a key strategy in implementing successful policy decisions for sustainable land management should take into account public-private partnerships.

What policy instruments are available?

There are a number of policy instruments available driven that can support the adoption and implementation of sustainable land management. 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). These considerations are discussed in greater detail in the ELD Initiative report "The Value of Land"[4].

When selected carefully with a thorough understanding of the costs and benefits of action and inaction at all relevant scales, applying a mix of these instruments to incentivize the implementation of sustainable land management results in a host of benefits.

[i] *For a broad overview on possible environmental policies and economic instruments for natural resource management, the OECD has a comprehensive database available at: www2.oecd.org/ecoinst/queries.*

BOX 1

Examples of policy instruments to enable the adoption of sustainable land management

(based on the 'The Value of Land' (ELD Initiative, 2015)[4])

- **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 United States, 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:** Landowners 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).

03 Recommendations: How can ecosystem services be valued and barriers to action overcome?

The total economic value of land: The ELD Initiative approach

This framework guides the estimation of the total economic value of land and land-based ecosystem services derived from it. Total economic value is the sum of use and non-use values (see *Figure 1*). **Use value** is the economic value from using land for economic profit, and includes *direct use, indirect use,* and *option values*. For land, *direct use* value is from direct consumption of land products (food, timber, etc.), whereas *indirect use* value stems from indirect consumption (e.g., pollination leading to production of consumed food). *Option value* refers to the value that stakeholders relate to the possibility to shift to other options in the future. **Non-use value** is the economic value of land not associated with consumption or profit, and includes *existence, bequest*, and *stewardship* values, further described in *Figure 1*. Ecosystem services can be integrated and aggregated within the TEV to estimate the total value of land.

The 6+1 Approach

The 6+1 step approach to the economic valuation of ecosystem services developed by Noel & Soussan (2010)[5] and endorsed by the ELD Initiative is intended to be used for case-based study analyses. It is a holistic approach grounded on the concept that sustainable land management generates greater economic benefits than its associated costs, something which is continually proven in economic studies on sustainable land management. It is a tool that assesses the costs and benefits of management options, intended to materialise the profits of improved land management practices through increased productivity and production, the establishment of alternative livelihoods and other benefits. A brief summary is given below, and a more detailed step-by-step guide and examples from a range of case studies can be found in the ELD User Guide[6], as well as the ELD Initiative Scientific Interim Report[7], ELD Practitioner's Guides[8,9], and ELD e-learning courses[ii].

- *Step 1:* **Inception**, *the identification of the scope, location, spatial scale, and strategic focus of the ecosystem services valuation, based on stakeholder consultations and the preparation of background materials on the socio-economic and environmental context of the assessment.*

- *Step 2: The assessment of the quantity, spatial distribution and ecological characteristics of* **land cover** *types, categorised into agro-ecological zones and analyzed through the use of Geographical Information Systems (GIS).*

- *Step 3: The analysis of* **ecosystem services** *based on the four ecosystem service categories provided by the Millennium Ecosystem Assessment, for each land cover category.*

- *Step 4: The role of the assessed ecosystem services in the* **livelihood***s of communities living in a previously delineated land cover area, and for the overall* **economic development** *in the study zone.*

- *Step 5: The identification of* **land degradation patterns and pressures** *on the sustainable management of land resources, including their spatial distribution and the assessment of both biophysical and socio-economic drivers of degradation.*

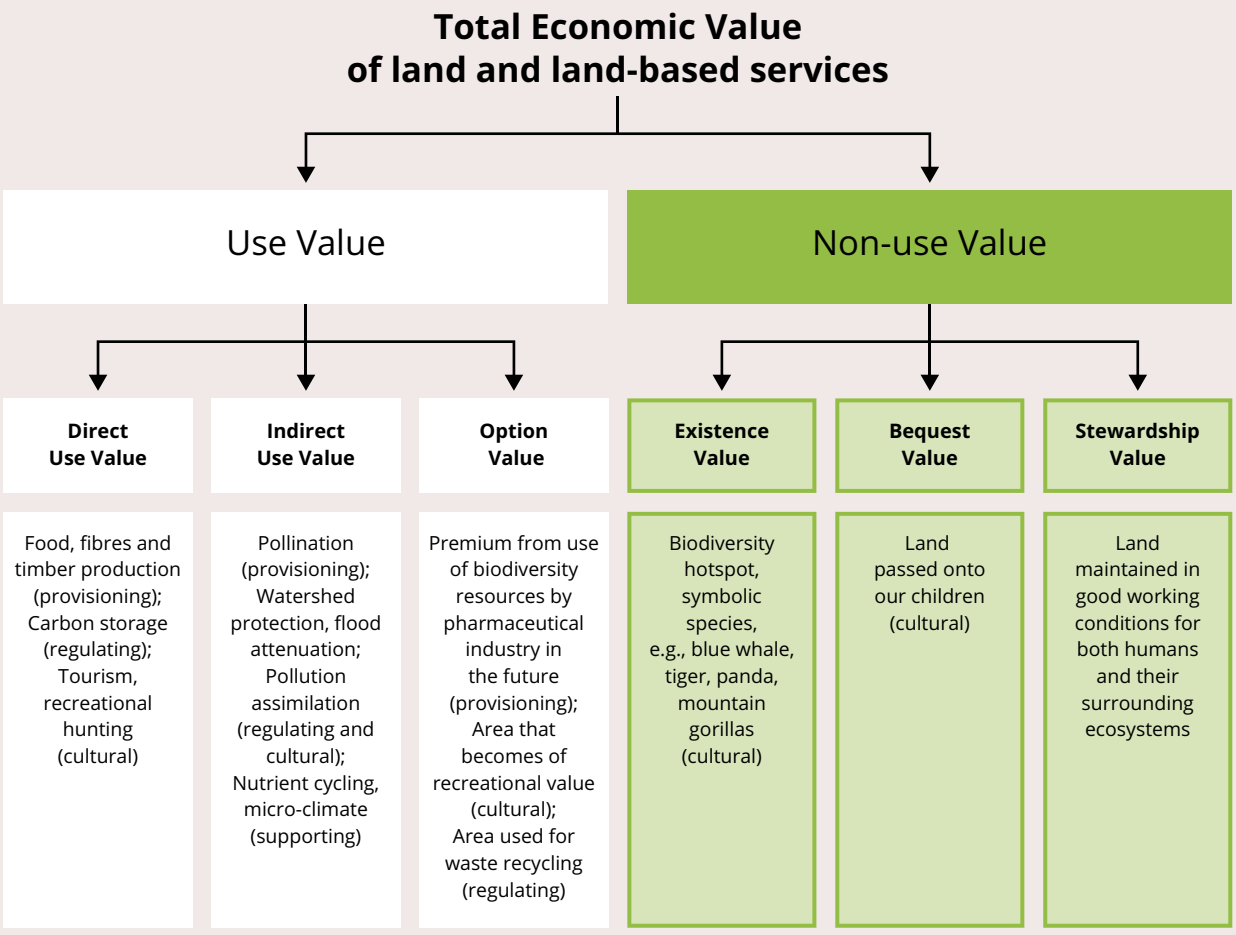
- *Step 6: The assessment of* **sustainable land management options** *that have the potential to reduce or remove degradation pressures, including the analysis of their economic viability and the identification of the locations for which they are suitable.*

The *+1 step* is to **take action**: implementing the most economically desirable option(s) based on the analysis from the previous steps. The specific

ii *ELD e-learning (MOOC) course material is available at www.mooc.eld-initiative.org.*

FIGURE 1

The total economic value of land and land-based services
(from ELD Initiative, 2013[7], adapted from Nkonya et al. 2011, p.,70[10], and Noel & Soussan, 2010[5])



options for land use change are explored further in the next section.

Scenario analysis

Scenarios can be used to explore plausible (rather than probable) futures[11] of land use systems and have become an important way to inform decision-making[12,13]. The goal of scenario planning is to illustrate the consequences of different sets of drivers and policy options, and the implications of potential tipping points, that is, critical thresholds at which a tiny perturbation can qualitatively alter the state or development of a system[14]. They can describe the whole system including trade-offs and synergies.

Recent ELD Initiative research combined three existing sets of global scenarios to evaluate the future value of global ecosystem services under four land-use scenarios that could potentially either accelerate or reverse land degradation[4]. These scenarios are a synthesis of prior scenario studies, and provide a set of plausible future options for society. The results have indicated that up to USD 75.6 trillion/yr can be gained by shifting towards policies based on more sustainability-oriented policies.

Ultimately, scenarios are not predictions – they only point out the range of plausible future conditions and allow for the consideration of different trajectories and potential economic and environmental outcomes, given the choices made. However, they can also be used by policy-/decision-makers to engage stakeholders in thinking about the kind of future they desire, either through jointly developing plausible scenarios or discussing and ranking the results of scenario planning.

As part of the ELD research, downscaling of these global scenarios to regional and national levels is also being undertaken. This downscaling allows interested policy-decision-makers to evaluate the impacts of each scenario in terms of their specific base of ecosystem services, and address more nuanced needs and demands. As the ELD Initiative has developed a robust database of information and details for 208 countries on the impacts of land degradation on ecosystem services and ensuing losses, the Initiative can provide national and regional[iii] level analyses upon request by policy-/decision-makers.

How to overcome barriers to action? Supporting conditions and recommendations

Policies and resulting actions need to be technically and legally feasible, socially and environmentally acceptable, and backed by sufficient financial resources. The right conditions to enact sustainable land management thus need to be available. To foster inclusive socio-economic development, the ELD Initiative recommends the following action by policy-/decision-makers:

Monetary conditions: Mobilising funding

- Sustainable land management investments require availability of and access to knowledge, financial means, and technology (e.g., seeds, saplings, organic fertilisers), which can often be unavailable to land users and stakeholders. An adequate market infrastructure through which resource users could obtain goods and diversify household incomes can also

iii *See Table 4.1 in 'The Value of Land' (ELD Initiative, 2015) for regional analyses.*

be absent. Depending on the scale of action, funding can be mobilised from numerous sources, including private sector investments, sector asset investments or impact investments, public funding or tax exemptions, charity grants, international donors or banking institutions (e.g., Global Environment Facility, World Bank), micro-credits, etc. Certification schemes and eco-labels can also generate funding through market premiums for commodities[15]. Alternatively, existing markets can be harnessed to pay for land management activities. When carefully designed, policies and payment schemes like 'payments for ecosystem services' can provide strong incentives for sustainable land management[7].

- In addition to grants or crowdsourcing initiatives, profits from park entrance fees or (eco-) tourism can be reinvested. Some banks and supra-national bodies also offer 'green bonds' – funds raised from fixed income investors to support environment-related projects[16,17]. Integrated funding strategies can identify and harness a mixture of financial sources and policy instruments to channel funding for sustainable land management. The Global Mechanism (GM) of the UNCCD suggests a five-step approach that includes the identification of entry points and partners for funding, the establishment of a coordination strategy, and the design of collaborative enabling policies[18]. Given their mandate to provide advice on increasing the effectiveness of financial mechanisms to support sustainable land management, partnering with the GM specifically can be helpful for policy-/decision-makers to access and create pathways to funding and receive guidance for action.

Fiscal conditions: Removing perverse incentives and establishing favourable ones

- Sustainable land management also entails creating the 'right' incentive structures, and eliminating incentives that sustain or even foster unsustainable land use and the loss of ecosystem services. These so called perverse incentives include tax easements or subsidies that, intentionally or not, support polluting industries, agricultural intensification, deforestation, etc. It is important to consider all of the nuances, contexts, and possible future outcomes when establishing incentives for sustainable land management.

- Economic instruments and tax systems can also be designed as positive incentives for sustainable land management, for example, taxing polluting industries through the 'polluter-pays' principle. Increasing prices or banning the use of unsustainable agricultural inputs is another option that policy-/decision-makers can undertake. Alternatively, existing incentives that may encourage degrading practices, for instance overgrazing by livestock, can be redirected towards public grant funding for sustainable livestock management[19].

- Finally, for any incentive structure to be effective, a stable macroeconomic environment is needed. Stable macroeconomic variables such as interest rates, inflation, or the balance of payments allow potential investors, individuals, and governments to effectively estimate future economic returns to investments into land management, and thus make more informed decisions.

Technical conditions: Identifying appropriate and 'future-proofed' sustainable land management technology

- Globally, best-practice examples of sustainable land management techniques and economic policy instruments are well documented. The comprehensive ELD Initiative report, '*The Value of Land*', as well as databases such as WOCAT or the OECD 'database on environmental policy instruments' offer detailed accounts of techniques and policy instruments (see *footnote i*). Such sources of information need to be utilized and distributed amongst relevant stakeholder groups.

- To guarantee successful and cost-effective adoption of sustainable land management techniques, land users need the necessary skills and know-how, as well as access to resources such as tree saplings or machinery[20]. The provision of rural extension services and the creation of knowledge and tool exchange platforms are helpful.

- Computer simulation models can help to analyse ecosystem services per land-use unit, as well as create and evaluate scenarios for ecosystem restoration compared to business as usual. The ELD Initiative can provide the scientific and technical support needed to improve capacity in the development and implementation of such required assessments, and has developed a structured step-by-step approach for cost-benefit analysis and subsequent implementation.

- Selecting 'future-proof' sustainable land management technologies can help curb future land degradation and reduce livelihood and sustenance vulnerability as well. While climate change has uncertainties, there are platforms which can inform policy-/decision-makers about estimated impacts for their respective country or region, such as the 'Climate Analogues' initiative by the Consultative Group on International Agricultural Research (CGIAR, *www.ccafs-analogues.org*). Further research and technology development is necessary, including new ways of land productivity improvement and the implementation of soil erosion control and water harvesting techniques.

- Not all technologies and techniques are suited to every locality, but rather need to be carefully selected and customised. For instance, the introduction of certain tree species or crop varieties may reduce soil erosion and foster carbon sequestration in one location, but fail in others due to different biophysical conditions. To select appropriate technologies, it is important to consider the drivers of current and future land use change and degradation, which can be manifold and intertwined between human behaviours and the environment[21]. Any new land use technologies will not only affect the provision and composition of ecosystem services, but also thus the behaviour of land users. Choosing techniques or economic incentives thus needs to be holistic, taking this interdependence into account.

Legal conditions: Property rights allocation

- Property rights play an important role in the establishment of policies for sustainable land management supported by economic valuations, and lack of secure tenure is often a major deterrent for conservation and investment. It constrains the capacity to foster inclusive growth in the development of economic mechanisms aimed at promoting sustainable land management. Tenure security is thus essential though does not necessarily require formal land titling. Establishing formally recognised land registers and enforcing customary (individual or collective) tenure rights can help to identify the appropriate stakeholder(s) who should take action against land degradation, or receive compensation when property rights are transferred to another land manager (e.g., foreign investors) Where customary and statutory rights coexist, tenure reforms need to be undertaken carefully, also in order to equally benefit all stakeholders and genders. In settings with overlapping tenure rights, privatisation may create tensions and foster the marginalisation of poor land users.

Cultural conditions: Understanding traditional norms and gender roles

- Incentivising sustainable land management economically and politically should consider cultural values and norms, as policies can either fail or create unintended tensions when they disregard them. Gender relations play an equally important role, especially in rural areas where women are increasingly running households and managing natural resource uses. Less than 20 per cent of global agricultural land is held by women[22], but many lack or are denied rights to the land, despite the fact that women with land ownership can earn more money, which they often spend on caring for family members in higher proportions than men, ultimately leading to improved food security and reduced poverty[23]. Ensuring policies cater to gender rights and equity is another critical component of establishing sustainable land management. If power relations are too imbalanced or if key stakeholder groups such as women or traditional authorities are ignored, agreements over land use may not hold in the long run. The 6+1 approach can be used to rebalance potential power asymmetries, since it explicitly takes cultural ecosystem services and the inclusion of multiple stakeholders into account.

Political conditions: Building capacity and establishing good governance

- National institutional structures addressing land degradation are often top-down in nature, and are at risk of bypassing the needs and demands of all stakeholders, disregarding local knowledge, and/or developing costly, ineffective, or redundant policy tools. Sub-optimal integration of these points in the development and implementation of policy instruments and sustainable land management techniques can create biases, and hinder effective action[18]. Likewise, without political will, the adoption of these economic and policy instruments and management practices is difficult, if not impossible. Partnerships can be setup between government, civil society, the private sector, international and local actors (resource user groups, traditional authorities), creating knowledge exchange across spatial scales, and the reduction of barriers to action. The empowerment of local institutions plays a vital and crucial part in this, especially where enacting bodies are required locally Policy making ultimately needs to involve various land users and related stakeholders in order to facilitate legitimate, efficient, and sustainable land management solutions.

- To avoid political deadlock and reluctance towards action, policy-/decision-makers need to form alliances and partnerships across ministerial divides, jurisdictional levels, and political parties. By creating synergies and coherence between ministries and institutes working in land use planning (e.g., agriculture, forestry, environment, urban planning), and by integrating sustainable land management issues into all decision-making processes, costs of action can be reduced and duplication of efforts avoided[18]. At the same time, economic benefits of sustainable land management policies for all stakeholders need to be communicated through outreach activities and public relations, education, and the inclusion of non-governmental stakeholders into the policy process.

- Furthermore, many instruments can be costly and require a long time horizon for planning, implementation, and taking effect – sometimes well beyond election cycles, which often drive political decisions. The benefits from implementing a measure by one government could then be reaped by a subsequent government, which can be another deterrent for taking decisions. Political and institutional conditions can thus be considered as constraining all other 'success factors'.

- Policy processes should be designed flexibly, able to take lessons learned into account, and adapt to changing circumstances. Once desired measures and policy instruments are implemented, they also be should subject to regular monitoring and evaluation to account for potential shifts in benefits derived from ecosystem services, and to cater to potentially necessary future adjustments.

CHAPTER

04 Conclusion

The value of terrestrial ecosystem goods and services goes beyond what the land provides for important sectors, such as food, water, and forestry. Recognizing that trade-offs among competing land-use sectors such as agriculture, industry, urbanization, and tourism are inevitable, economic assessments and approaches to managing and investing in land resources should aim to understand the total range of values that are important to all of society. A wide range of global examples from the Initiative's work has proven that investing in sustainable land management is both an affordable and a low-risk proposition and comes with positive returns on investments. More financing and novel, accessible funding mechanisms are needed to support the scaling up and out of sustainable land management. However, the public sector can concurrently focus on mainstreaming sustainable land management into existing policies, creating and supporting enabling environments, and driving institutional and policy reform.

There are a number of key messages to take away from the ELD Initiative, including that land management based on sustainable principles generates increased benefits to all stakeholders. Economic assessments and approaches to managing land resources are key in guiding decisions and should capture the total range of land and land-based ecosystem values that are important to all of society and stakeholders. If we develop rigorous cost-benefit analysis and assessment tools to identify the risks of action and inaction we can identify viable models with real economic benefits for both the public and private sector. Policy-/decision-makers need to plan and coordinate investments and trade-offs at scale and cooperatively develop appropriate institutional structures and stakeholder engagement. Seeking alternative livelihood options for land users and assessing the opportunities of transforming current management systems can lead to changes with higher benefits for all stakeholders while also ensuring the maintenance of the natural resource base.

By obtaining a thorough understanding of the economic implications of our decisions, we can progressively reduce subsidies that promote degrading practices for short-term gains; improve the incentive structure for sustainable land management, such as payment for the provision of ecosystem services, or direct subsidies or taxes to sustainable and beneficial practices. We can even provide incentives at the farm level so farmers can access the capital required to make necessary changes. By improving tenure and governance regimes to promote long term sustainable investment by land users, policy-/decision makers can also leverage private finance. In the meantime, public finance could provide the risk guarantees, seed capital, and catalytic funding. Grasping the increased benefits, revisions of political strategies, justification for investments and re-alignments of budgets can be decided and implemented through bridging the gaps of available information and between stakeholders. The tools and methods provided by the ELD Initiative represent vital support in tackling these tasks, and policy-/decision-makers are encouraged to engage with the growing community of actors that are seeking to implement sustainable land management through the lens of understanding economic benefits.

Above all, the ELD Initiative has proven that sustainable land management has the potential to make a real impact. The potential to feed more people; provide opportunities for growth and livelihood diversification, restore natural ecosystems; address climate change impacts and build justice and security for the world's rural poor. Sustainable land management should be the "new-business-as-usual" for all policy-/decision-makers. We can make smart, informed choices if we are guided by the evidence and data, towards a world that enacts policies which place economic, environmental, and human well-being and sustainability as paramount goals.

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