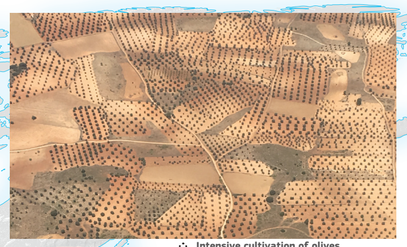
Cost of Land Degradation

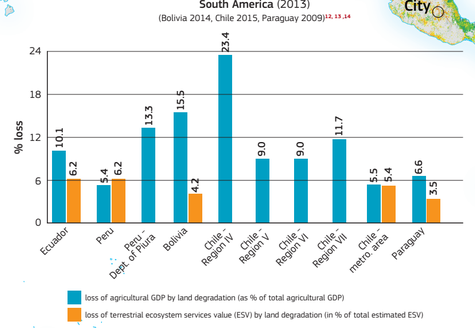
Understanding economics increases awareness and prompts sustainable land management

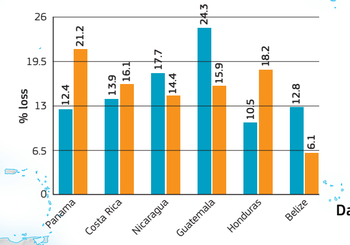
Annually, the loss of ecosystem services due to land degradation represents a reduction of 10-17% of global GDP[1].

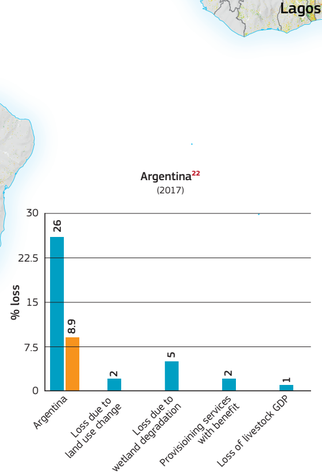


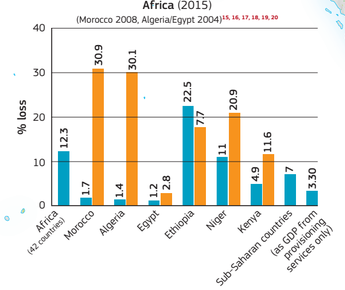
Intensive cultivation of olives. To reduce competition for water, optimise fertiliser use and facilitate management, olive trees are cultivated without undergrowth. This potentially increases risk of degradation.
Source: Cherlet, M.

Harvested quinoa in South America.
Source: Reynolds, J.









All graphs represent results of some of the methods mentioned here below:
– the econometric model outputs are expressed as a percentage of the agricultural GDP;
– results from the ecosystem services approach are expressed as the percentage of reduction in the Terrestrial Ecosystem Services Value (ESV).
Background map: convergence of evidence in high density cropland (see page 148) and shows where Global Land Issues (GCIs - page 145) coincide.

Historically, a reduction in productivity (usually plant yield) and its subsequent economic cost, was the main criterion used to define the severity of land degradation[2]. A more robust criterion now exists that places land degradation into the context of issues that matter the most to humans – estimating the monetary value associated with a "persistent reduction of ecosystem goods and services"[3]. For example, in absolute terms the monetary value of total global ecosystem goods and services – the terrestrial ecosystem services value (ESV) which includes food, feed, water availability, timber, air and water purification, soil formation, storage of carbon, flood mitigation and pollination – was recently estimated to be $125-145 trillion US$/year while losses due to land degradation ranged from $4.3–20.2 trillion US$/year[4]. The Economics of Land Degradation (ELD) Initiative, which is a global initiative that promotes an awareness of the economic consequences of land degradation, and the value of sustainable land management (SLM), estimates that the value of ecosystem services lost due to land degradation is equivalent to 10-17% of global GDP[1].

Monetary valuations of ecosystem goods and services such as these should nonetheless be considered as rough approximations. There are numerous reasons for this, including: (i) the lack of a universally accepted pricing system[5]; (ii) the lack of cost–benefit economic analyses at local scales and in data-poor areas[6]; (iii) many physical or environmental linkages that support or maintain ecosystem functions are difficult to quantify and thus remain 'hidden'[7]; and (iv) most ecosystem services are interdependent, interactive, and function on long time scales, which makes their economic valuation extremely challenging[8]. In spite of these shortcomings, the monetary valuation of ecosystem services has many benefits, from raising awareness to supporting decision-makers who are considering the economic benefits of SLM[9,10]. Econometric data at the local scale has the potential to impart insights into the cost-benefits of alternative strategies (and their trade-offs) as well as the monetary value of adopting a specific land-management practice[6].

Case study: Ecosystem services and economics in Botswana rangelands[11]

In rangelands of southern Botswana, ecosystem services provide local inhabitants with food, fuel, construction material, groundwater, genetic diversity, climate regulation, recreation and spiritual inspiration. In a report prepared by the ELD Initiative, four land uses – communal grazing, private cattle ranching, private game ranching and protected areas (WMAs, Wildlife Management Areas) – were ranked according to their abilities to deliver these ecosystem services.

Quinoa field in Bolivia.
Source: Reynolds, J.

Communal livestock grazing was found to deliver the widest range of ecosystem services, mainly via commercial food production, wild food production, fuel, construction material, climate regulation and spiritual values; WMAs delivered the next widest range of ecosystem services, followed by private cattle ranches and private game ranches.

While cattle production provides the largest financial returns to private cattle ranchers, its negative consequences in terms of land degradation affect all users of communal rangelands. Hence, costs and benefits are not distributed fairly and policy incentives that support the livestock sector – especially those linked to fencing and borehole drilling – result in an overemphasis on commercial food production, at the expense of other services. Veld products, construction material and fuel wood remain undervalued due to a lack of markets, while access to these ecosystem services is negatively affected by policy support for fencing and borehole drilling. The ELD report concludes that there is a need for policy reform that can support livelihood diversification – and hence SLM – and highlights the need for investment to explore new and potential market opportunities for veld products and carbon trading.

Calculating the economics of land degradation

International organisations, such as the Organisation for Economic Co-operation and Development (OECD) and the United Nations Convention to Combat Desertification (UNCCD), initiated programmes to investigate and test different pragmatic approaches to estimate the costs of land degradation. In 2005, the OECD highlighted the cost of inaction as a key consideration for decision-making and resource allocation in combating desertification and land degradation. In April 2013, the UNCCD held the second Scientific Conference to analyse, discuss and build on experiences, research and methodologies used in different contexts and places worldwide. More recently, the Economics of Land Degradation (ELD)[1] developed an holistic framework for the consideration of the economic values of land in political decision-making processes and the benefits derived from the sustainable management of land and soil on a global and local scale.

Currently applied methods to estimate the cost of land degradation illustrate the diversity of views and approaches:

i Replacement cost method, which counts the value of nutrients needed to add to the land, in order to recover the lost fertility.

ii Methods based on the loss of net erosion and other associated losses related to water and biodiversity.

iii Econometrical models, where the cost of land degradation is obtained by calculating the difference in cultivation output between affected and non-affected lands. These models calculate production and yield functions of the most important crops in affected and non-affected lands, as well as data from affected areas compared with optimal economic frontiers of production. Value differences in crop produce between non-degraded and degraded land drive the estimation of economic loss of degradation.

iv Methods that consider the Total Economic Value (TEV) of land estimate the economic loss by comparing the economic benefits derived from adopting sustainable land-management practices with the costs of these practices.

v The ecological economics approach[2], based on the estimated Total Terrestrial Ecosystem Services value at global level and its degraded fraction with results for all countries.

All methods depend heavily on the way degradation is approached and measured, which explains the large range of estimates in economic costs. As shown in WAD3, this should be viewed and estimated following stakeholders' interests which will likely yield a wide variety of spatial and numerical results which are all valid and complementary, relecting very different and local situations.

Hay stacks. Well managed terraced fields on the Chinese Loess plateau minimise the risk of degradation.
Source: Cherlet, M.