

Land degradation and cities: The essential role of local and regional governments

ICLEI Briefing Sheet - 2017, No. 3 - Land Degradation and Cities

Global concern for the challenges posed by land degradation has been affirmed by target 15.3 of the Sustainable Development Goals (SDGs), which is aimed at halting and reversing land degradation. Engaging with the challenges posed by land degradation in the 21st century requires a systematic approach that recognizes urban activities as a meta-underlying driver and includes the existing and potential contributions of local and regional governments as part of the solution.

Key messages

- Land degradation is a growing impediment to global sustainable development. It is increasing at a rate of 5 to 10 million hectares and directly impacts the health and livelihoods of an estimated 1.5 billion people globally.
- There are multiple threats posed by land degradation: it endangers food and water security, increases communities' vulnerability to natural hazards, and can potentially compromise geopolitical stability and security.
- Land degradation has been acknowledged in target 15.3 of the SDGs, which set the global agenda for sustainable development from 2015 to 2030. Nonetheless, the efforts to develop systematic approaches which national and subnational governments can follow to halt land degradation and rehabilitate affected lands are in their infancy.
- The study of land degradation in the 21st century must recognize that urban activities underpin many of the proximate and underlying drivers of global land degradation.
- Local and regional governments can play a pivotal role in halting and reversing land degradation by utilizing policy levers and planning strategies such as compact city planning, sustainable land management, landscape-level approaches, and rural-urban partnerships.
- The United Nations Convention to Combat Desertification (UNCCD) - which leads the global effort to achieve land degradation neutrality - provides a conceptual framework wherein the various activities of local and regional governments can appreciably support the goal of halting and reversing land degradation.

What is land degradation?

Land degradation is a multi-faceted and complex socio-environmental phenomenon wherein a land area loses some combination of biological productivity, economic productivity, and/or ecosystem functions and services. This loss is the result of interactions between biophysical and socio-economic determinants and factors operating at different spatial and temporal scales ^[1, 2].

The extent of global land degradation is uncertain. Projections range between 10-35 million km² of land that has experienced some extent of degradation, which means that a conservative projection would indicate that 20 percent of all global land in use has been degraded ^[3, 4].

What are its causes?

The causes of land degradation can be classified into two major categories: proximate and underlying drivers ^[5, 6, 7]. Proximate causes of land degradation are those drivers that directly affect the terrestrial ecosystem; these can be further subdivided into naturally occurring (biophysical) drivers and human-induced (anthropogenic) drivers. Underlying drivers are those which have indirect effects on proximate causes.

Biophysical drivers which result in land degradation include natural disasters (e.g., floods, landslides, etc.), severe and adverse climatic conditions (e.g. heavy rainfall), and non-anthropogenic climate change (e.g. soil degradation as a result of a rise in air temperature).

Land degradation has been linked to biodiversity loss and climate change, both as a cause and an effect, while land degradation and climate change can form an ecologically disastrous feedback loop [8, 9]. Climate change aggravates land degradation by changing the spatio-temporal patterns of earth temperature, rainfall, solar radiation, and wind. One example of the results of this effect are the extended droughts which occur as a direct result of climate change, which in turn exacerbate land degradation in certain areas of the world. Moreover, CO₂-induced climate change and land degradation are inextricably linked due to the mutual effects of precipitation and land degradation [10].

Anthropogenic drivers – such as unsustainable land use in general, overgrazing, over-cultivation and cultivation on steep slopes, mining, deforestation, ineffective management of water resources, pervasive use of certain agrochemicals, and population-related factors – are increasingly changing environments and causing unprecedented land degradation and depletion of natural resources [11, 12].

Soil sealing – the loss of the ecological, permeable functions of soil due to covering land surface for housing, roads, or other construction [13, 14] – is a proximate and anthropogenic driver of land degradation that is highly linked to urbanization. It has become increasingly problematic due to the rapid expansion of the built environment, and is also linked to urban heat island effect and increased potential severity of extreme weather events such as flooding [15, 16].

Global population growth – and in particular the growing global urban population – also places additional pressure on land resources for food production. This leads to soil erosion and the loss of arable lands for housing.

Underlying drivers of land degradation with a direct link to urban lifestyles and governance include poverty, land tenure insecurity, population growth and density, market access, failing institutions, and a weak policy and regulatory environment in the environmental and agriculture sectors [3, 17].

What are its consequences?

Land degradation poses an existential threat to all species. It makes all populations less resilient to the adverse impacts of climate change [9], and also negatively impacts food security, the quality of water resources, air quality, socio-cultural values, and economic development [18].

The impacts of land degradation on food security are pronounced. Degraded land results in reduced crop yield and can lead to the permanent contraction of agricultural land; this endangers food security at greater spatial scales and threatens rural livelihoods, increasing the poverty rate among those whose livelihoods are heavily dependent on food production, as well as among low-income urban inhabitants who must spend more on food due to increased food prices as a result of decreased supply. As consumption patterns increase, greater productive demands are placed on land. There are about 1.3 billion land users involved in some method of agricultural production that produce food for both themselves and the other 5.7 billion people living on earth [19].

The vicious cycle of land degradation and poverty, combined with the negative economic effects of poverty and food insecurity to national economies, fundamentally hinders the improvement and development plans aimed at solving these pervasive issues [20].

Land degradation also has economic impacts on communities and imposes a huge cost on the global economy. According to the UNCCD, the global cost of land degradation is estimated at USD \$490 billion annually [21]. This figure does not include the contribution of land degradation to the cost of natural disasters caused by ecosystems, occurring as a result of disruption by human impact and climate change, which is estimated to be more than USD \$300 billion annually [22].

Moreover, and as a potential consequence of land degradation at a larger scale, global peace and stability is often threatened by food and water insecurity [23]. The inability to derive a livelihood from land, either due to gradual degradation or the absolute loss of land as a result of disasters such as landslides, can lead to “forced migration”. In such situations, people have to relocate, either within their country or across political borders, and the majority end up in urban areas [24]. While various other factors – ranging from social to religious to political – also impact forced migration, poverty and the loss of productive capacity as a result of land degradation remain the fundamental driver [23].

Although land degradation can be stopped and reversed, it is crucial to deal with and control its causes and drivers; otherwise, degraded land resources will deteriorate further, which may in turn lead to irreversible levels of degradation and desertification and result in additional depletion of ecosystem services [2]. Such measures are usually beyond the capacity of individual land-users and require active engagement of stakeholders across all scales of government and sectors.

Why are local and regional governments paying attention?

One of the biggest challenges facing sustainable development is found in preparing for the doubling in size of the urban population during the period between 2010-2050; cities around the world will incorporate 2.4 billion additional urban inhabitants by 2050. Currently, it is estimated that about 200,000 people migrate from rural areas to cities in all around the world every day [25], while a UNCCD Report from 2014 indicates that about 60 million people could move from the degraded areas of sub-Saharan African countries to North Africa and Europe by 2020 alone [26].

Local and regional governments have a clear mandate to safeguard their communities by prioritizing action aimed at reversing existential environmental threats such as land degradation. However, the relationship between urban areas and land degradation is highly complex, as urban areas represent both a cause and an effect. Urbanization and urban lifestyles are directly impacting some proximate causes of land degradation (e.g. increasing GHG emissions), and are also highly linked to several underlying drivers of land degradation; drivers such as migration, poverty, market

access and failing institutions and regulatory frameworks are all occurring to varying degrees within cities.

Global concern around the requirements for sustaining 'life on land' has been signaled by the inclusion of SDG 15 in the 2030 Agenda for Sustainable Development. Achieving this global goal requires a paradigm shift which recognizes the increasing rights and responsibilities of cities in the 21st century. This new paradigm must acknowledge urban activities as a "meta-underlying driver" of land degradation and consider local and regional governments as key allies in minimizing land degradation and restoring affected land areas.

What can local and regional governments do?

Land is not a renewable resource, and the preservation of land resources is closely linked to governance patterns and management practices at all levels of government. In order for land degradation to be halted and reversed, active engagement of all stakeholders is required. Local and regional governments can play a pivotal role by utilizing a number of cross-cutting policy levers and planning strategies.

Integrating sustainable land management (SLM) principles into planning can effectively contribute to a reduction in land degradation. For example, local governments can promote urban agriculture to produce food within cities, and as such, reduce the pressure on farmlands in rural areas, therein resulting in less land degradation.

Guidelines for compact city planning and smart growth can be mainstreamed into urban and regional planning. These principles can prevent and decrease the transformation of arable lands in peri-urban areas, can reduce the extent of soil sealing which occurs as a result of the expansion of the built environment, and can revitalize previously degraded brownfield areas.

A landscape-level approach is an integrated planning and decision making method which is increasingly understood as a set of principles and approaches toward expanding food production and security, conserving ecosystems and environment, alleviating poverty, and coping with natural disasters caused by climate change. Landscape-level

Compact City Planning & Smart Growth: Nagpur

Nagpur, India, is a 2.4 million inhabitant urban agglomeration. A recent study indicated that approximately 36 percent of Nagpur's population resides in informal settlements, often in-and-around Nagpur's peri-urban agricultural and forest lands.

In order to promote greater inclusivity, as well as safeguard its natural assets, Nagpur has developed a smart growth strategy that emphasizes compact, mixed-use planning on all publicly owned land and advances sustainable urban transport in the form of two metro-line corridors. These initiatives deter future land degradation by encouraging the redevelopment of core city areas, promoting mixed-use development along the transportation corridors, and providing affordable movement options for those living in informal settlements^[30].

approaches are aimed at proper allocation and management of land in areas where productive land uses (e.g. agriculture, mining, etc.) compete with environmental and biodiversity goals. This allows for achievement of socio-economic objectives without compromising ecological integrity^[27]. In that regard, local and regional governments can utilize the approach to balance the provision of land-based goods and services with the conservation of natural ecosystems and land that are pivotal to halting land degradation.

A number of additional strategies, such as sustainable urban transport and increasing the energy derived from renewable sources, have the added benefit of reduced GHG emissions. This can mitigate climate change and reduce the frequency and severity of proximate natural causes of land degradation.

Urban and rural areas are highly interdependent and increasingly integrated. They form a complex set of linkages, such as labor market flows and environmental services, and represent an important strategy for tackling land degradation. This is not a new concept; famed urbanist Jane Jacobs noted how cities can serve as the engines of economic development in rural areas^[28].

A rural-urban partnership – defined by the OECD (2013) as mechanisms of cooperation that manage urban-rural linkages to achieve common goals and more desirable and sustainable regional development – can help fight poverty and prevent forced rural out-migration. These have been successfully practiced in a number of countries, including Japan, Australia and Germany.

Rural-Urban partnerships can lead to a range of benefits at various scales of government, including: increased government capacity for executing policy; the creation of a development and land use policy that supports landscape preservation; sustainable management of natural resources; and larger and more integrated markets^[29]. More integrated markets can increase employment in rural areas, which in turn can reduce forced migration by safeguarding the capability to earn a livelihood. This can lead to less pressure on urban lands and reduced urban expansion and informal settlement, all of which contribute to land degradation.

Rural-Urban Partnerships: Nuremberg Metropolitan Region

The Nuremberg Metropolitan Region (NMR) in Germany encompasses a set of contiguous administrative districts, 11 urban and 22 rural, and is seen as a leading example of a successful rural-urban partnership.

In the NMR partnership, the links between rural and urban areas in common economic activities focus on agriculture and food production. The partnership produces observed benefits including: enhanced local productive linkages; better management of natural resources; economies of scale; increased political significance, financial resources and better dialogue with other government levels; improved quality, access or economic viability of services' provision; improved local government capacity to carry out tasks; and aligned priorities for economic development^[29].

The way forward

Land degradation is driven by multi-scalar and temporally dynamic processes, and as such, the scale and level at which strategies to halt land degradation are planned and executed are extremely important. Land degradation processes operating at larger spatial scales interact with those operating at smaller scales; accordingly, in order to deal with land degradation at the global level, we need to encourage conscientious actions at the local level.

However, we cannot lose sight of the fact that the impacts of land degradation vary across geographical regions. Each area affected, whether urban or rural, faces issues unique to their own context. Local and regional governments must select for the appropriate countermeasures to halt and reverse the effects of land degradation in their own communities.

These potential solutions can be categorized as preventive, curative, and preventive-curative measures. For instance, while the employment of compact city and smart growth principles are a preventive measure to reduce and halt land degradation, utilization of sustainable land management practices and landscape-level approaches directly support the reduction and restoration of degraded land.

The signing into force of the Paris Climate Agreement in December 2015 and the New Urban Agenda in October

2016 have set a global standard for sustainable urban development which will keep global temperature increases below 2°C. Similarly, the enactment of SDG 15 signals global recognition of the significance of land degradation as a challenge which must be tackled by 2030.

Considered in unison - and owing to the connections between climate change, land degradation, and poorly managed human expansion - it is clear that none of these global frameworks will be successful without integrated and aligned urban systems.

With local and regional governments already engaged in various practices that both halt and exacerbate land degradation, a concerted effort must be made to ensure that land degradation transitions from a collateral to a primary goal.

The key players in international land degradation community, and in particular the UNCCD, can help to empower local and regional governments by encouraging all national signatories to the Convention to Combat Desertification to acknowledge the role of local and regional governments as being integral to achieving SDG 15, as well as by recognizing urban activities as a growing meta-underlying driver of land degradation in 21st century.

Further Reading & References

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United Nations
Convention to Combat
Desertification

This ICLEI Briefing Sheet has been made possible by the United Nations Convention to Combat Desertification. The UNCCD supports countries to achieve Land Degradation Neutrality at the national level. Its Secretariat has been located in Bonn, Germany since 1999. Contents do not necessarily reflect the views of UNCCD.

Authors

Pourya Salehi
Urban Research Junior Officer
ICLEI World Secretariat

Michael Woodbridge
Urban Research & Policy Officer
ICLEI World Secretariat

Contributor

Yunus Arikan
Head of ICLEI Global Policy & Advocacy
ICLEI World Secretariat

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ICLEI World Secretariat
Kaiser-Friedrich-Straße 7
53113 Bonn, Germany
Email: urban.research@iclei.org

