Zentrum für Entwicklungsforschung
Center for Development Research
University of Bonn

ICARDA
Science for Better Livelihoods in Dry Areas

ZEF
Policy Brief No. 14

Economics of Land Degradation in Uzbekistan

by Aden Aw-Hassan, Vitalii Korol, Nariman Nishanov, Utkur Djanibekov, Olena Dubovyk and Alisher Mirzabaev

August 2015

MAIN FINDINGS

1. Estimates indicate that about 26% of croplands and 17% of rangelands in Uzbekistan have experienced considerable degradation over the last three decades.

2. The costs of land degradation in Uzbekistan are substantial and reached up to 0.85 bln USD per year due to changes in land use and land cover alone between 2001 and 2009.

3. Combating land degradation has significant economic benefits. Each dollar invested in land rehabilitation and restoration is estimated to yield about 4 USD in return over the next 30 years.

4. There are numerous low-cost technological options already available for land rehabilitation in the country, which mainly need broader dissemination: Cultivating halophytic plants in salinized areas (e.g. licorice), and rotating crops including alfalfa, mung bean and other legume crops. The latter are nitrogen-fixing crops, which can also help to save costs for fertilizers.

5. To transform agriculture into a sustainable, high-return activity while abating and reversing land degradation, more focused investment is needed in disseminating projects that popularize technologies, monitor their adoption and impact and, above all, raise awareness among farmers and increase their knowledge.

Introduction

Land degradation is a severe economic and environmental challenge for Uzbekistan. It has a negative impact on agricultural production, and on rural incomes and livelihoods. It thus poses one of the major problems for sustainable development in Uzbekistan, though numerous efforts to address it have been made. Uzbekistan's government is, for example, planning to allocate more than 1 billion USD for maintenance and modernization of the irrigation and drainage system[1] in the country until 2020.

Types of land degradation in Uzbekistan

Major types of land degradation are:
- *Secondary salinization:* Up to 53% of irrigated lands are affected by soil salinity, causing decreasing yields and profits[3]. Shallow groundwater tables and malfunctioning drainage also contribute to salinization.
- *Soil erosion:* About 80 tons per ha of irrigated croplands are lost each year. Wind erosion affects more than 50% of farmlands[4,5], and 19% of the irrigated area is affected by water erosion[6].
- *Overgrazing:* Pastures cover about half of the country's total territory (24 million ha). Degradation caused by overgrazing affects ten million ha of land cover (42%)[3].

Based on satellite data and local ground-truthing with communities, we assessed that about 26% of croplands and 17% of rangelands have been affected by degradation during the last three decades[2] (Fig 1). The major shifts in land use and land cover are:

- In the province of Navoi five million ha of barren areas have been mainly shifted to shrub-lands and – to a lesser degree – grasslands.
- The total area of croplands in Uzbekistan has increased by 0.3 million ha.
- The Aral Sea continues to shrink.

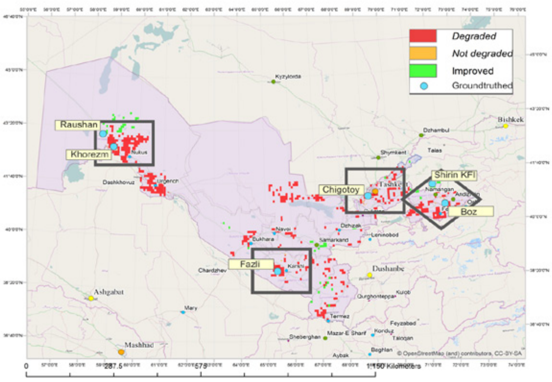

Figure 1. Local ground-truthing of land degradation hotspots in Uzbekistan. Source: Aw-Hassan et al. (2015)

Costs of land degradation vs. costs of action

Costs of inaction: To estimate the costs of land degradation we used the Total Economic Value (TEV) framework. TEV includes direct and indirect ecosystem services such as provisional, supporting, regulating and cultural services. The results indicate that 0.85 billion USD were lost per year between 2001 and 2009., which was equivalent to about 4% of Uzbekistan's Gross Domestic Product (GDP) in 2007[11]. We also estimated the decline in productivity in terms of lower meat and milk production as well as weight loss among livestock to be up to 6 million USD per year. The province of Karakalpakstan bears the highest financial burden of land degradation - mainly because of the continued desiccation of the Aral Sea. Other provinces with significant land degradation issues are: Kashkadarya, Buhoro, Samarkand, Surhandaryo, Farg'ona and Sirdaryo.

Costs of action: We assessed that the costs of action against land degradation are four times lower than the costs of inaction when projected over a 30-year time horizon and, above all, after sustainable land management measures were applied. Each USD spent on restoring lands will yield about 4.3 USD in return. Thus, the costs of action would amount around 11 billion USD over the next 30 years, whereas, if nothing is done, the resulting losses may equal almost 50 billion USD.

Drivers of sustainable land management

As the level of crop diversification has an impact on soil fertility, mono-cultural farming with one single crop such as cotton or wheat should be reduced, and crop rotation, especially with legumes, increased. Besides crop diversification the major factors contributing to sustainable land management are: more secure land tenure, better market access and the availability of non-farm jobs in rural areas.

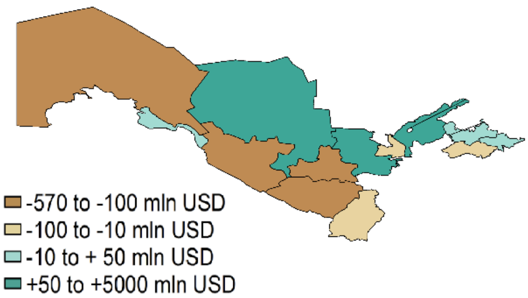

Figure 2. Net changes in the Total Economic Value (TEV) of ecosystems in Uzbekistan between 2001 and 2009. Source: Aw-Hassan et al. (2015)

Technological options for sustainable land management

Over the past years, the Government of Uzbekistan has taken many steps to improve irrigation and drainage infrastructure to reduce water losses and mitigate soil salinization. These measures cost around 2,000 USD per ha, though, by now, there are effective and low-cost interventions that can be undertaken by farmers to complement efforts made by the state, such as:

- Introducing salt- and drought-tolerant species such as salt-tolerant alfalfa varieties may help to rehabilitate degraded rangelands.

- Including nitrogen-fixing forage crops in crop rotations can help reduce the use of fertilizers and improve soil fertility. Fodder systems with salt-tolerant feed can improve soil quality and add an extra income for famers[7].
- Applying contour irrigation can reduce soil erosion from 4.5-8.2 ton per ha using conventional practices to 0.1 ton per ha[4].
- Zero or minimum tillage can also reduce soil erosion while increasing soil organic matter and soil moisture.
- Tree plantations in degraded croplands may help restore degraded soils[8] and provision tree products for income generation[9].

Conclusions

Costs of land degradation in Uzbekistan are substantial, whereas investments in land rehabilitation (sustainable land managment) are profitable. Sustainable land management needs to be enhanced by institutional and socio-economic policies. These may include a better dissemination of information and knowledge among farmers as well as higher-quality and more demand-oriented agricultural extension services[10].

Acknowledgement

This policy brief and research was financially supported by The German Federal Ministry for Economic Cooperation and Development (BMZ).

References

1 ICTSD (International Center for Trade and Sustainable Development), (2014). The problem of water resources in Central Asia. (in Russian) http://ictsd.org/i/news/mosty-blog/187411/#sthash.bZ4pi386.dpuf, accessed on 22 April 2014.
2 Le, Q. B., Nkonya, E., & Mirzabaev, A. (2014). Biomass Productivity-Based Mapping of Global Land Degradation Hotspots. ZEF-Discussion Papers on Development Policy, (193). Bonn, Germany.
3 Djanibekov, U., Khamzina, A., Djanibekov, N., Lamers, J.P.A., (2012). How attractive are short-term CDM forestations in arid regions? The case of irrigated croplands in Uzbekistan. Forest Policy and Economics 21, 108–117.
4 CACILM (2006) Country Pilot Partnerships on Sustainable Land Management. CACILM Multicountry Partnership Framework. Executive Summary. Tashkent, ADB.
5 Pender, J., Mirzabaev, A. and Kato, E. (2009). Economic Analysis of Sustainable Land Management Options in Central Asia. Final Report submitted to ADB. Washington, DC, USA.
6 Bucknall, J., Klytchnikova, I., Lampietti, J., Lundell, M., Scatasta, M., Thurman, M. (2003). Irrigation in Central Asia: Social, Economic and Environmental Considerations. World Bank, Washington, USA.
7 Toderich, K., Shoaib, I., Juylova, E., Rabbimov, A., Bekchanov, B., Shuyskaya, E., Gismatullina, L., Osamu, K., Radjabov, T., (2008). New approaches for biosaline agriculture development, management and conservation of sandy desert ecosystems. In: Abdelly, C., Ozturk, M., Ashraf, M., and Grignon, K., 2008. Biosaline agriculture and high salinity tolerance. Birkhauser Verlag/ Switzerland.
8 Khamzina, A., Lamers, J.P.A., Vlek, P.L.G., (2008). Tree establishment under deficitirrigation on degraded land in the lower Amu Darya River region, Aral Sea Basin.Forest Ecology and Management 255 (1), 168–178.
9 Lamers, J.P.A., Bobojonov, I., Khamzina, A., Franz, J.S., (2008). Financial analysis of small-scale forests in the Amu Darya lowlands of rural Uzbekistan. Forests. Trees and Livelihoods 18 (4), 375–382.
10 Aden Aw-Hassan, Vitalii Korol, Nariman Nishanov, Utkur Djanibekov, Olena Dubovyk and Alisher Mirzabaev (2015). Economics of Land Degradation in Central Asia. In: Nkonya E., Mirzabaev A., von Braun J., 2015. The Economics of Land Degradation and Improvement. Springer, Dordrecht, Netherlands.
11 All calculations are made at the constant 2007 USD values for comparability.

IMPRINT

Publisher:
Zentrum für Entwicklungsforschung (ZEF)
Center for Development Research
Walter-Flex-Strasse 3, 53113 Bonn
Germany
phone: +49-228-73-1846
e-mail: presse. zef@uni-bonn.de

www.zef.de

Contact: Alisher Mirzabaev, ZEF, almir@uni-bonn.de

Editors: Rebecka Ridder and Alma van der Veen

Layout: Katharina Zinn