iY-1 Perspectives

Volume 1
Issue 1 *Sustainable Development*

Article 13

Land-Use/Coverage Changes and Ecosystem Services: The Case of Gansu Province

Yingyuan (Eric) Xu
Syracuse University

Land-Use/Coverage Changes and Ecosystem Services: The Case of Gansu Province

Yingyuan Xu (Eric)

Introduction

Gansu Province is located in the northwest part of China. It has a long and narrow landform with complex and diverse landforms, including mountains, plateaus, plains, river valleys and deserts. Most of its region has a dry climate, with arid and semi-arid regions accounting for 75% of the total area. In historical time, this area has been suffered from water and soil erosion and land desertification, which change the coverage and terrain over time. In the last 40 years, the spatial expansion of the urban areas and human activity has accelerated this process, which might cause hidden dangers (Liu et al., 2020).

The purpose of this paper is to consider how large-scale land-use/coverage-change (LUCC) can impact the supply of ecosystem services (ESs). In order to achieve this goal, it is needed to identify the LUCC features in Gansu Province between 1992 and 2015 and then provides the integrated assessment of LUCC with regard to ESs capacity (Liu et al., 2020). Being aware of the relationship between LUCC and the ESs will help to find a way for humans' co-exist with the nature again. Moreover, it can help the local government to constitute laws and rules that can help achieve sustainable development.

The Sustainable Development Goals

In 2015, the United Nations (UN) published article *Transforming our world: The 2030 agenda for sustainable development* (United Nations General Assembly, 2015). In this article, the UN expounded the 17 sustainable development goals (SDGs), why SDGs should be achieved, and how SDGs can be achieved. The SDGs are about problems in varieties of

Xu, Yingyuan (Eric). (2023). Land-use/coverage changes and ecosystem services: The case of Gansu Province. *iY-1 Perspectives, 1*.

dimensions that today's world has not fully resolved, such as poverty, hunger, equality, ecosystem stability, etc. The UN also gives detailed aims that need to fulfill to achieve the SDGs.

SDG#15

The following paragraphs will focus on the Goal#15 *Life On Land*. Liu et al. (2020) explain that the Goal#15 is the SDGs most frequently occurred in the ESs report of the land in Gansu, which means the ESs indexes are most related to the achieving of the Goal#15. The UN shows the importance of the forests, what people can do to protect the forests and how protecting the forests can relate to people's lives (United Nations, n.d.). The UN argues that the forests are home to terrestrial species of animals, plants and insects, and the loss of forests is undermining the well-being of billions of people. It is important to protect the forests in the earth.

Findings and Discussion

LUCC refers to the changes in area and types of surface vegetation covers and non-vegetation covers due to climate change and human activities. Liu et al. (2020) focus on the LUCC between 1992 and 2015. They divide the land-use forms of Gansu into three types: relevant to ecological conservation (EC), relevant to urbanization growth (UG), and relevant to agricultural and farming development (AD) and compare the land-use forms in Gansu Province. The result shows that in this period of time, Gansu Province has experienced large-scale expansions of grassland, cultivated land, and built-up land. Further study indicates that the forests and bare land have decreased by 6645 and 4066 square kilometers while the area of water bodies had an increase of 45 square kilometers (Liu et al., 2020). The authors warn that the decrease in cultivated land and forests, together with an increase in grassland and bare land demonstrates potential ecosystem degradation.

The ecosystem services are the sum of the benefits that nature provides people and contribute to people's well beings (Eurac Research, 2018). There are four categories of ecosystem services: provisioning services, regulating services, cultural services and supporting services, each of them facilitates the achieving of different SDGs. Since the ESs was invented, the evaluation of the ESs has been a criterion to indicate the state of the ecological environment. Liu et al. (2020) calculate the positive or negative values of different land-use forms will have on the ESs and based on which, they build a series of LUCC-ES models for further study.

The LUCC-ES model based on average capacity of the ESs shows that the forest and the water body have the highest capacities of ESs (6.6 and 4.7) while the build-up land and bare land have the lowest (1.8 and 2.7). Model based on time shows that the capacities of all the four ESs in the middle and Northern part of the Gansu Province had a rapid raise during the 2000s. Model based on contrast of the capacities shows that the northern part of the Gansu Province, which is the location of industrial base, has high capacity of cultural services but has middle capacity of supporting services and low capacities of provisioning services and regulating services. Liu et al. (2020) convince that although the capacities of all the four ESs in Gansu Province have been improved between 1992 and 2015, the capacities of provisioning services and regulating services remain low, which can cause potential downsides like ecological degradation and the decline of the capacity to control desertification.

Liu et al. (2020) suggest that compare with the other two services, provisioning services and regulating services are more frequently related to the SDGs, among which the Goal#15 is the most frequently occurred. She believes that improving the capacities of provisioning services and regulating services is the key to achieve sustainable development in Gansu Province. The local

government of Gansu Province can consult the above-mentioned results before implementing land-use policies to promote large-scale land-use changes.

Conclusion

In conclusion, the relationship between LUCC and the ESs offers a way to measure the role of different land-use forms in achieving sustainable development. It also offers a way for the government to assess the consequences of the land-use policies they are going to implement.

The goal of sustainable development has gradually replaced the blindly pursuing of economic development in Gansu Province. The rapid raise of the capacities of all the four ESs in Gansu Province during the 2000s has showed that the incessant expansion in Gansu Province has already become the past. However, people should still pay attention to the potential ecosystem degradation and find ways to fully achieve sustainable development.

References

Eurac Research. (2018, August 2). What are ecosystem services? [Video]. *YouTube*. https://m.youtube.com/watch?v=r7UCAsBT5Yg

Liu, L., Liang, Y. & Hashimoto, S. (2020). Integrated assessment of land-use/coverage changes and their impacts on ecosystem services in Gansu Province, northwest China: implications for sustainable development goals. *Sustainability Science, 15*, 297–314. https://doi.org/10.1007/s11625-019-00758-w

United Nations General Assembly. (2015, October 21). *Transforming our world: The 2030 agenda for sustainable development*. United Nations. https://sdgs.un.org/2030agenda

United Nations. (n.d.). *Goal #15: Why it matters*. https://www.un.org/sustainabledevelopment/why-the-sdgs-matter/