Kyrgyzstan: Of pastures, water, and climate change

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The Kyrgyz Republic is one of the most vulnerable countries to climate change in the Central Asian region (Dzhaparova, 2021). This is due to its predominantly mountainous terrain, high dependence on glacial water for agriculture and energy, the importance of natural resources as a source of livelihood in rural areas, and the need for electricity for water supply (Jalilova, 2018).

The consequences of natural disasters brought about by climate change cannot be overestimated, especially in rural areas, as these have a far-reaching impact on access to natural resources, tenure and land systems, health and food security, among others. Evidence of climate change in the Kyrgyz Republic cannot be disputed. For example, the last 20 years have been the hottest on record. In addition, annual precipitation has decreased significantly over the past 50 years (Jalilova, 2018).

Under such conditions, the issues of environmental protection, ensuring equitable access to natural resources, guarantees of tenure and land use systems, as well as adaptation and mitigation of the consequences of global climate change come to the fore. There is indeed a direct link and dependence between the existing system of tenure, management and use of natural resources and adaptation to climate change and the mitigation of its consequences.

Brief information on Kyrgyz Republic

The Kyrgyz Republic is located in the center of the Eurasian continent in the northeast of the Central Asia region. With a total land area of 199,950 square kilometers, the country is divided into three administrative levels: regions and cities of Bishkek and Osh, districts, and rural administrations.

There are more than 20 ecosystems in the Kyrgyz Republic, from glaciers and snowfields to deserts, rangelands, and forests. The forests cover almost half of the country's territory; however, the forest cover is relatively small, accounting for 5.6 percent of the total land area. The climate of the Kyrgyz Republic is continental with hot summers and cold winters, although the conditions vary greatly - from a slightly arid continental climate on the mountain slopes to a "polar" climate in the high-mountainous regions of the Tien Shan and Pamir.

The variety of natural and climatic conditions and landscapes of the Kyrgyz Republic is categorized into four climatic zones:

- **Valleys** - foothill zone (up to 900 to 1,200 meters), characterized by hot summers and moderately cool and snowless winters with little precipitation;
- **Mid-mountain zone** (from 900 to 1,200 meters to 2,000 to 2,200 meters) with a typical temperate climate with warm, rather humid summers and moderately cold "snowy winters;"
- **Alpine zone** (from 2,000 to 2,200 meters to 3,000 to 3,500 meters), which varies between cool summers and cold, sometimes snowy, winters. July temperatures are 11 to 16 ° C. Winters are long (November to March), in cold months the temperature ranges from -10 ° C to -3 ° C; and,
- **Snowy zone** (3,500 meters and above), characterized by a harsh and very cold climate. This is a zone of snowfields, rocks, glaciers and a belt of moisture accumulation. Even in the lower reaches of this zone, the average July temperatures do not exceed for to seven degrees Celsius; in January they go down to -19 °C to -22 °C (Ministry of Agriculture of the Kyrgyz Republic, 2014).

Mountains account for more than 90 percent of Kyrgyzstan's territory and because of this, farming is possible on only about five to seven percent of the land, almost all of which depend on irrigation. In addition, of this land, pastures account for 80 percent (FAO, 2020).

The continued degradation of pastures, which are "the exclusive property of the State," is a serious threat to the country's food security because it means that the productivity of the scarce farmland continues to decline. As of 2015, 49 percent of the total pasture area in Kyrgyzstan have been degraded (Shimizu, 2006). (See Table 1)

Table 1. Degree of pasture degradation in the Kyrgyz Republic (in %)

Pasture type	Area (Thousand ha)	Degraded area (Thousand ha)	Degraded area (in %)
Summer (pasture areas located at ≥2,500-meters above sea level [masl])	3,951	1,432	36
Spring to autumn (≥1,500 masl)	2,756	1,378	50
Winter (<1,500 masl)	2,440	1,718	70
Total area	**9,147**	**4,528**	**49**

Source: Program for the development of pasture management in the Kyrgyz Republic for 2012 to 2015

Factors causing land degradation include excessive grazing or abandonment of pastures, deforestation, and natural disasters. As such, the ability of the soil to absorb and retain water is lost, thus it is eventually washed out or eroded.

In addition, a source of concern is the state of the republic's water resources, considering that Kyrgyzstan is highly dependent on irrigation to ensure sustainable development and food security.

In the Kyrgyz Republic, only 22.5 percent of irrigated lands are fed with water from reservoirs; full water supply to the rest of the lands is not guaranteed (Water Resources Service of the Kyrgyz Republic, n. d.).

It is ironic that despite the abundance of water resources, the Kyrgyz Republic is constantly faced with a shortage of water, both for irrigation and for drinking. This trend intensifies in dry periods, and according to forecasts of climatologists, this deficit will be felt more and more every year.

Climate Change and Land Tenure

The most pressing issues today related to land policies include ensuring equitable access to land resources; improving tenure systems, especially in low-lying coastal areas at high risk to the adverse effects of climate change; and, undertaking measures to protect the poor and vulnerable from loss of livelihoods, and developing opportunities for them to directly benefit from climate change mitigation measures (Taylor, 2009).

For pastoralists, improving their livelihood through traditional and novel approaches to land and livestock management is likely to be needed. Reciprocal relationships between pastoralists and agriculturalists will play a key role in future climate change and land tenure development.

A legal and policy framework for promoting informal social institutions to regulate access to resources at sustainable levels, which could be based on traditional resource management institutions and informed by modern institutions, is preferable to simplistic attempts to increase productivity through expanded access to resources.

It will be most effective and appropriate to implement land tenure and use policies that maximize security of land and property rights, consolidate and expand people's control over land and natural resource assets, and create incentives for sustainable use of the environment.

The general messages about the realities of climate change in relation to land tenure are not different from the principles of progressive land policies now widely recognized and promoted by international development agencies.

These include: a) provision of secure land rights under a diversity of forms of tenure, including the recognition of customary rights and the devolution of responsibilities for land registration and management to more local levels; b) promoting land access for disadvantaged groups including women and indigenous peoples; c) upgrading of tenure and infrastructure in urban informal settlements; d) improving equality in the distribution of land; and, e) better governance in land administration, in particular to ensure equitable access to and good use of public land.

In general, we believe that there is a need for tenure policies that provide both: a) greater security in land and property rights so as to consolidate and extend people's control over land and natural resource assets and provide incentives for good environmental stewardship, and b) greater flexibility to accommodate changes in land use and settlement patterns so as to provide clear options for people who may be prompted to move because of climate related threats to human settlements and livelihoods.

Climate Change and Emergencies

In response to the growing challenges to sustainable management of natural resources due in part to climate change, the Kyrgyz Republic has ratified a number of international treaties, including the UN Convention to Combat Desertification (1994), United Nations Convention on Biological Diversity (1992), United Nations Framework Convention on Climate Change (1992), Kyoto Protocol (1997), and Paris Agreement on the United Nations Framework Convention on Climate Change (2015).

The Kyrgyz Republic realizes the particular importance of environmental protection and rational use of natural resources and takes all necessary measures to fulfill the provisions of these documents. The State Agency for Environmental Protection and Forestry under the Government of the Kyrgyz Republic (SAEPF) is responsible for the implementation of the obligations of the Kyrgyz Republic under the Framework Convention on Climate Change and the Kyoto Protocol thereto.

The government in 2012 passed a resolution establishing the Coordination Commission on Climate Change Problems (CCCC), under the leadership of the Vice Prime Minister of the Kyrgyz Republic in charge of environmental protection.

The main goal of the Coordination Commission is to lead and coordinate the activities of ministries, departments, and organizations to fulfill the obligations of the Kyrgyz Republic under the UNFCCC and the Kyoto Protocol.

The Kyrgyz Republic is acutely aware of the catastrophic effects that irreversible climate change will have on the country's environment, economy, and society. The situation is no less than critical.

Adaptation and mitigation measures must be put in place and in Kyrgyzstan, the design and implementation of these measures should be seen as part of a strategy to consolidate the country's achievements in achieving the Millennium Development Goals and then the Sustainable Development set by the United Nations to address poverty and human development.

Some of the main elements of adaptation activities are improvement of the regulatory legal framework for adaptation to climate change; improvement of information tools for monitoring climate change processes and assessing climate risks; and, organization and promotion of transboundary cooperation on adaptation to climate change.

The Kyrgyz Republic is pressed to act swiftly due to its high vulnerability to climate change risks. A decrease in water resources and a change in temperature due to climate change, for example, will have a direct impact on the quality of its scarce land used, crop yield, and consequently, food security.

Studies carried out by the Institute of Water Problems and Hydropower of the National Academy of Sciences of the Kyrgyz Republic show that the fertility of the country's arable lands will decrease as a result of climate change, and the extent of deserts and semi-deserts will expand from 15 percent of the land area (in 2000) to 49.7 percent (in 2100). The territory and productivity of high-altitude pastures may decrease by up to 50 percent, while the projected loss of spring to autumn ephemeral pastures will be a staggering 70 percent (United Nations Development Programme in Kyrgyz Republic, 2009).

Increases in the frequency and severity of floods (and associated riverbank erosion) and droughts are likewise projected because of higher temperatures and decreased snowfall. In particular, river floods and waterlogging in spring, heat loads in summer, landslides and flash floods, and snowmelt in summer will be increasingly felt; precipitation in the form of rain and snow is expected to increase with the frequency of heat waves.

The projected decrease in crop yields and livestock productivity will have the most adverse impact on the population, and will contribute to a further increase in food prices, worsening the socio-economic situation, especially of rural residents.

It is therefore necessary to improve the efficiency of the use of land resources and the adaptation of agriculture. Main measures include:

- optimization of location and specialization of agricultural production;
- selection work for the cultivation of drought-resistant and salt-tolerant crops;
- integrated pasture management and development of grazing livestock, taking into account adaptation to climate change;
- improvement of the appropriate agricultural infrastructure to better adapt to the negative effects of climate change; and,
- improvement of the food security monitoring system and creating a yield forecasting system.

Role of Local Communities in Climate Emergencies and Disasters

Local communities play a central role in the planning and management of the country's pasture, forest and water resources, and are key players in the rapid response and prevention of natural disasters from climate change. Rural residents are united into community groups that manage a specific natural resource. These include water users' associations and pasture committees. The functions of these entities are enshrined in the Laws of the Kyrgyz Republic "On Associations of Water Users" and "On Pastures."

On Pasture

With the adoption of the Law of the Kyrgyz Republic "On Pastures" in 2009, the majority of rural residents has created 454 Pasture User Associations (PUUs). The said law provided for the transfer of the rights of planning, use, and management of pasture resources from the State to local communities. As the rightful owner of the land, pasture users began to take responsibility for these lands and has allowed them to improve pasture conditions, repair livestock paths, bridges, and other infrastructure elements. They have been able to solve other problems that hinder effective, efficient, and equitable use of pasture resources.

The above processes have enabled for the practice of long-term planning, unity and unification of pasture users; community mobilization; improved joint efforts to prevent natural disasters and address emergency situations; increase initiative in the community; strengthen inter-generational communication; and, improve mutual understanding and mutual support of rural residents on the use of natural resources and the associated conservation of biodiversity. At the same time, there has been an increased level of involvement of women and youth in the planning, management and use of pasture resources, and strengthening the rights of the local population to manage pastures, and reducing the level of conflicts.

On Forests

Joint forest management approaches were also employed by organized rural communities through the planning and implementation of measures to regulate the impacts of climate change on forests. Aimed for the achievement sustainable forest management with the participation of local governments, the population, and local communities, joint forest management has become a proven method of climate change adaptation and prevention of emergencies in rural areas.

On Irrigated Agriculture

Following the adoption of the Law of the Kyrgyz Republic "On Associations of Water Users," 487 water user associations have been created with the aim of operating and maintaining irrigation systems and managing irrigation water in their service areas. The norms of the Water Code of the Kyrgyz Republic also provide for the consistent expansion of the participation of water users, the public, and the sectors involved in the planning, formulation, implementation, and monitoring of government decisions.

The role of local communities in emergencies and natural disasters cannot be overemphasized. They often play an important role in building resilience to disasters and enhancing environmental security by maximizing awareness and encouraging civic participation in disaster preparedness activities. This, however, requires appropriate knowledge and capacity on the part of local stakeholders, as well as close collaboration and clear division of responsibilities between local governments, civil society and the private sector. One of the most effective in this case are preventive measures that rural residents are successfully implementing on the ground.

The irrigation sector is more vulnerable to natural disasters (mainly mudflows). To protect the rural population from mudflows and irrigation systems, the construction of protective dams is being practiced, and field exercises are being conducted with local stakeholders.

Planting elm seedlings were also being carried out to create buffer zones on along the riverbanks to prevent the risks of mudflows, floods, and coastal erosion.

Agroforestry – a holistic approach to taking advantage of the benefits of combining shrubs and trees with crops and/or livestock – has once again proven to be cost effective and effective. This approach combines agricultural and forestry technologies to create more diverse, beneficial, cost-effective, productive, and sustainable land use systems. The introduction of agroforestry methods is aimed to contribute to the adaptation of the landscape to the changing climate, help combat land degradation and desertification, protect biodiversity and soil fertility, provide a healthier water system, and reduce the likelihood and intensity of forest fires. Tiered farming and agroforestry systems help reduce exposure to hazards while meeting the needs of local communities for food, firewood, feed and timber. In a multi-storey planting environment, crops under tall trees or horticultural crops withstand shade and provide the microclimatic conditions required for all crops.

Recommendations and Lessons Learned

The forms of land tenure, determined by law or custom, determine who can use what resources, for how long, and under what conditions.

The guarantee of tenure and use of land resources is given based on the legislation in force in the country and the established traditions and customs at the local level. These give confidence that human rights to land will be recognized and protected.

People with precarious land tenure, however, face the risk that their land rights will be compromised by competing claims or even lost through evictions.

The effects of climate change on their lands disproportionately affect rural residents, especially those who do not have tenure and use rights (including those who have some restrictions on gender, nationality, age), since they are tied to the land and cannot switch livelihoods easily.

The lack or low level of guarantees for tenure and use of natural resources increases the vulnerability of the poor and reduces the ability of farmers, pasture users, pastoralists, and urban populations to cope with the changes caused by climate change.

Timely documentation and wide dissemination of good practices demonstrating a direct link between improved tenure, use, land management, and the ability of the poor to adapt to climate change will enable preventive action to adapt and mitigate the effects of climate change.

The need to restore many elements of the nomadic lifestyle of pasture users through a combination of traditional and modern approaches to land management and animal husbandry is becoming evident.

Such synergies will play a key role in the future in the development of policies for adaptation to climate change and sustainable land tenure. The legal and policy framework for the promotion of informal social institutions is necessary for the quality regulation of equitable access to land resources on a long-term basis, based on long-term traditional principles of natural resource management and modern planning and monitoring mechanisms.

The critical issues that should be addressed by land policy are: ensuring equitable access, tenure and use systems in areas subject to significant direct risks of climate change, especially in low-lying coastal areas at serious risk; accelerated securing of land tenure to improve households and the ability of communities to adapt to the impacts of climate change and food security; and, undertaking measures to protect the poor and vulnerable from loss of livelihoods and developing the opportunities available to them to reap direct benefits from climate change mitigation measures.

Governments should integrate into their national land policies a variety of effective climate change adaptations with broad potential for use, and regularly identify gaps in understanding the impacts of climate change on specific regions and change the legal framework for land use accordingly.

Conclusion

The direct impacts of climate change on land use systems and land-related employment have the potential to have a range of impacts on access to and ownership of land, with direct and indirect negative impacts on both basic livelihoods and human well-being.

Despite the widespread publicity of climate change issues, there is still very limited understanding of the relationship between climate change impacts, social and political responses, and land tenure. The links between climate change and land tenure issues can be multiple, complex, and indirect. However, the impacts of climate change and volatility are being felt through transformations in natural ecosystems, land opportunities and land use systems. More and more, these changes will lead to increased pressure on dwindling land stocks for both the agricultural sector and industrial use.

As a result, land issues and policies are key factors in adaptation planning when there is a need to strengthen land tenure, improve governance in high-risk settings, and secure access to land for populations for whom land is their main livelihood.

An overview of the realities of climate change in relation to land tenure does not differ from the principles of progressive land policy, which are now widely recognized and promoted by international development agencies.

These include: securing land rights under various forms of tenure, including the recognition of customary rights and the transfer of responsibility for land registration and administration to local levels; promoting access to land for the poor, including women and youth; improving tenure conditions and infrastructure in informal settlements; increasing equity in the distribution of land; decentralized natural resource management and an inclusive framework for stakeholder engagement in conflict management; encouraging a fair rental market to improve the system of interconnection of supply and demand for land; and, effective land management to ensure equal, equitable access to and proper use of public land.

On the other hand, there will obviously be a need for better regulation of land use in risk areas, which could limit the overall availability of land and lead to the need to expedite provision elsewhere.

In practice, however, the relatively high costs of resettlement or compensation for land loss and large-scale settlement of property rights, coupled with the likelihood of climate change impacts on unsafe property tenure in risk areas, could lead governments to ignore tenure security issues for vulnerable groups.

As a result, it is not enough to simply promote positive land policies, responses to the risks of climate change need to be developed and a more systematic integration of land policies with climate change adaptation planning.

In general, tenure policies are needed that will both ensure greater security of land and property rights in order to consolidate and expand people's control over land and natural resource assets, provide incentives for sustainable use of the environment, and provide people in expected contexts with more demographic mobility and flexibility in adaptation and changes in land use and settlement structures to cope with climate-induced threats.

These two elements of security and flexibility are important factors in current land tenure policies. Thus, land policy should be aimed at addressing the use and management of land resources, especially in those territories that directly face significant direct or indirect risks from climate change.

At the same time, it is necessary to take into account the possibility of granting guaranteed rights to households to land in areas safe from emergencies, access of local communities to their direct use and appropriate infrastructure.

Inventory of current settlements and vacant lands, documenting informal rights, assessing the suitability of land and climatic hazard, various natural and climatic risks - this is just a small list of actions by local authorities to improve and equitable distribution of land.

In addition, government measures to protect the poor and vulnerable from potential loss of livelihoods and to increase the opportunity for direct benefits from climate change mitigation measures (e.g. deforestation/reforestation, etc.) are critical.

All of these measures need to be targeted at disproportionately affected populations (women, vulnerable and other social groups at particular risk due to poverty, poor access or limited access to land and natural resource assets), taking into account the existing impacts of natural and other hazards and limitations on adaptive capacity.

Land policy is one of the key elements of adaptation planning. Thus, in addition to improving and protecting against climate change, land policy should include not only land inventory, regulation of tenure, resettlement and improvement of land use efficiency, but also to apply preventive and adaptive measures according to the specific set of climate change impacts and taking into account the existing legal and institutional framework.

Safeguarding tenure rights is a critical element of land restoration, leading to increased agricultural production, better living conditions and helping to combat climate change. Clear and secure land tenure is critical to sustainable land use because disputes over land ownership and control create uncertainty and discourage investment.

Investors are deterred from financing potential land restoration projects and work when risk assessments reveal precarious land titles and unclear land control. Secure land tenure and good governance are especially important in situations involving women and young people, who are often disadvantaged by traditions and customs or local practices that favor men. Vulnerable groups such as youth and women in land-dependent communities cannot achieve decent livelihoods without land and access to productive resources.

Developing strong governance is another important factor in attracting and securing investment in agriculture, which is the main source of livelihoods and an essential element of any comprehensive landscape restoration and development effort.

Ensuring the rights of villagers to access land is a critical factor in their ability to respond to climate change. People with secure land tenure are more motivated to invest in farming practices that help mitigate climate change.

Such systems increase agricultural productivity and income, and increase resilience to unpredictable and adverse weather conditions, including drought. Ensuring social inclusion and cohesion around land tenure is also key to rural resilience as it reduces conflict and promotes sustainable management of natural resources by farmers. ■

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"Kyrgyzstan: Of pastures, water, and climate change" is a sequel to the 2018 Land Watch Asia Monitoring Reports, which were acclaimed by the relevant academia, practitioners, and civil society as an innovative and practical endeavor to track the state of land reform of a country.

This study aims to demonstrate the relationship and dependence between and among the existing system of tenure, management and use of natural resources, and adaptation to climate change and the mitigation of its consequences.

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DISCLAIMER

ACRONYMS

AA	Aiyl Aimak (administrative-territorial unit in the countryside)
ANGOC	Asian NGO Coalition for Agrarian Reform and Rural Development
AO	Aiyl Okmotu (local government)
APU	Association of Pasture Users
CANR KR	Comprehensive Assessment of Natural Resources of Kyrgyzstan (2008 to 2010)
CCCC	Climate Change Coordination Commission
FAO UN	Food and Agriculture Organization of the United Nations
GDP	Gross Domestic Product
IFAD	International Fund for Agricultural Development
MALRFI KR	Ministry of Agriculture, Land Reclamation and Food Industry of the Kyrgyz Republic

MES KR	Ministry of Emergency Situations of the Kyrgyz Republic
NAP	National Action Plan
NAS KR	National Academy of Sciences of the Kyrgyz Republic
NLA	Normative Legal Acts
NSC KR	National Statistical Committee of the Kyrgyz Republic
NUWUA	National Union of Water Users Association of the Kyrgyz Republic
PC	Pasture Committee
PUA	National Association of Pasture Users “Kyrgyz Jayity”
RG KR	Resolution of the Government of the Kyrgyz Republic
SAEPF KR	State Agency for Environmental Protection and Forestry of the Kyrgyz Republic
SFF KR	State Forest Fund of the Kyrgyz Republic
SRS KR	State Registration Service under the Government of the Kyrgyz Republic
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
WC KR	Water Code of the Kyrgyz Republic