REVIVING THE ROOTS

Land use and soil care practices among smallholders in Naryn and Issyk-Kul regions in Kyrgyzstan

ЭЛ ТОО
MOUNTAIN PEOPLE

Centralasiengrupperna

siani

The research presented in this report has been carried out by the Kyrgyz NGO El Too and the Swedish NGO Centralasiengrupperna, as part of the SIANI-funded expert group 'Reviving the Roots'. The core of this expert group consists of Nuraiym Syrgak, Altynai Zamirova, Tatiana Stebneva, Gustaf Sörnmo and Simone de Boer.

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Cover image
Mother Earth – artwork by Nurgiza Turdalieva**,** second-year student at Issyk-Kul State University. This is one of the artworks in the Mother Earth exhibition curated as part of the Reviving the Roots project.

Artwork description: On fabrics cascading from top to bottom, reminiscent of rays of light or streams of rain, a symbolic scene unfolds as a woman offers an apple to a child. This simple gesture is imbued with profound meaning. The Earth, like a mother, nourishes, protects, and cares for humanity.

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Summary

This report presents the findings of qualitative research conducted within the SIANI expert group ‘Reviving the Roots’. The primary goal of the study was to understand the historical and current local perceptions of soil, and practices related to soil management and soil care, in Kyrgyzstan’s Issyk-Kul and Naryn regions. The study is the first and foundational component of the Reviving the Roots project, aimed at improving soil health in Kyrgyzstan and contributing to enhanced food security and sustainable livelihoods. By focusing on ecological knowledge, it aims to restore holistic perceptions of soil and to promote sustainable agriculture practices that align with the Kyrgyz traditional ethos of harmonious coexistence with nature.

Summary of main findings

In smallholder farmers’ daily lives today, land is valued and approached foremost in relation to livelihoods, as people’s wealth and wellbeing are closely connected to their land, their livestock, and the fertility of the soil. Practices of soil care, preservation, and improvement are mainly motivated by material benefits, with soil commonly assessed based on its productive capacity. This means smallholders often prioritise practices that offer immediate returns over long-term soil care. This is reflected in the widespread use of synthetic fertilisers and pesticides, despite awareness of their harmful effects on soil and human health, as these inputs are seen as the most accessible way of enhancing yields and managing pests in the short term. There is a growing interest in organic methods, but their adoption is restricted by limited knowledge about soil health and nutrient requirements, and by a lack of resources. Crop rotation is increasingly practiced, but there remains potential for wider adoption and for it to be used more proactively. Sustainable agriculture practices such as (vermi)composting and water-efficient irrigation systems are also gaining attention, but they are still only practiced on a small scale, due to limited knowledge, infrastructure, and resources. Adoption of practices such as tree shelterbelts and crop rotation are furthermore constrained by small plot sizes. Much decision-making regarding soil health practices is moreover based on habit, advice from neighbours or relatives, or information found online, while expert guidance and support remain scarce.

Interestingly, and in some ways contrasting to daily material practices and concern about immediate needs, the way smallholders relate to and think about the land is also influenced by spiritual notions and folkloric sources that represent ideal attitudes and provide normative guidance. In these sources, understandings of the earth, land and soil are holistic, reciprocal, and ecocentric. In this view, all living beings are connected to the earth and to each other. The earth is seen as a mother who provides sustenance/livelihoods and abundance/blessing when people respect her and take good care of her. Therefore, in this view, the health and wealth of the people is interwoven with the health of the earth.

However, while people know on a spiritual or customary level what it means to respect and value the land, they generally struggle to bring this into their agricultural practice and methods of soil care in a more tangible or practical form, as becomes apparent from opting for harmful, non-reciprocal practices. We think this is at least partly the case because views on soil and agriculture specifically are influenced by Soviet practices and ideologies aimed at

yield maximisation and human dominance over nature. Moreover, while the concept of *land* is strongly present in folkloric sources and notions of human-environment relationships, the concept of *soil* is less prevalent. These sources also generally do not refer to land/soil in the context of agriculture, and many of these folkloric sources reflect a society and way of life quite different from how people make a living today.

In addition, farmers encounter multiple challenges that influence how they care for and manage the soil, which might make it difficult to act in ways that are considered culturally, morally or spiritually 'right', or ecologically sustainable. Pests, diseases, and weeds, for instance, continuously threaten crops. Environmental pressures, including water scarcity and unpredictable weather patterns, cause concern and require farmers to rapidly adapt. While soil fertility and livelihoods are affected by progressive soil degradation, most respondents in our study showed limited understanding of fundamental soil processes, often conflating erosion, degradation, and pollution, which hampers their ability to address these problems. Institutional challenges, such as lacking support from local authorities and a limited understanding of legal frameworks, further limit farmers' capacity to adopt more sustainable soil management practices.

Summary of recommendations

Based on the research findings, we suggest working towards bridging the gap between cultural-historical values of relating to and using the land – characterised by reciprocity and holistic ways of thinking – and actual farming practices – to some extent characterised by extraction and short-term gain – while also addressing geographical, climatological and socio-economic challenges. Agronomists, soil scientists, and soil laboratories; local self-governments and state authorities; NGOs and international organisations, and the Reviving the Roots project group could take the following steps to support this process.

- Work towards soil literacy through awareness campaigns, education, leaflets, et cetera in farmer-friendly language; incorporating the topic of soil literacy in school curricula; addressing soil issues through art and culture by organising exhibitions in rural areas, partnering with artists, and highlighting the hidden life beneath the soil that farmers may not be aware of; centring the notion of Mother Earth and the soil as living organism to emphasise holistic and reciprocal relationships with the soil; emphasise that soil is not only a natural resource but also part of Kyrgyzstan's cultural and natural heritage.
- Alongside lab-based soil analysis, promote traditional and sensory-based soil assessment methods, thereby empowering farmers to trust and refine their ability to evaluate soil quality themselves.
- Ensure that recommendations made after lab-based soil analysis include not only mineral fertilisation, but also organic methods.
- Support local cooperation around shelterbelt planting, integrated pest management, crop rotation planning, and PGS systems, thereby ensuring shared communal responsibility for sustainable land stewardship.
- Create farmer support programmes at the municipal level.
- Incentivise sustainable practices through subsidies or tax benefits.
- Ban the use of highly toxic herbicides and pesticides and improve law enforcement in case of harmful land use practices.

1. Introduction

1.1. Reviving the Roots project

This report elaborates how agricultural land and soil in Kyrgyzstan – especially in the Issyk-Kul and Naryn region – are perceived and cared for, both historically and today. The findings presented in this report are the result of a study conducted within the project 'Reviving the Roots', funded by the Swedish International Agricultural Network Initiative (SIANI) and implemented by the Kyrgyz NGO El Too and the Swedish NGO Central Asia Solidarity Groups (Centralasiengrupperna in Swedish). The Reviving the Roots project aims to improve soil health in Kyrgyzstan by reviving Kyrgyzstan's traditional holistic perception of soil and supporting sustainable soil management practices among smallholder farmers in Kyrgyzstan. Ultimately, the aim is to contribute to enhanced food security and sustainable livelihoods for rural Kyrgyz communities. The research presented in this report is one component of the project. Other components include an awareness-raising campaign consisting of an art exhibition and fair, consultations with duty bearers, and fostering dialogue on sustainable soil management among academic and civil society actors in Kyrgyzstan and Sweden.

The report is structured as follows: the remainder of this introduction elaborates further on soil and rural livelihoods in Kyrgyzstan, as well as the specificities of the research. The introduction is followed by two Context chapters. The first Context chapter outlines the institutional framework for land and soil use. The second Context chapter provides details on smallholder agriculture in Naryn and Issyk-Kul regions specifically. The three chapters that follow mainly contain research findings related to perceptions on land and soil, agricultural practices, and some of the challenges faced by farmers. Based on the research findings, recommendations and ways forward are shared in the last chapter.

1.2. Soil and rural livelihoods

Kyrgyzstan is a predominantly rural society; around 60% of the population lives in rural areas.[1] Even though most of the agricultural production takes place on smallholder family farms (FAO, 2020), agriculture is the backbone of the Kyrgyz economy, employing 30-40% percent of the labour force and contributing to 10-20% of the GDP.[2] Many people in rural areas are partly or fully dependent on their land for their livelihoods. Maintaining and improving soil quality and health is therefore crucial for safeguarding their future subsistence needs, as well as their wealth and wellbeing.

[1] https://www.fao.org/faostat/en/#country/113; https://data.worldbank.org/indicator/SP.RUR.TOTL.ZS?end=2024&locations=KG&start=1960&view=chart.
[2] Various sources state different percentages.

In addition to a kitchen garden attached to the house, people often own a small plot of land in the vicinity of their village, which is generally used for fodder crops and staple foods. Sometimes people rent land as well. While production is predominantly for subsistence use, some farmers are able to sell surplus harvest. In Naryn and Issyk-Kul, where the study took place, rural denizens also often own livestock in addition to cultivating crops. This reflects the long history of animal husbandry in these regions. Before the Russian and later Soviet administration introduced and developed agriculture in northern Kyrgyzstan, there was a tradition of livestock breeding and pastoralism that was adapted to the (semi-)arid and mountainous conditions of the area (Shigaeva et al., 2007, p. 394). Crop farming as a significant source of livelihood is thus relatively recent.

In pre-Soviet times, people's lives and livelihoods depended on sustainable pasture management practices based on holistic and ecocentric understandings of the relationships between people and the land (Rural Development Fund, 2015, p.4). New farming practices introduced by the Soviet administration shifted this paradigm to a rather exploitative approach under the banner of 'modernisation' (Spies et al., 2023). Within this paradigm, nature is regarded as a resource that serves human needs and as such enables a certain kind of 'development'. Since the dissolution of the Soviet Union, the persisting modernisation paradigm has been influenced by transnational neoliberal development agendas and international donors (Spies et al., 2023, p. 259), many of which are currently shifting their focus to more environmentally sustainable agricultural practices.

The dissolution of the Soviet Union also led to the discontinuation of the all-Union market and the all-Union division of labour and production, as well as the deterioration of various types of infrastructure, which made commercial agricultural production nearly impossible in the first years of independence (Abazov, 1999, pp. 197-198; Spoor, 2004, p. 6). Amidst the disintegration of the agricultural sector, subsistence farming became the dominant survival strategy (Pétric, 2015, p. 11). Since Kyrgyzstan's independence, smallholder farmers' daily practices have mainly revolved around safeguarding survival and attaining short-term results. This means they often opt for 'unsustainable' farming methods for their promise of quick returns.

Influenced by certain notions of development and modernisation, as well as concerns about food security, state policies have for a long time incentivised farmers to use these methods, for instance through subsidising mineral fertilisers. While these methods may offer short-term benefits, they deplete the soil in the long term. Both Soviet and post-Soviet agricultural practices, such as overcultivation and overgrazing, agrochemical use, and excessive irrigation, have led to erosion, salinisation and compaction of the country's farmland (Anarbaev, 2017; CIAT and World Bank, 2018; FAO and ITPS, 2015; Pétric, 2015, p. 7). Wind erosion and climate change furthermore exacerbate processes of soil degradation, and population growth puts increasing pressure on the land. The Reviving the Roots project addresses the issue of soil degradation by raising awareness about current and historical attitudes towards the land, as well as the various ways in which smallholders use and care for the soil.

1.3. The research

The study focuses on two regions – Issyk-Kul and Naryn – and spans three types of landscapes: semi-desert (Tong district), high mountain valley (Tash Bashat/Naryn area), and fertile agricultural lowland (Chelpek/Karakol area). The aim of the research was to gain insight into ways of thinking about, managing, and relating to land and soil, as well as the geographical and institutional contexts in which these views and practices are situated. In addition, analysis of folkloric sources was carried out to gain insight into historical and cultural perceptions of land and soil.

Both field research and content analysis were conducted between March and May 2025. Under the supervision of Nuraiym Syrgak, Altynai Zamirova and Bakyt Choitonbaev of the El Too foundation, nine students from four Kyrgyz universities – studying anthropology, sociology, linguistics, international relations, and history – conducted semi-structured interviews, focus group discussions, and content analysis. Together, Diana Nurdinova, Albina Soodonbekova, Gulnur Urmat kyzy, Adelina Akylbekova, Sezimai Kubatova, Akylai Alymbekova, Sezim Esengeldieva, Karlygach Moidunbekova and Meerim Jailoobek kyzy conducted the following research activities:

- interviews with 23 knowledge holders: village elders, soil scientists, agronomists, legal experts, NGO workers, artisans, and manaschi (in Tong district, Chelpek/Karakol area, Tash Bashat/Naryn area, and Bishkek);
- six focus group discussions with male and female smallholder farmers (in Eshperov (Tong district), Chelpek, and Tash Bashat);
- content analysis of multiple folkloric sources – proverbs, the Manas epic, short epic poems, and the work of poet improvisers – to trace cultural and historical meanings of soil.

Research design, analysis and report writing were done by Nuraiym Syrgak (El Too), Tatiana Stebneva (Centralasiengrupperna), and Simone de Boer (University of Gothenburg).

2. Context: institutional dimensions of soil care and land use

Soil care and land use practices are influenced by various institutional frameworks such as national legislation and governmental policies. Educational and scientific institutions, NGOs, and commercial parties also play a role in shaping how smallholder farmers relate to, and make use of, their land. In general, within those frameworks, farmers are increasingly expected to take responsibility for their own gardens and fields by actively protecting and enhancing soil quality, health and fertility through science-based practices, preventing erosion, adhering to legislation, and participating in agriculture-focused educational and development programs.

2.1. Governmental and educational/scientific institutions involved in agriculture, land use, and soil issues

The National Government of the Kyrgyz Republic		
Actor/body	**Areas of work**	**Main activities**
Jogorku Kenesh (Parliament) of the Kyrgyz Republic	Legislation and compliance with international frameworks.	Sets the legislative and policy framework for soil protection, approves international agreements, and oversees compliance with national soil policy.
State Service for Land Management, Resources and Property under the Cabinet of Ministers	State policy on land resource management and land relations; registration of property rights to real estate; efficient provision of services in land management, land cadastre, topography, geodesy, and cartography; promotion of the development of the land and real estate market.	Developing a unified legal framework for the state registration of rights to immovable property (real estate), their limitations or encumbrances (such as mortgages, easements, leases), and transactions (such as sale, inheritance, or transfer of rights) across the entire territory of the Kyrgyz Republic.
The State Enterprise for Land Management *Kyrgyzgiprozem* under the State Agency for Land Resources, Cadastre,	Land management and cadastre, including land surveying, boundary setting, and land use planning. Soil and environmental protection such as soil analysis, erosion control, and land reclamation.	Land surveying/monitoring, mapping and cadastral work. Participation in land use planning at the national and regional levels. Soil and environmental protection, namely protecting soil from water and wind erosion, landslides, mudflows, flooding, waterlogging, desiccation, compaction, salinization, and pollution from industrial waste, chemicals, and radioactive substances.

Geodesy and Cartography under the Cabinet of Ministers of the Kyrgyz Republic[3]	Mapping and GIS land inventory and monitoring, including land classification, productivity assessment, and monitoring. Legal and administrative support, e.g. border delimitation, zoning, and protected area designation. Training and capacity building.	Prepares plans for the reclamation of degraded lands. Land quality assessment and transformation justification. Research and analysis.
Republican Soil Agrochemical Station under the Ministry of Agriculture[4]	Land cadastre, geobotany, and monitoring, as well as laboratory studies of soils and plant nutritional properties throughout the territory of the Kyrgyz Republic, regardless of the ownership form of economic entities, and also under contracts with individuals and legal entities.	Conducting land surveying, soil studies, agrochemical and geobotanical assessments. Developing and supporting national and regional land use, conservation, and soil fertility programs. Designing land use plans, resolving boundary issues, and preparing land management documentation. Creating projects for land reclamation, erosion control, and improving degraded or low-productive lands. Conducting soil and water analysis to recommend appropriate fertilisers and soil treatment. Performing land quality assessments, inventory, and valuation for taxation or land market purposes. Monitoring land and soil conditions, including contamination levels. Applying GIS technologies and maintaining cartographic materials. Providing methodological guidance to regional agrochemical stations.
Land and Water Resources Inspection under the Ministry of Water Resources, Agriculture, and Processing Industry of the Kyrgyz Republic[5]	State supervision and control over the compliance with the norms and requirements of the legislation of the Kyrgyz Republic in the field of land and water.	Ensures enforcement of land laws, proper land use, and prevention of illegal occupation or misuse. Land monitoring: oversees land balance data, availability of unused land, and changes in land quality and use. Land degradation and restoration: controls measures to prevent soil erosion, salinisation, and other forms of land degradation; monitors land reclamation and improvement projects. Land transformation and documentation: participates in land category changes and ensures proper documentation and use according to designated purposes. Support and public awareness: provides legal guidance, participates in commissions, and helps resolve land-related disputes.

[3] Source: Charter of the State Enterprise for Land Management "Kyrgyzgiprozem" from Feb 12, 2024.
[4] Source: official website of the organization, https://pochva.gov.kg/rpas.
[5] Source: Regulation on the Service for Land and Water Supervision under the Ministry of Water Resources, Agriculture, and Processing Industry of the Kyrgyz Republic dated March 7, 2024, No. 98.

Department of Chemicalization, Plant Protection, and Quarantine under the Ministry of Water Resources, Agriculture, and Processing Industry of the Kyrgyz Republic[6]	Ensure the protection of the territory of the Kyrgyz Republic from the introduction, entry, and/or spread of quarantine pests, to protect agricultural plants from pests, diseases, and weeds, as well as to preserve and improve soil fertility.	The Department's main areas of work include control and monitoring through phytosanitary and soil surveillance, pest and disease forecasting, inspection of plant products and vehicles, monitoring of soil fertility and pesticide residues, and oversight of quarantine zones. It regulates the import, transit, and export of plant materials, registers pesticides and agrochemicals, manages state pesticide reserves, implements pest control programs, and prepares forecasts. In terms of services, it offers phytosanitary certification, disinfection, lab testing, pest control, and expert consultations. The Department also supports legal and methodological development and cooperates with national and international partners in plant protection and quarantine.
Department of Processing Industry and Organic Agriculture under the Ministry of Water Resources, Agriculture, and Processing Industry of the Kyrgyz Republic[7]	Development of state policy and legal regulation in the fields of food industry and agricultural processing, green agriculture, organic production, implementation of adaptation and mitigation measures in the agricultural sector related to climate change, and the export of agricultural products, including organic products.	The Department develops legal and strategic frameworks for food processing, agricultural exports, green and organic agriculture, agri-cluster development, and climate adaptation, while setting and harmonizing technical standards and national guidelines. The Department also provides consulting, technical, and laboratory services, offers market data and training, and assists in developing cooperatives and value chains. In its regulatory role, it registers bioproducts, organic producers, and land and issues permits and certifications. Additionally, it promotes green and climate-resilient technologies, supports access to financing, facilitates research, international cooperation, and public-private partnerships, and publishes guidance on food safety and sustainable farming practices.

[6] Source: Regulation on the Department of Chemicalization, Plant Protection, and Quarantine under the Ministry of Water Resources, Agriculture, and Processing Industry of the Kyrgyz Republic dated March 7, 2024, No. 98.

[7] Source: Regulation on the Department of Processing Industry and Organic Agriculture under the Ministry of Water Resources, Agriculture, and Processing Industry of the Kyrgyz Republic dated March 7, 2024, No. 98.

Local Governance Institutions		
Actor/body	**Areas of work**	**Main functions**
Local self-governments[8]		**Ayil okmotus (municipalities)** are responsible for allocating land ownership and use rights, overseeing pasture management, implementing land reform, controlling land use and protection, managing state agricultural land fund lands, and allocating land for construction within village boundaries according to urban planning documentation. **City mayors' offices** handle similar functions in urban areas. They allocate land ownership and use rights, manage pasturelands, issue permits for land surveying and development, monitor land use, and approve land transformation, including re-categorization for residential or public use. They also review land amnesty cases and set differentiated local land tax rates within their jurisdictions. **City keneshes (mayorship councils)** in republican and regional cities are primarily responsible for approving land use programs, zoning regulations, city master plans, and setting local land tax rates. **Ayil keneshes (village councils)** contribute to territorial planning, approve village development plans, determine plot sizes for household use, develop programs for rational land use, and set land tax rates for agricultural lands based on soil quality.

Educational/scientific institutions		
Actor/body	**Areas of work**	**Main functions**
Kyrgyz National Agrarian University; Department of Soil Science, Agrochemistry, and Farming	Has a soil analysis lab.	The department hosts two innovative scientific laboratories that meet modern requirements: The Kyrgyz-Japanese Soil and Agrochemical Laboratory (established with the support of the Japan International Cooperation Agency – JICA). The Key Laboratory for Agricultural Resource Research in Central Asia, focused on the study of water, soil, and plant quality, equipped with two autonomous weather stations and a CD-modelling laboratory.

[8] Source: Land Code of the Kyrgyz Republic.

Kyrgyz-Turkish Manas University in Bishkek	Has laboratories and programmes related to agriculture.	Soil Science and Plant Nutrition Laboratory; Fruit and Vegetable Growing Laboratory; Field Crops Laboratory; Biotechnology laboratory.
National Academy of Science; Department of chemical-technological, medical-biological, and agricultural sciences	Different institutes within the department have different focus areas. The Botanical Gardens are part of the department.	Its activities include: research on plant species, pests and diseases, biological diversity of flora and fauna, environmental microbiology; preservation and sustainable use of natural plant resources; flora and fauna monitoring.

2.2. Legislation around agriculture, land use, and soil issues

Current legislation of the Kyrgyz Republic outlines a comprehensive framework for the protection, rational use, and rehabilitation of land resources. These measures are designed to safeguard land as a vital component of the natural environment, maintain soil fertility, and ensure long-term land productivity, particularly in the agricultural and forestry sectors.

2.2.1. Land Code

In Kyrgyzstan, issues of land management and soil protection are regulated by a number of legal acts. The main legal base is the Land Code.[9] The Land Code was adopted in 1999 and since then, there have been nearly 200 amendments.

The Land Code obliges landowners and land users to manage and use the land responsibly. This includes preventing degradation, erosion, pollution, and other negative impacts, while also undertaking measures to restore and enhance soil quality. In cases where land degradation is irreversible, the law provides for its conservation following state-defined procedures.

In the Land Code, land and soil protection is covered mostly under section 19.[10] In this section it is for instance stated that environmental and sanitary standards must be considered in the planning, construction, and commissioning of infrastructure and industrial facilities. Any development likely to affect land conditions is subject to environmental assessment and regulatory approval. In addition, the law sets maximum allowable

[9] https://cbd.minjust.gov.kg/3-5/edition/1285814/ru.
[10] https://cbd.minjust.gov.kg/8/edition/23438/ru?anchor=g19.

concentrations for harmful substances in soil to protect both public health and ecosystems, with standards and assessment methods established by the government.

Oversight of land use and protection is carried out by authorised state bodies. These institutions are empowered to monitor compliance, issue binding instructions, and enforce corrective actions where necessary. The procedures for such state control are regulated by the Cabinet of Ministers.

2.2.2. Law on the Protection of Soil Fertility of Agricultural Lands

In addition to section 19 of the Land Code, Law No. 165 On the Protection of Soil Fertility of Agricultural Lands (August 10, 2012) is concerned more specifically with soil protection.[11]

A key emphasis of the law is the prevention of soil degradation caused by both natural and human-induced factors such as erosion, salinisation, pollution, compaction, and nutrient depletion. The law promotes the application of scientific and environmentally sound methods of land management and encourages the use of soil-preserving technologies, crop rotation, and agrochemical measures tailored to local conditions.

The law defines state policy principles, including the prioritisation of long-term soil health over short-term economic interests, transparency and public participation in soil protection efforts, and the accountability of land users and decision-makers for harm caused to soils. Special attention is given to the risks and limitations associated with mountain agriculture, which is widespread in Kyrgyzstan.

The law also defines procedures for soil monitoring and assessment, including agrochemical surveys and integration of soil data into the national land cadastre. Norms for permissible concentrations of harmful substances in soils are established to ensure the protection of both human health and the environment.

Responsibilities for the implementation of this law are distributed among multiple levels of governance. The Jogorku Kenesh (Parliament) is responsible for developing national soil protection policy and ratifying relevant international agreements. The Government of the Kyrgyz Republic and authorised executive agencies are tasked with implementing policy, approving national programs, conducting scientific research, and overseeing enforcement mechanisms. Local self-governments are responsible for implementing district- and village-level soil protection programs and for monitoring compliance.

In addition, the State Design Institute for Land Management *Kyrgyzgiprozem* under the Ministry of Natural Resources of the Kyrgyz Republic plays a critical role in supporting sustainable land management and environmental stewardship in the Kyrgyz Republic. Its functions encompass a wide range of technical, analytical, monitoring and planning activities aimed at the efficient use and protection of land resources.

[11] https://cbd.minjust.gov.kg/203765/edition/724793/ru.

Landowners and users are required to adopt sustainable soil management practices, prevent harmful impacts, and report on soil conditions. In cases of damage, they are held liable for restoration and compensation. The law stipulates that failure to implement necessary measures may lead to judicial expropriation of the land in question.

2.2.3. Law on Organic Production

Law No. 66 On Organic Production (March 23, 2023), defines the legal basis for actors and institutions in the sphere of organic production and regulates the production, circulation, and labelling of organic production.[12] Regarding soil specifically, it emphasises the importance of using cultivation practices that maintain or increase soil organic matter, enhance soil stability and soil biodiversity, and prevent soil compaction and erosion. This law prohibits harmful inputs, namely, the use of synthetic fertilisers, pesticides, GMOs, ionising radiation, and unapproved chemical additives. Organic producers are required to maintain and enhance soil organic matter, biological activity, and fertility through natural methods like composting, crop rotation, and organic means of plant protection. Tillage and cultivation methods must prevent soil erosion and compaction, supporting long-term soil quality and health.

2.2.4. Additional laws

Law No. 166 On the Development of Agriculture establishes legal relations between citizens, legal entities, state executive bodies and local government bodies within the development of the agri-food sector.[13] Preserving, restoring and reproducing soil fertility, as well as preventing soil degradation, are mentioned as areas where the state offers support.

Law No. 4 On the Administration/Management of Agricultural Land regulates legal relations in the administration and management of agricultural land (e.g. land ownership, inheritance, purchase and sale).[14] There is no mention of soil in this law.

2.2.5. Program on the Development of the Green Economy

The program for the development of the green economy in the Kyrgyz Republic for 2019-2023 aimed to lay the basis for changing state policy to enable the implementation of green economy approaches.[15] In the sphere of agriculture, the objective of the program was to increase productivity while developing sustainable resource management and resource-saving practices, as well as organic and climate-resilient agriculture. The program mentioned concessional loans and leasing opportunities for agricultural equipment that protects soil layers (e.g., zero-till technology, where the soil is not disturbed). Benefits for using bio-

[12] https://cbd.minjust.gov.kg/4-3309/edition/1239228/ru.
[13] https://cbd.minjust.gov.kg/202555/edition/1213000/ru.
[14] https://cbd.minjust.gov.kg/4-368/edition/1024478/ru.
[15] https://cbd.minjust.gov.kg/453438/edition/1189681/ru.

fertilisers and water-saving drip irrigation systems are also mentioned. Regarding soil specifically, the action plan included the following points:[16]

- Conducting agrochemical studies on the content of nutrients in the soils of arable lands, including the creation of a data bank of agricultural lands.
- Creation of soil maps by region to create programs and projects for assessing and controlling soil fertility of agricultural lands.
- Develop recommendations for soil analysis that farmers can access online.
- Develop recommendations on effective rates, types, forms, and application technologies of fertilisers based on soil properties, crop composition, and application method.
- Develop proposals for soil remediation in obsolete pesticide warehouses and the disposal of obsolete pesticides using environmentally safe methods.

Within the program, it was emphasised that unsustainable land use practices and inappropriate irrigation leads to waterlogging, salinisation and soil erosion. Agrochemicals were mentioned as a cause for a reduction in natural pollinators and increased mineralisation of the soil, which reduces the humus layer. Non-observance of crop rotation was highlighted as one of the practices that leads to the deterioration of soil fertility. The program also included a warning that when arable lands are located on a slope, there is a risk of significant washing out of fertilisers down the slope, which results in chemical pollution in large areas.

The Ministry of Economy and Commerce has published a draft plan for the development of the green economy for 2024-2028.[17] This plan includes an evaluation of the previous plan. It notes that not all measures stated in the previous plan have been implemented (yet). Regarding green agricultural development, it is moreover mentioned that “there remains a number of unresolved issues in the field of green agriculture, including those related to irrigation water supply, degradation of irrigated and rain-fed arable land, degradation of pastures, and green financing" (p. 51). The plan lists the following tasks for developing green agriculture in the period 2024-2028:

- Develop state support for the development of a green agriculture economy in order to ensure its sustainable development.
- Increase the efficiency of water use in the agricultural sector through improving irrigation infrastructure, introducing resource-saving technologies, as well as economic mechanisms.
- Increase the sustainability of livestock farming through the restoration of pasture resources and the use of innovative technologies.
- Creation of a sustainable farming system through the development of organic farming methods and soil fertility management.
- Increase capacity through improved information, training and education in the field of green agriculture.
- Adaptation to climate change and reduction of its negative impacts.

[16] https://cbd.minjust.gov.kg/159310/edition/1189687/kg.
[17] https://mineconom.gov.kg/froala/uploads/file/3bd5db922cf87fc28a0f3cbeced8e2bbe286956c.pdf.

2.2.6. Program on Soil Fertility Improvement

In March 2024, the Cabinet of Ministers approved the Action Plan for the Soil Fertility Improvement Program of the Kyrgyz Republic for 2024–2028.[18] This program aims to:

- Develop draft regulatory legal acts in the field of soil fertility protection.
- Develop institutional arrangements for the system of preserving and increasing soil fertility of agricultural lands.
- Conduct soil and agrochemical studies of agricultural lands for cadastral valuation of land resources and justified use of fertilisers.
- Preserve a favourable ecological environment.
- Foster the reclamation of saline and alkaline lands.

2.2.7. Implementation and interpretation of land and soil-related laws

Smallholder farmers and other rural landowners are generally not very familiar with laws on land management and soil protection, and many find the legislation language hard to understand. Some farmers are familiar with some of the basics of the Land Code, primarily zoning principles such as the illegality of ploughing and building heavy constructions on pastureland, and one of the latest amendments to the law that now permits the planting of trees and berries on croplands.

As for soil protection, some landowners know they are legally obliged to not misuse and pollute their land by littering, discarding of toxic substances, et cetera. They said the government has the right to take away the land from someone who misuses it. However, no such case has been recorded so far. One of the legal experts interviewed for this study also mentioned that, in his practice, he has never encountered a case of the government confiscating private land for reasons of misuse. He explained that while “there are heavy legal penalties for [things like] excavating the land’s topsoil and killing all its elements,” people are seldom fined for mismanaging their land. Inspectors and local land officers working at the municipalities are mainly busy with solving land management, ownership and trespassing issues arising between farmers. Generally speaking, responsible agencies do not have sufficient resources for the implementation and enforcement of legislation. Gardens, moreover, are not monitored at all. Another issue that was mentioned is that land type registration does not always match reality. Some areas in Tong were said to be labelled “irrigated, arable,” but in reality are unsuitable for cultivation because they are covered with rocks or have turned into a swamp.

In 2024, a new law on the enlargement of municipalities was enacted. As a result, several small municipalities were joined. Where previously one municipality comprised two or three villages, nowadays it may include up to twelve. This has resulted in various concerns and rumours among landowners that their land could be taken away. Respondents living in Chelpek village – which through a process of administrative reorganisation had recently been

[18] https://cbd.minjust.gov.kg/44-116/edition/4957/ru.

joined with Karakol town – shared their concerns that their land could be taken away by the Karakol town administration. This made residents of the village hesitant to acquire land and had them sell their land as well, in case the government wanted to take it away.

3. Context: land, soil and farming in Issyk-Kul and Naryn

3.1. Agricultural land and soil in Naryn and Issyk-Kul

3.1.1. Soil types

In the area of Tong district, stony, white and brown-grey soils are prevalent. This is a semi-desert area where, generally speaking, the soil has a low humus content – although there are also patches of black soil, for instance near Eshperov village. The area of Chelpek village (near Karakol) has more fertile soil with a higher humus content. The soil here is considered black. Near Issyk-Kul lake and in the hills the soil is lighter and less suitable for cultivation. While Tash Bashat village in Naryn mostly has black soil, there are areas nearby that have white soil that is “hard as brick.”

3.1.2. Land size

In all villages where the study took place, households received a share of previously collectivised land during the process of land reforms after the dissolution of the Soviet Union. Share sizes differed between villages, however, and in subsequent years people have sold, bought and rented (out) land. This means the amount of land households own and farm differs. Among the farmers included in our study, the maximum number of hectares they owned in addition to their garden was 20. It seems farmers in Chelpek generally have more land than farmers in Eshperov and Tash Bashat.

3.2. Smallholder farming in Naryn and Issyk-Kul

Crop cultivation is often combined with keeping livestock and other livelihood activities of a household. Especially when people do not have a stable salaried job, crop cultivation is important as it provides food for the family and for livestock.

A large share of the work is done manually, which means agricultural production is time-consuming and dependent on the availability of household/family members to do the work. Most of the manual labour is done by women, as they are often responsible for garden work, which is rarely mechanised. On the one hand, many farmers see manual labour as tough and would prefer some level of mechanisation to make the work easier. This especially applies to work in the fields. On the other hand, some people also appreciate creating something with their own hands and seeing the result of their labour. It was furthermore mentioned that there are spiritual and mental health benefits from being physically active and creative, and from creating things with one’s own hands. It makes the result more

meaningful, and it brings joy when others appreciate the work you have done. Inogamova-Hanbury (2015, p. 199-200) also notes that, with regard to the smallholder farmers she studied in Talas in 2009:

> “Zher Ene [Mother Earth] not only feeds the farmers but also fulfils many of their fundamental needs. Farming is an activity with which to express their will, creativity, care for other community members and to be part of the miracle of transformation: of seeds transforming into plants, plants into yield, yield into nutrition, and nutrition becoming part of blood and flesh. (...) Farming satisfies farmers' basic need for subsistence and also their need to express creativity through growing on the land.”

3.3. Types of crops people cultivate

People tend to cultivate different types of crops on their field compared to gardens. Fields are often used for staple and fodder crops, and also serve as orchards. Gardens are generally used for vegetables and fruits. The type of fruit and vegetables people cultivate varies between the different regions and between individual farmers, depending on the geography, soil, climate and people’s interests, experience, and participation in agriculture projects.

Common fodder crops are grass, alfalfa/lucerne, barley, wheat, sainfoin, and other leguminous plants. Common food crops include potato, onion, carrot, garlic, and beetroot. In Issyk-Kul, farmers generally have various types of fruit trees (e.g. apricot, apple, cherry, plum) and berries (raspberry, currants, strawberry). Vegetable cultivation has become more varied in recent years to include tomato, cucumber, pepper, eggplant, zucchini and other types of squash, lettuce, spinach, different kinds of cabbages, and kitchen herbs – although not all of these crops are widespread yet. In Naryn, cultivation is limited compared to Issyk-Kul, due to its high altitude and short growing season. A few farmers have started to use greenhouses to make it possible to grow a wider variety of crops.

Crop selection is influenced by various factors, such as the availability of seeds/seedlings; the availability of knowledge about, or experience with, certain crops; characteristics of the soil, and geography and climatic conditions in a certain area and its (perceived) suitability for cultivating particular crops. For example, in Tong district, many farmers (with varying farm sizes) cultivate apricots, as they can tolerate dry and stony soil. Currants are widespread in Issyk-Kul at large because the temperate climate provides more suitable conditions than the hotter parts of the country.

Farmers' decisions are also increasingly driven by market demand and opportunities, and many learn to adapt to market trends, for example, by increasingly diversifying the crops, or by specialising in a crop that is in high demand. Farmers are often encouraged to try new crops when they see their neighbours succeed in growing and selling them, as seen with the increased cultivation of berries. However, farmers commonly lack sufficient knowledge about market needs and struggle to sell their produce. This can lead to surpluses of specific crops, such as apricots, resulting in cultivation expenses becoming higher than what farmers can earn from selling their harvest. Additionally, farmers are not protected from fluctuating prices

(potatoes being a frequently cited example), which leads to further uncertainty about which crops to plant. Several respondents highlight a need for more guidance and support from the government on which crops to grow and how to effectively access the markets. This is in line with existing literature (Spies et al., 2023) that lists the lack of extension and advisory services for small-scale farmers and the unavailability of market structures that would encourage crop diversification among the main challenges hindering sustainable land use.

Lastly, when people are involved in both crop farming and livestock herding, they might experience tensions between the two, for instance, regarding what type of crops to grow (food for humans or animals) and the question of whether livestock should be allowed to walk and graze on their fields after the harvest.

3.3.1. Changes in crop types

In the early years after independence, wheat and barley used to be the main crops. Today, wheat is not as common, as the cost of cultivation is high and it often does not get ripe. It is often also cheaper to import wheat from Kazakhstan and Russia. In general, people seem to be diversifying the crops they cultivate to include more vegetables. And it was mentioned that people increasingly cultivate legumes to soften the soil and suppress weeds. Leguminous crops are also used as livestock feed. Lately, there is increasing awareness regarding the benefits of using locally adapted seeds instead of imported ones. Respondents from Naryn reported that they have started experimenting with different crop varieties, selecting those better suited to the local climate. This has led to positive results and helped challenge earlier beliefs that nothing could grow in their region. This also reflects evolving perceptions of land potential and a more adaptive and proactive approach to farming.

4. Perceptions of land and soil, and relationships between people and land

4.1. Perceptions of soil types

Regarding the question what types of soil people were familiar with, the most commonly mentioned were black soil (кара топурак [*kara topurak*]), grey soil (боз топурак [*boz topurak*]), white soil (ак топурак [*ak topurak*]), clay soil (чопо [*chopo*]), sandy soil (кум кайрак/кумай [*kym kairak/kumai*]), and rocky soil (таштан топурак [*tashtan topurak*]). Brown soil was mentioned by soil scientists, who differentiated between light chestnut soil (ачык каштан [*achyk kashtan*]), chestnut soil (каштан [*kashtan*]), and dark chestnut soil (кочкул каштан [*kochkul kashtan*]). They also mentioned sandy loam (RU супесь [*supes*]) and yellow soil (RU серозём [*sierozem*]).

In general, people value black soil because it is regarded as fertile. It is said to be rich in humus, nutrients, minerals and oxygen. Respondents described it as oily (майлуу [*mailuu*]), strong (кучтуу [*kuchtuu*]), and soft (жумшак [*zhumshak*]). Furthermore, land without rocks or stones is generally valued more than land with rocks or stones, although stony soil is considered suitable for the cultivation of apricots. This is also reflected in the prevalence of apricot production in Tong area. Sandy soil is said to be suitable for cultivating black currants, apricots and carrots. White soil is generally considered to be unsuitable for cultivation, because of its low humus content. It is considered thin and weak. It is said to only has value for making bricks. A few people mentioned saline (шор [*shor*]) soil as an example of bad soil. In general, farmers associate soil fertility mostly with a dark soil colour, high humus content, good moisture retention as well as good permeability, and a soft and loose texture. A few mentioned the presence of microorganisms.

One farmer, however, said that “all soil is valuable somehow, for a certain kind of vegetation. There is no such thing as useless land. As long as you take good care of it, it will be good.” Elder respondents also mentioned that one cannot say that land is in essence bad or good, but that it is a matter of perspective. They also emphasised that people should be satisfied with what nature or the land provides.

4.2. Relationships between people and land

4.2.1. Land and soil in folkloric sources

In addition to the material value of land and its importance for sustaining livelihoods, land also has symbolic and spiritual value. In folkloric sources, for instance, land or earth (жер [*zher*]) is not merely a physical phenomenon. Land/earth is an actor who witnesses, responds to, and influences human emotions, acts and (mis)fortunes. In epic storytelling and poetry, the earth is often portrayed as an active participant in the unfolding of the narrative,

expressing emotions and hindering or facilitating the actions of human characters. The land/earth can be intimidating and powerful, tender and caring; it can present a threat, offer refuge, or a path to salvation.

This understanding of land/earth as actor or character represents a broader notion of human-environment relations in which humans are interwoven with the environment and "all landscape spaces are thought of as spaces of relationship" (Aitpaeva & Féaux de la Croix, 2023, p. 7). Related to this notion are several ideal attitudes, such as respect for and reciprocal relationships with land/earth, sacralisation of space, awareness of life's cyclicality, and the connection between generations. A few respondents mentioned that before there were national laws, principles for relating to the land were passed down by the ancestors, for instance through the Manas epic. One of the seven commandments of Manas prescribes to live in harmony with nature, which a couple of respondents interpreted as "protecting nature as the apple of our eye."[19]

The reciprocal relationship between humans and the earth, and the caring character of the earth, is most prominently expressed through the notion of Mother Earth (жер эне [*Zher Ene*]). Mother Earth provides sustenance or livelihood (ырыскы [*yrysky*]) and abundance or blessing (берекелүү [*berekeluu*], especially when people respect her and take good care of her.

There are several proverbs that refer to the earth as a mother:

- Өскөн жер – өз эне, өзгө жер – өгөй эне. "The land where you grew up is your own mother, a foreign land is a stepmother."
- Жер – эненин жери, суу – атаңын суусу. "The land is your mother's land; the water is your father's water."
- Байлыктын атасы-эмгек, энеси-жер. "The father of wealth is labour; the mother of wealth is the land."
- Жерге түшкөн – жетимдики. "What falls to the ground belongs to the orphan."

Related to the notion of Mother Earth is the understanding that the earth and the soil are important for generating life: plants grow in soil, these plants are eaten by animals and humans, humans eat animal products, and humans use materials from nature to create objects, build houses, make clothes, et cetera. This is for instance illustrated by these quotes from our respondents:

> "Like a mother, the land gives birth, nurtures, and sustains life. From the soil, things grow and multiply. Like a mother who nurtures with milk, the earth feeds countless living beings, including human beings." (NGO worker)
>
> "Mother Earth gives us everything she grows – she gives us our harvests, our food – she nurtures us, like a mother nurtures her child." (female farmer)

[19] The seven commandments of Manas represent ideals and values drawn from the Kyrgyz epic poem Manas. They were drafted by the first president of Kyrgyzstan, Askar Akayev, to form the state's ideological basis (Van der Heide, 2023, p. 98; for an elaboration on Akayev's use of Manas in constructing a national Kyrgyz ideology, see Pétric, 2015, chapter 1).

Many proverbs emphasise a connection between the fertility or richness of the land and the wealth, prosperity, and wellbeing of the people:

- Жер ырыскынын кудугу. “The earth is a well of sustenance.”
- Жер иштеткен жебей койбойт. “The land is not without food.”
- Жерге караган жебей калбайт. “Those who look to the earth will not be left without food.”
- Жер байлыгы – эл байлыгы. “The wealth of the land is the wealth of the people.”
- Жери байдын, эли бай. “If the land is rich, the people are rich.”
- Жер семизи – мал семизи. “The fatness of the land is the fatness of cattle.”
- Жер тойбой – эл тойбойт. “If the land is not satisfied, the people will not be satisfied.”

From folkloric sources and the understanding of our respondents, however, it becomes clear that the earth does not just give without being given something in return. Humans need to use their knowledge and labour to make Mother Earth care for them. Our respondents mentioned things like “The land feeds us, but to make Mother Earth care for you, you need to work,” and “The generosity of the land depends on how we treat it. The more we take care of it, the more it gives us back.”

There are several proverbs and sayings related to labour:

- Жер эмгек менен гүлдөйт. “The earth flourishes with labour.”
- Байлыктын атасы – эмгек, энеси – жер. “The father of wealth is labour; the mother of wealth is the land.”
- Жер жемишин берет, эл эмгегин берет. “The earth gives its fruits; the people give their labour.”
- Эр эмгегин жер жебейт. “The earth does not eat/betray a man’s labour”
  Жер мээнетти жебейт. “The land does not eat hard work.” (Meaning that the land does not waste the hard work of a person; if you work well with the land as a farmer, your efforts will yield something.)
- Жаздын бир күнү бир жылга тете. “One day in spring is worth/equal to a whole year.” (Meaning if the land is treated well in spring, it will feed you for the entire year.)
- Жаз жарыш, куз күрөш. Hurry and work with the land from spring to autumn.

There are also proverbs that refer to a connection or comparison between land and knowledge:

- Жердин көркү – эгин, эрдин көркү – билим. “The beauty of the land is its crops; the beauty of a person is their knowledge.”
- Билим – элге, суу – жерге. “Knowledge is for the people; water is for the land.”
- Жер – ырыстын киндиги, билим – ырыстын тизгини. “Land is the navel of prosperity; knowledge is the reins of prosperity.”

Beside the importance of knowledge and labour for nurturing good relationships with the land and getting a good harvest in return, many people perform seasonal rituals, sacrifices, and prayers. Respondents noted that these practices have various origins (pre-Islamic, Islamic, Soviet) and have changed over time.

In general, people pray for beneficial weather, for instance, to ask for rain or for the wind to calm down. The first ploughing used to be a significant event where people gathered with their clan in the fields to pray for rain and a good harvest. They would slaughter a sheep, spread the blood on the field and say things like “let the earth open and give milk” (жер жарылып, сүт чыксын). In Soviet times, the first ploughing in spring was a communal event. Nowadays people tend not to gather in the field anymore, but organise small gatherings in their house where they perform *bata* (бата; asking for blessing). They also organise gatherings or festivals to celebrate the harvest. More recently, these festivals have been developed in the context of tourism. One example is the apricot festival in Tong.

In addition to approaching land in reciprocal terms, land is also valued in relation to notions of cultural identity. It is seen as a link to ancestry, homeland, and the nation/people.

Proverbs related to homeland, identity, or personhood include:

- Туулган жердин топурагы алтын. “The soil from your homeland is gold.”
  One respondent explained that in the past, “warriors and soldiers would carry soil from their homeland with them wherever they went. That soil gave them strength and spirit.” (The full proverb is Туулган жердин топурагы алтын, эли мазар, суусу мүрөк. “The soil of the birthplace is golden, the people are sacred, and the water is pure.”)
- Жер сагынбаса, эл болбойт. “If one doesn’t long for the land, one is not truly a person.”
- Жеринен ажыраган жети жыл ыйлайт, элинен ажыраган өлгөнчө ыйлайт. “Those who are separated from their land cry for seven years, and those who are separated from their people cry until they die.”

Soil specifically -- as opposed to land more generally – is also associated with a person’s death. Kyrgyz people call the burial process *topurak saluu*, which means covering with soil. From a religious point of view, every human is created from soil and returns to soil after death (адам баласы топурактан жасалган, кайра топуракка айланат/кайра эле топурак болуп кетебиз да).

Judging from folkloric sources and ritual practices, people are dependent on the land and connected to it through relationships of reciprocity and obligation. It is important to keep in mind, however, that folkloric sources do not necessarily provide a complete or fully accurate representation of attitudes and daily life practices. Instead, they should be regarded as offering insight in ideal attitudes and behaviour. It is highly probable that in the past, as today, proverbs, sagas, epics, et cetera served as moral guidance and were used to teach people how to behave (see also Aitpaeva and Féaux de la Croix 2023, p. 8).

4.2.2. Disconnect between ideal attitudes and actual practices

To a large extent, people’s customary understanding of, and attitude towards, human-land relationships reflect folkloric sources such as poems, epics, folk songs, and proverbs, as well

as religious values and understandings. However, while proverbs are generally quite well-known, our respondents had difficulty remembering the details of epics, poems, and literary sources and did not usually refer to these sources when thinking about soil or land use practices. For instance, while one of the seven commandments of Manas emphasises the importance of having a good relationship with nature, only a few respondents referred to Manas.

Moreover, even though people seem to be confident about their understanding of what it means to respect and value the land on a spiritual level, many struggle to connect this to their agricultural practice in a tangible form. There is not much consensus about, or reflection on, how these general, rather abstract values and attitudes can be translated into concrete soil use, management and care practices in a way that aligns with those ideal notions. Many smallholder farmers feel they do not have enough knowledge to take proper care of their soil and to work correctly with their land. And while many respondents expressed the importance of taking good care of the land, they also admit that this is not always done (by themselves nor others) and that people do not live according to ancient 'laws' of respecting Mother Earth and of relations of mutual obligation and mutual responsibility. Some people mentioned that this is reflected in how they and others exploit the land and contribute to soil degradation. Various people also mentioned pollution and littering as a sign of how people do not care for the land. In addition, waste was referred to in relation to wasting materials, i.e., throwing them out instead of reusing them. Some respondents mentioned that this is different from the past, when everything was made by hand from natural materials. Nowadays people do not value materials and discard them easily, they said, thereby producing waste and using natural resources carelessly.

It is clear that there is a disconnect between current ways of (making a) living with/from the land, and historical practices and ideologies/ideal notions of what it means to relate to and work the land. This disconnect could be explained by at least two factors. Firstly, while the concept of land (жер [*zher*]) features widely in folkloric sources and understandings of human-environment relationships, the concept of soil (топурак [*topurak*]), is less prevalent. These sources also generally do not refer to land/soil in the context of (smallholder) agriculture, which is understandable given that they often reflect a historical/pre-agrarian (ideal) society and thus a way of life quite different from how people make a living today. Secondly, people's views on, and relation to, soil in the context of agriculture is heavily influenced by Soviet practices and ideologies. In general, the introduction of new agricultural practices during the Soviet period has "had profound effects on belief systems and the way people see themselves in relation to each other, to other species, and to inanimate features of the landscape" (Féaux de la Croix and Penati, 2023, p. 9). Agriculture today is very different from agriculture in the Soviet Union, however, and many practices and attitudes of that period became obsolete, although their imprint lingers on.

Through this disconnect, many people also contrast past and current practices and attitudes. There seems to be a general idea that in the past people knew better how to relate to, and take care of land. Several respondents mentioned that the ancestors (in pre-Soviet times) respected nature by not polluting it and by asking the earth for permission before using her resources. Nowadays, respect for nature has dwindled, they said. Regarding specific agricultural practices and knowledge of soil, the Soviet period is generally seen as a time when people knew and did better compared to today. Since independence and the transition

to private property, farmers have had to manage every step in the farming process themselves. In general, people are still grappling with what this means.

4.2.3. Perspectives on Soviet and post-Soviet practices

Our respondents often compared the Soviet, early post-independence, and current periods to describe changes in agricultural practices, soil management, and overall ways of farming. The Soviet period is often described as a period of ‘rational’, ‘efficient’ and ‘scientific’ use of the soil, aimed at maximising productivity and characterised by centralised management, scientific planning, laboratory assessments and individualised recommendations, crop rotation, and crop planning. Some interviewees differentiated such an approach from ‘care’ and acknowledge the negative consequences of the Soviet production-oriented land-use strategies on soil health. At the same time, some of the Soviet-time practices are seen as forms of care and good soil management (crop rotation was mentioned most often). Respondents also mentioned that yields were high during Soviet times, unlike the poor yields people experience nowadays.

The early post-independence period was often described by our respondents as difficult. The shift from a large-scale and centrally planned system to fragmented small private plots placed responsibility for managing the land directly on individual farmers. While this change opened new opportunities for farmers' autonomy and creativity (Inogamova-Hanbury, 2015), many farmers highlight ongoing challenges related to lack of knowledge, insufficient guidance and support, and lack of resources. Other challenges mentioned by the respondents include the deterioration of technology and infrastructure and insufficient plot size.

Another post-independence change mentioned by the respondents is the increased use of the agrochemicals, which contributes to land degradation. While during the Soviet period the application of agrochemicals was said to be measured and calculated (though still heavy), post-independence practices frequently result in overuse. Furthermore, several respondents reported a decline in the quality of synthetic fertilisers following independence.

Like in Soviet times, the goal of soil management today is still often centred on productivity, which affects the land management practices people choose. It also means that when agriculture has become less profitable, people commonly turn to other sectors. However, soil scientists and agronomists we interviewed noted that they have noticed a change in farmers’ attitude and practices in recent years. It seems farmers are increasingly becoming more aware of the value of soil and the importance of soil health for their livelihoods and are introducing more sustainable practices (e.g. crop rotation or drip irrigation techniques). Respondents from Chelpek highlighted positive improvements compared to early post-independence years, noting that farmers are increasingly engaged in efforts to improve soil quality.

5. Current soil care and soil management practices among smallholder farmers in Naryn and Issyk-Kul

5.1. Farmers' motivations for soil care

While spiritual and customary meanings of land and soil play a role in people's understanding of human-environment relationships, the foremost reason why farmers are interested in soil care, preservation, and improvement is maintaining soil productivity to provide for the family through subsistence farming, fodder crops, and the sale of surplus harvest. This reflects the economic situation in the country, as agriculture remains the basis of the livelihoods for a large share of the population, and the wellbeing of many rural households depends on the fertility of the soil. In general, farmers' immediate concern is how to get by; how to provide for their family in the short term. This means they firstly think about this year's yield. The future fertility of their land, as well as the long-term (environmental) consequences of their practices, are often of secondary concern.

It should be noted, however, that some respondents, particularly those interested in organic farming, are also interested in soil care for health reasons, linking soil health to human health. As one agronomist put it:

> "Everything starts with the soil. The chemicals we apply, we end up eating them, our children eat them, and many illnesses come from food. And where does food come from? It all comes from the land. And we're treating the land improperly."

5.2. Perceptions of good and careful soil management

Generally speaking, smallholder farmers think of good soil management and care practices as "doing things properly, (pro)actively and on time." No significant differentiation was made between care and management. In particular, farmers emphasised weeding, irrigating, fertilising and crop rotation as important soil care/management practices. They also mentioned that biohumus (vermicompost) and compost are good to use as fertiliser instead of chemicals.

In contrast, irrational and irresponsible use of agrochemicals and neglecting/abandoning land were mentioned as bad practices. Interestingly, there are also proverbs that say that when land is neglected, it will be inhabited by marmots or wild boars. (Жер ээн болсо, доңуз дөбөгө чыгат. / Жер ээн болсо, суур (кээде доңуз) дөбөгө чыгат.) Farmers furthermore reflected on the fact that many do not take care of the land in winter. They said that after the harvest, most people "forget about the land until spring." Instead, they thought that it would be better to already plough, fertilise and irrigate in autumn to have a better start in the spring.

Soil scientists and agronomists furthermore mentioned “only taking from the land” (exploiting the land) and having a careless or indifferent attitude as examples of bad care. Good care practices they brought up in addition to what farmers mentioned are: mulching, planting shelterbelts, cultivating green manure, planting beneficial plants that attract beneficial insects, adding beneficial microorganisms to the soil, using special organic products for plant protection, and using less chemicals.

5.3. Current practices

People’s soil management practices and crop choices are influenced by various factors, the most common being: habit (what they are used to doing); practices of other people around them; what they think will give the most benefit in the short term; market prices for staple crops; the need for fodder to feed their livestock; availability or lack of infrastructure (roads, irrigation water); transportation options and costs (for transporting manure and harvest); and the availability and costs of seeds, machinery, and labour. In general, farmers often rely on what they have heard from others on what works and does not work in terms of management practices and crop types. They also look for information online, mostly on social media, but they might not always have a way to verify this information or to critically assess it. Although still limited, farmers furthermore increasingly seek the help of agronomists and soil scientists, and their advice seems to play a role in changing farmers’ attitudes and practices. However, farmers are often hesitant to spend money on services and advice and do not always show up at information sessions. Various people also noted that there are not enough agronomists and soil scientists in the country, and especially not in the villages.

5.3.1. Synthetic and ecological measures

Even though farmers, legal experts, agronomists and soil scientists are aware of, and talk about, the potential harmful impact of synthetic inputs for both soil health and human health, these measures continue to be favoured by many. This is largely because they are seen as an easy and quick, although sometimes costly, response to agricultural challenges such as low productivity, and weeds and pest infestations. The use of agrochemicals and preventive/reactive measures is often not systematic, however, and people tend to change practices based on the availability of resources and advice from relatives or neighbours. One respondent mentioned that chemical fertilisers from abroad need to be treated with caution, as it is often not known how they are produced, or what their effect could be on the soil.

In our study area, there is an increasing interest in the development and use of organic methods of plant protection besides the well-established method of limewashing fruit trees. These ‘new’ methods include entomophagous insects and products for soil improvement produced by the Organic Department under the Ministry of Agriculture. Yet, adoption of organic methods remains limited outside of specific organic/permaculture projects.

Answers from respondents reveal that some farmers employ a mixture of organic and synthetic means of plant protection and fertilisation. This happens often without full awareness of their effect on the ecosystem and how these methods may interact with each other. In general, smallholder farmers seem to have a limited understanding of, or concern about, the chain of consequences of land management practices – for example, how agro-chemicals might end up in flowers that bees get nectar and pollen from, and that way end up in honey; or that antibiotics given to livestock might end up in animal products and in manure that is used on the fields.

5.3.2. Fertilisation

The majority of farmers rely on manure for the fertilisation of their fields and gardens. Chemical fertilisers, such as ammonium phosphate, ammonium nitrate, and potassium nitrate, are also used, especially in fields (as opposed to gardens). In addition, there is an increasing interest in, and use of, biohumus (vermicompost), primarily in home gardens. Based on findings from Simone de Boer's PhD research (publication forthcoming), farmers who have adopted the use of biohumus show enthusiasm about its potential positive effects for the garden. They noticed that their soil became softer, and their crops grew bigger and faster, and yielded an abundant and good quality harvest. The most engaged farmers displayed particular interest in caring for compost worms, often discussing their worms' wellbeing with fellow compost enthusiasts, and treating the worms almost as members of the household – a view especially common among female farmers. A small group of farmers furthermore leave organic matter from plants on their fields to decompose after harvesting. However, most people clean the plot and burn the leaves. Fields are often used as winter grazing areas for livestock. Another practice to improve the quality of topsoil that was mentioned by respondents is bringing black soil from the mountains to the fields and gardens.

The study reveals that farmers have limited (scientific) knowledge regarding key aspects of plant nutrition, including which nutrients and in what amounts crops require them, how these nutrients are absorbed, and where they can be sourced. There is a limited awareness of soil pH requirements for various crops and of how the pH value of the soil can be influenced. Farmers also lack information on the composition of the fertilisers they use. Additionally, some respondents, particularly in Tong, noted that people lack knowledge about appropriate manure quantities, which sometimes leads to excessive application, damaging the plants and soil.

5.3.3. Irrigation

Irrigation poses a challenge to farmers because of inconsistent water availability and poor municipal irrigation infrastructure. Recently, some farmers have started to use drip irrigation and rainwater collection systems. However, conventional practices continue to dominate. Land is often irrigated in an uncontrolled manner or simply flooded, which leads to soil erosion.

5.3.4. Tillage

While tillage is a very widespread practice, there remains debate and uncertainty about what the best tillage practices are. The lack of consensus surrounding tillage practices is also evident among agronomists, with some advocating for deep tillage and some for more surface-level practices. The type of soil also influences the choice of tillage practices. In addition, *tondurma* – tilling and irrigating the land in late autumn – was mentioned as a practice to kill weeds and pests by freezing them, as well as softening the soil.

5.3.5. Analysis and monitoring

According to the soil analysts that were interviewed for this study, there is currently no sufficient database and nationwide monitoring of soil types and soil health in Kyrgyzstan.[20] Duulatov et al. (2021, p. 11, drawing from Kulikov 2018) also note that:

> "In Soviet times, a thorough mapping of the soil was carried out for the whole country, it also included an assessment of soil loss, but the soil classes do not correspond to the modern FAO World Reference Base and need to be translated (Kulikov 2018). The Kyrgyzgiprozem Institute has an extensive database of soil and plant resources in Kyrgyzstan and conducts regular field works to update the data, but these field trips are insufficient, and data are limited for use by governments and are not accessible to the broader scientific community (Kulikov 2018)."

For individual farmers, it is becoming more common to get their soil analysed to learn which nutrients should be applied. However, such practice is not very widespread, and there is a limited number of laboratories available in the country. The extent to which existing laboratories include organic fertilisation methods in their recommendations, as well as whether they provide guidance on soil characteristics such as pH levels or salinity, remains unclear. Laboratory analysis for diseases also remains limited. When plants are affected by diseases, farmers frequently lack knowledge about the causes and appropriate treatment, especially about non-chemical methods.

While several respondents highlight the need to increase the use of laboratory testing, the importance of learning to assess soil quality and plant health by sight and touch was also emphasised. As one agronomist said:

> "Every crop is a living being. It tells you: 'I'm lacking this, please give it to me. I need more water, or I need magnesium.' It shows through its leaves. You need to learn how to read it. If every farmer learns to speak with the plants, their yield will increase, and their relationship with the land will improve. (...) The soil also tells you whether it is healthy or not; you can see and feel it."

[20] See also https://www.fao.org/countryprofiles/news-archive/detail-news/fr/c/1729967/.

According to Simone de Boer's research (publication forthcoming), some farmers involved in organic or permaculture farming say that they are increasingly able to access the soil through sensory methods. We see such knowledge and skills as deeply valuable, as not only do they increase self-reliance of farmers, but they also help restore a more relational and embodied way of knowing that fosters a more attuned relationship to the land and other living organisms.

5.3.6. Crop rotation

Crop rotation was standard practice on Soviet collective farms, but this practice diminished after independence when these farms were dissolved. Nowadays, farmers are increasingly using crop rotation again, although some respondents noted that it is still insufficiently practiced. In addition, there seems to be a lack of knowledge about the mechanisms behind crop rotation, and many farmers primarily implement it as a reactive measure when yields decline, rather than as a proactive, preventive practice. The adoption of crop rotation is also constrained by limited plot size. Previous research (Anarbaev, 2017) shows that this problem is especially acute in the more densely populated southern part of the country. The variety of crops used within rotation remains limited and includes crops such as potatoes, barley, wheat, alfalfa, and sainfoin. Some respondents mentioned using perennial forage legumes, such as alfalfa and sainfoin, in crop rotation to enrich and regenerate the soil – a practice supported by the literature, especially in the contexts of livestock development, as these fodder crops place less strain on the soil (Jalilova et al. drawing from Tykhonova et al., 2021).

5.3.7. Tree shelter belts

In relation to wind erosion and water scarcity, tree shelterbelts were mentioned by just a few people as useful measures to prevent wind erosion and to capture snow. Tree shelterbelts were very common in Soviet times, but deliberate use of shelterbelts has declined since independence, and many trees have been cut down over the years.

Ruppert et al. (2020) note that the farmers they spoke with (in Jalal-Abad and Issyk-Kul) are unsure about planting tree shelterbelts because they fear their plot of land is too small, resulting in even less available land for cultivation, as well as shade on their fields. Farmers are also unsure about the legal/policy framework for planting shelterbelts. According to Ruppert et al.'s study in the Bokonbaevo area, farmers are generally quite positive about tree shelterbelts. They note that "in Bokonbaevo, where a tradition of making effective use of shelterbelts exists and strong winds and a lack of precipitation prevail, farmers are more likely to adopt shelterbelt systems' (p. 13). They also suggest that owners of adjacent plots could work together to create large shelterbelts protecting multiple plots, as a measure to not 'lose' too much land. Another suggestion is that fruit trees (and we can add nut trees to that as well) could be integrated in shelterbelts "as a way to generate additional income and to diversify the basis of livelihoods" (p. 14).

Regarding the legal/policy context, Ruppert et al. note:

> “Important obstacles identified during field studies were the role of and rule setting by the local governments (Aiyl Okmotu). The interpretations and knowledge of the national legal framework varied considerably from village to village. Therefore, working together and with the support of local governments is important. Since the usefulness of shelterbelts was demonstrated for the large-scale cooperative farms during Soviet times, one way to overcome the obstacle of small field sizes would be to promote the adoption of cooperative arrangements to set up joint shelterbelt systems covering larger areas of land” (p. 14).

5.4. Awareness of micro- and macroorganisms

Only a few respondents mentioned the importance of micro- and macroorganisms for soil health, and there seems to be a general lack of knowledge about their role in the soil ecosystem. Respondents showed a stronger concern with macroorganisms that damage their crops, such as Colorado beetles, grasshoppers, caterpillars, and mice, while the interest and knowledge about organisms that are beneficial to their crops remain limited, aside from references to earthworms and pollinators.

One soil scientist highlighted the importance of microorganisms for soil structure, fertility, and decomposition of organic matter. This respondent stressed the need for conducting seminars for farmers to increase their awareness about microorganisms that inhabit the soil and teach farmers about the different types of organisms, their functions, and the soil conditions in which they thrive. Insufficient awareness of these micro- and macroorganisms is linked to a limited recognition of soil as a living ecosystem, as observed by one of the agronomists interviewed. This, in turn, contributes to increased reliance on chemicals and pesticides and to a rather extractive relationship to the land in general.

6. Challenges faced by smallholder farmers in Naryn and Issyk-Kul

6.1. Pests, illnesses, and weeds

Many farmers mentioned that they struggle with the prevention and control of pests and illnesses in their crops. In Issyk-Kul, there has recently been a disease that wiped out most of the pear trees. The rapid spread of weeds by wind, irrigation water, or manure, was also mentioned as a challenge.

6.2. Water and weather

Unpredictability of water availability – from glaciers, rain, and irrigation systems – is a widespread issue and concern among farmers. Poor maintenance of both municipal and private irrigation channels leads to overflowing and washing away of topsoil and nutrients in the soil. In Tong area especially, proper irrigation and land management practices are a cause for concern because in many places the soil has a very low humus content, which makes the soil particularly susceptible to erosion. In many places in Naryn, people struggle to get sufficient and good quality harvest due to the relatively cold weather and short growing season. The risk of crop damage due to hail and frost was mentioned by respondents in all study areas.

6.3. Soil degradation

Wind and water erosion, as well as salinisation, were mentioned by some people as negatively impacting soil fertility. However, most farmers do not seem to have a full understanding of what erosion is, and what the difference is between erosion, degradation, and pollution. Many farmers *do* know, however, that soil depletion is caused by repeatedly planting the same crops and overuse of synthetic fertilisers and other agrochemicals. Erosion as a result of uncontrolled irrigation and strong winds was also mentioned by some farmers.

Duulatov et al. (2021, p. 2) furthermore note:

> “Little information is available on soil erosion in Kyrgyzstan, mainly since soil erosion is problematic and costly to measure, as well as due to vast areas with different soil and vegetation cover, variable climate, landscape, and land use and management. Complicated mountainous terrain, climatic conditions, a complex combination of ameliorative conditions, a large distribution of stony, unstable erosion, and salt-bearing rocks are natural causes of soil/land degradation and increased human activity. One of the most sensitive types of soil degradation in the country is water erosion. More than

two-thirds of the arable land is subject to wind and water erosion exacerbated by irrigation erosion."

6.4. Pollution and waste

Respondents mentioned several ways in which polluting practices negatively impact soil health and quality, as well as the quality and safety of ground- and irrigation water. These practices include: overuse of agrochemicals; discarding of oil, diesel or other toxic substances into fields, gardens or irrigation channels; and wastewater discharge in ground or surface waters. The latter is prevalent in Issyk-Kul especially, as a result of increasing tourism and insufficient wastewater treatment systems.

In addtion, Doolotkeldieva et al. (2018) note that:

> In Kyrgyzstan, "there is a large legacy of former storehouses and dumping zones for obsolete pesticides and wastes from pesticide production, as is often observed in former Soviet countries. (...) In the territory of Kyrgyzstan, 50 storage facilities of obsolete pesticides exist, which store about 5000 t of these hazardous chemicals. In many places, the local populations try to dig out obsolete pesticides for reuse. They pose a serious threat to the people living there, to livestock, and to the environment" (p. 31849).
>
> "The hazard risk of these places is increased by the fact that local farmers are unaware of the harmfulness and prohibition of these pesticides, and they dig them out of the places they were buried for the purpose of using them in their crops and orchards. Illegal digging further increases the potential for contaminants to enter the environment" (p. 31854).

We did not delve into this problem in our research, but this could be taken up in future research in the study areas.

6.5. Institutional limitations

Many respondents also noted that the (local) government does not take enough responsibility for guiding farmers on proper land use practices and for monitoring land use and soil quality. From interviews with agronomists, soil scientists and legal experts, it became clear that the advisors/experts in the agricultural departments in the district government rarely go out in the fields to consult with farmers. It is also unclear what kind of expertise these people have and what kind of advice they would/could give to farmers.

Regarding the legal frameworks, farmers, agronomists and soil scientists are not fully informed about the existence of laws related to land and soil. While they know some of the basics of the Land Code, awareness and knowledge of additional laws and programs is limited. It is furthermore unclear if local governments have sufficient legal expertise to be able to guide farmers.

7. Recommendations and ways forward

Based on the research findings, we suggest working towards bridging the gap between cultural-historical values of relating to, and using the land – characterised by reciprocity and holistic ways of thinking – and actual farming practices – to some extent characterised by extraction and short-term gain – while also addressing geographical, climatological and socio-economic challenges. The following steps could be taken to support this process.

7.1. Recommendations for agronomists, soil scientists, soil laboratories

- Promote soil analysis in laboratories by providing farmers with addresses, contact details, and price lists of nearby soil laboratories. Clearly explain the necessity of soil analysis as an economically efficient method to improve soil health by applying only the specific fertilisers needed for a particular plot, rather than using a general mix adopted from neighbours or other villagers.
- Alongside lab-based soil analysis, promote traditional and sensory-based soil assessment methods, thereby empowering farmers to trust and refine their ability to evaluate soil quality themselves. This may include hands-on methods for analysing soil structure, texture, colour, smell, and estimating the humus content in their fields.
- Ensure that soil analysis recommendations include not only mineral fertilisation, but also biological and organic soil enrichment options such as green manure, composting, organic mulching, and crop rotation. Provide practical guidance for implementation of these measures based on the results of soil assessment and analysis.
- Identify and promote digital or mobile applications that can help diagnose plant diseases and pests, with the goal of preventing soil contamination from the excessive or inappropriate use of chemical pesticides and herbicides by farmers who lack awareness of alternative solutions.
- In communication with farmers, centre the notion of Mother Earth and the soil as living organism, as well as soil being part of cultural and natural heritage, to emphasise holistic and reciprocal relationships with the soil.

7.2. Recommendations for local self-governments and state authorities

- Initiate soil literacy and farmer support programmes where smallholder farmers can learn about soil analysis, soil-borne diseases, soil management practices, erosion, land degradation, and the essential role of micro- and macroorganisms in maintaining soil fertility. In this communication, centre the notion of Mother Earth and the soil as living organism, as well as soil being part of cultural and natural heritage, to emphasise holistic and reciprocal relationships with the soil.

- With the enlargement of local municipalities, create a dedicated position within the municipality responsible for soil quality and sustainable land management. Currently, land officers are primarily focused on administrative duties, and there is no one tasked with monitoring or supporting soil health.
- Incentivise sustainable practices such as the adoption of drip irrigation systems, the use of organic fertilisers, reforestation, and shelterbelt planting through subsidies or tax benefits.
- Support the formation and functioning of local cooperatives or neighbourhood groups to coordinate collective efforts in shelterbelt planting, integrated pest management, and crop rotation planning, thereby ensuring shared responsibility for sustainable land stewardship.
- Ban the use of highly toxic herbicides and pesticides whose harmful effects have been scientifically proven; specifically the herbicide *Typhoon*, which is widely used by farmers despite evidence that its toxicity can persist in the soil for up to 100 years.
- Enforce existing laws on land degradation and soil conservation, ensuring they exist not only on paper but are actively implemented at the local level.
- Set fines for harmful land practices, including over-irrigation, misuse of agrochemicals, deforestation, and improper waste disposal on farmland. This could be promoted by the PGS system, where smallholder farmers monitor each other.

7.3. Recommendations for NGOs, international organisations

- Initiate awareness-raising campaigns and trainings on the following topics: soil micro- and macroorganisms, soil erosion and degradation, the soil cycle within the ecosystem, and how synthetic fertilisers used in soil can enter the food chain and affect bees and other ecosystem participants. In these campaigns, centre the notion of Mother Earth and the soil as living organism, as well as soil being part of cultural and natural heritage, to emphasise holistic and reciprocal relationships with the soil.
- Enhance learning materials by translating complex scientific language into accessible, farmer-friendly terms; produce leaflets and promote these materials via social media.
- Provide sustainable alternatives for soil improvement and pest/weed management, including the use of entomophagous insects, tree shelterbelts, green manure, biological remedies, organic mulching, and companion planting methods.
- Promote and encourage a community-based approach to soil protection and improvement, such as planting tree shelterbelts and adopting efficient irrigation practices.
- Address soil issues through art and culture by organising exhibitions in rural areas, partnering with artists, and highlighting the hidden life beneath the soil that smallholder farmers may not be aware of.

7.4. Next steps and recommendations for Reviving the Roots project team

- Raising awareness of cultural-historical values of relating to, and using the land, as well as the disconnect between these notions and actual farming practices which are in some cases harmful for the environment and people's health. This will be done through:
    - Exhibition-fair with artworks and information stands.
    - Aytish performances.
    - Social media campaigns.
    - Focus groups/consultations/information sessions with various people involved in policy, legislation, monitoring, and teaching related to smallholder farming.
    - Focus groups/consultations/information sessions with smallholders.

- Introduce permaculture as a method of bringing holistic and reciprocal notions into the practice of food production. Permaculture methods connect to cultural-historical notions and ideal attitudes, as well as the material realities of smallholder farming in today's context of climate change, environmental degradation, and livelihood needs. This will be done through:
    - Exhibition-fair with artworks and information stands.
    - Aytish performances.
    - Social media campaigns.
    - Focus groups/consultations/information sessions with various people involved in policy, legislation, monitoring, teaching, et cetera related to smallholder farming.
    - Focus groups/consultations/information sessions with smallholders.

- Explore options for working together with schools and developing school curricula on holistic and reciprocal land use and soil care practices. In partnership with artists and artisans.

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