NATIONAL ACTION PLAN

FOR PREVENTION AND COUNTERING OF STRONG WINDS AND SAND AND DUST STORMS IN THE KYRGYZ REPUBLIC FOR 2021-2030

Bishkek - 2021

Disclaimer::

Developed by: **Tian Shan Policy Center at the American University of Central Asia**

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Contents

ABBREVIATIONS

AHP	Adverse hydrometeorological phenomenon
AUCA	American University of Central Asia
CAREC	Regional Environmental Center for Central Asia
DLD	Desertification, land degradation
EADB	Eurasian Development Bank
EBRD	European Bank for Reconstruction and Development
FLUA	Forest and Land Users' Association
GAFSP	The Global Agriculture and Food Security Program
GEF	Global Environment Facility
IPCC	Intergovernmental Panel on Climate Change
IWRM	Integrated Water Resources Management
Kyrgyzhydromet	Agency on Hydrometeorology under the Ministry of Emergency Situations of the KR
LDN	Land Degradation Neutrality
LGA	Local government administration
LGB	Local government bodies
MES	Ministry of Emergency Situations of the Kyrgyz Republic
MoA	Ministry of Agriculture of the Kyrgyz Republic
MVR	Meteorological visibility range
NAP SDS	National Action Plan on Sand and Dust Storms
NGO	Non-governmental organization
NSC	National Statistics Committee of the KR
PUA	Pasture Users' Association
RSAS	Republican Soil Agrochemical Station
SAEPF	State Agency on Environmental Protection and Forestry under the Government of the KR
SALR	State Agency on Land Resources under the Government of the KR
SAWR	State Agency on Water Resources under the Government of the KR
SDS	Sand and Dust Storms
TSPC	Tian Shan Policy Center at the American University of Central Asia
UNCCD	UN Convention to Combat Desertification and Drought
WB	World Bank
WUA	Water Users Association

ABOUT PROJECT

The project “Regional approaches to combating sand and dust storms and drought” is funded by the Secretariat of the United Nations Convention to Combat Desertification (UNCCD) and implemented by the Regional Environmental Center for Central Asia (CAREC).

Considering that the countries of Central Asia (CA) are significantly affected by drought and sand and dust storms (SDS), especially in areas outside the highlands, where semi-arid and arid climate prevails. Recognizing the increased risk of droughts and SDS, the UNCCD Parties have taken decisions on countering the negative impacts of droughts and SDS.

In order to assist the participating countries in improving their preparedness and resilience to droughts and SDS, and creating conditions for the implementation of coordinated actions and exchange of data at the national and regional levels, the UNCCD Secretariat developed mechanisms for promoting policies in the field of drought and SDS management, provided support to states in the development of national drought management plans, methodologies and tools, including a drought management package, and a comprehensive list and global overview map of SDS sources has been developed.

The initiative of the UNCCD Secretariat for Central Asia aims to support the countries of the region in the development and implementation of strategies to reduce the risks of SDS and droughts at the national and regional levels, and facilitates coordination among government agencies working in the climate and environmental sphere, academia, practitioners and local communities.

Through a comprehensive drought risk mitigation and SDS strategy, including monitoring and early warning systems, CA countries can strengthen regional integration and capacity to effectively improve their preparedness and resilience to relevant environmental and natural disasters, focusing on proactive management in line with national mitigation plans. disaster risks and mitigation; and national plans for the management of land, water and other natural resources.

It is also worth noting that the UNCCD Secretariat and CAREC recognize the importance of women in the implementation of the Convention and other environmental initiatives and therefore identifies the following critical areas for their involvement: (i) raising awareness and participation in the development and implementation of programs; (ii) decision-making processes that men and women implement at the local level in the management, development, implementation and evaluation of regional and national action programs (RAP and NAP); and (iii) capacity building, training and public awareness, especially at the local level with the support of local organizations.

INTRODUCTION

The problem of combating sand and dust storms (SDS) is in the zone of special attention in the world[1] and in the region of Central Asia, especially in the plain part of its territory. The main permanent regional sources of dust are located in a large “dust belt” that extends from west to east over the deserts and steppes of Central Asia.

The territory of Kyrgyzstan, due to its location in the southeastern "corner" of the region, absence of deserts within the country and protection by mountains, is not subject to the impact of sand storms in their full understanding. At present, local winds with dust of local significance are widespread, sometimes these winds are turning into hurricanes, which have become more frequent in recent years. These winds are mainly common in the syrt highlands of the Central Tien Shan, in the Alai, Kochkor, Talas valleys and in the Issyk-Kul basin, especially in its western part. Also, in the south of the country - in Leilek, Batken regions of Batken province, Aksy, Nooken regions of Jalal-Abad province.

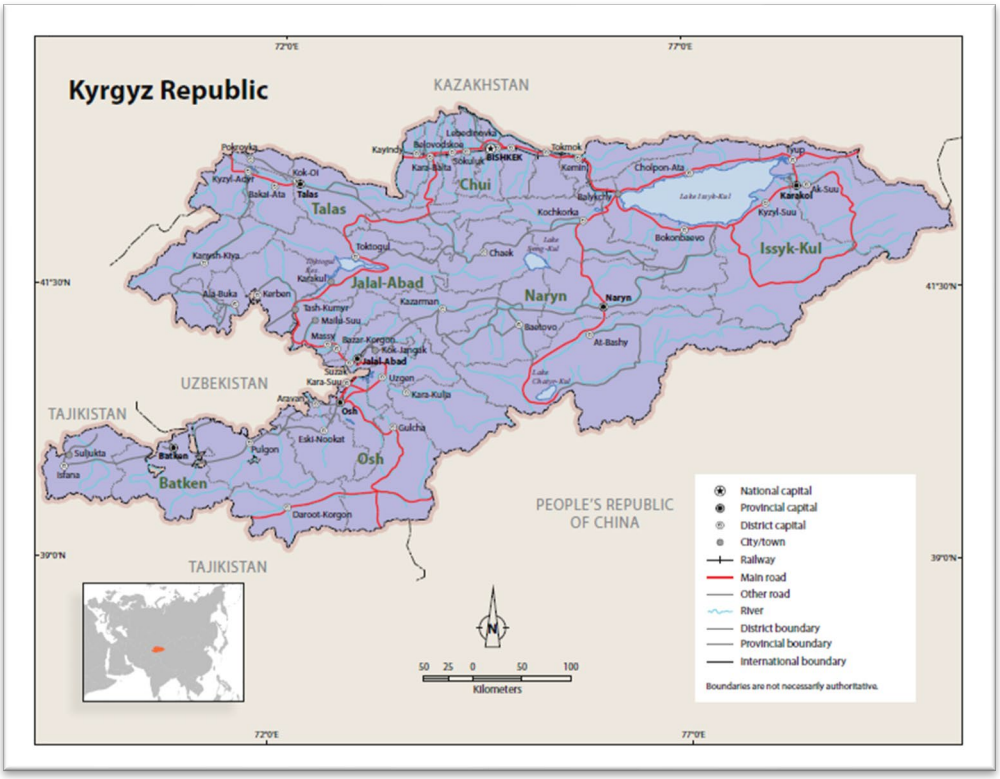


Fig. 1. Map of Kyrgyzstan (source - ADB)

Taking into account the potential danger to agriculture, the energy system, health and life of people, hurricane winds and sand and dust storms becoming more possible due to climate change, the country is taking measures to prevent them. Thus, in the approved Concept of the comprehensive protection of the population and the territory of the Kyrgyz Republic from emergencies for 2018-2030, strong hurricane winds, as well as drought, are included in the list of natural emergencies and are classified as dangerous meteorological phenomena. In the Emergency Response Plan, hurricane winds are included in the list of 20 hazardous natural processes and phenomena, the threats to which the territory of Kyrgyzstan is exposed to. However, in the list of

[1] Global Assessment of Sand and Dust Storms/UNEP, 2016 r.
https://uneplive.unep.org/redesign/media/docs/assessments/global_assessment_of_sand_and_dust_storms.pdf

most frequent disasters, hurricane winds are not mentioned, which indicates that the country's territory is not so strongly susceptible to these phenomena (see Table. 1). And in the register of risks of the most dangerous natural disasters in the country, storms are no longer listed.

Table 1. Major disasters registered in Kyrgyzstan in 2000-2008 (source - MES)

Disaster types	Mudflows and freshets	Landslides and rockfalls	Fires	Epidemies	Earth-quakes	Aval-anches	Techno-genic	Flooding
Number of cases	445	198	192	140	171	164	133	78

In the first places - mudflows, floods, earthquakes, mountain landslides and rockfalls, avalanches. Consequently, Kyrgyzhydromet and the National Statistical Committee keep records of storms, but does not track indicators of dust pollution. Only recently Kyrgyzhydromet started monitoring of particulate matter concentration of the air in cities, to evaluate presence of small dust particles contributing to urban smog, which became an issue in large cities of the country.

However, if you look at the detailed statistics of storms and hails from 2011 to 2019 given in Table 2, you can observe that there was an acute increase in storms frequency in the Kyrgyz Republic, especially in 2012-2016 years.

Table 2. Statistics of emergencies related to hurricane winds (source: MES)

Years	**Hurricane winds**	Hails	Years	**Hurricane winds**	Hails
2011	15		2016	21	6
2012	36	1	2017	17	2
2013	27	4	2018	7	1
2014	14	6	2019	4	1
2015	36	1			
Total: hurricane winds - 177, hails - 22					

At the same time, as mentioned above, predicting the potential danger of possible future sand and dust storms due to climate change, the Ministry of Agriculture, as the executive body of the UNCCD in the Kyrgyz Republic, decided to participate in the Regional Pilot Project in CA on the development and implementation of strategies / plans to reduce the risk of SDS at the national and regional levels.

The purpose of the National Action Plan (NAP) for the prevention and countering of hurricane winds, sand and dust storms (SDS) in the Kyrgyz Republic for the period 2021-2030 is to attract attention and raise awareness on storms, possible SDS, to strengthen resilience and preparedness. The expected results are an identification of most vulnerable population groups from storms and SDS, mapping of their sources, using the methodology of the UNCCD Secretariat, identification of priority actions, recommendations for stakeholder coordination and international cooperation.

In general, tackling the hazards of winds and storms will contribute to the achievement of the Sustainable Development Goals and targets adopted under the 2030 Agenda for Sustainable

Development. To ensure that the multidimensional impacts of winds and sand and dust storms do not undermine national efforts to achieve sustainable development, it is necessary to understand the risks from SDS for early warning, design and implementation of countermeasures.

Due to limited presence of SDS in Kyrgyzstan and their relatively low impact on human security and livelihoods, the main emphasis in this Report is made rather not on SDS themselves, but rather on high winds and their impacts. Such approach will allow for better integration of SDS considerations into existing policy agenda in the country, which currently does not prioritize direct impacts of SDS. In this way, prevention of SDS in the coming years can be addressed via targeting of high winds and their impacts in the Kyrgyz Republic.

In Kyrgyzstan, the Project is implemented by the Tian Shan Policy Center of AUCA, which has established itself as the responsible executor of the previously successfully implemented projects on land degradation. The project is being implemented under the leadership of the Ministry of Agriculture, in close cooperation with the State Agency for Water Resources, the State Agency for Land Resources, the Ministry of Emergency Situations, Kyrgyzhydromet, the Ministry of Health and other government agencies of the Kyrgyz Republic, under the coordination of CAREC.

Chapter I. Storms and their influence on land cover

1. Sources and impacts of storms

As natural phenomena, high winds and hurricanes are weather events common in arid and semi-arid regions, including Kyrgyzstan. They are usually formed by thunderstorms or strong pressure gradients associated with cyclones that increase wind speed over local and large areas. For example, the Ulan and Santash winds arise when, first, a cold air cyclone invades the Issyk-Kul basin from the west or east. The reason for the increase in wind speed and transformation into storm hurricanes is that cold air, passing the mountains through the saddles, descends like a stormy water stream. Secondly, warm air rises from the surface, and the flow of cold air displacing it blows with increasing force.

The climate of Kyrgyzstan is determined by the significant remoteness of its territory from the oceans, seas and its location in the center of the Eurasian continent. Hence, it is continental with significant fluctuations in air temperature, also it is dry, with moderate precipitation and little cloudiness. The high elevation of the territory above sea level and the mountainous relief also affects the distribution of air masses inflowing from the outside, including hurricane winds from the northwest, the wind speed of which reaches 15-20 m / s and above.

The wind regime is very complex and depends on the nature of the relief. Kyrgyzstan is a mountainous country. The difference in elevation marks is significant - from 500 to 7439 m above sea level. The annual direction, or wind rose, is asymmetric. The prevailing direction of the winds depends on the relief. An important feature of the wind regime in Kyrgyzstan is mountain-valley circulation, characterized by a periodic change in direction: at night the wind blows from the mountains to the valleys, and during the day from the valleys to the mountains. In the winter months, valley winds are less pronounced and develop only at noon hours, thus, mountain winds prevail in the annual section. During cold incursions, westerly winds occur. The coast of the lake Issyk-Kul is characterized by breezes - during the day the wind blows on the coast, at night from the mountains and coast to the lake.

Mountain ranges hinder the development of high wind speeds, so the average annual speed ranges from 1 to 3 m / s. However, during cold incursions, strong westerly winds occur, associated with squalus-rainy clouds, squalls; at the outlets of southern cyclones, there are mainly eastern and southeastern dryers. The number of days with strong winds (≥15 m / s) is small and ranges from 2-4 to 15-20 per year.

In the Issyk-Kul basin, the frequency of strong winds is higher. In the central and eastern parts - on average, 20-50 days are noted annually, in the western part of the basin - more than 70, in some years up to 120 days with strong winds. The west wind "Ulan" blows mainly along the lake, in the eastern part - the east wind "San-Tash". When these winds occur simultaneously, they form tornadoes.

Strong winds are also widespread in the syrt highlands of the Central Tien Shan, in the Alai, Kochkor, Talas valleys. Also, in the south of the country - in Leilek, Batken regions of Batken province, Aksy, Nooken regions of Jalal-Abad province. There are local strong winds with local dust, which have become more frequent in recent years. Sometimes on the roads you even have to stop driving vehicles - as nothing is visible due to the dust.

The 2013 Climate Profile provides average data for 2000-2010 on the frequency of emergencies and the amount of economic damage, including from hurricanes, strong winds. As can be seen from the data presented, the Issyk-Kul oblast is the most vulnerable to hurricane winds, and the Naryn and Batken oblasts are the least vulnerable.

Table 3**:** Assessment of the provinces' exposure to hurricane winds (source: Climate profile of the KR)

Indicator	Chuy	Osh	Jalalabad	Batken	Issikul	Naryn	Talas
Number of cases	24	23	19	11	33	11	15
Damage, in thousands $ as per prices of 2005 year.	130.69	125.24	103.46	59.9	179.7	59.9	81.68
Annual increase of cases	0.3	0.3	0.036	0.06	1	0.07	0.2

For comparison, the summary results by type of emergency are given in the table below. These estimates can be considered as a predictive estimate only for a limited time interval (for a period not exceeding 5 years).

Table 3: The total results of changes in the number of emergency situations per year in % of the average annual number of emergency situations per year (source: Ministry of Emergencies)

Emergency types	Chuy	Osh	Jalalabad	Batken	Issikul	Naryn	Talas
Landslides	-17,6	0.8	6,1	6.6	3	22.3	nd
Avalanches	14,5	18,4	17,1	nd	15,4	13,5	nd
Mudflows and freshets	14,8	21,5	8	11,8	15	20,3	7,6
Flooding	nd	nd	nd	nd	nd	nd	nd
Heavy rains	-4,6	-19,3	-11,7	-14,3	-3	-9,1	15.9
Hurricane winds	12.5	13.8	-1.9	5.8	30.3	-6.6	11,5
Hails	nd	nd	nd	nd	nd	nd	nd
Snowfalls	nd	nd	nd	nd	nd	nd	nd
Total	4,7	12,3	7,5	9,7	15,2	11,9	8,5

nd – no data or insufficient data for correct evaluation.

As can be seen from the table, despite some divergence of trends in individual types of emergencies, in general, there was a tendency for the total amount to increase in all regions, with the exception of heavy rains, a decrease in the amount of which was observed in all regions except Talas region. Less clear tendency for hurricane winds, a decrease in the number of which is seen in Jalal-Abad and Naryn regions. (Research for 2000-2010 was carried out with the support of the World Bank to substantiate the project "Improvement of hydrometeorological support in the Kyrgyz Republic", as well as UNDP to develop the country's Climate Profile)[2]. Anthropogenic wind sources supplement (increase or decrease) the effect of natural wind sources in the territories of landscapes created by humans. In agriculture, anthropogenic wind sources arise as a result of changes in land use. Winds intensify in case of non-observance of anti-erosion agricultural techniques, deforestation and deprivation of the soil surface by vegetation, excessive water intake and redirection for irrigation purposes, which leads to the complete drying of water bodies, soils are subject to wind erosion (deflation). And, on the contrary, the speed of wind and soil erosion decreases - while observing the methods of soil-saving agriculture, the introduction of crop rotations, and the cultivation of pastures.

Paragraph 63 of the Compendium on Sand and Dust Storms, approved at the 14th Session of the Conference of the Parties to the UNCCD, New Delhi, 2-13 September 2019, states that "strategies for sustainable land use and integrated landscape management can be engaged in the context of

[2] Climate profile of the Kyrgyz Republic. – Ilyasov Sh, Zabenko O., Gaidamak N., Kirilenko A., Myrsaliev H., Shevchenko V., Penkina L.. – Bishkek, UNDP, 2013 – page 99. http://climatechange.kg/wp-content/uploads/2014/12/Klimaticheskij-profil-KR_2014.pdf

the Land Degradation Neutrality (LDN) process to eliminate sources of SDS in affected areas at the national level. The LDN target-setting process provides an opportunity to collectively consider options for reducing, in particular, anthropogenic sources of SDS, including assessing and trends in land degradation, and identifying drivers of land degradation, with the participation of relevant stakeholders."

In order to implement this point, Kyrgyzstan has developed and approved voluntary land degradation neutrality targets (LDN in accordance with specific national circumstances and development priorities (described in the SDG paragraph).

Let us consider the relationship between winds and land degradation. Intensive use of land resources, in addition to harvesting crops and livestock products, leads to the spread of land degradation processes. Land degradation, according to the conclusion of the GEF experts, is classified as a factor in the beginning of the desertification process. Since 1985, the area of degraded land in the country has grown significantly (according to various sources, from 50 to 80% of farmland). The area of deflationary dangerous territories in the country, where the wind speed reaches 15-20 m / sec., is about 5 386.0 thousand hectares (according to other data - 5 689.8 thousand hectares). It should be noted that the last comprehensive monitoring of lands was carried out in 1990, and subsequent sample studies do not fully reflect the development of processes, hence the scatter of data.

The development of water and wind erosion processes is due to factors of natural and anthropogenic nature. Natural factors - a) the dissection of the territory of the republic, including all hydrographic formations (watersheds, slopes, hollows, gullies and river valleys), b) the properties of soils, parent and underlying rocks (loess and loess-like loams, due to their looseness, are eroded and eroded much easier than clay), c) terrain slopes, d) winds, hurricanes.

The anthropogenic factor, namely the activities of people, is associated with improper organization of agricultural landscapes, cutting of shelterbelts, deep plowing of light soils, stubble is removed, soils remain exposed to external wind impact. The centers of the spread of wind erosion are localized in the Western Issyk-Kul region, the eastern part of the Kemin region, the western part of the Kara-Buura region, the Kochkor depression, as well as in the Batken, Osh and Chui regions.

Where soils are not protected by ground vegetation, winds blow out small particles containing a significant portion of the soil's nutrients and humus. According to some data, the percentage of humus in the fertile soil layer, for example, in the intensively used gray soils of the Chui Valley, decreased from 2.5% in 1992 to 1–1.5% in 2012. If the loss of humus continues at such a pace, then in 40 years we will lose the most fertile topsoil, and the time spent by nature on its formation. After all, nature takes from 100 to 300 years to create a conditional 1 cm of the fertile soil layer[3].

According to the design institute "Kyrgyzgiprozem", 1.6 million hectares of pastures have thinned vegetation cover due to excessive grazing by livestock and are subject to wind erosion. According to other surveys, out of 9.0 million hectares of pastures, from 3 to 4 million hectares are degraded, mainly near villages and nearby areas due to overload of grazing by livestock. Long-distance distant pastures (syrts Kara-Kujur, Aksai, Arpa, Sarydzhaz, etc.) are little used due to difficulties with transport, destruction of bridges and roads, shelters, housing, lack of water sources. During the Soviet era, about 1.5 thousand wells and water supply structures, 1.6 thousand km of water supply networks for livestock watering were built on these pastures, the cost of which was more than $ 10 million. Now they are mothballed or out of order[4].

[3] Fedorov V. Biosphere-landuse-humanity. Moscow., Agropromizdat, 1990. Karabaev N.A. Agrochemical and ecological foundations of fertility and productivity of mountain soils in Kyrgyzstan. Bishkek, 2000

[4] National Action Plan (NAP) and a framework for enhancing the implementation of the UNCCD in the Kyrgyz Republic for the period 2015-2020. Materials of a press tour to the Suusamyr Valley and meetings with journalists in the MAFPM, July 6, 2017

In economic terms, short-term costs also include damage to buildings and other infrastructure facilities, power lines, interruptions in transport, etc. For example, hurricane winds in the cities of Bishkek, Karakol, etc., knock down old trees that break electrical wires, damage buildings, cars , and there were also casual human casualties. Socially, airborne particulate dust is a significant health hazard, especially in arid and semi-arid areas. In the case of humans, inhalation of fine dust particles can cause respiratory, allergic and cardiovascular diseases, lung cancer and acute lower respiratory tract infections. Due to the fact that the territory of the country was not affected by large-scale SDS, there is no data in the state statistics on this score. As well as on the impact of SDS on the ecosystem[5].

2. Analysis of drivers leading to land degradation

The Kyrgyz Republic was one of the first post-Soviet states to implement land and agrarian reform. However, more organizational and legal issues of land redistribution were resolved, and less issues of increasing the productivity of agricultural labor, improving soil fertility, increasing crop yields and the profitability of agricultural producers, building a monitoring and assessment system for the rational use and protection of land resources.

Today, the main unresolved problems of agriculture, leading to land degradation, hindering effective land management are the following:

- departmental and legal disunity, limiting the conduct of a coordinated land policy;
- small contour of land plots that do not ensure the profitability of production and the conduct of rational land use;
- low farming culture;
- lack of agricultural machinery, water supply and land reclamation, fertilizers and other infrastructure;
- lack of a system of qualitative assessment, monitoring of the efficiency of the use of agricultural land;
- a shortage of financial resources, various forms of government support that do not go beyond the WTO requirements.

The problem of combating land degradation is of a certain complexity, since various ministries and departments, local authorities and local communities, specialists of different profiles should participate in its solution, and large anti-erosion, reclamation measures should be carried out not on any piece of land, but for whole regions in a complex manner. The increase in the area of land subject to degradation processes indicates a decrease in the effectiveness of the activities of management institutions and local government bodies in the field of rational use of land resources. Constant reforms of the executive authorities, change of management and middle-level personnel do not allow to understand the essence of the problems, to define and implement mechanisms of interdepartmental coordination, including the development and adoption of consolidating normative legal acts. The lack of coordination between local authorities, local government bodies and public civil organizations in the implementation of environmental legislation leads to illegal deforestation and forest belts, extensive use of arable land, and a decrease in biodiversity.

The small size of land allotments is associated with the consequences of the land and agrarian reform carried out after 1991. The allocation of land to all on the basis of an equitable distribution of shares has led to an excessive fragmentation of land. And the agricultural sector is currently represented by more than 452.3 thousand peasant (farmer) holdings with arable land shares of only 0.7 - 1.5 hectares. And today it has become a barrier to the growth of the production potential of agricultural producers, the introduction of the simplest crop rotations and crop rotations, the

[5] Social trends of the Kyrgyz Republic. Issue 15. - Bishkek, NSC, 2019. Chapter 7 "Public health"

profitable use of agricultural machinery, irrigation water, etc., due to the incompleteness of reforms towards the cooperation of economically interested economic entities (clusters, territorial production groups).

Low culture of agriculture is observed everywhere, with some exceptions. In their fields, most farmers do not observe the rule of crop rotation, even simple three-field, or crop rotation, effective technological agricultural practices for the cultivation of crops, where unknowingly, where not thinking about the consequences of non-compliance. The Law "On the Protection of Soil Fertility of Agricultural Lands" includes norms on increasing the responsibility of land users for maintaining and increasing soil fertility, but due to the lack of support measures at the local level on a permanent basis, its implementation has not received proper development. At the local level, actions are not being supplemented to develop, based on soil maps and cartograms, operational and promising programs for improving soil fertility and combating land degradation for the next 5-10 years.

In recent years, the issues of modernizing the agrotechnical park, improving water supply and land reclamation, by increasing state support, have begun to be addressed. However, these measures are insufficient. The volume of annual investments, for example, in the irrigation sector did not exceed 25-30% of the calculated indicators. According to the expert assessment of the World Bank specialists, the funds for the satisfactory operation of the irrigation network serving over 1 million hectares of irrigated land amount to 1200.0 million soms per year. In addition, 190.0 million soms are required annually for capital repairs for pumping stations and wells, for large hydraulic structures and canals - within 90.0 million soms. At present, the throughput of a significant number of irrigation and drainage canals has decreased by 20-30%, pumping stations, water intake and control structures are operated at the limit of physical wear and tear. This leads to a reduction in the actually used irrigated land, a decrease in the efficiency of irrigation, and ultimately to additional losses in crop yields by at least 15-20%. About 9% of the total area of irrigated land does not meet the amelioration standards in terms of soil salinity and groundwater levels.

The basic conditions of agriculture are accounting and assessment of the quality of soil resources, dynamic analysis of the state of the soil cover, collection and interpretation of accurate reliable information in digital form about soil areas and land, with the creation of an automated information system center for the monitoring database. The annual State (national) reports on the state and use of the country's land fund mainly reflect the quantitative indicators of its dynamics and do not reflect the qualitative indicators. Although, according to Article 106 of the Land Code, these reports should also contain qualitative indicators of the state of land. In order to fulfill the established norm, in accordance with the Government's decree "On conducting an inventory of the land fund of the Kyrgyz Republic" dated 03.03.2014 No. 114, the Ministry of Agriculture began work on conducting an inventory of the country's land fund during 2014-2018, which includes the implementation of work to establish boundaries between economic entities , regardless of the form of ownership and departmental subordination. At the same time, it is planned to carry out a high-quality accounting of land, which will be reflected in the annual State (national) reports on the land fund. However, faced with a large volume of work, the inventory timeline was extended for another two years.

Most of the farms do not have the necessary financial resources to conduct effective land use based on the use of advanced technologies and modern agricultural machinery. A direct consequence of this is low labor productivity and capital-labor ratio, a high proportion of fixed costs and high production risks, volatile and low incomes. Out of 7.0 billion soms of loans intended for farmers, the government distributed 5.0 billion among five commercial banks. For another two billion, such a mechanism for distribution and issuance is being developed so that these loans with a designated purpose would go to farmers.

The Kyrgyz Republic is an agro-pastoral country. Due to the special economic and social importance of pastures, reforms in pasture policy have been initiated. In order to exclude degradation, especially of near-village pastures, the regulation of the seasonal transfer of livestock to remote pastures has now begun. Natural restoration of forage grasses of pastures requires the introduction of a permanent, planned in time and in space, change of pasture areas for grazing - pasture rotation. Earlier, before the adoption of the Law "On Pastures", the implementation of the practice of changing sites was difficult due to the separate management of pastures. Alongside pastures were managed by local self-government bodies, intensively used pastures were leased by regional state administrations, high-mountain distant pastures were under the jurisdiction of regional state administrations. And the main pasture users, farmers, did not participate in pasture management. As a result, this has become one of the main reasons for the degradation and irrational use of pastures.

At present, only villages and nearby pastures are intensively used. Long-distance distant pastures (syrts Kara-Kujur, Aksai, Arpa, Sarydzhaz, etc.) are little used due to difficulties with transport, the destruction of shelters, housing, lack of water sources, etc. During the Soviet era, about 1.5 thousand wells and water supply facilities, 1.6 thousand km of water supply networks for livestock watering, the cost of which amounted to more than $ 10 million. Now they are mothballed or out of order.

Inappropriate land use planning, deforestation, insufficient flood control, and disruption of slope stability also lead to an increase in natural disasters. For example, 70% of irrigation facilities are located in mountainous or foothill areas of the republic. In this regard, water facilities are very vulnerable to natural disasters in the form of floods, mudflows in the spring-summer period and the passage of sludge (ice crumbling) in the winter-spring period of the year.

3. Review of past and present practices on prevention and countering storms

3.1. Practices of the period before 1990s

During the Soviet period, activities to prevent winds and storms were included in all program documents of the country and were subject to mandatory execution with the allocation of proper funding and material and technical means. So, according to the 32nd edition of the Scientific and Applied Reference Book on the Climate of the USSR (1989), which was devoted to the Kyrgyz SSR, during the Soviet period, dust storms were monitored, and regular, albeit infrequent, dust storms were recorded. The highest frequency of occurrence of dust storms across the country was observed in Rybachye, now Balykchy, - 12 cases per year. The second most prevalent city is Frunze, now Bishkek, with a frequency of 11 cases per year.

Practical actions were based on evidence-based recommendations. In agriculture, for example, on their basis, in Kyrgyzstan, the Agricultural System was developed and published in 1968, recommended by the Ministry of Agriculture to all collective and state farms of the republic as a practical guide for developing their detailed plans of organizational, economic, agricultural and land structure ... On the basis of the System, collective farms and state farms ordered the development of on-farm land management projects through the Ministry of Agriculture to the Kyrgyzgiprozem design institute, after the approval of which they became a practical guide for farms. All of the above program documents included mandatory measures to prevent the negative impact of winds and the spread of wind erosion of soils.

Protective forest plantations as a necessary component in the fight against water and wind erosion of soils, improving the microclimate, contribute to the preservation of soil fertility, significantly reduce surface runoff and soil washout on slopes, protect pastures from water and wind erosion, protect fields from the harmful effects of droughts and dust storms, contribute to a more even

distribution of snow and an increase in soil moisture. For the period from 1968 to 1990, according to the State Forestry Agency (at that time), field-protective forest belts were created on an area of 5311 hectares and anti-erosion forest plantations of 1969-1998 were planted on an area of 36830 hectares. However, with the complication of the social and living conditions of the people during the perestroika period, an intensive unauthorized felling of forest belts and protective forest plantations began, which leads to a decrease in productivity, an increase in erosion processes and desertification of territories.[6]

Studies of the Central Asian Research Institute of Forestry have established that forest plantations reduce wind speed in the zone of 15-fold height of trees by 60-65%, 20-fold - by 50-55% and 25-fold - by 30-40%. The relative humidity of the air under the influence of protective forest belts increases by 10-15%. By reducing unproductive evaporation, forest belts reduce the need for irrigation water by 20-25%, which is equivalent to one irrigation, and by lowering the level of groundwater, they prevent secondary salinization of irrigated lands.

In the rainfed zone, protective forest belts, in addition to improving the microclimate, contribute to the accumulation of moisture in the soil and its productive use by agricultural crops. On slopes and lands with rugged relief, they protect the soil from erosion.

Protective forest belts contribute to an increase in productivity on irrigated lands: cotton - by 2.5 c / ha, corn - by 10-11 c / ha, fruit crops - by 10-23 c / ha; on rainfed lands in the zone of 30-40 times the height of trees, the grain yield increases by 2-2.5 centners / ha.

Taking into account these and other scientifically grounded studies, the Kyrgyz SSR developed and published in 1968 the Agricultural System, recommended by the Ministry of Agriculture to all collective and state farms of the republic as a practical guide for developing their detailed plans for organizational, economic, agricultural and land structure. On the basis of the System, collective farms and state farms ordered the development of on-farm land management projects through the Ministry of Agriculture to the Kyrgyzgiprozem design institute, after the approval of which they became a practical guide for farms. All of the above program documents included mandatory measures to prevent the negative impact of winds and the spread of wind erosion of soils.

In areas prone to wind and wind erosion, it is recommended that special soil cultivation practices be introduced to prevent wind erosion. As established by stationary studies of the Research Institute of Soil Science in 1970-71, for example, in the Western Issyk-Kul region, the Kochkor depression, in the presence of wind erosion, autumn plowing enhances erosion processes. In these areas, the winter period is characterized by the absence of snow cover, and the autumn-spring period is characterized by dryness and frequent strong winds.[7]

The main measures against winds and prevention of wind erosion on arable lands were the creation of shelter belts, non-moldboard tillage, which preserves stubble on the surface of the arable land, which reduces the blowing of fine soil. As well as bridle pairs, sowing across the prevailing wind direction, harrowing, rolling and plowing and autumn-winter moisture-accumulating irrigation, replacing autumn-plowing areas with spring plowing, expanding winter crops and sowing spring crops in a short agrotechnical period. On steep slopes and in areas with sandy and sandy loam soils, buffer strips of perennial and annual grasses were practiced.

Windbreaking shelterbelts were located perpendicular to the prevailing wind direction. The breeds, planting technology and care for them were selected according to the properties of the soil and their purpose.

[6] The agricultural system of the Kirghiz SSR. Frunze, 1968. Section 4. Chapter 1 "Protective afforestation"

[7] The agricultural system of the Kirghiz SSR. Frunze, 1968. Section 4. Chapter 2 "Fight against soil erosion"

3.2. Practices from the 1990s to the present

In the current period of the sovereign development of Kyrgyzstan, new action programs to prevent and counter strong winds have not been developed. Moreover, attention to them has waned, considering them a common occurrence, and everywhere at all levels of society there is an underestimation of the risks from strong winds. So, formally, Kyrgyzhydromet included dust (but not sand) storms in the list of dangerous phenomena to be monitored at observation stations.

There is a technical definition of a dust storm: a strong dust storm lasting 6 hours or more, with an average wind speed of 15 m / s or more, accompanied by a deterioration of the MVR to 100 m or less. However, due to insufficient provision of budgetary funding, Kyrgyzhydromet currently does not monitor dust storms. Also, in view of the low prevalence of SDS phenomena and insignificant economic and social damage from them on the territory of the Kyrgyz Republic, they are not included in the Emergency Risk Register approved by the government.

The growing attention and adoption of strategies and plans for preparing / adapting to climate change is positive. The country is taking the necessary measures to implement the provisions of the UN Framework Convention on Climate Change and the Kyoto Protocol. In order to coordinate the activities of ministries, departments and organizations to fulfill obligations, a Coordination Commission on Climate Change Problems (CCCCP) has been established, chaired by the Vice Prime Minister of the Kyrgyz Republic. The Climate Dialogue Platform of Kyrgyzstan has been created, uniting the efforts of not only representatives of the civil sector, but also representatives of government bodies, science, business structures and development partners. The "Priority areas for adaptation to climate change in the Kyrgyz Republic until 2017" were approved. In order to fulfill the obligations on reporting to the UNFCCC, three National Communications on Climate Change were prepared and submitted to the UNFCCC Secretariat. In 2015, the Climate Investment Fund (CIF) approved the participation of the Kyrgyz Republic in the Pilot Program for Building Resilience to Climate Change.

Measures are being actively implemented to fulfill the obligations of the UN Convention to Combat Desertification. Basic, national-scale measures, such as solving the problem of combating the processes of land degradation, were included in the National Strategy for Sustainable Development of the Kyrgyz Republic for the period 2013-2017, the National Development Strategy of the Kyrgyz Republic for the period 2018-2040. Under the auspices of the MoA, the National Action Plan (NAP) and the Integrated Financial Strategy (IFS) were developed as part of activities to enhance the implementation of the UNCCD in the Kyrgyz Republic for the period 2015-2020. Measures have been implemented to separate functions for land administration and independent government departments for land and water resources have been established.

However, positive organizational measures are not accompanied by the effective creation of a mechanism for the implementation of legal acts. Thus, the necessary laws are adopted, but “below” for a number of objective and subjective reasons they cannot be fully implemented.

The Climate Profile of the Kyrgyz Republic does not include strong winds in the list of climate change-related impacts. Other impacts are listed there - an increase in average temperatures; an increase in evaporation and a violation of water balance; increased intensity of droughts; degradation of agricultural land; an increase in maximum temperatures, etc. However, it is known that temperature drops are one of the sources of wind generation, and it would be logical to include strong winds in the list.

Accordingly, the implementation of practical measures is insufficient. The felling of forest shelter belts remaining from the Soviet period is widespread, the systems of farming and land management are no longer functional, and are reduced to extensive methods of private farmers' management, aimed, at best, at obtaining short-term benefits, at worst, at simple survival from the year in year.

The situation may change with the growth of cooperation (consolidation) of private farms, the organization of large associations. In this case, it will be possible to concentrate funding for planting inter-farm and intra-farm field-protective forest belts, on enlarged hectares - to revive the design of scientifically grounded land management, introduce soil-protective agricultural techniques and crop rotation. There are positive trends in forestry. Thus, in the arid Batken oblast, in order to develop desert areas, reduce the impact of winds and soil deflation by means of forestry enterprises and the FAO / GEF project "Sustainable management of mountain forest and land resources in the face of climate change", planting of black saxaul began on an area of 1000 hectares.

3.3. Institutions

Development and implementation of measures in the country to prevent and counteract winds and SDS is in the competence of the following state bodies.

The Ministry of Agriculture, Food Industry and Land Reclamation (MoA) develops and maintains a holistic agricultural policy, including the organization of measures for the rational management of agricultural resources, drought prevention, and counteraction to soil degradation, which is an indicator and a first step towards desertification. Since winds and hurricanes are a factor in the development of wind erosion of soil, it is in the competence of the Ministry of Agriculture and Food Industry to develop schemes for the creation of anti-erosion protective forest belts, followed by sending them to local governments (LSGU) as a practical guide for implementation. Local governments recommend farms that implement these recommendations according to their financial capacity. According to the legislation (Law "On the protection of soil fertility of agricultural lands" dated 08/10/2012), the tasks of soil protection are assigned to farms (land owners). In case of non-fulfillment of the assigned tasks, it is within the competence of the Ministry of Agriculture and Food Industry, together with the local self-government bodies to apply administrative measures of punishment to the landowner, up to deprivation of the land plot.

The State Agency for Land Resources (recently created, at the end of 2019) is responsible for developing and maintaining a coordinated policy for sustainable land management and land use. Protective forest belts are part of on-farm land management. At present, the technical functional tasks are being detailed between GAZR and the Ministry of Agriculture and Food Industry.

The State Agency for Water Resources (recently created at the end of 2019) carries out the functions of developing and maintaining a unified policy for the rational use and protection of water resources. Services for water supply to farmers' fields and irrigation of protective forest belts are in the competence of SAWR.

The Ministry of Emergency Situations, together with the subordinate Agency for Hydrometeorology, are engaged in the prevention / forecasting and elimination of the consequences of natural disasters, including droughts, low water levels, hurricane winds, and emergency monitoring and assessment. In practice, the Ministry of Emergency Situations monitors the implementation of the Concept of Comprehensive Protection of the Population and Territory of the Kyrgyz Republic from Emergencies for 2018-2030, in which strong winds, as well as drought, are included in the list of potential natural emergencies. However, in the Register of real risks, the threats of which the territory of Kyrgyzstan is exposed, drought and hurricanes do not appear.

Other departments are also solving important tasks. Thus, the State Agency for Environmental Protection and Forestry under the Government of the Kyrgyz Republic is the responsible executive body for the implementation of the obligations of the Kyrgyz Republic under the UNFCCC and the Kyoto Protocol, a number of other environmental international UN conventions. Authorized to monitor and assess the implementation of environmental legislation in the country.

The State Inspectorate for Environmental and Technical Safety under the Government of the Kyrgyz Republic oversees compliance with environmental legislation.

A number of non-governmental organizations are implementing projects of FAO, GEF on forest planting of foothill land tracts, rational use of pastures - the Association of Forest Users and Land Users of Kyrgyzstan, the Association of Pasture Users of Kyrgyzstan “Kyrgyz Zhaiyty”, the Republican Union of Water Users Associations of the Kyrgyz Republic, the CAMP Alatoo Public Fund. Their activities can also be considered a significant contribution to the prevention and resistance to strong winds, soil degradation, fields and pastures.

3.4. Legislation

There are no specific regulatory legal acts in the country devoted to wind issues in the database. Wind issues are tackled in conjunction with land degradation and disaster management issues.

Thus, in the National Strategy for Sustainable Development of the Kyrgyz Republic for 2013-2017, approved by the UP of the Kyrgyz Republic of January 21, 2013 No. 11, in section 10.1 "Agro-industrial sector" it is especially highlighted that "the processes of land degradation for the cultivation of agricultural crops and animal husbandry are currently pose a significant threat to food security and move from the category of environmental to the category of threats to the country's sustainable development. "

The main norms for regulating land use, including for the protection and rational use of soil fertility, the fight against water, wind erosion are defined in the Land (1999), Forest (1999), Water (2005) codes, laws " On the peasant (farm) economy "(1999)," On the chemicalization and protection of plants "(1999)," On the protection of the environment "(1999)," On the protection and use of the flora "(2001.), "On the management of agricultural land" (2001), "On pastures" (2009), "On the subsoil" (2012), "On the protection of soil fertility of agricultural lands" (2012, amendments 07/06/2016). In the period from 2015-2019, amendments, changes, additions were made to these laws and regulations. So, in the Land Code alone, about 40 amendments have been made in recent years.

In order to implement the codes and laws, the Government adopted the relevant by-laws - decisions on the reclamation (restoration) of lands and the procedure for their acceptance into operation, inventory of the land fund of the Kyrgyz Republic (03.03.2014 No. 114), approved the Concept of preserving and increasing soil fertility in agricultural lands. appointments in the Kyrgyz Republic for 2017-2020, Priority areas for adaptation to climate change in the Kyrgyz Republic until 2017 (02.10.2013 No. 549), Regulations on state land registration (land cadastre) (17.03.2014 No. 137), Priorities for preserving biological diversity of the country for the period up to 2024 and the Action Plan for the implementation of these Priorities for 2014-2020, annual government decrees on measures to organize the timely conduct of spring field and harvesting works, the Strategy for the Development of Agriculture of the Kyrgyz Republic for the period up to 2040, etc.

The rights, taxes and responsibility of the subjects of land relations are regulated by the Tax, Administrative Codes of the Kyrgyz Republic, the Law of the Kyrgyz Republic "On Local Self-Government and Local State Administration".

However, assessing the degree of land degradation in the country, the negative prospects of extensive land use, it is necessary to continue the process of improving the legal framework for regulating the use and protection of land resources. For example, in accordance with the Land Code, the Law "On the Protection of Soil Fertility of Agricultural Lands", the Regulation on State Land Registration (Land Cadastre), control over the implementation of the Concept of Conservation and Improvement of Soil Fertility of Agricultural Lands in the country for 2017-2020 is carried out an authorized state body performing the functions of developing state policy in the field of agriculture, and its structural divisions and institutions responsible for preserving and

increasing soil fertility. But, in connection with the creation of SALR and SAWR, it becomes necessary to redistribute the functions, powers of the Ministry of Agriculture, SALR and SAWR in terms of rational land use and soil protection, protection from wind erosion.

The Law "On the Protection of Soil Fertility of Agricultural Lands" of 08/10/2012, with amendments on 07/06/2016, Article 8 stipulates the obligations of the land owner to introduce soil protection technologies, the development of scientific research, crop rotations, fertilizers, measures to protect soil from wind and water erosion, carry out soil surveys. In Articles 18, 19, 20, responsibility for carrying out these measures is assigned to the owner and land user. But how to fulfill these obligations, if the farmer does not have knowledge of soil protection technologies (the technologies of prominent Soviet scientists T. Maltsev and A. Barayev are forgotten and are not disseminated), there is no domestic scientific research, soil surveys are not carried out by most farmers, the small contour of the plots does not allow introducing crop rotations and proper mechanization. Article 21 provides that financing of measures for the protection, rational use and preservation of soil fertility is carried out at the expense of economic entities, and can also be carried out within the framework of targeted programs and other government decisions. But given the low profitability of smallholder farmers, it is difficult to hope that the farmer will provide adequate funding for these activities[8].

Most of the legal acts establish that at the level of districts and aiyl aimaks, control over their implementation is carried out by district state administrations and local self-government bodies. However, in practice it is observed that forest belts are thinning from unauthorized felling, dry from lack of irrigation, new forest belts are not created, citing a lack of funding. Consequently, there is a need to develop local laws and regulations (regulations, instructions, etc.) with the legal establishment of a mechanism for the implementation of country legislation. For this reason, situations are created called "the law is, but it does not work."

4. Early warning system for disasters

An early warning system for the impact of strong winds, hurricanes, functions in the context of emergency situations. The state policy in the field of protecting the population and territories from natural and man-made disasters is aimed at early implementation of the necessary measures to ensure their prevention and mitigation of damage, the maximum possible use of the available resources and means of state structures and self-government bodies.

It has been determined that the territory of the Kyrgyz Republic is potentially exposed to more than 20 hazardous natural processes and phenomena (earthquakes, landslides, avalanches, mudflows, floods, flooding, rising groundwater levels, heavy rains, lightning, hail, snowfalls, rockfalls, hurricane winds). So, in the period from 2013 to 2018, 1320 emergencies of a different nature occurred on the territory of the republic, in which 416 people died. Direct material damage from emergencies amounted to 6 billion 215 million 100 thousand soms. From the statistics of emergency situations that have occurred in recent years, it is clear that earthquakes, landslides, avalanches, mudflows pose the greatest threat to mountainous Kyrgyzstan. The hurricane winds show (check Table 2 in the introduction) an unstable growth trend in 2012-2013, 2015-2016 and a decrease in most recent years. Therefore, in the list of priorities for monitoring and protective measures they occupy the last place, the negative impact of which on the economy is minimal.

Emergencies can occur at any time of the day and requires an uninterrupted exchange of information between ministries, departments, local authorities and the private sector. An important condition for the safety of the population and the required level of safety is a system for alerting the population and government bodies about the threat of an emergency. The purpose of creating a warning system is to ensure timely delivery of warning signals and information about dangers

[8] Apasov R.T. Soil is a vital resource. - "Word of Kyrgyzstan", June 17, 2020. - www.slovo.kg

that are high in the event of a threat or emergencies to the population and management. The notification begins with the transmission of the agreed, in advance extremely clear to the population of warning signals (the sound of a siren, beeps, frequent blows to sounding objects, etc.). After that, it is necessary to convey information about the danger and behavior in the created conditions in order to avoid infection of people from harmful damaging factors in a particular emergency. Potentially dangerous objects are local warning systems, areas of responsibility that go beyond these objects.

One of the prerequisites for the development of the early warning system was the adoption of the new Law of the Kyrgyz Republic "On Civil Protection" on 24.05.2018. This Law establishes that the powers of the state body in the field of emergencies and local self-government bodies include the organization and provision of timely warning, warning and informing the population about the threat or occurrence of emergencies. The heads of government bodies at all levels must inform the population through the warning, warning and information system about the introduction of certain systems of functioning of the control bodies and forces and means of the population system, as well as measures to ensure security.

In the period after the adoption of the said Law, more than 20 by-laws have been developed and adopted to regulate the organization and maintenance of the early warning system for the population in the country. Earlier, by the Decree of the Government of the Kyrgyz Republic issued on January 3, 2011 No. 1, the Unified Information and Management System for emergency situations was introduced, including early warning of the population about the approaching emergency situations.

In order to implement the Law, in 2018 was developed a Concept of comprehensive protection of the population and the territory of the Kyrgyz Republic from emergencies for 2018-2030. It was also supplemented by the Action Plan on Concept implementation and the Emergency Response Plan[9].

The adopted regulations are designed to solve the following difficulties in the early warning of emergencies:

1) Imperfection of organizational and regulatory legal acts governing areas of responsibility and functions for building early warning and protection measures against emergencies at all levels of management. There is inconsistency in the legislation of various sectors, which leads to a weak involvement of state bodies, local governments in the implementation of measures to reduce disaster risk.

2) Lack of financial capabilities and limited potential of the material and technical base of the state system of Civil Protection. Taking into account the current socio-economic situation of the country, it is difficult to build an early warning system and protect the population and territories from emergencies in full, since the measures are very expensive and require significant financial resources.

3) Low level of "safety culture" among the population and insufficient level of training of officials.

In most cases, the population has a one-sided perception of "life safety". The population, realizing the need to protect life and health in natural emergencies, underestimates the need for preventive measures, does not perceive potentially dangerous phenomena, objects, processes as sources of emergency situations and often provokes their occurrence. For example, farmers, cutting down forest belts, do not perceive them as the cause of wind erosion and a decrease in soil fertility. The

[9] http://ru.mes.kg/2018/02/22/koncepciya-kompleksnoj-zashhity-naseleniya-i-territorii-kyrgyzskoj-respubliki-ot-chrezvychajnyx-situacij-na-2018-2030-gody/

fact is that a significant part of the farmers are former employees, retired military men, etc., who did not have the practice and knowledge of agronomy.

The insufficient level of officials' expertise, first of all, is due to the high turnover of personnel in state bodies and local self-government bodies, insufficient financial support for training employees of government bodies on prevention and protection from emergencies.

The action and response plans provide for the development of an automated Unified Information Management System in emergency and crisis situations. The coverage of the territories by the components of the Unified Information and Management System is envisaged in 7 provinces and two largest cities - Bishkek, Osh.

The goal of the Response Plan is to establish the basis for coordinated interaction between ministries, departments, local state administrations, local governments, local communities, organizations, enterprises and institutions, regardless of their form of ownership, as well as international and non-governmental organizations accredited in the Kyrgyz Republic, for effective response in emergencies[10].

For example, the Plan describes step-by-step actions for warning and notifying all relevant parties about an emergency. A project has been implemented for the further development of the Unified Information and Control System for Forecasting, Early Warning, Prevention and Elimination of the Consequences of Emergencies in the Kyrgyz Republic. The project has also implemented the following main tasks:

- creation and improvement of the Unified State Duty Dispatch Service 112 (USDDS);

- optimization of the daily management processes;

- creation of the National Comprehensive System of Information and Notification of the Population (hereinafter - OXION);

OXION is entrusted with the solution of the following main tasks:

1) Improving the rapidity of guaranteed warning, notification of emergencies.

2) Increasing the effectiveness of informing the population about the rules of safe behavior in the events of a threat and emergencies.

3) Raising the level of life safety culture.

5) Increasing the effectiveness of information provision to facilitate quicker rehabilitation of victims of emergencies.

OXION uses the following technologies and technical means to inform and alert the population: electronic sirens; interception of TV and radio broadcasting channels; instant messaging service; audio message; LED screens; CCTV cameras; sound amplifying equipment for information; mobile complexes for informing and alerting the population.

To promptly alert the population at all levels, special systems of centralized information and warning are being created. Responsibility for the organization and practical implementation of the notifications is borne by the heads of executive bodies and heads of local state administrations, heads of local self-government bodies, who act, by mandate of their positions, as the heads of the Civil Protection at the relevant level.

Thus, the adopted normative legal acts allow solving the problems of organizing and maintaining early warning, warning, informing the population, as well as organizing work to eliminate the consequences of emergencies.

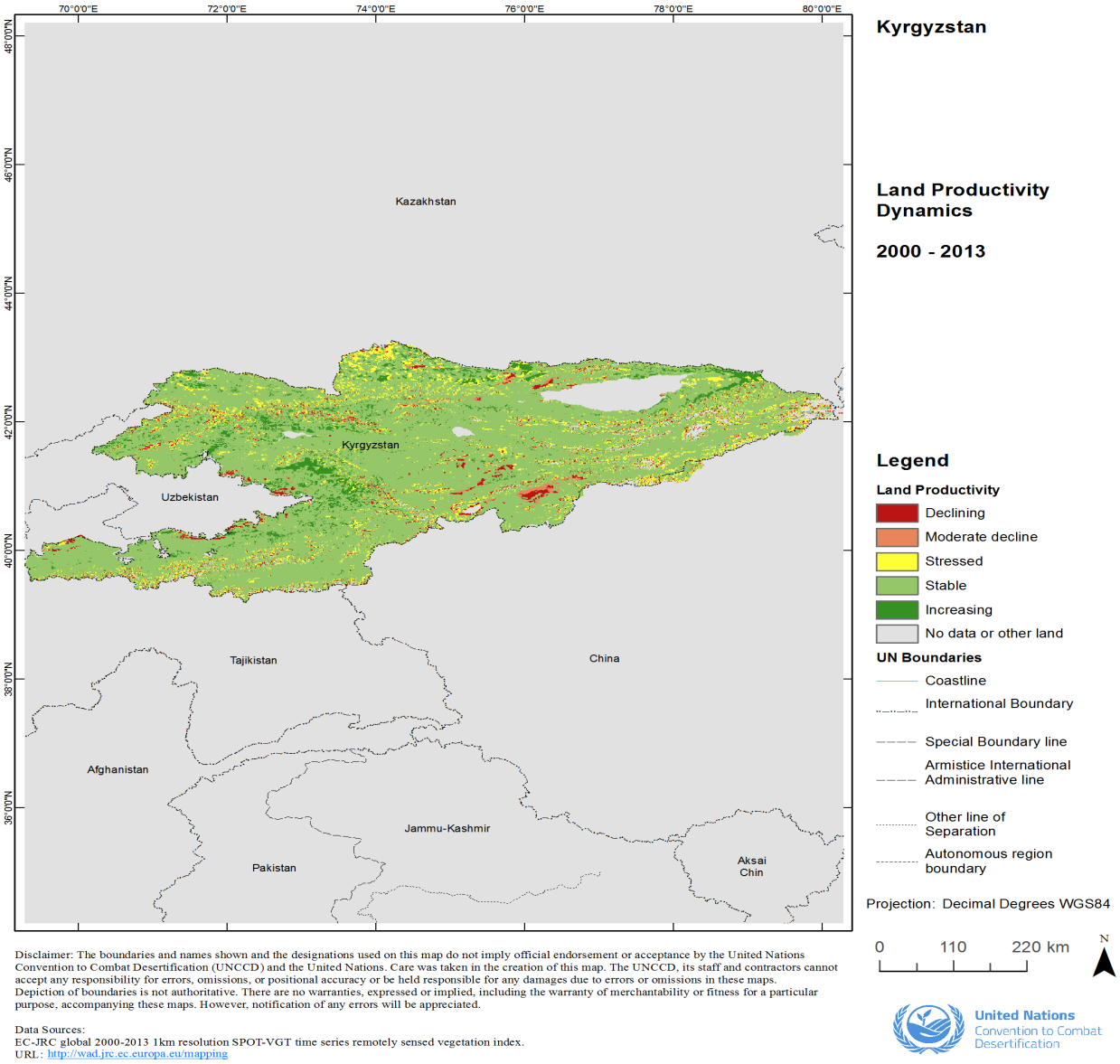
[10] (http://ru.mes.kg/2018/02/22/plan-reagirovaniya-na-chrezvychajnye-situacii-v-kyrgyzskoj-respublike/)

At present, automated systems 112 are functioning in the dispatch services of emergency operational services of provinces and cities, including the ministries involved. A system of voice notification of the population (acoustic systems) in the buildings of provincial state administrations and city administrations has been introduced. A system for warning about dangerous hydrometeorological phenomena of livestock breeders in pastures is working in a test mode.

5. Mapping of the regions vulnerable to storms

According to SDS source map[11], the following 6 hot spots are identified in the Kyrgyz Republic - the north of the Chuy valley, the western and southern parts of the Issykul depression, the Inner Tien Shan, the eastern syrts of Issykul, the Fergane and the Alai depression.

These hotspots largely correlate with problem areas in the field of land degradation. Thus, the UNCCD database on LDN also identifies these same zones in a broad sense, albeit with some differences. See below the UNCCD maps and the Vukovic map.



Disclaimer: The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations Convention to Combat Desertification (UNCCD) and the United Nations. Care was taken in the creation of this map. The UNCCD, its staff and contractors cannot accept any responsibility for errors, omissions, or positional accuracy or be held responsible for any damages due to errors or omissions in these maps. Depiction of boundaries is not authoritative. There are no warranties, expressed or implied, including the warranty of merchantability or fitness for a particular purpose, accompanying these maps. However, notification of any errors will be appreciated.

Data Sources:
EC-JRC global 2000-2013 1km resolution SPOT-VGT time series remotely sensed vegetation index.
URL: http://wad.jrc.ec.europa.eu/mapping

[11] Ana Vukovic, 2019. Gobal sand and dust storms base map. UNCCD-funded report.

Fig. 2. Map of the land productivity dynamics in the Kyrgyz Republic, source - UNCCD, 2000-2013

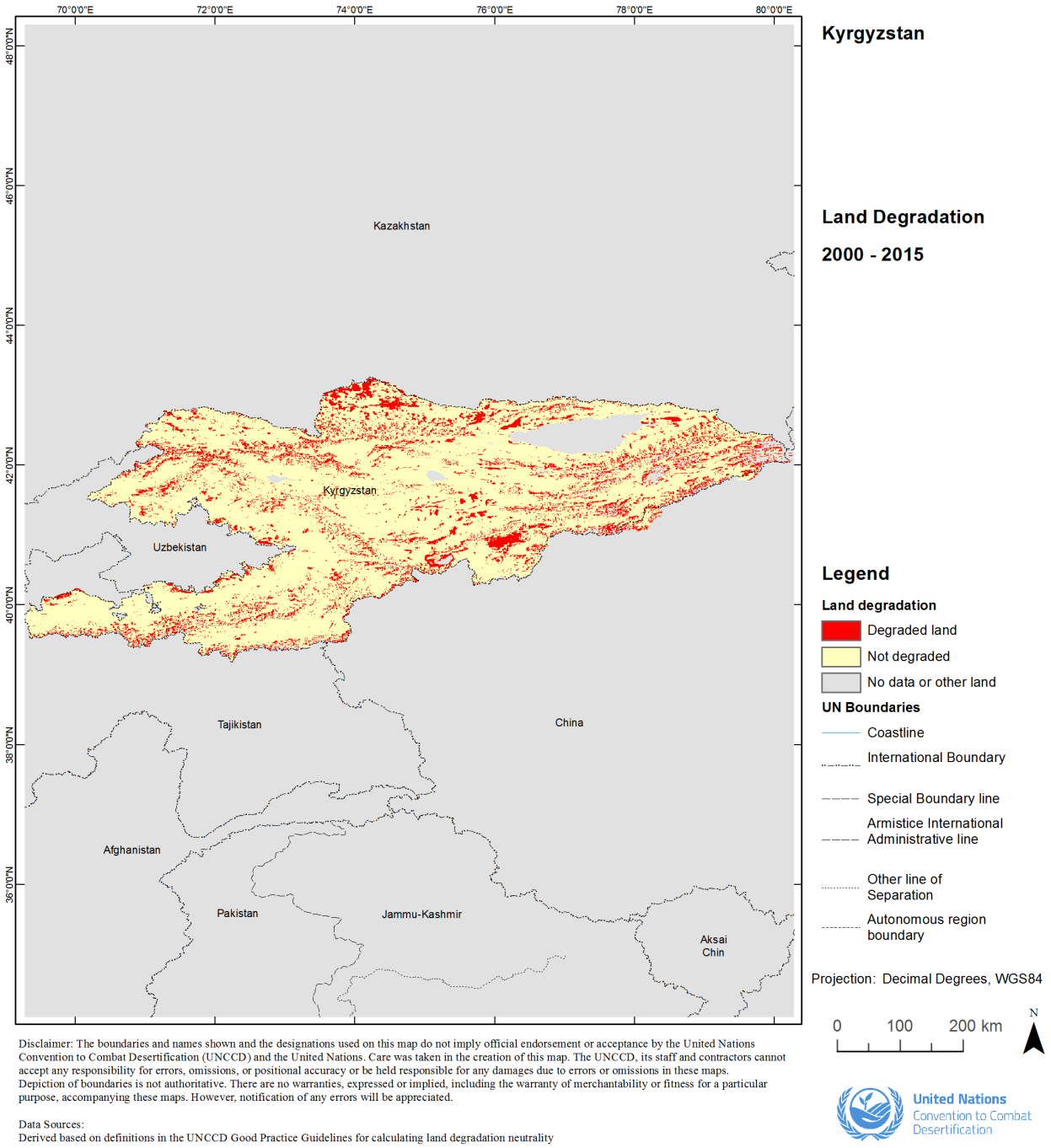


Fig. 3. Map of land degradation in the Kyrgyz Republic according to the UNCCD, 2000 - 2015

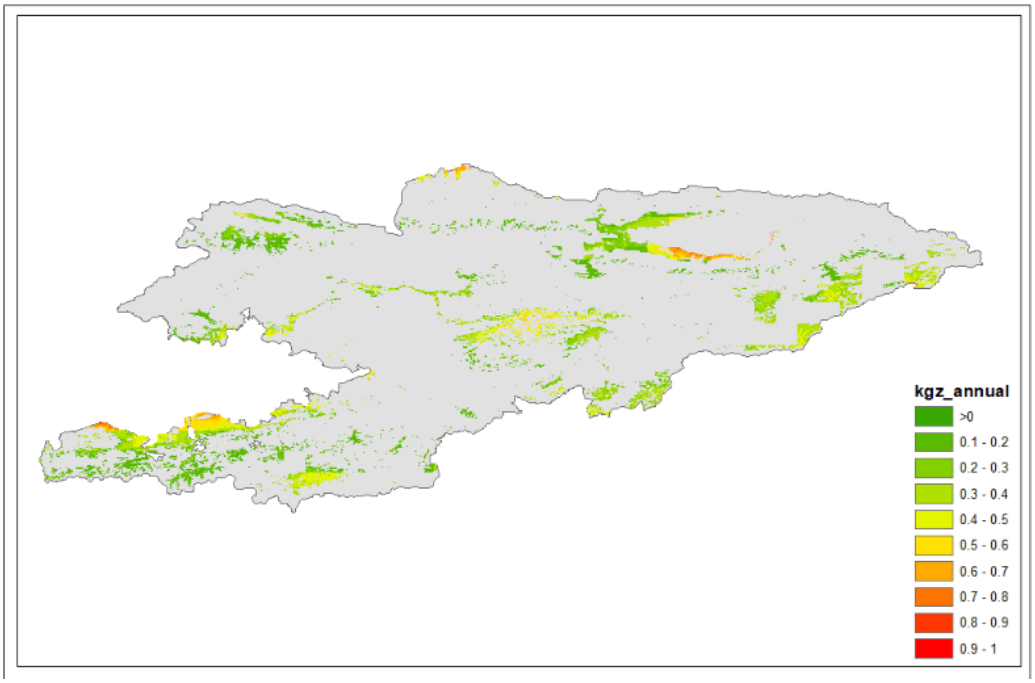


Fig. 4. Map of vulnerability to SDS, Kyrgyzstan, according to Vukovic

For a more detailed analysis of the problem, our project also prepared a soil map of Kyrgyzstan, based on national data:

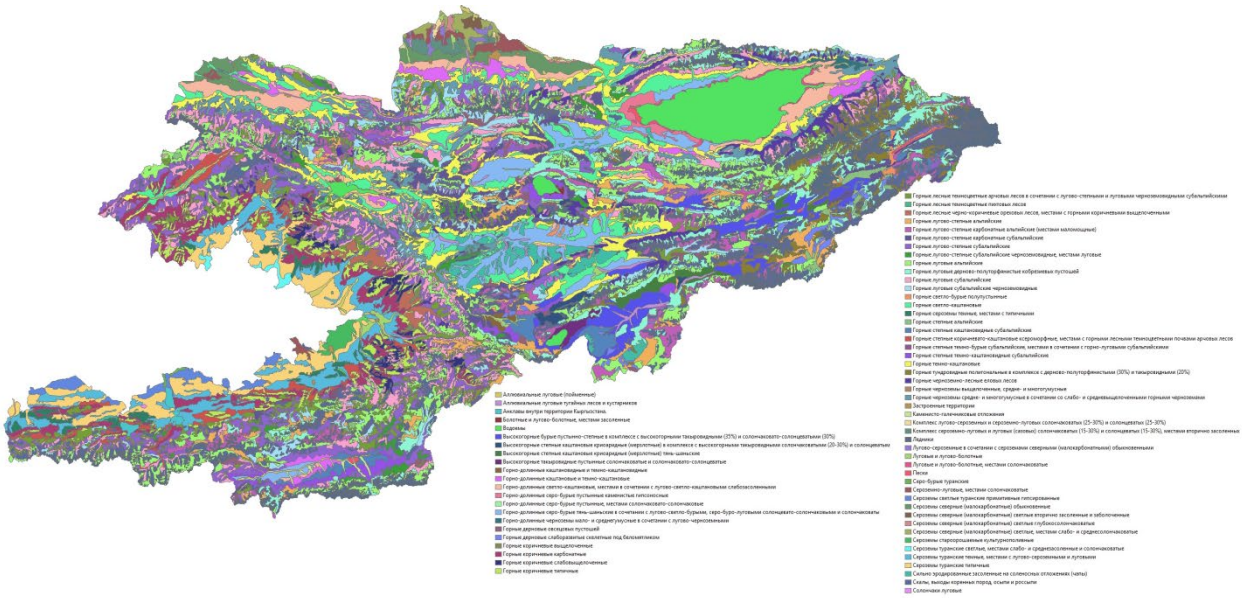


Fig. 5. Soil map of the Kyrgyz Republic

Based on the maps with the UNCCD and Vukovic data, a combined map was prepared to show the most appropriate soil types for SDS:

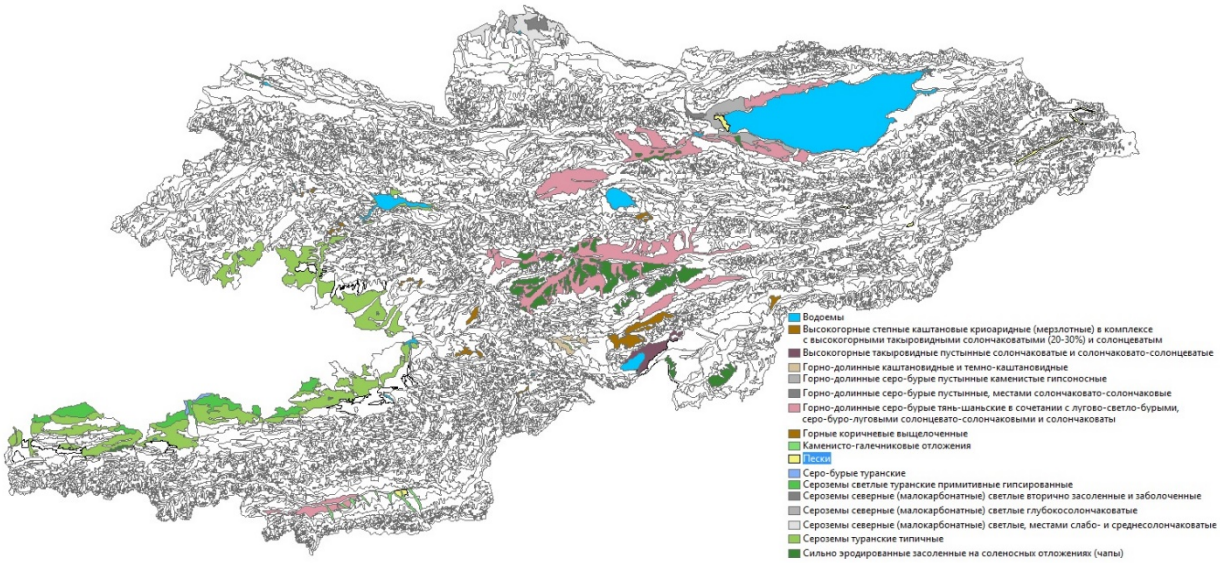


Fig. 6. Soil types with the highest potential for the occurrence of SDS

A resulting map was also developed, where you can see combined all major factors contributing to the occurrence of SDS (susceptibility to SDS, land degradation, and soil types):

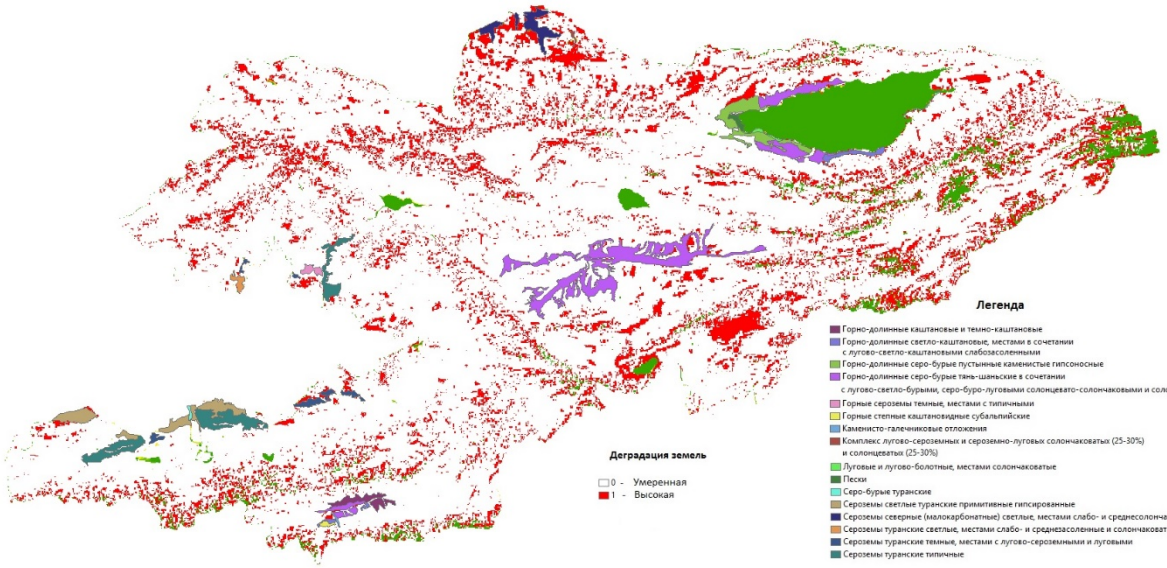


Fig. 7. A map summarizing the main factors of SDS, including land degradation, soil types and Vukovic's exposure to SDS.

Thus, taking into account the data available in the country, it can be summarized that the problem of SDS in Kyrgyzstan is not acute, due to the relative rarity and insignificance of these phenomena in the country. The Kyrgyz Republic, due to the peculiarities of its geographic location and relief, does not get significant damage from SDS. Nevertheless, there are areas in the country that are exposed to the impact of SDS, therefore it is necessary to work on prevention. Of particular concern are dust storms, the impact of which in the Central Asian region will only increase due to projected climatic changes.

Unfortunately, at present, the country does not monitor either sand and dust storms or dust storms at the national level. Air pollution by dust is also not monitored at the national level, although the problems of smog and pollution have increased significantly in recent years and are attracting the attention of the public and relevant government agencies. This was confirmed through consultations with Kyrgyzhydromet, the main government agency responsible for air pollution monitoring. The main sources of SDS and dust storms in the country are very few places of sands precence, as well as sandy deserts in the neighboring countries.

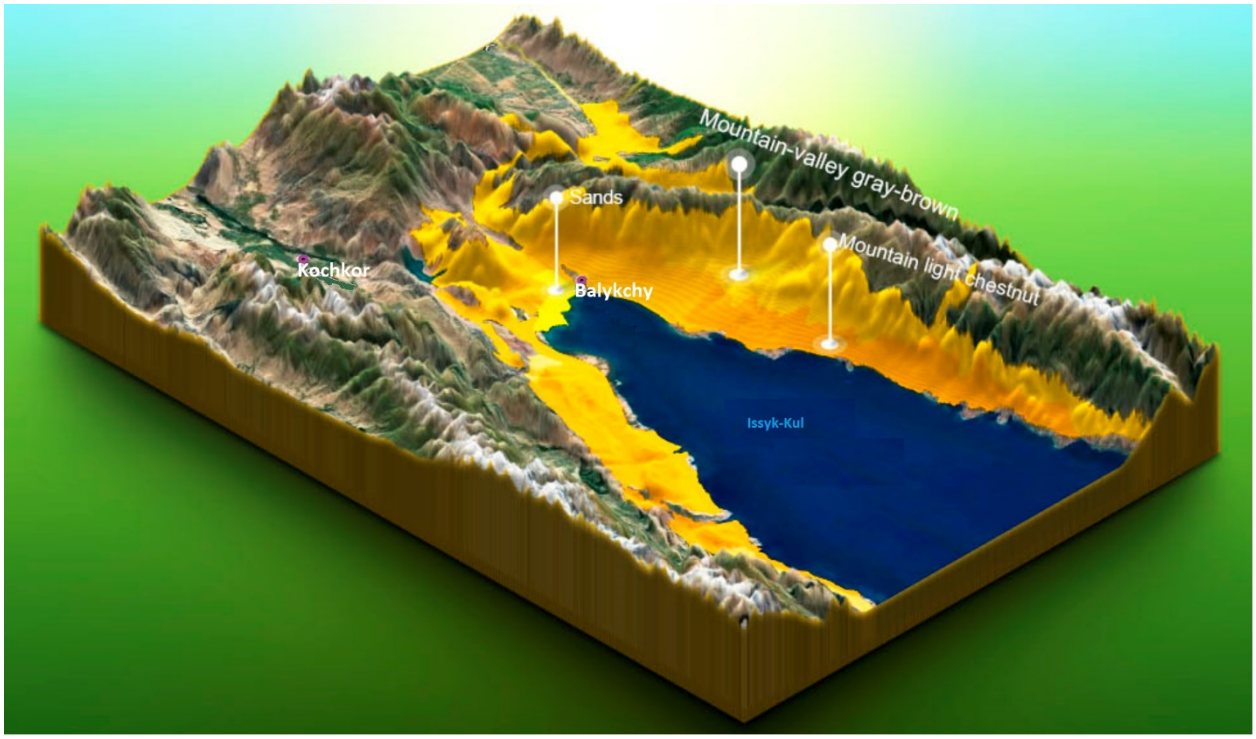


Fig. 8. Map of the western Issyk-Kul region showing the localization of sands and other types of soils contributing to the formation of SDS.

Thus, the Western Issyk-Kul region is the main hotspot in terms of exposure to SDS on the territory of Kyrgyzstan. Figure 8 shows the spatial distribution of sands as well as other soil types that contribute to the formation of SDS in this region. This region is also the most vulnerable to strong winds. The number of days with a strong wind here can reach up to 120 days per year, while on average no more than 15-20 days per year with a strong wind are recorded in the country.

6. Sustainable Development Goals related to Kyrgyzstan and storms

On September 25, 2015, 193 UN member states, including the Kyrgyz Republic, adopted the Sustainable Development Program for the period until 2030, containing 17 Sustainable Development Goals (SDGs) and 169 targets. The program provides for the commitment of the international community to eradicate poverty and hunger and achieve sustainable development in all areas (social, economic and environmental) over the next 15 years (2016-2030). Today, each country is conducting an analysis against 17 goals to determine the degree of its readiness to move towards adopting feasible development strategies and plans, to implement practical measures that bring about real change in the light of its own priorities, needs, opportunities, resources.

The Kyrgyz Republic is committed to the implementation of the UN 2030 Agenda for Sustainable Development. Sustainable Development Goals are included in government policy and are reflected in the National Development Strategy of the Kyrgyz Republic for 2018–2040, the Government's Program "Unity. Trust. Creation" for the period 2018–2022, based on a person-centered approach. In 2020, with the support of UNDP and GIZ, the First National Voluntary Review of the achievement of the Sustainable Development Goals in the Kyrgyz Republic was published. In 2019, the Kyrgyz Republic ranked 48th out of 162 in the SDG index (https://www.sdgindex.org), taking into account six transformations: 1) education, gender and inequality, 2) health, well-being and demography, 3) energy decarbonization and sustainable industry, 4) sustainable food supply, land, water, oceans, 5) sustainable cities and communities, 6) digital revolution for sustainable development.

On SDG 15 Target 15.3: "By 2030, combat desertification, restore degraded lands and soils, including lands affected by desertification, drought and floods, and strive to ensure that land does not deteriorate worldwide",

The Ministry of Agriculture developed and approved voluntary land degradation neutrality (LDN) targets in accordance with specific national circumstances and development priorities, and were presented at a high-level meeting at the 13th UNCCD Conference of the Parties, held in Ordos[12] (PRC) in autumn 2017:

1. To improve the ecological state of pastures by introducing a system of pasture rotation in at least 40 aiyl aimags.

2. Improve access to 10,000 ha of pasture land through improved pasture infrastructure (bridges / roads, watering points).

3. Introduce sustainable land management practices on 100,000 hectares of land (including pastures and forests).

4. Conduct reclamation work on 10,000 hectares of agricultural land.

In the Kyrgyz Republic, work is already underway to localize the SDGs. At the same time, indicator 15.3 was included in the list of priority indicators in the field of agriculture and ecology. However, the main work on this indicator is still ahead and it takes time to work out the methodological base and establish a mechanism for interaction between the involved ministries and departments. Due to the insufficient elaboration of the methodological base and the lack of data on this indicator at the national level, further serious technical support from international organizations is required. For example, with the funds of the CARB-ASIA project of the Humboldt University (Berlin, Germany) within the framework of the GIZ program "Capacity Building for

[12] https://knowledge.unccd.int/home/country-information/countries-having-set-voluntary-ldn-targets/kyrgyzstan

Policy Development on Climate Change in South Asia, Eastern Europe, South Caucasus and Central Asia. Phase III ", the first version" Methods for assessing organic carbon stocks in soils and improving climate reporting on agricultural ecosystems in Kyrgyzstan "was developed, which was discussed in the Kyrgyz Agrarian Academy in September this year. The objective is to help Kyrgyz soil scientists develop a scientifically based method for assessing the accumulation of organic carbon in soils of various land use categories in Kyrgyzstan, adapted to international standards. Following the discussion, proposals were made to adapt the developed Methodology to the soil types of Kyrgyzstan.

Winds are one of the factors in the spread of wind erosion or soil deflation. Wind erosion of soils often manifests itself in the form of dust storms. The wind carries away the most fertile topsoil from the fields, reducing the level of soil fertility and crop yields. In the foothill and mountainous regions, under favorable natural conditions and low anthropogenic load, the vegetation of the mountain slopes reliably protects the soil from erosion. However, when vegetation is cleared, soil erosion manifests itself very strongly, much more than on the plain. The patterns of manifestation and distribution of wind erosion of soils in mountainous areas have been studied much less well than in plain areas. The mountains are characterized by a more intense wind regime, higher wind speeds, therefore, a violation of the fragile balance between the soil and wind is often accompanied by wind erosion. This is typical, for example, for foothills, low-mountain areas and intermontane basins of the country's mountains.

Thus, SDG 15 indicator 15.3 and national voluntary LDN targets are interdependent and complementary. Winds causing wind erosion of soils can make it difficult to achieve national voluntary LDN targets. Therefore, the adoption of measures to prevent the negative impact of winds on agricultural landscapes is relevant and necessary.

The main national agency coordinating SDG monitoring is the National Statistical Committee (NSC) of the Kyrgyz Republic. At the same time, the NSC plays the role of a body that collects and consolidates information on SDG indicators received from the relevant government agencies of the country. For indicator 15.3, the implementing body is the Ministry of Agriculture of the Kyrgyz Republic.

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Chapter II: Analysis of storms' impacts: socials aspects

1. Gender policy

Mainstreaming a gender dimension in improving women's access to natural and economic resources, participating in decision-making, increasing household income and family nutrition is critically important. There is an understanding of this issue in the country and measures are being taken to support women.

Gender differences are an essential aspect in the development of measures to prevent and cope with winds and hurricanes. Women and men have different perceptions of the impact of wind exposure on agriculture and nutrition. The differences are based on the fact that men and women have different gender roles and responsibilities, different access to resources and different decision-making.

About access to resources. Article 14 of the Law of the Kyrgyz Republic "On the Foundations of State Guarantees for Ensuring Gender Equality" regulates equal access to land use. It is established that "the state provides persons of different sex with an equal right to use a land plot, which is granted, transferred for unlimited (without specifying a period) or fixed-term (temporary) use. Land rights are equally protected for people of different sexes. "

Also, in the introductory part to this Law it is noted that the Law "is aimed at establishing progressive democratic relations between men and women on the basis of national traditions." Legally, equality of rights of the sexes to land is guaranteed by the state. But, according to national traditions, the head of the family is a man, due to great opportunities, therefore, the family democratically delegates to him the right to be the owner of the land and the head of the farm, and imputes the obligations arising from this status. Therefore, in about 80% of cases, the legal owners of the farm are men, such a picture exists throughout the republic. If there is no older husband and son in the family, then in this case the woman has to become the head of the farm and the owner of the land with the ensuing obligations. When fulfilling obligations, in practical life, in the event of disputes over water, pastures, women lose in comparison with men. Therefore, it is important for local authorities to control the resolution of such disputes and take into account the gender aspect. In the decision-making process, include women, authoritative youth, respected aksakals[13].

Women, as one of the most vulnerable groups of the population, are especially vulnerable to the consequences of natural disasters. According to climate change scenarios, the frequency of extreme natural events associated with hurricanes, water will increase. It is necessary to develop gender-sensitive approaches to research and other emergency prevention and preparedness activities. Women with specific needs (pregnant women, having babies, caring for sick and elderly family members) are especially vulnerable; they are more dependent on environmental conditions, since they have specific needs and react more sharply to the impossibility of meeting them.

In the context of the COVID-19 pandemic in June 2020, the Government adopted a concessional lending program "Financing Entrepreneurship Entities". Within the framework of the program, at least 30% of the recipients of preferential loans must be women entrepreneurs, or enterprises, the majority of whose employees are women.

A large reserve for improving agricultural productivity and family nutrition is rural women who work on their plots in households. In order to support them, the government is taking measures. For example, grants from the Global Agriculture and Food Security Program (GAFSP)

[13] Gender Aspects of Access to Natural Resources / "Independent Center for Expertise and Assessment", NGO - Center for the Study of Public Opinion "El-Pikir" with the support of the UNDP project "Institutional Strengthening and Building Opportunities for Sustainable Development", Bishkek, 2007. - 40 p.

have been attracted within the framework of the Agricultural Productivity and Nutrition Improvement Project (APNIP), administered by the World Bank. In the amount of US $ 1.5 million only in 2020, there were formed 369 self-help groups (SHGs) in the country's villages, consisting of 2,754 farmers, of which 2,488 are women, or 90.3%. These groups were provided with certified seeds of vegetables and grain crops, and types of small-sized equipment (tunnel greenhouses, knapsack pollinators, drying cabinets, motoblocks, mowers, drip irrigation accessories, etc.). On the "field days" on the basis of demonstration plots, trainings on agricultural techniques of crop cultivation are conducted, with the invitation of a wide range of women, not members of the SHG, to disseminate knowledge and information[14].

This focused support for employment and self-employment of women in rural areas contributes to the growth of family economic income, which, in turn, increases the ability to withstand emergencies, including strong winds.

2. Vulnerable population groups

Strong winds, hurricanes, in addition to the negative impact on the soil cover, the economy, also affect people. Undoubtedly, winds and hurricanes affect the living conditions of the entire population. However, there are the most vulnerable groups in the entire population. The UN Human Development Report 2019 notes that systemic problems of the societal development, including climate change, are expanding the range of vulnerable segments of the population. According to the Report, in addition to women, the most vulnerable segments of the population in Central Asia are young workers, migrants, long-term unemployed, disabled people, historically marginalized communities and residents of rural and geographically isolated areas, such as remote, highland areas of Kyrgyzstan[15].

Climate change is predicted to cause strong dusty winds in Kyrgyzstan. At the same time, the following population groups become vulnerable, guided by the Report.

Women in Kyrgyzstan have a lower level of employment compared to men, receive lower wages and pensions, are more dependent on social assistance from the state, so they have fewer opportunities to save, and in emergency situations, including strong winds, hurricanes , they are in a more vulnerable position[16].

The employment rate of women of working age is lower than that of men of working age. The indicators of employment and economic activity of women of working age in Kyrgyzstan are lower than in the corresponding age group of men. In recent years, the level of economic activity of the working-age population (from 16 years to 58 years for women, up to 63 years for men) of the country has gradually decreased: from 71.8% in 2009 to 66.6% in 2018. By sex, it is found that the level of economic activity (participation in the labor force) of men of working age is consistently above 80% (in 2018 - 81.2%), while the same indicator for women has not increased over this period. above 60.6% in 2009 and 2018 decreased to 51.4%[17].

The excess of the level of employment of men in relation to the level of employment of women is noted in all age groups, but the most significant - in the age groups of 20-39 years. At this age, women most often leave work in connection with the birth of a child. But already in the 45-54 age group, there is a convergence in the employment rates of men and women. Women of this age, as a rule, have grown-up children and return to work. The number of officially registered unemployed women has decreased significantly, this was a steady trend in recent years, but the

[14] From the Report of the Agricultural Productivity and Nutrition Improvement Project (APNIP) 2020

[15] http://hdr.undp.org/sites/default/files/hdr_2019_overview_-_russian.pdf

[16] Women and men in the Kyrgyz Republic. - B., 2019 .-- S. 41-72. - http://www.stat.kg/ru/publications/sbornik-zhenshiny-i-muzhchiny-kyrgyzskoj-respubliki/

[17] Employment and unemployment. Results of the Integrated selective survey of Household Budgets and Labor Force in 2018 " - B .: NSC KR, 2019: - pp. 15-31.

indicators at the end of 2018 turned out to be the worst, when there were even fewer women registered, and the number of men doubled.

In addition, the difference in wages between women and men is observed in all spheres of economic activity. The level of wages of men in the republic is more than a quarter higher than that of women. In 2018, the average monthly salary of men was 17.5 thousand soms, which is 1.3 times more than that of women - 12.5 thousand soms.

Older women are more marginalized and economically vulnerable than older men. The gap in the wages of women and men leads to a gap in the size of the pension of women and men. Among pensioners, women accounted for 65%, men - 35%. Considering the fact that there are significantly more women than men among people of retirement age, women are more dependent on measures of state pension and social policy. Over the past five years, the gap between the average assigned monthly pension for women and men has decreased by 4.2%. In 2014, the average assigned monthly pension for women was 92.7% of the average assigned monthly pension for men, in 2018 - 98.6%. Over the age of 65, the number of women is almost twice that of men, since at the age of 60 every second woman is already a widow, while the percentage of widowers in this age category is only 14.6%. Social and living conditions, which in villages are much worse and more difficult, strongly affect people's lives. It is necessary to pay serious attention to this fact, given that about 66% of the population live in the villages of the republic, most of which are female. Despite the fact that in Kyrgyzstan there is a high rate of provision of private housing (about 90%), 12% of single elderly people live in rented housing[18].

At the same time, we note that pensioners as a social group as a whole are a vulnerable group of the population. The share of pensioners in the total population of the republic over the past five years has been about 11%. They mainly depend on the state pension and social policy. For every fourth household (especially in rural areas), the only source of income is a pension. The level of household income in most regions, with the exception of Bishkek, Chui and Issyk-Kul regions, is below the subsistence level. However, only 30% of pensioners receive pensions above the subsistence level. Elderly residents of cities receive more social assistance, while residents of villages use more financial assistance and assistance related to medicines, prostheses and other auxiliary medical devices.

Many retirees in Kyrgyzstan are forced to work because it is impossible to live on retirement, let alone fix a roof or fix other wind damage. Thus, every fourth retired Kyrgyzstani cannot eat well, and every third can pay for their treatment, since they have no money for this[19].

People with disabilities are a vulnerable group. At the end of 2018, in Kyrgyzstan, the number of persons (among the adult population) recognized as persons with disabilities amounted to 10,700 people. Of the total number of persons with disabilities (PWD), women accounted for 43%. Only a third of them have a job, and the rest are in need of employment. Women and men with disabilities equally experience economic hardships that make it harder for them to withstand the winds (restrictions on movement, elimination of destruction, etc.). Among those caring for children and family members with disabilities, it is clear that they are predominantly women.

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[18] Elderly People in the Kyrgyz Republic: Report of a Statistical Study. - Bishkek, NSC KR, 2017

[19] https://kloop.kg/blog/2018/07/23/rabota-posle-50-ti-slozhno-najti-i-legko-poteryat-a-polnotsenno-zhit-napensiyu-nevozmozhno/

In 2018, in order to provide them with more favorable conditions, a Government Decree was adopted on the introduction of a "personal assistant" service for children with disabilities. Personal assistance is seen as an important social tool for the empowerment, independence and participation of children with disabilities, while at the same time reducing unemployment among family members. Since January 2019, more than 6.5 thousand disabled children in need have been using the services of a "personal assistant". Monthly assistance in the form of payment for the services of a personal assistant is set at 4,900 som[20].

Families of migrants are also a vulnerable group. The migration outflow of the population has been observed in Kyrgyzstan practically since the moment of gaining independence.[21] As of the beginning of 2019, there were about 860 thousand people in labor migration, including about 640 thousand people in the Russian Federation. In one in four households in the country, one or more family members are migrants, thereby weakening the family's ability to withstand the devastating effects of the wind. The main reason for labor migration is weak employment opportunities with decent wages. A stable migration outflow to the Kyrgyz Republic has developed at the level of about 50 thousand people a year. According to the State Migration Service, men make up about 65% of labor migrants, but recently there has been a trend towards an increase in the proportion of women migrants. Since 2014, the number of women involved in internal (interregional) migration significantly exceeds the number of men. At the same time, in 2018 their number exceeded the number of men by almost 2 times. The largest outflow of migrants is observed from regions with a high level of poverty, such as Jalal-Abad or Batken regions, and especially from remote high-mountain areas.

Impact of COVID-19

Significant difficulties were created due to the introduction of quarantine measures against the spread of the COVID-19 pandemic, which increased the degree of vulnerability of the population. For example, at the time the borders were closed, about 5 thousand citizens of Kyrgyzstan were blocked or isolated in the countries of destination and could not return, as well as their families (especially children who remained in the country of origin). The reasons for this situation are that the periods of stay of migrants in the territory of the country of destination expire, under conditions of quarantine, the activities of organizations and firms are reduced and terminated. Lack of income, fear of contracting a viral infection and being abroad, far from family and friends during a pandemic, make them vulnerable. It is clear that migrants in irregular situations, asylum seekers, exploited and trafficked people may be particularly at risk of COVID-19, as their living environment or work may expose them to the virus without the necessary protection.

Most rural women cannot switch to telecommuting, especially in mountainous and remote villages. For rural women and women from remote areas, online platforms and mobile consultations do not work, as most of them do not have personal computers / tablets / mobile phones (smartphones) and do not have any ICT skills or even simple knowledge of how to use them. The epidemic fell on the period of spring field work, due to the specifics of climatic conditions in most regions of Kyrgyzstan, it is March and April that are the most active time for their conduct. The introduction of quarantine led to the fact that rural residents were deprived of access to information, loans, seeds, fertilizers, markets for the sale of their products. Accordingly, socio-economic difficulties are created throughout the year, which will lead to deepening poverty of the population and a decrease in the capacity to withstand the negative impact of winds.

[20] Resolution of the Government of the Kyrgyz Republic dated November 23, 2018 No. 556

[21] Social trends of the Kyrgyz Republic. Issue 15. Bishkek, 2019

3. Storms' impacts on population health

There have been no special studies showing the direct effect of winds on the health of the population in the country. However, it is assumed that there is an indirect effect of winds on human health through increased dust content in the air and pressure drops. In order to approach this problem, let us consider the spread of the main groups of diseases of the population over the past five years in those regions that are most susceptible to the effects of strong winds, namely, Issyk-Kul, Chui, Osh, Talas regions, and where the least - Naryn, Batken regions. The analysis is based on the publication of the National Statistical Committee "Health of the population and health care in the Kyrgyz Republic", Bishkek, 2020.[22]

For cardiovascular diseases. If over the past 5 years the number of people with cardiovascular diseases diagnosed for the first time in their life in the republic is approximately the same level, 884.4 - 878.8 people per 100 thousand of the population (see Table 4), then in areas exposed to winds, there is deterioration in public health. So, in the Issyk-Kul region from 810.5 people in 2015 to 1164.1 in 2019, Chui, respectively, from 825.4 to 941.2, Talas - from 544.4 to 888.9 cases per 100 thousand population. Of course, the impact of winds is assumed in conjunction with other factors. It is also noted that this category of diseases is one of the main causes of death among the population.

Table **4: The incidence of diseases of the circulatory system in Kyrgyzstan (per 100,000 population)**

	Patients registered - total					including with a diagnosis, established for the first time in life				
	2015	2016	2017	2018	2019	2015	2016	2017	2018	2019
Kyrgyz Republic	**5 269,7**	**5 036,3**	**5 581,7**	**5 618,4**	**5 387,3**	**884,4**	**855,7**	**949,9**	**847,1**	**878,8**
in provinces:										
Batken	3 935,5	2 810,8	3 528,1	4 125,3	4 125,3	831,4	670,8	881,9	738,4	904,5
Jalalabad	3 206,9	2 369,2	3 650,6	3 769,7	3 814,7	506,8	436,9	967,9	870,7	659,3
Issikul	5 034,4	5 689,7	5 960,3	5 835,7	5 910,3	810,5	887,4	920,7	915,3	1 164,1
Naryn	4 280,1	3 906,9	4 307,8	5 181,7	5 319,0	653,4	640,1	672,0	841,1	962,8
Osh	3 805,6	3 852,7	3 889,5	3 561,2	3 369,9	1080,5	1322,2	1065,7	646,9	659,0
Talas	2 808,4	2 894,4	3 103,0	3 526,1	3 801,6	544,4	398,5	438,8	731,6	888,9
Chuy	4 995,5	4 478,5	5 140,6	5 232,8	4 975,3	825,4	514,2	872,2	901,8	941,2
Bishkek	11 795,9	12 017,7	12 249,7	11 716,5	11 185,3	1 329,0	1 290,4	1 127,1	1 034,5	1 165,3
Osh	4 122,9	4 353,3	5 477,8	5 387,4	4 682,4	885,3	899,4	819,3	971,3	915,1

For respiratory diseases. The dynamics of the indicator in the republic over the past 5 years has been more or less stable, 8641.3-8755.0 people per 100 thousand of the population (see table 5). But in the cities of Bishkek and Osh there is an increase in respiratory diseases. So, in Bishkek in 2015 14746.0, in 2019 - 17106.4 cases of lung diseases, asthma and other respiratory organs, in Osh, respectively, 7173.5 and 9469.7 cases per 100 thousand population. Storms and winds contribute by bringing more dust particles to these towns. But of course, other factors also influence the growth of pollution in cities, for example, emissions of the most common air polluting wastes from thermal power plants, boiler houses, the private sector, exhaust of cars -

[22] http://www.stat.kg/ru/publications/sbornik-zdorove-naseleniya-i-zdravoohranenie-v-kyrgyzskoj-respublike/

sulfur dioxide, nitrogen oxides, carbon, which are monitored by Kyrgyzhydromet and the National Statistical Committee.

Table **5: The incidence of respiratory diseases in Kyrgyzstan (per 100,000 population)**

	Patients registered - total					including with a diagnosis, established for the first time in life				
	2015	2016	2017	2018	2019	2015	2016	2017	2018	2019
Kyrgyz Republic	**10 220,1**	**11 269,2**	**11 424,6**	**11 294,9**	**9 669,7**	**8 641,3**	**8 630,9**	**8 731,3**	**8 821,2**	**8 755,0**
n provinces:										
Batken	9 489,6	7 692,5	7 991,8	8 304,7	6 911,3	11 561,0	10 006,6	9 777,5	9 967,3	9 925,0
Jalalabad	6 142,1	5 314,8	7 155,1	7 412,0	5 921,2	5 880,0	6 047,3	5 858,9	5 545,5	5 371,0
Issikul	8 401,7	10 603,6	9 716,3	8 925,7	7 636,7	7 111,7	7 410,0	6 439,0	6 396,7	6 654,7
Naryn	7 301,9	7 968,9	7 400,0	8 381,9	7 189,1	7 317,5	6 330,7	5 565,0	6 329,6	6 311,3
Osh	8 081,7	8 805,9	7 912,2	6 873,1	5 686,3	5 836,7	5 837,5	6 143,7	6 355,7	6 151,8
Talas	5 645,1	7 055,7	5 020,9	4 524,9	4 073,9	4 553,2	4 138,3	4 122,3	3 363,5	4 323,7
Chuy	11 268,9	11 321,0	11 947,1	11 780,1	9 267,9	10 770,3	10 324,5	10 202,5	10 905,0	9 985,1
Bishkek	19 331,7	23 968,8	24 897,0	25 238,1	23 079,4	14 746,0	15 666,0	16 829,2	16 410,2	17 106,4
Osh	11 939,7	15 889,8	13 812,9	14 077,2	11 911,2	7 173,5	8 175,2	8 915,4	10 021,4	9 469,7

A more pronounced correlation of the effect of winds on health is revealed when comparing the number of cases in the main groups of diseases associated with the influence of strong winds in the city of Balykchi, surrounded by sandstones and located in the center of strong winds in the Western Issyk-Kul region, and in the Tyup region, which is less exposed to winds. An increase in indicators of deterioration in the health of the population in the city of Balykchi itself between 2015 and 2019, and in comparison, with residents of the low-wind Tyup district, is visible (see table 6). Of course, other factors also affect the performance. For example, a larger number of the population, a more arid climate generally, and a shortage of drinking water in the city of Balykchy. However, the impact of strong winds reaching a hurricane in Balykchy on the health of residents is beyond doubt. If we also take into account that the population of Balykchy is 50 thousand people, and the Tyup district is 65 thousand, then we get that more than 60 cases per thousand of the population are registered in Balykchi, and about 29 in the Tyup district. Thus, in Balykchy in 2019 there were almost twice as many cases of respiratory diseases were registered as in the Tyup region.

Table 6. **Comparison of morbidity in Balykchy city and Tyup district of Issyk-Kul province**

	Registered patients aged 18 years and older					including with a diagnosis, established for the first time in life				
	2015	2016	2017	2018	2019	2015	2016	2017	2018	2019
Balykchy town										
All diseases	18 905	20 622	19 524	18 911	18 183	7 142	8 190	10 135	8 738	10 132
including:										
diseases of the eye and its appendages	2 483	3 444	2 436	1 946	1 753	422	750	876	865	480
diseases of the circulatory system	2 838	2 875	2 923	2 779	2 787	452	291	334	534	540
respiratory diseases	1 549	2 136	3 148	2 875	3 012	1 146	1 514	2 616	1 543	2 548
Tyup district										
All diseases	13 055	17 883	16 326	14 527	13 705	5 884	9 401	8 080	6 157	5 361
including:										
diseases of the eye and its appendages	452	114	230	145	137	126	48	101	59	58
diseases of the circulatory system	1 833	4 215	3 755	3 681	4 179	370	1 388	561	372	475
respiratory diseases	2 516	3 382	2 287	2 221	1 865	2 032	2 602	1 565	1 501	1 159

There are also other groups of diseases where there is an increase in morbidity (mental, oncological, infectious diseases, congenital defects, etc.).

Let us add that sociological studies carried out in 2004 revealed that the real morbidity rates are much higher than the official data, since many sick people often do not go to state medical institutions, therefore they do not fall into the state statistics data.[23]

[23] K. Isaev. Features of the state of health of the population of Kyrgyzstan in modern conditions. Bishkek, 2004.

Chapter III. Roles of stakeholders

The most interested in the development and implementation of measures to prevent strong winds, as a factor of wind erosion of soil, loss of crops, are the Ministry of Agriculture, Food Industry and Land Reclamation (MoA), State Agency for Land Resources, State Agency for Water Resources. The government authorized these central bodies to solve the main issues of sustainable agricultural production and nutrition of the population of the republic, water supply, rational use and protection of lands.

In case of hurricanes and possible sand and dust storms such as emergency situations, causing large-scale damage, the role of the central coordinating body is transferred to the Ministry of Emergency Situations and its Agency for Hydrometeorology (Kyrgyzhydromet).

Kyrgyzhydromet could play a significant role in forecasting and responding to winds, hurricanes and possible SDS. In Soviet times, Kyrgyzhydromet performed a wide range of observations, forecasting, including the wind regime. In personal consultation, a representative of Kyrgyzhydromet from the relevant Department of Hydrometeorological Observations, Forecasts and Information Provision explained that due to insufficient provision of the state, Kyrgyzhydromet currently does not track sand and dust storms. Also, due to the low prevalence of sand and dust storms and insignificant economic and social damage from them in the territory of the Kyrgyz Republic, they are not included in the list of the most dangerous natural phenomena approved by the Ministry of Emergencies, and therefore are not monitored at the national level.

According to the 32nd edition of the Scientific and Applied Reference Book on the Climate of the USSR, which was devoted to Kyrgyzstan and was published in 1989, during the Soviet period, monitoring of the PPB was conducted and regular, albeit infrequent, dust storms were recorded. The highest frequency of occurrence of dust storms across the territory of Kyrgyzstan was noted in the city of Balykchi - 12 cases per year. Bishkek was in second place in terms of prevalence with a frequency of 11 cases per year. From a seasonal perspective, the most active months for the manifestation of dust storms were February, March, April, September and October.

Table 7. Average number of days per month with a dust storm for the period 1936-1980

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	year
0,8	1,3	1,6	1,5	1,0	0,4	0,7	0,5	1,3	1,6	0,9	0,8	12

With the collapse of the USSR, due to a reduction in budget funding, the number of observations, including the wind regime, decreased, and by now the observational meteorological network has sharply decreased to about 30 meteorological stations, which is significantly lower than the WMO recommendations. Although it is obvious that for the Kyrgyz Republic, as a mountainous country with a sharp variability of climatic conditions, wind regime, the density of the location of meteorological stations should be much higher in order to accurately reflect the current and forecast of the future situation. And the list of main tasks was reduced to:[24]

- monitoring the natural environment to protect the population from natural hydrometeorological events;
- forecasting hydrometeorological phenomena, issuing forecasts of weather, water content of rivers and water inflow into reservoirs, forecasts of avalanche danger, agrometeorological forecasts, forecasts of high chemical pollution of the natural environment;

[24] Improving Hydrometeorological Service in the Kyrgyz Republic. - World Bank Review. 2009

 satisfying the needs of the population, government agencies and sectors of the economy in hydrometeorological information, including on hazardous natural hydrometeorological phenomena.

Ensuring the functioning of the Interstate Hydrometeorological Network (MGMS) is one of the main tasks of Kyrgyzhydromet. The interstate hydrometeorological network includes 12 observation meteorological points of the Kyrgyz Republic - Tokmok, Balykchy, Kyzyl-Suu, Naryn, Tien Shan (Kumtor), Talas, Bishkek, aerological station Bishkek, Suusamyr, Jalal-Abad, Kara-Suu, Isfana. Information from the stations arrives in a timely manner, the observations are sufficiently reliable and stable. Out of 12 stations - 4 are automatic, all stations operate according to the program of meteorological stations of the 2nd category. Information from 7 stations (Tokmok, Naryn, Tien Shan (Kumtor), Talas, Bishkek, Jalal-Abad, Kara-Suu) is transmitted to the World Meteorological Organization (WMO) and Roshydromet in the form of “Climatsinop” reports.

Other departments are also solving important tasks. Thus, the State Agency for Environmental Protection and Forestry under the Government of the Kyrgyz Republic is the responsible executive body for the implementation of the obligations of the Kyrgyz Republic under the UNFCCC and the Kyoto Protocol, a number of other environmental international UN conventions, environmental legislation. Consequently, the State Agency in the case of SDS can monitor and assess them as factors of influence on the environment.

There are 40 districts and 453 aiyl aimags in Kyrgyzstan. Local authorities and local self-government bodies are obliged to carry out organizational measures for the implementation by farms of the recommendations of the Ministry of Agriculture on combating wind erosion, to prevent the loss of crops. According to the legislation (Law "On the Protection of Soil Fertility of Agricultural Lands" dated 08/10/2012), the tasks of soil protection are assigned to farms (land owners). In case of failure to fulfill the assigned tasks, it is within the competence of the Ministry of Agriculture, together with the local self-government bodies to apply administrative measures of punishment to the landowner, up to the deprivation of the land plot.

Although the government has overall responsibility for preventing and countering winds and SDS, it is a joint responsibility also of NGOs, the private sector, and the scientific and civil society.

The following measures should be encouraged by all stakeholders - government agencies, NGOs, private business, scientific and rural communities, and the media:

 to the rural community, local self-government bodies - to interact with government agencies to provide, in particular, practical recommendations in the context of the development and implementation of the regulatory framework, standards and plans for SDS; participate in the implementation of local and national strategies; contribute to raising awareness among the population on the formation of a culture of prevention of SDS and carrying out educational work, organize interaction between rural self-help groups (SHG);

 agricultural science and research organizations - to focus on the factors and scenarios of the emergence and deployment of SDS, to expand research for their applied use; ensure interaction between agricultural practice and science in the decision-making process. Search for models of financing (investment) of scientific research in market conditions;

 private agricultural and not only, business, entrepreneurial structures - to integrate their business activities with measures for the management of SDS, develop and implement business projects based on public-private partnerships (PPP); carry out explanatory work among its employees and clients, organize training events for them; to finance research and implementation of innovations, technologies in the management of SDS, together with government agencies to participate in the development of regulatory legal acts and technical standards for SDS;

 to the media (mass media) - to participate in carrying out constant awareness-raising campaigns and polls of the population, to promote a deeper awareness / understanding of the public of the problems with strong winds, hurricanes, which over time can develop into sand and dust storms (SDS) of a catastrophic scale, and disseminate reliable non-confidential information about the causes, threats and consequences of SDS, in cooperation with stakeholders.

In general, support the development of partnerships at the local, national levels in the implementation of local and national action plans for hurricanes, and sand and dust storms.

Chapter IV. Priority actions on prevention/countering of storms and potential SDS

Priority 1: Understanding of storms' and SDS' hazards

As it was already mentioned in the Introduction, the territory of Kyrgyzstan, due to its geographic location and protection by mountains, was not exposed to the impact of SDS in their large-scale understanding. Usually, some dusty winds of local significance are observed, reaching level of storms in strength sometimes. But, given the potential danger of future sand and dust storms due to climate change, the country is taking measures to prevent them.

A study of the literature on SDS and the experience of other countries exposed to storms shows that a low level of awareness (awareness, knowledge, consultation) at all levels about the danger of possible SDS, directions, methods of preventing and countering storms in most cases is one of the main reasons not the preparedness of the population to "meet" storms and the damage from them, along with a lack of financial resources, managerial and scientific knowledge, agricultural culture and safety culture. Practice in Kyrgyzstan is no exception.

Winds, hurricanes, being one of the factors of wind erosion (deflation) of the country's soils, reduce soil fertility and crop productivity. Underestimation by farmers and authorities of the negative impact of winds, and in the future, possible storms, leads to economic losses. Many farmers do not know that, according to the legislation of the country, the responsibility for the management and rational use of land is assigned to the peasant (farm) households themselves and other subjects of agriculture.

Gaps in knowledge of farmers about the culture of agriculture, the need to restore protective forest belts are trying to fill in the course of training programs (trainings), consultations, field days at demonstration plots Ministry of Agriculture, Food Industry and Land Reclamation, together with local authorities, rural advisory services (RAS), specialized non-governmental associations, but the coverage is insufficient, in total, approximately 30% of agricultural producers and other nature users. Agrarian research institutes are making efforts to introduce resource-saving and "green" technologies, disseminate information and educate about local knowledge about effective agricultural technologies and examples of best practices. However, a lack of funding is holding back the scope of research.

Local authorities, local governments, ministries, departments are not sufficiently informed about the danger and long-term consequences of land degradation from failure to take measures to prevent / counteract winds, hurricanes and are more concerned with current general administrative, economic and social issues, losing control over the implementation of legislation by all subjects of land use for the rational use of land.

Meanwhile, management policy and practice should be based on an understanding of the hazards of strong winds, hurricanes, possible future SDS in all its dimensions, including vulnerability, potential, exposure of people and property, characteristics of threats and the environment. Such knowledge can be systematized to assess pre-disaster risk, to prevent and mitigate disasters, and to design and implement appropriate preventive disaster preparedness and effective responses.

Hence, the task is to improve the safety culture both at the level of local communities, local state administrations and local self-government bodies, and at the level of ministries, departments about the causes and consequences of emergencies, including winds from which - land degradation, countermeasures ... In the aforementioned Concept of Comprehensive Protection of the Population and the Territory of the Kyrgyz Republic from Emergencies for 2018-2030, adopted by the government in 2018, detailed measures have been developed to improve the culture of understanding (perception) of security. Therefore, we will cite only the main ones, without duplicating government regulations.

For these purposes, it is recommended:

1) relevant coordination bodies like MoA, SALR, SAWR, Ministry of Emergency Situations, Kyrygzhydromet, SAEPF should conduct activities on raising public awareness and education on prevention/countering SDS on a regular basis, especially in areas where strong winds and possible SDS might emerge through local, national mass media, IT-networks. Content of information and educational materials should be focused on the following: manifestations and factors of strong winds and SDS, land deflation as consequences, comparison of necessary costs and possible economic / social damage from inaction, facts and perpetrators of malicious violations of land use and predatory use of soil fertility, etc .;

2) Associations of Pasture Users, Forest Users and Land Users, Water Users, the Tien Shan Policy Center (TSPC) of AUCA to implement pilot projects to organize cooperation of local nature users (farmers, WUAs, pasture users, forestry enterprises), for example, on joint planting of forest plantations and forest belts, payments for ecosystem services (PES), combating desertification and land degradation and other related topics;

3) on TV and radio, in order to educate and raise the environmental and environmental awareness of the population, to promote the fight against SDS, the careful and rational use of land, water and forest resources, the organization of periodic cycles of "Zher-Ene" programs, videos, meetings of stakeholders. Release and screening of popular science films using archival and documentary materials showing the threat and consequences of inaction on the part of land users, best practices for preventing winds, hurricanes, SDS, land degradation;

4) the widespread holding of seminars, round tables, educational lectures with the involvement of experts and specialists on the problem of land desertification, combating SDS, using interactive communication with the population, students, schoolchildren;

5) support the development and exchange of knowledge in the field of agroecology, paying particular attention to aspects of economic and social impact.

Priority 2: Political framework of prevention and countering of storms and SDS

The effectiveness of measures to raise awareness of the danger of strong winds and SDS among the population and government officials depends on the existence of a country's land legal and emergency policy framework and framework to counteract the effects of winds, SDS, land degradation and desertification. The policy framework and framework is developed by certain institutions through normative legal acts of a legislative, subordinate and departmental nature, creating a favorable political environment.

Institutions

Until recently, the different sectors of land and water legal policy were dispersed across several government bodies. Therefore, land inventory, land management, cadastral, topographic-geodetic and cartographic works have not been carried out for a long time, the boundaries of pasture use have not been determined. All this affected the unresolved issues of organizing measures to combat hurricane winds and SDS.

At the end of 2019, in the course of comprehensive discussions at the governmental and non-governmental levels, specialized institutions were formed - the State Agency for Land Resources and the State Agency for Water Resources.

The State Agency for Land Resources under the Government of the Kyrgyz Republic was established in order to effectively manage land resources and land legal relations, form a full-

fledged geographic information system for land resources and real estate, and ensure uniformity in the application and observance of land legislation.

The State Agency for Water Resources under the Government of the Kyrgyz Republic was established for the purpose of coordinated water resources management. Despite the fact that our country is rich in water resources, the provision of the regions with drinking and irrigation water remains low. With the establishment of the State Agency, unified planning and management of water resources will be carried out, based on the principles of integrated management.

In view of this, we believe that favorable conditions are emerging for the implementation of a coordinated policy regarding the rational use of land resources, the organization of measures to combat winds, hurricanes, possible SDS, the balance of rights and obligations of landowners and land users, as well as their responsibility for violation of land and in the field Emergency legislation.

At the same time, the task of improving the institutional sphere of managing the organization of measures to prevent and combat hurricane winds, SDS, land and legal relations still remains. For example, the issue of insurance against disaster risks is relevant. In 2018, the Law of the Kyrgyz Republic "On the specifics of insurance in crop production" was adopted. According to the Law, the Agent can be a legal entity with one hundred percent participation of the state to manage funds allocated to support insurance in crop production. The allocation of funds is carried out through the Republican Agricultural Insurance Fund, which is formed at the expense of contributions from insurers in the amount of 5% of the total amount of insurance premiums received under agricultural insurance contracts. The agent is a representative of a government agency, and his financial activity is based only on insurance deductions from the Republican Agricultural Insurance Fund. However, to date, the law has not been implemented due to the lack of an institutional and financial implementation mechanism.

The Ministry of Agriculture has developed a proposal on this issue. The issue of creating a state institution "Agency for State Support of Insurance in Crop Production" under the Ministry of Agriculture, Food Industry and Land Reclamation of the Kyrgyz Republic "is under consideration. The corresponding proposals were sent to the Ministry of Finance and the Ministry of Justice to give an opinion. The results of the conclusion on the establishment of a state institution "Agency for State Support of Insurance in Crop Production" under the Ministry of Agriculture, Food Industry and Land Reclamation of the Kyrgyz Republic will be submitted to the Government of the Kyrgyz Republic.

Kyrgyzhydromet is a leading link in the system for the prevention of strong winds and PPB. However, insufficient funding from the republican budget does not allow developing its potential. To some extent, they are supported by fees for the provision of services to non-governmental organizations, attracted by project grants from the World Bank. However, in order to conduct a full-scale systemic monitoring and forecasting of strong winds and possible SDS in connection with climate change, it is advisable to increase internal and external funding of Kyrgyzhydromet.

In this regard, it is recommended:

1) to carry out a functional analysis of the rights, duties, powers of ministries, departments, organizations operating in the field of land management in order to determine measures in relation to strong winds, hurricanes, SDS;
2) if appropriate, create a specialized subordinate unit that would take responsibility for the development and implementation of coordinated measures to prevent and counteract strong winds, SDS, as well as organizations for state support of crop insurance;
3) ensure coordination between ministries / departments, local authorities, local self-government bodies, NGOs involved in the implementation of programs in the field of

combating desertification and land degradation, as well as on SDS, at the national and local levels;

4) increase funding for Kyrgyzhydromet from the republican budget and from other sources that do not contradict the legislation. Continue attracting projects with donor funds from international financial organizations for the objectives of the SDS;

5) with regard to nature users, in general, implement a policy of stimulating the enlargement of farms, improving the culture of farming and pasture use, mastering moisture-saving irrigation technologies, rational use of state forest fund lands, supporting rural women, and encouraging private investment in the development of arid lands, the creation of windbreak forest belts.

Legislation

As measures to improve regulatory legal acts, it is recommended:

1) make changes and additions to land, tax legislation, bylaws and departmental acts that strengthen responsibility for ineffective use of agricultural land, failure to implement measures to prevent and counteract winds and possible SDS, as well as a draft government decision on the creation of an organization for state support of insurance on crop production;

2) develop programs / plans of action on SDS, in the context of combating land degradation and desertification, integrated with national, sectoral, regional development strategies / plans, taking into account international obligations under the UNCCD, and the development of economic, administrative and legal instruments;

3) call on public organizations, civil communities to increase their practical contribution and participation in national processes for monitoring and evaluating measures to prevent the negative impact of strong winds, hurricanes, and possible SDS.

Priority 3: Broadening of the research and science contribution into fight with storms and potential SDS

During the Soviet period, the contribution of research institutes of institutions was significant. On the basis of their recommendations, the entire complex on-farm land management was developed and implemented, which included measures to counteract wind erosion of soil. For example, let us recall that studies of the Central Asian Research Institute of Forestry have shown that forest plantations reduce the wind speed in the zone of 15-fold tree height by 60-65%, 20-fold - by 50-55% and 25-fold - by 30-40 %. The relative humidity of the air under the influence of protective forest belts increases by 10-15%. By reducing unproductive evaporation, forest belts reduce the need for irrigation water by 20-25%, which is equivalent to one irrigation, and by lowering the level of groundwater, they prevent secondary salinization of irrigated lands.

Research Institute of Agriculture, Institute of Forestry, Kyrgyzgiprozem worked in Kyrgyzstan, which dealt with this issue and had corresponding structural units with scientific staff. Currently, these institutions continue their activities, however, in the new conditions, they are experiencing difficulties in finding funding. Lack of funding leads to the reduction of divisions and employees, respectively, and to difficulties with research and development of recommendations for countering wind erosion of soil, on-farm forestry management.

Most likely, the solution to the issue of increasing the research contribution will become possible as the mechanism for funding / investing in science is reformed (transition to grant funding, the effectiveness of the implementation of scientific developments, funding from several sources, etc.)

What measures can be implemented:

1) conducting scientific research to identify promising agricultural technologies, economic assessment of damage from strong winds and possible SDS, land degradation, recommendations on the implementation of measures to prevent and counteract them;

2) making forecasts for the SDS, in the context of climate change, the onset of periods of low water, the development of adaptation measures;

3) on the basis of identifying the adaptive capabilities of natural vegetation, preparation of recommendations for the creation of protective afforestation of drought-resistant tree species, for example, saxaul, as an effective method of combating desertification and land degradation;

4) improvement of the system for monitoring hurricane winds, SDS as an emergency, the state of land resources using GIS technologies. It is required to develop an information system that allows creating technological and cartographic databases (wind database, SDS) and using the accumulated information for data analysis, sampling and reporting on user requests. The database should store all the information necessary for assessing winds and forecasting the SDS, the state of land resources, data processing and the choice of measures to combat winds, SDS, land degradation and mitigate risks, losses. The software of this database should also contain: technological data base; base of electronic maps; GIS-module for communication of technological and cartographic bases.

5) enhance scientific cooperation with bilateral, regional and global contexts to raise the level of the national expertise and knowledge on topics related to high winds and SDS.

Priority 4: Investments in activities on prevention and countering of storms and SDS

An integration of strong wind and SDS in the enhanced multi-hazard Early Warning system is strongly recommended to improve the resilience and preparedness of the country to various challenges related to SDS and high winds. This will be in line with UNDRR, WHO, UNEP approaches and attract interests from other partners to support the development.

Investments in activities to prevent and counteract winds are carried out in the aggregate of financing agriculture, water management, emergency situations, forestry from the republican budget and the budgets of local governments. The use of the expenditure side of these budgets represents the main source of domestic financing for agriculture, water, forestry and emergency situations. The budgets of the cities of Bishkek, Osh, Karakol and others have provided funds for the sanitary felling of old and diseased trees, planting new forests as measures to prevent the risk of strong winds and hurricanes.

In the context of the COVID19 pandemic, in June 2020, the Government adopted a concessional lending program "Financing of Entrepreneurship Entities" (Economy-banks-business. No. 8 (573), September 16, 2020). Under the program, soft loans will be provided with an interest rate of 6-10% per annum, loan terms - from 3 to 5 years, vacations are provided for 12-18 months.

Measures are being developed by the Government to continue providing a package of concessional loans for agriculture. At the same time, in order to exclude the misuse of loans, the mechanism of their targeted provision is being improved. A new project has been developed, involving the introduction of two categories. This is the category "Financing of Agriculture - Farmer", which will have a social orientation and will be intended for small agribusiness to obtain unsecured loans. The second category is "Agricultural financing - cluster", for the development of the cluster potential of the regions with the possibility of receiving up to 10 million soms. At the same time, the very model of financing the new project will change. In the meantime, within the framework of the "Financing Agriculture - 8" project, 3445 soft loans have already been issued to agricultural producers through commercial banks in the amount of 1 billion 856 million 700 thousand soms. This was reported by the press service of the Ministry of Finance. Of these, 722 soft loans were

issued for plant growing, 2 644 for livestock, 41 soft loans for a cluster, 29 for processing, and 9 for a miller.

Another source is private funding for these activities. Based on their own business priorities and in order to build a positive image, some private companies finance activities aimed at environmental protection and sustainable land management. Companies such as "Mercy Corps" and "Kumtor" have projects aimed at teaching advanced agricultural technologies in agriculture, environmental protection. Financing is also provided for other private companies in the mining industry (Jerui), oil refining (Chinese companies).

External investment is and will continue to be a significant source of investment in SDS measures. For example, the forestry enterprises of Batken oblast, with the support of the FAO / GEF project "Sustainable management of mountain forest and land resources in the face of climate change", planted plantations of black saxaul on the lands of the state forest fund and ayil aimags on an area of 1000 hectares.

There are other projects - “Conservation of globally significant biodiversity, adjacent land and forest resources of mountain ecosystems of the Western Tien Shan and support of sustainable livelihoods), US $ 4.2 million, GEF grant,“ Integrated Forest Ecosystem Management ”, 16.11, grant WB / IBRD, in which the established afforestation also plays a wind protection role. At the same time, it is necessary to initiate projects aimed directly at prevention (mitigation) and counteraction to winds and SDS. And also the task is to help create an environment for more efficient use of financial resources.

Chapter V. International cooperation and regional partnership

To facilitate better results in combating strong winds and SDS it is very important to develop and support international cooperation. The main goals of such cooperation are: a) interaction with countries and UN agencies at the global, regional level; b) providing a common platform for the exchange of experience, knowledge, information, resources to strengthen measures to prevent and counter sand and dust storms; c) identifying, mobilizing and facilitating access to financial resources for a joint response to SDS, including with the involvement of new and innovative resources and mechanisms.

As part of the implementation:

 Decision 31 / COP.13, Ordos, 2017 on the “Policy Advocacy Framework for Sand and Dust Storm Management” to the UNCCD Parties “to encourage regional cooperation to combat sand and dust storms and facilitate information exchange, dissemination and transfer of knowledge ",

 Decision 25 / COP.14, New Delhi, 2019 on “Follow-up to the policy framework and thematic issues: sand and dust storms” “take a proactive approach to enhancing cooperation and coordination at the global, regional and subregional levels in to address the causes and consequences of sand and dust storms while promoting and supporting initiatives to optimize comprehensive SDS preparedness that reduces risks and increases resilience of climate-affected and vulnerable communities and ecosystems. "

 and since the phenomena of climate change in Central Asia, an increase in temperature in the atmosphere, drought, a shortage of water resources, aggravated by strong winds, hurricanes, and possible SDS, are of a transboundary nature, the regional plan provides for:

1. Develop regional cooperation and initiatives in the areas of implementation of early warning measures for the impact of winds and SDS. As a rule, with developed regional cooperation, it is easier to enter global cooperation. Examples are the negotiation process that took place between the countries of the region, which resulted in the participation of Kyrgyzstan in the regional project on drought and SDS. Another example is the meetings of representatives of the countries of the region and the Russian Federation organized with the assistance of the UNCCD Secretariat during COP14 on September 13, 2019 in New Delhi to discuss the initiative to create a permanent interregional group consisting of representatives of relevant ministries, departments, organizations of the countries of Central Asia and the Russian Federation. A successful result was the approval of this initiative and the beginning of the process of signing by the countries of the region of the Agreement on the creation of the interregional group "Central Asia - Russian Federation" in order to facilitate cooperation for the implementation by countries of the goals and objectives of the UNCCD, the UNCCD Framework Strategy for the period 2018-2030; cooperation can be realized through the implementation of joint international projects, exchange of experts, conducting scientific and practical research and conferences, training specialists, conducting trainings.

2. Search for funding for joint projects and scientific developments.

3. Development and coordination of regional and interregional positions on issues of common / mutual interest.

4. Organization of regional conferences, including high-level ones, in the areas of the UNCCD (SDS, land degradation, drought, etc.) in order to develop joint intentions, plans for the transition from policy to action.

5. Organization of seminars for the exchange of experience, successful examples of mitigating the consequences of strong winds, SDS and desertification risks, in the areas of

sustainable land and water resources management, implementation of scientific and technological solutions, training.

6. In order to increase the capacity of personnel and institutions, organize training courses on the above topics, taking into account specific regional realities.

7. In view of the importance of the functioning of the early warning system for FSB, develop cooperation between the relevant services of the countries on the prevention of the danger of possible FSB and liquidation of their consequences as an emergency.

8. Exchange of experience in the science of predicting the onset of SDS, droughts leading to soil degradation and desertification.

Globally, in order to participate in international initiatives, gain experience, search for external donors, it is important to develop cooperation with:

 UNCCD Secretariat, UNEP, WMO, GEF;

 international financial organizations (WB, ADB, IDB, EBRD, EDB, etc.), funds (IFAD, State Agricultural Fund, Kyrgyz-Russian Development Fund, etc.), including "green development".

 non-CIS countries in the above areas.

CONCLUSION

The Kyrgyz Republic, taking into account the global assessment of sand and dust storms prepared by UNEP, WMO and the UNCCD, the increased frequency and intensity of strong winds in the last decade, their negative impact on agriculture, infrastructure, ecosystems, as well as transboundary impact, takes measures response at the institutional, technical and scientific levels. Taking into account the potential danger of hurricane winds and possible large-scale SDS in the future due to climate change, the country began to take measures to prevent them, provided for in the approved Concept of comprehensive protection of the population and territory of the Kyrgyz Republic from emergencies for 2018-2030.

According to the Sustainable Development Goals in 2019, the Kyrgyz Republic ranked 48th out of 162 in the SDG index, taking into account six transformations: 1) education, gender and inequality, 2) health, well-being and demography, 3) energy decarbonization and sustainable industry, 4) sustainable supply food, land, water, oceans, 5) sustainable cities and communities, 6) the digital revolution for sustainable development. As you can see, indicators on sustainable supply of food, land, water, health, gender are also included in the NAP SDS and synergize with the SDGs.

The main priorities of actions to prevent / counteract hurricane winds, possible SDS in the submitted National Action Plan (NAP) for the period 2021-2030 include:

 increasing understanding of the danger of hurricane winds, SDS at all levels of society,

 develop / implement a framework and framework for land legal and emergency policies to counter the effects of winds, SDS, land degradation and desertification,

 increase research contribution to combating hurricane winds, SDS through reforming the funding / investment mechanism for science (transition to grant funding, the effectiveness of the implementation of scientific developments, funding from several sources, etc.),

 expand the search and initiatives to attract national and external investments for the implementation of the NAP SDS.

The expected outcomes of the NAP implementation are expected to be:

 increased understanding (information, education, propaganda) at all levels of society about the threat and consequences of hurricane winds, possible SDS (for example, soil deflation leading to land degradation / desertification), directions of their neutralization and counteraction through the involvement of all interested sides of the population - central authorities and local self-government, peasant (farmer) households and agribusiness, public (civil) sector. Understanding will influence the process of rethinking the problem, both among policymakers and managers, as well as farmers and the local community;

 the institutional and legal framework of a targeted land-legal and emergency policy will be improved by achieving coordination of actions between ministries / departments, local authorities, local self-government bodies, NGOs of measures to counter winds and SDS.

 The updated NLA will create a legal framework for an effective policy to prevent and counteract hurricane winds, possible SDS, with the use of economic incentives, administrative measures to influence inactive stakeholders. Integration of national, sectoral, regional development strategies / plans, taking into account international obligations under the UNCCD;

 Practical actions to prevent and counteract hurricane winds, possible SDS will be based on scientifically grounded agricultural technologies, innovations, recommendations of scientists aimed at minimizing damage from them. An effective fight against strong winds will be promoted

by building sustainable land management in the context of ensuring a land degradation neutrality (LDN), including sustainable water use based on IWRM principles;

 Development of more specialized maps, revealing the problematics of SDS in the republic, as well as related social and environmental issues such as land degradation, the impact of dust on the health of vulnerable groups of the population;

 the allocation of budgetary funds on a program-targeted basis will improve in order to increase the effectiveness and efficiency of actions, to attract investment funds through international financial institutions, mechanisms and funds, to find innovative sources and mechanisms for financing the NAP SDS.

Early implementation of measures to prevent winds and SDS as emergencies will allow:

 prevent and reduce the risk of natural disasters from them;

 increase the degree of protection of the population and territories;

 to reduce the amount of social, economic and environmental damage from the named dangerous meteorological phenomena.

For the consistent implementation of the main tasks to prevent these phenomena, there are favorable conditions, such as support at the top level of the country's leadership, experience in organizing interaction between government agencies and the business community and other stakeholders, regional and international cooperation in this area.

At the same time, there are also possible risks in the implementation of the NAP. When implementing NAPs, they can have a deterrent effect and slow down the achievement of objectives:

 lack of funding due to the diversion of funds to other urgent tasks, such as overcoming the consequences of the COVID-19 pandemic, sudden earthquakes, mountain landslides, mudflows;

 lack of qualified human resources;

 social upheavals and changes in political regimes.

However, they can only slow down the implementation of the NAP objectives. As the political and socio-economic potential of the country strengthens, these risks will be consistently overcome.

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ANNEXES

See the matrix in a separate file.