

The 4th International Geography Symposium

BOOK OF PROCEEDINGS

Editors
Recep EFE
İsa CÜREBAL
László LÉVAI

23-26 May, 2016
Kemer - Antalya - Turkey

ISBN 978-605-66576-1-0

4th International Geography Symposium - GEOMED 2016
Editors: Recep EFE, İsa CÜREBAL, László LÉVAI



GEOMED 2016
4th International Geography Symposium

May 23 - 26, 2016 - Kemer, Antalya, TURKEY

**BOOK OF
PROCEEDINGS**

Editors

Recep EFE, İsa CÜREBAL, László LÉVAI

ISBN 978-605-66576-1-0

DISCLAIMER

Views expressed by the authors of papers in this Book of Proceedings, do not represent the views of the editors, or of GEOMED2016 Symposium. No content responsibility lies with Symposium Committee, or their members as organizers of the conference. Whilst all papers were subjected to a review process, accuracy of information and the content of papers, remains the responsibility of the authors.

Page and Text Design: İsa Cürebal

978 605 66576 1 0



International Scientific Advisory Committee

Abdalla Abdsalam AHMED - Water Resources, UNESCO
Habib AHMAD - Hazara University, Pakistan
Mehmet ARSLAN - Al-Farabi Kazakh National University, Kazakhstan
Eyüp ARTVINLİ - Eskişehir Osmangazi University, Turkey
Seyed Esmaeil ASGHARPOUR - Islamic Azad University, Iran
Ibrahim ATALAY - Mehmet Akif University, Turkey
Emin ATASOY - Uludag University, Turkey
Dan BALTEANU - Romanian Academy, Romania
Gideon BIGER - Tel Aviv University, Israel
Stanley D. BRUNN - University of Kentucky, USA
Helmut BRÜCKNER - University of Marburg, Germany
Eric CORIJN - Vrije Universiteit Brussel, Belgium
Andrej ČERNE - University of Ljubljana, Slovenia
İsa CUREBAL - Balıkesir University, Turkey
Tuncer DEMİR - Akdeniz University, Turkey
Uğur DOĞAN - Ankara University, Turkey
Mimoza DUSHI - University of Pristina, Kosovo
Recep EFE - Balıkesir University, Turkey
A.Evren ERGINAL - Ardahan University, Turkey
Abd-Alla GAD - NARSS, Egypt
Ibrahim Farida HANUM - Universiti Putra, Malaysia
Pua Bar KUTIEL - Ben Gurion University, Israel
Darrel MADDY - University of Newcastle, UK
Laila MANDI - CNEREE - University Cadi Ayyad, Morocco
Lia MATCHAVARIANI- Tbilisi State University, Georgia
René MATLOVIČ - University of Presov, Slovakia
Ouessar MOHAMED - Institut des Régions Arides, Tunisia
Gulnara NYUSSUPOVA - Al-Farabi Kazakh National University, Kazakhstan
Takashi OGUCHI - University of Tokyo, Japan
Nizar OMRANI - Arid Land Institute, Tunisia
Hasan ÖZDEMİR - Istanbul University, Turkey
Munir ÖZTURK - Ege University, Turkey
Galina N. PARANINA - Herzen State University, Russia
Fantina TEDIM - University of Porto, Portugal
Aigul TOKBERGENOVA - Al-Farabi Kazakh National University, Kazakhstan
Jorge Batlle SALES - University of Valencia, Spain
Abdullah SOYKAN - Balıkesir University, Turkey
Witold WILCZYNSKI - Pedagogical University of Kraków, Poland

Landscape-Ecological Zoning of Agricultural Areas in South Kazakhstan Region

G.N. NYUSSUPOVA¹, A.A. TOKBERGENOVA, K.B. ZULPYKHAROV

Abstract

A complex analysis of natural, man-made and environmental components was used within the areas of the South Kazakhstan oblast and highlighted the major environmental problems in rural areas.

Methods of landscape-ecological zoning used at work. Evaluation of landscape ecological state of the South Kazakhstan oblast within the administrative areas based on the basis of the earlier series of thematic and specialized maps, binding of which were the "Physical Map" and "Map of anthropogenically disturbed landscapes". In addition, research was conducted and published numerous stock of official statistics.

The result of the study was a landscape-ecological zoning of the South Kazakhstan Oblast reflects the spatial structure of natural complexes, the degree of conversion and anthropogenic disturbance, the level of environmental stress areas.

The article describes the development trends of landscape structure of concrete territory, agriculture land of South Kazakhstan oblast, studied the interaction of all components of the landscape, inherent in this region and their changes under the influence of anthropogenic impacts. The forecast of the development of modern negative processes and present a proposal for a recommendation Environment agriculture land of South Kazakhstan oblast, taking into account characteristics of the natural resource potential of the region.

The results can be used by local executive bodies for industrial and agricultural development of the territory of South Kazakhstan oblast.

Key Words: landscape, ecology, zoning, rural areas

INTRODUCTION

The system of reforming of agriculture of the Republic of Kazakhstan, carried out in recent years, requires new approaches to assessing the impact of agricultural production on natural systems. In the framework of the organization and to create various management forms, including peasant and farming, there are environmental problems that can be solved on the basis of landscape-ecological, socio-economic and ecological-demographic criteria for the assessment. The diversity of natural conditions in South Kazakhstan oblast, namely, the significant distribution of sandy and clayey plains on the North, East and South-East region, flood plain complexes in the Central part and mountain ranges in the Eastern and South-Eastern part of the region has led to uneven industrial-agricultural development of territory, of population distribution and infrastructure. South Kazakhstan oblast is the mainly agricultural development district. In Central and South-Eastern part of the region is dominated by areas of irrigated and rain-fed agriculture. Long-term agricultural impact on the natural complexes of the South-Kazakhstan oblast contributed to the qualitative and

¹ Department of geography, land management and cadastre, Al-Farabi Kazakh National University, Almaty, Kazakhstan, e-mail: gulnaran@mail.ru, tokbergen@mail.ru, kanat_8827@inbox.ru

quantitative restructuring of their structure and the development of negative ecological processes, which are manifested in:

- the change and instability of the water regime, the level, quality and salinity of surface and groundwater;
- qualitative and quantitative change in agricultural land (change of water-salt regime, fertility, physical and chemical properties of soil);
- qualitative and quantitative transformation of biological diversity (change in species composition, productivity, percent cover, etc.);
- change the structure of agricultural land and reducing diversity of zonal landscapes;
- dissemination of anthropogenic-caused by negative processes (water erosion, deflation, degradation of soil and vegetative cover, salinization, water logging and flooding, etc.).

Area of research: the agricultural landscapes of South-Kazakhstan oblast

MATERIALS

Analysis of landscape-ecological state of the territory of South Kazakhstan region has allowed to identify the degree of tension following landscape-ecological zones: a stable, satisfactory and hard.

Stable area (I) within the South-Kazakhstan region covers about 25% of the territory represented in the North-West, South-East and South-West region and is characterized by a weak expression of anthropogenically caused ecological landscape changes. At the termination of anthropogenic impact on natural complexes return to their original state. Stable landscape-ecological condition of agricultural land predominates within the Tulkubas (60%), takes place in the territories of Suzak (30%). Of Baydibek (30%), Kazygurt (20%), Otrar (30%), Tolebi (30%) administrative districts and grossly under-represented in Arys (10%), Shardara (10%) administrative districts (table 1).

Stable ecological landscape is most evident in the Aeolian landscapes of ridge-hilly plains composed of Sands with ephemeroidea-bilesenlerini, psammolittoral with a predominance of rushuna, saxaul vegetation, sometimes with the participation of promotingnational on rough Sands and the landscape is relatively elevated plains (plateaus Betpakdala), represented by a weakly sloping, flat plains crossed by clays, Sands, Sandstone and gravel with transketolase-chernobayevka, sagebrush-Karaulova, ephemeral-the thin vegetation vegetation on gray-brown loamy soils and solonetz desert gravelly.

The main degradative process for areas of stable landscape-ecological condition is the degradation of the vegetative cover due to irrational herding cattle and fragmentary manifestation of the processes of deflation.

Satisfactory zone (II) within the South Kazakhstan oblast is more than 60% of the area is characterized by moderate degree of anthropogenic transformation of the components of the landscape and the region is most widespread in the North-East, South-East and Central part, one way or another, capturing all the administrative districts of the region. Zone satisfactory ecological landscape of the state predominate in Shardara (70% of its area), Sairam (90%), Ordabasy (95%), Saryagash (85%), Kazygurt (70%). Of Baidibek (70%), Otrar (30%), Tolebi (30%) administrative districts (table 1). The territory within the area of satisfactory landscape-ecological status, characterized by processes of degradation of arable land, degradation of pasture vegetation, land salinization, water and wind erosion, local contamination of surface waters and waters used for drinking purposes. Much less common are factors such as soil contamination and atmospheric air. Zone satisfactory ecological state

most represented in the landscape relative to the omitted plains formed by the alluvial plains ancient alluvial folded stratified loam, sandy loam, sand with one-year saline-agricolo-shrub, sagebrush-golfinopoulou, melkozerova-couch grass couch grass, wormwood-one-year saline vegetation on meadow-gray soils and saline solonchaks meadow; alluvial-proluvial with erosional plains dismemberment, stacked pebbles, loam, sandy loam with ephemeral-ephemeraloid, with sagebrush vegetation) in tall grass meadows on the light gray soils of the South combined with golfinopoulou vegetation on meadow-gray soils of the solonchak meadow and along riverbeds; aeolian hummocky plains, folded by Sands with ephemeraloid-psammolittoral, eurotia, ephemeraloid-blocksaway vegetation. The landscape is relatively elevated plains within the area satisfactory ecological state of the reservoir is confined sloping plain, complicated uplands, composed of clays, Sands, sandstones and pebbles with Keyreu-whiteland sagebrush, sometimes with significant participation balica, sagebrush-black haloxylon the vegetation on gray-brown light loamy saline soils in combination with the thin vegetation on the salt marshes.

Within the hummocky plains moderate ecological status are characterized by tectonically-denudation shock hummocks, composed of Neogene-Quaternary loess-like loam, gravel, conglomerates with ephemeraloid-sagebrush-short grass, ephemeraloid-grass vegetation to sierozem ordinary South.

Data natural ecosystems in economic terms represent photophone (rainfed and irrigated) land and moderately modified pastures.

Tense zone (III) within the South-Kazakhstan oblast occupies about 15% of the area, confined mainly to the valley of the Syr Darya river, areas adjacent to major industrial centres and oil fields, the burial grounds for the disposal of polluting and toxic substances. In addition, in the hard zone comprises a rural area with a high density of population and highly developed irrigation development.

Within the South Kazakhstan oblast, the stress landscape-ecological condition is most pronounced in Maktaaral administrative region (90% of the area) and the territory subordinated to the maslikhat of the city of Shymkent (100%) and the city of Turkistan (50%). Zones of intense landscape and environmental status is represented also in Otrar (30%), Suzak (20%), Tolebi (20%) administrative districts and negligible in Arys, Kazygurt, Ordabasy, Sairam districts. Areas characterized by a high degree of anthropogenic transformation of natural landscapes. The nature of spatial spillover processes predominantly linear and locally-areal. This zone is confined drawpolyline plains consisting of stratified loam, sandy loam, sand with one-year thistle-agricolo-shrub, sagebrush-golfinopoulou, one-year thistle vegetation on meadow-gray soils and saline solonchaks meadow, ephemeral, ephemeral-wormwood, sedge-keyreu plants on takyrs soils, ephemeral-mint-flavored -sedge, one-year-ephemeral-grass vegetation on the light gray soils of the southern light. Stressful environmental conditions are characterized as alluvial-proluvial plain, complicated beds of temporary streams, composed of loam, gravel loess-like loams with ephemeraloid-residential area, ephemeral-ephemeraloid, melkozerova-areaway vegetation on the light gray soils of the North with the participation of meadow-gray soils, soccavo-feather grass-fescue with the participation of savanorola kropotova, ephemeral-ephemeraloid, sagebrush) in tall grass meadows with vegetation to sierozem ordinary. Landscapes of hummocky plains of the most tectonically modified-denudation udarnye hummocks with ephemeraloid-short grass, ephemeraloid-playaway vegetation to sierozem ordinary South. The main reasons for the creation of the tense ecological situation in the above mentioned areas are: pollution of the Syrdarya river, groundwater contamination and ambient air of

rural areas close to developed fields and industrial complexes, salinization and pollution of irrigated areas, deflation and dehumification rainfed arable land, degradation of pastures due to uneven grazing.

Table 1: Landscape and ecological status

Administrative district	Zone		
	Stable, %	Satisfactory, %	tense, %
Arys	10	80	10
Baydibek	30	70	-
Kazygurt	20	70	10
Maktaaral	-		100
Ordabasy	-	95	5
Otyrar	30	40	30
Sayram	-	70	30
Saryagash	-	85	15
Sozak	30	50	20
Tolebi	30	50	20
Tulkubas	60	40	-
Shardara	10	70	20
The territory subordinated to the maslikhat of Shymkent			
The territory subordinated to the maslikhat of Turkistan			50

Environmental analysis the qualitative state of farmland in South Kazakhstan oblast (Consolidated analytical report on the status and use of lands of RK for 2015), showed that on 01.01.2015, the total area of agricultural land on 18% of their area, there is no manifestations of negative processes, and 82% of the farmland adverse natural and anthropogenic processes take place (figure 1).

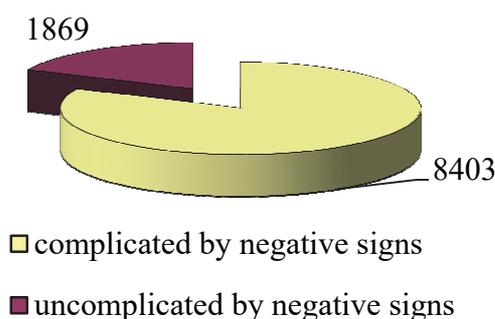


Figure 1: Characteristics of agricultural land by level of complexity with negative signs on 1 January 2015, in thousand hectares

In agricultural lands, complicated by negative signs, the largest area is occupied land, subject to deflationary, sodic processes, replaced and deflated (figure 2).

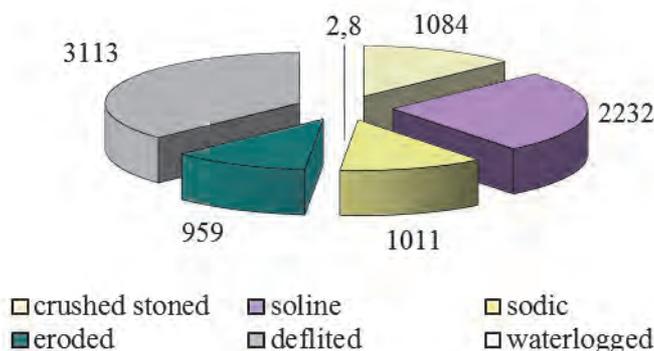


Figure 2: Ecological condition complicated by negative characteristics of agricultural land, in thousand hectares

METHOD OF RESEARCH

The study of the landscape-ecological zoning of agricultural areas of Kazakhstan was based on the following methods: comparative - geographical, cartographical, spatial analysis method, economic and statistical analysis, etc.

RESULTS

Landscape-ecological zoning of rural areas of South Kazakhstan oblast has allowed to establish the types and processes of degradation, the degree of their manifestation and the territorial distribution within the administrative districts of the region. A closer look at the leading anthropogenic processes.

Degradation of vegetation from the standpoint of its economic use is manifested in the degradation of pastures, grasslands and forests.

Table 2: Ecological condition of rangelands (Statistical Yearbook on agriculture in South Kazakhstan oblast in 2015)

Administrative district	Area pastures thousand hectares	Watering pastures thousand hectares	Watering %		Degraded pastures, thousand hectares
			Engineering structures	Natural sources	
Baydybek	460,1	377,9	81,4	18,6	136,4
Kazygurt	207,7	198,2	78,2	21,8	10,7 0
Maktaaral	3,0	2,5	85,7	14,3	2,1
Ordabasy	146,1	97,1	82,7	17,3	124,7
Otyrar	1647,9	454,1	89,2	10,8	894,8
Sayram	44,9	44,3	84,4	15,6	29,7
Saryagash	650,4	293,3	87,2	12,8	138,4
Sozak	3503,2	2424,9	89,6	10,4	1206,5
Tolebi	133,1	124,9	76,3	23,7	86,1
Tulkybas	94,8	87,4	76,2	23,8	81,1
Shardara	1094,4	1031,1	75,7	24,3	1055,3

Pastures in South Kazakhstan oblast is 88,6% of the area of all agricultural lands. Of the total area of pastures medium downed 969,6 thousand hectares, much downed 370,3

thousand hectares Of them - modified – 308,6 thousand hectares; were weedy and poisonous plants – 995,6 thousand hectares (Consolidated analytical report on the status and use of lands of RK for 2015, Materials NPC Animal and veterinary Sciences. Almaty. 2015).

The ecological condition of rangelands characterize such indicators as the degree of their degradation, culture technical condition, water invasion, depends on evenness of pasture use (table 2).

Ephemer-wormwood, sedge-wormwood-psammophyte shrubby pastures within the South Kazakhstan oblast are moderately impaired, and long-term saltwort bur grass Saline pastures only slightly modified. The causes of land degradation in this case are overgrazing. Environmental manifestations of the degradation of pastures in South Kazakhstan oblast is the dominance of secondary groups, deflation or water erosion as a result of cattle failure. In about 75% of the area of degraded pastures presented pastures were weedy and poisonous plants (figure 3). The most severely degraded pasture in Suzak, Otrar, Shardara, Saryagash and Kazygurt districts.

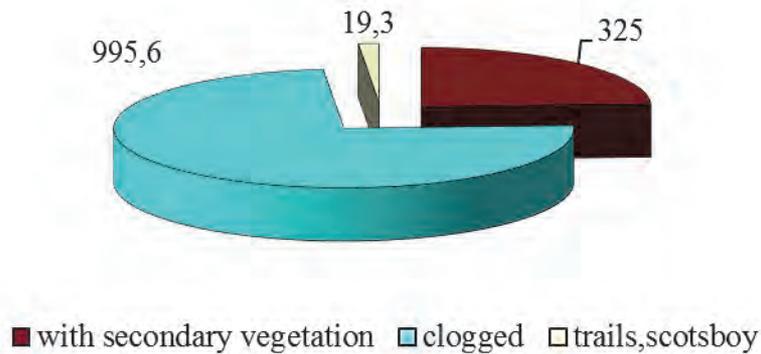


Figure 3: Characteristics of degraded pastures by category on January 1, 2015, thousand hectares

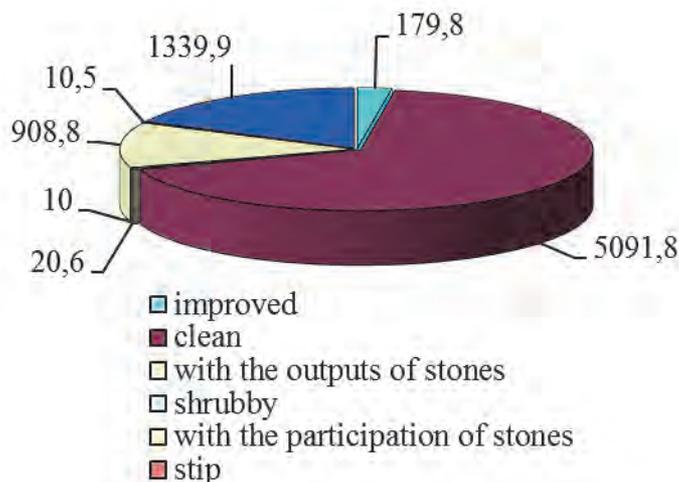
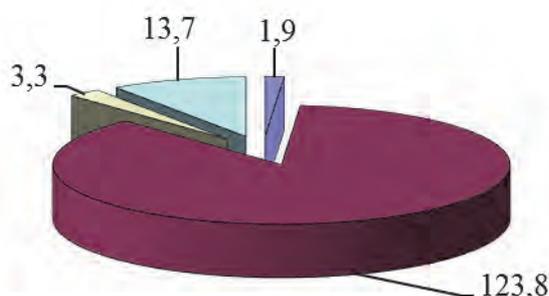


Figure 4: Culture technical condition of pastures for 1st January, 2015, one thousand in hectares

Analysis culture technical status of pasture ecosystems of South-Kazakhstan oblast indicates their satisfactory ecological condition. Clean pastures is a 55,9% of the area of the latter (figure 4).

Thus, degradation of rangelands in varying degrees is observed in all areas. However, the ecological condition of pastures in South Kazakhstan oblast is characterized as satisfactory. Around villages and wells are areas of ecologically intense, accompanied by the processes of deflation and water erosion. Most susceptible to degradation of grassland Aeolian plains, where largely developed processes of deflation and tropicalist.

The hayfields in the overall structure of agricultural land in South Kazakhstan oblast is just 142,7 thousand hectares or 1.4% of their area and are confined to the floodplains of the Syr-Darya, Shu, Arys, Bugun, Sarysu rivers and their tributaries, natural depressions and the shores of lakes (Statistical Yearbook on agriculture in South Kazakhstan oblast in 2015). Grasslands are very dynamic and depend primarily on hydrological conditions of river systems and method of use of the hayfields. Background grasslands of South Kazakhstan region were presented by reed beds, grass, cany, forb-grass communities. A General trend of reduced river flow due to regulation and diverse economic activity in lowland complexes led to a change in environmental conditions, reduction of the area of hayfields and change their quality. Currently, the environmental manifestation of the degradation of grassland is the enhancement of salt marsh processes and the increase of halophytic species in the structure of grasslands, on the one hand, the reduction of yield and quality of the land on the other. More than 88 % of grassland within the South-Kazakhstan oblast belong to the category of pure (figure 5), indicating their satisfactory culture technical condition.



■ improved ■ clean □ shrubby □ overgrown with poisonous plants

Figure 5: The culture technical condition of hayfields on January 1, 2015, thousand hectares

However, in Suzak, Otrar, Shardara, Sairam and Ordabasy districts noted the degradation of grasslands in the direction of strengthening the halophytic grass species and reduce productivity.

Forest. In the composition of the forest Fund are lands covered with forests, as well as territory not covered with forest but granted for needs of forestry. The area of forest Fund on the territory of South Kazakhstan oblast on January 1, 2015 amounted to 3120,7 thousand hectares; of them to forest land belongs 453,9 thousand hectares (Consolidated analytical

report on the status and use of lands of RK for 2015). Structural characteristics of the forest area of the region shown in figure 6.

Forests on the territory of South Kazakhstan oblast have a limited distribution, riparian, lowland desert and mountain forests confined to floodplains, sand and mountain ranges. Because of low forest cover forest in the area classified as forests of the 1st group. Over the last 5 years in South Kazakhstan oblast on an area of 2.5 thousand hectares reforestation carried out, with about 50% of the above recovery of forest the area accounts for 2014 (Regions of Kazakhstan-Almaty: RK statistics Agency, 2004).

Tugai forests are formed by a Loch, willow, Russian olive is confined to the floodplains of the Syr Darya, Sarysu, Shu, Bugun etc. are of great environmental importance in the area of stabilization of the water regime and channel processes improvement of microclimate and are most common in Arys, Suzak, Shardara and Otrar districts.

Desolate forest in the South Kazakhstan oblast is confined to the sandy Kyzylkum massifs and Moyynqum (Suzak, Otrar and administrative Shardara districts) and represented mainly haloxylon thickets. Main causes for haloxylon degradation is deforestation for fuel and the reduction of groundwater, leading to the death of the latter.

Within Kazygurt, Tolebi, Tyulkubas, Tolebi and partly Suzak administrative areas within the mountain system Karatau, the Kyrgyz range and the Western Tien-Shan high-altitude common juniper woodlands with a shrubby part of undertier formed by honeysuckle, cotoneaster, spirea and deciduous and small-leaved forests formed by ash, Apple, hawthorn, maple, almond.



Figure 6: Distribution of forest area, trees and shrubs plantings on 1 January 2015, hectares

Forests play an important role in improving the environmental situation in the region. In river valleys they perform water protection, protective, sanitary-hygienic and health functions, improve the microclimate. The ecological condition of the forests of South-Kazakhstan oblast as a whole is estimated as satisfactory. The main causes of forest degradation in South Kazakhstan oblast are deforestation and fires.

Bring significant damage to forests fires. Forest fire zonation within South Kazakhstan oblast allocated Ugam, Boralday and desert areas. So the number of fires on 1 million hectares in Tyulkubas, Tolebi, Kazygurt districts is from 4.4 to 19.6 (Arkhipov V. A.(2004). Forest Fire zonation, Schuchinsk). The area of one fire average ranges from 7.0 to 100.0 thousand hectares.

Forest degradation is noted in Arys, Suzak, Shardara, Otrar, Kazygurt, Tolebi, Tyulkubas districts.

Degradation of arable land. In the General structure of farmland in South Kazakhstan oblast, the arable land occupies only 8.2% of the area of farmland (Statistical Yearbook on agriculture in South Kazakhstan oblast in 2015) and established irrigated and rainfed arable land. Most large tracts of arable land used under rainfed agriculture, concentrated in Saryagash, Kazygurt, Tolebi, Ordabasy, them. Of Baidibek districts.

Irrational use and long-term operation without taking into account the crop rotation system, led to a significant reduction in fertility due to the loss of humus and deterioration of soil-conservation properties of soil, due to the development of erosive and deflationary processes. Currently the total arable land in the region is complicated by the negative signs more than 52% of the area, mainly in Saryagash, Kazygurt, Tolebi, Ordabasy, them. Of Baidibek administrative districts (figure 7).

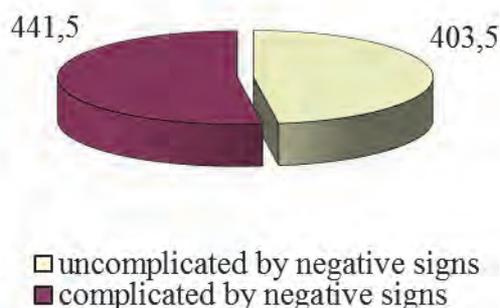


Figure 7: Characteristics of rain-fed arable land at the level of complication negative signs on 1 January 2015, hectares

The main causes of the degradation of rain-fed arable land is salinization and water erosion. Thus, among the disturbed arable land, about 53% of arable land degraded by reason of the manifestation of the processes of water erosion (figure 8).

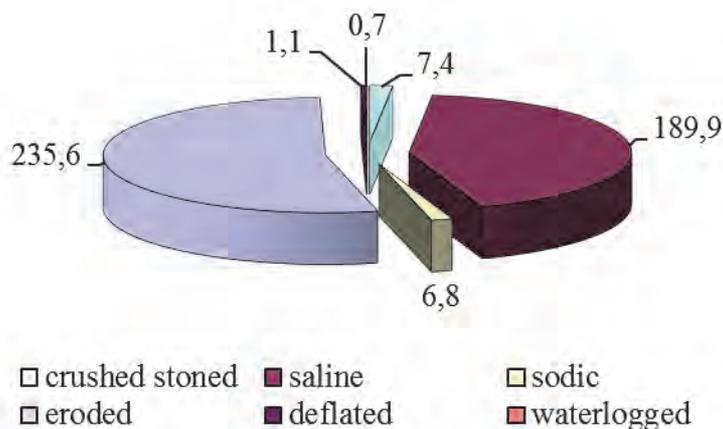


Figure 8: Ecological condition complicated by negative symptoms of arable land on 1st January 2015, hectares

Irrigated arable land in South Kazakhstan region represented slightly and takes only 442,3 thousand hectares or 2.2% of the area of arable land and confined to river valleys, sloping oldalluvial the plains in the territory of Maktaaral, Shardara, Suzak, Ordabasy administrative districts.

The ecological state of the irrigated areas is estimated as unsatisfactory. More than 65% of the area of irrigated lands is complicated by the adverse symptoms affecting their fertility, such as salinization, waterlogging, eroded, etc. it Should be noted that among the violated irrigated areas, about 90% are degraded because of salinization and the development of solonetz processes (figure 9).

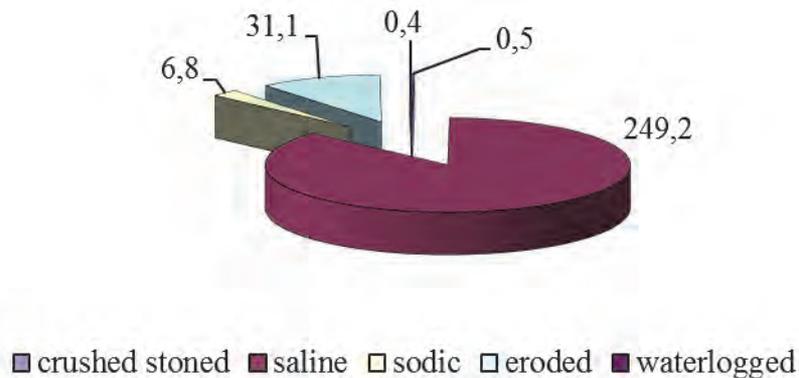


Figure 9: Ecological condition complicated by negative symptoms of irrigated arable land on 1 January 2015, hectares

The development of negative processes in irrigated lands caused by the poor quality of water, its high salinity, unstable hydrological regime, deterioration of reclamation condition of soil and violation of technology of processing, low technical operation of irrigation and collector drainage networks. All of the above leads to the development of the processes of secondary salinization, reduced soil fertility and crop yields.

DISCUSSION

The most important indicators of landscape ecological condition are the indicators of the quality of agricultural land, which are not only a criterion for assessing the anthropogenic impact on natural complexes, but also indicators of manifestation of the degradation processes.

Integrated analysis of natural, anthropogenic and environmental components within the areas allowed to identify the main environmental problems of rural territories of the South Kazakhstan region, which include:

- Scarcity and deterioration of quality of surface and groundwater, and silting up of reservoirs.
- The problem of rational use of water resources due to uncoordinated inter-state actions in matters of protection and regulation of transboundary watercourses. On the territory of Uzbekistan and Kyrgyzstan the discharge of water in the Syr Darya river occurs in winter, which is extremely unfavorable for Kazakhstan.
- Water pollution river basin Badam and the Keles rivers by sewage of cities.
- Insufficient provision of rural population with quality drinking water.