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Classification and Description of Pasture Lands of the Republic of Uzbekistan

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Abstract: The study examines the classification and description of pasture lands in the Republic of Uzbekistan, focusing on their geographical distribution, vegetation characteristics, and monitoring mechanisms. Pastures constitute 46.6% of the country's land area, with 21.1 million hectares dedicated to livestock production, a key factor in regional socio-economic development. Despite their significance, systematic geobotanical research and pasture monitoring have been limited over the past three decades, resulting in data gaps that hinder effective resource management. The research identifies this deficiency as a core knowledge gap and proposes the establishment of continuous monitoring systems in accordance with the national "Law on Pastures."

The study employs a comparative analytical method using data from the Cadastre Agency and national reports (2019–2021), combined with ecological zoning principles. Pastures are classified into four major zones—desert, foothill, mountain, and high-mountain—each subdivided into lower and upper tiers based on altitude, soil type, and vegetation composition. Results reveal significant spatial disparities: Navoi Region accounts for 41.9% of total pastures, while Syrdarya, Andijan, and Fergana collectively represent less than 0.3%. Findings underscore the necessity of region-specific management strategies, emphasizing vegetation diversity as a key determinant of pasture productivity.

The study concludes that implementing systematic land monitoring and digital cadastral mapping is vital for ensuring sustainable pasture use, ecological stability, and food security in Uzbekistan.

Keywords: pasture classification, land monitoring, Uzbekistan, vegetation zoning, sustainable management, geobotany, livestock development.

In the context of globalization of the world economy and population growth, it is necessary to move toward sustainable environmental management and the rational use of natural resources [85; p. 928].

Pasture lands classified under the category of agricultural lands are primarily used for livestock farming. In most countries of the world, this branch of agriculture is considered an important sector, and the majority of pasture areas, serving as natural sources of fodder, have a significant impact on the socio-economic development of regions. Monitoring the condition of pastures helps to detect changes at an early stage. Therefore, conducting systematic monitoring of pasture lands makes it possible to identify negative processes occurring in them and to manage these processes effectively.

The condition of the pastures in our Republic, the causes and extent of their degradation, the necessity of improving socio-economic and ecological conditions, and the establishment of sustainable pasture use are considered highly relevant issues [64; pp. 163–173, 65; No. 3 (167), pp. 41–45, 67; pp. 302–306, 68; No. 11, pp. 34–35].

Most of the pasture and hayfield areas are assigned to forestry enterprises. Over the past 30 years, almost no geobotanical research has been conducted in these territories. The absence of pasture monitoring has also led to a lack of updated data for accurate analysis of their current condition and the changes taking place within them.

According to Article 8, Paragraph 8 of the Law of the Republic of Uzbekistan "On Pastures" [2], the maintenance of pasture monitoring is explicitly stipulated, and the main purpose of this process is to ensure continuous assessment of the condition of permanent pastures.

Based on the land report as of January 1, 2021, the total area of natural pastures and hayfields in the Republic amounts to 21.1 million hectares, representing 46.6% of the country's total land area. Of these, 18.6 million hectares are classified as irrigated pastures and hayfields [12; p. 103].

According to the distribution of pasture and hayfield areas across the Republic of Karakalpakstan and the regions, the smallest areas of pastures are found in Syrdarya Region — 19.9 thousand ha (0.1%), Andijan Region — 21.1 thousand ha (0.1%), and Fergana Region — 23.5 thousand ha (0.1%). The largest pasture areas are located in Navoi Region — 8,893.3 thousand ha (41.9%), followed by the Republic of Karakalpakstan with 5,257.3 thousand ha (24.7%) (see Table 1.1.1).

Natural pastures and hayfields are characterized by their vegetation cover. Therefore, in studying them, it is necessary to determine the composition of plant species and analyze their fodder value.

1.1.1-jadval. Distribution of Pastures by the Republic of Karakalpakstan and Regions

Name of Region	Area (thousand ha)	Percentage (%)
Republic of Karakalpakstan	5,257.3	24.7
Andijan Region	21.1	0.1
Bukhara Region	2,558.1	12.0
Jizzakh Region	736.5	3.5
Kashkadarya Region	1,406.8	6.6
Navoi Region	8,893.3	41.9
Namangan Region	150.2	0.7
Samarkand Region	796.8	3.8
Surkhandarya Region	825.8	3.9
Syrdarya Region	19.9	0.1
Tashkent Region	445.7	2.1
Fergana Region	23.5	0.1
Khorezm Region	109.3	0.5
Total	**21,244.3**	**100**

Table: *Distribution of pasture areas across the Republic of Karakalpakstan and regions of Uzbekistan.*

(According to the information provided by the Cadastre Agency under the State Tax Committee, 2021)

In Uzbekistan, based on the distribution of vegetation and the altitude above sea level, existing pastures are divided into four regions [51; p. 160] (see Fig. 1.1.2):

- **Desert Zone** – consists of deserts and plains, as well as foothill plains located at an altitude of up to 400–500 meters above sea level. The annual precipitation in this zone does not exceed 300 mm.

- **Foothill Zone (Adir)** – represents the foothill area situated at an altitude of 1,000–1,200 meters above sea level, where the annual precipitation ranges from 300 to 400 mm.
- **Mountain Zone** – encompasses mountainous territories located at elevations of 2,500–2,700 meters above sea level, with an annual precipitation of approximately 400–500 mm.
- **High-Mountain Pasture Zone** – includes high-altitude mountain regions above 2,700 meters, where the annual precipitation exceeds 500 mm.

Fig. 1.1.2. Scheme of Vegetation Distribution in Uzbekistan

Each of the aforementioned regions is recommended to be studied by dividing them into **lower** and **upper zones (tiers)**. The classification is as follows:

- **Lower Desert Zone** – located at an altitude of 250–330 meters above sea level, characterized by sandy, light brown, saline, and takyr-type soils. The sparse vegetation cover includes psammophilous, gypsophilous, and halophilous shrubs, semi-shrubs, perennial grasses, and, occasionally, annual herbs. As the altitude increases, riparian vegetation can be found along riverbeds within the lower desert belt.
- **Upper Desert Zone** – includes foothill plains and undulating hills of the Kyzylkum Desert located at elevations of 250–300 to 400–500 meters above sea level. The soils belong to the light gray-brown and brown types. Vegetation in this zone is typically of the "ephemeral type" and "loess desert type," with varying density. Slightly saline areas contain annual weeds mixed with the main vegetation cover.
- **Lower Foothill Zone (Adir)** – starts from 400–500 meters above sea level and extends up to 600–800 meters, consisting of semi-desert mountain areas. The soils are classified as typical gray soils. Vegetation includes ephemeroids, ephemerals, and perennial large plants such as *Allium*, *Poa bulbosa*, *Ferula*, *Eremurus*, and sagebrush (*Artemisia*). The vegetation cover is typically dense and continuous, mostly occupying the lower sections of rainfed agricultural lands.
- **Upper Foothill Zone (Adir)** – located between 600–800 and 1,000–1,200 meters above sea level. The soils are dark gray. The dominant vegetation consists of tall grasses such as *Agropyron*, *Stipa*, *Melica*, *Malva*, *Scorzonera*, *Eremurus*, and various other herbaceous species. The lower layer is composed of ephemeroids. The majority of rainfed crop areas belong to this zone.
- **Lower Mountain Zone** – situated at altitudes of 1,000–1,200 to 1,800–2,000 meters above sea level. The soils include dark gray and brown forest types. The vegetation cover consists of shrubs such as *Rosa canina* and *Acer*, and trees including walnut (*Juglans regia*), apple

(*Malus*), plane tree (*Platanus*), and juniper (*Juniperus seravschanica*, *Juniperus turkestanica*). The lower layer comprises perennial grasses such as *Agropyron* and various meadow herbs. The relief conditions allow limited plowing; rainfed crops are cultivated on relatively small plots.

- **Upper Mountain Zone** – located between 1,800–2,000 and 2,500–2,700 meters above sea level. The soils are brown. The vegetation cover mainly includes trees such as Turkestan and sawr junipers, shrubs like *Rosa canina*, *Berberis*, and *Acer*, as well as perennial grasses such as *Festuca* and diverse meadow herbs.
- **Lower Highland Pasture Zone** – found at elevations of 2,500–2,700 to 2,600–2,800 meters above sea level. The soils are light brown with a gravelly mechanical composition. The vegetation cover is mainly composed of various grasses, xerophytes in patchy formations, and Turkestan juniper.
- **Upper Highland Pasture Zone** – situated above 2,600–2,800 meters. The soils are light brown and gravelly. The vegetation cover consists of *Festuca*, *Carex*, mountain xerophytes, and alpine meadows growing in the inter-rock mountain meadow soils among stony slopes.

The relationship between vegetation cover and pasture classification within each region and elevation zone is defined as follows:

- **Type of vegetation cover** → corresponds to a **group of pasture types**;
- **Formation of vegetation cover** → corresponds to a **pasture type**;
- **Association of vegetation cover** → corresponds to a **pasture subtype**.

Pasture subtypes, in turn, differ in terms of productivity.

In pasture science, the primary **taxonomic unit** is the **"pasture type"**, which refers to a form of vegetation formation characterized by specific ecological and agricultural features:

Pasture type – refers to agricultural land with uniform pasture value, similar seasonal use, suitability for specific types of livestock, and homogeneous characteristics of vegetation edificators, climate, relief, soil, moisture, and other environmental conditions.

The objectives of studying the vegetation cover are as follows:

a) to collect data on the qualitative and quantitative indicators of natural fodder areas within the territory of the Republic and on the state of their use;

b) to obtain scientifically substantiated information that serves the preparation of projects related to ensuring the efficient and rational use of pastures and hayfields and the organization of livestock farms;

c) to gather the initial data necessary for compiling and maintaining the cadastre of pasture lands.

Thus, the above considerations serve as the basis for carrying out pasture land monitoring.

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