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Issue Article

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URBAN GREEN SPACES – UZBEKISTAN'S CASE

Abstract: *Recently, in the context of climate change, the number of studies on the design of green spaces in the context of urban planning has been increasing. This is because green spaces are very important for a healthy and stable urban environment. This study examines the spatiality of green spaces in Uzbekistan. It also highlights the importance of geography in developing effective policies and finding solutions to problems related to green spaces in Uzbekistan. Relevant figures and maps on this topic are attached. The study discussed this issue mainly in the context of urban geography and then highlighted the important role of geography in this matter. One example from the history of Uzbekistan is presented as a case study. The purpose is that effective organization of green spaces is not new for Uzbekistan and can be a model for future steps. The topic deals with spatial analysis of green spaces in modern Uzbekistan. Proposals for the perspectives of green spaces have been made.*

Key words: *Urban geography, green spaces, place, spatial planning, urban planning, GIS.*

Language: *English*

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Introduction

Recently, in the context of climate change, the number of studies on the design of green spaces related to the issue of urban planning is increasing (Hulme, 2008; Aspinall, 2010; Sultana, 2014; Winkler, 2016; Peri et al., 2021; Krause et al., 2021; Bruno et al., 2021). This is because green spaces (such as parks, gardens, forests, etc.) are very important for a healthy and stable urban environment (Jones, 2009; Lee et al., 2011; Xuemei Ba et al., 2012; Vuokko et al., 2020; Kotval, 2022). Governments have also recognized that green spaces are important for environmental stability, well-being, and health. Some studies have also shown that urban green spaces contribute to people's happiness by enhancing their physical and mental health (Yang et al., 2021). One of the main reasons for this is the promptly growing population of cities worldwide. The UN predicts that the percentage of people living in cities will only increase in the future (UN, 2021). As global migration to cities continues, the population density increases, then which affects the spatial size of green spaces (Guy, et al., 2014; Jansen et al., 2018; Lerch, 2020). Those who have considered the concept of the city emphasize the necessity for a multidimensional approach to the issue of green spaces (So, 2016; Silva, 2018). This includes consideration of rapid urbanization and major environmental issues along

with urban development (Elaine, et al., 2017; Leinen, 2020; Cartier, 2021). Therefore, it is necessary to identify and determine the evidence about the physical (Brug, et al., 2006) and non-physical health benefits of urban green spaces (Mitchell, et al., 2008; Gebel et al., 2012). In addition, some studies have presented findings that support the idea that green spaces have positive health effects (Poppel et al., 2015; Horsley, 2015; Taefnia, et al., 2021). For example, in examining the spatiality of green spaces in Uzbekistan, this study found the decline of green spaces and ecologically problematic processes in the life of the city. In Uzbekistan, green spaces also consist of forests, gardens, parks, street trees, riparian plantations, or trees and shrubs on the banks of rivers, and garden areas in certain places. These green spaces make it easier to get rid of the heat (Zupancic et al.,2015) in Uzbekistan, where summers are too hot. They clean the air in densely populated urban areas (Anderson et al., 2012). It reduces noise from houses along highways (Dzhambov et al., 2015; Aditya, et al., 2019). Overall, it provides comprehensive mental and physical health benefits (Guzejev, 2008; Dimitrova and Dzhambov, 2014). The transformation of cities during the period of development in the "New Uzbekistan" increases the negative impact on green spaces (FAO, 2018; WHO, 2020). Therefore, the provision of urban green spaces has become an urgent issue. In this regard, there is a need for a spatial study of legal logging events, forestry, and private revegetation in the regions. Geographers have hardly studied this issue in Uzbekistan (Sharipjonova et al., 2020; Aslanov et al., 2021). This is because the transparent database for the development of the green space indicator is not well formed. Available data on Uzbekistan is often limited. Only national data on land use, including official parks, forestry, and some open spaces, are available in the form of official statistics as well as data from social media.

2. Methods and results

This study analyzes the spatiality of green spaces in Uzbekistan based on the available information. To determine the spatiality of green areas in Uzbekistan, the work uses indicators and current analytical data on green areas (2017~2022). In places where it was not possible to find accurate information during the study period, data from social media were used. Thus, this article highlights the importance of geography in developing effective policies, and in finding solutions to problems related to green spaces in Uzbekistan. An example from the history of Uzbekistan is presented in the form of a case study. This is to highlight that effective organization of green spaces is not new for Uzbekistan and can be a model for future steps. Then, the spatial situation related to the issue of green spaces in recent years in modern Uzbekistan is considered. This paper contains proposals that can have both theoretical and practical implications for the prospects of green space. The concluding section highlights that geography and geographers have great potential to contribute more to issues of urbanization and green spaces in Uzbekistan.

3. Amir Temur's gardens - as an example of the organization of green spaces (Case study)

1) Introduction

The reason I cite a historical fact for the case study is that there is a close connection between history and geography (Dennis, 1984). Thus, the *place* is linked to geography or geographic conditions (Anderson, 2010). In history, some countable rulers have organized the politics of transformation and culturalization at the level of *"Utopia"*. The personality of a historical figure, I will mention in the case study was one of the great founders of such a great civilization. The context of this case study refers to historical geography. This is because in this work I want to cite Amir Timur's gardens to understand how and why the geography of a particular place has changed over time. As some geographers have noted, it is of particular importance to study how people and civilizations have changed the landscape over time (Golombek, 1995; Ganiev, 2021).

Thus, the purpose of this case study is to highlight that the effective organization of green spaces, management of land use, and construction of a thriving city actually happened in the history of Uzbekistan (Golombek, 1995; Bakhtiyorov, 2022) and can be repeated. Because with the help of geography it is possible to study a certain existence at a certain time or period in the past. This requires the study of any phenomenon specific to a particular place or region.

2) A word on Amir Timur[1]

Amir Timur (1336 - 1405) is also referred to in the literature as *Timur and Tamerlan.* Amir Timur was a great statesman of the Middle Ages, a great Turkish general, the founder of a centralized state, and a leader known as a promoter of science and culture. His empire (Figure 1) included Central Asia, the territories along the Caucasus, the southern Russian territories, Egypt and Syria, and northern India.

[1] https://en.wikipedia.org/wiki/Timur

Figure 1. Map of the kingdom of Amir Timur

Photo credit: Wikipedia.

Thus, Timur created a centralized governing system (Wikipedia: Timurid Empire). He paid great attention to the development of socioeconomic relations, science, and culture. During Timur's time, the fields of urban planning, architecture, science, culture, and art developed rapidly (Bakhtiyorov, 2022).

3) Urban development in the time of Timur

Timur has an extraordinary policy on urbanism and development (Nurkulova, 2021). A quote from Timur: *"I have ordered the construction of mosques, madrasas (Islamic colleges), houses, and baths in every city, the construction of rest stops for travelers, and the construction of bridges over rivers. Whoever improves a place like a desert or creates a green place or improves any uncultivated land does not have to pay taxes for three years, but after the three years, a tax is levied according to the state law"* (Karomatov, 2003; Csiky, 2016).

Therefore, Timur attached great importance to landscaping and territorial development. The activities in this regard were supported and supervised. During his time, construction and architecture developed to an exceptional level (Karomatov, 2003). French historian Bartold writes: "*Timur was an enterprising builder. He built large buildings and surrounded them with huge (and luxurious) gardens. He restored cities and villages. He built water structures and repaired the damaged ones. He did not leave empty land areas where culture could be established. Timur's creative activity was amazing. The best period of Muslim architecture is associated with his name"* (Bartold, 1963; Bartold, 1973). Thus, during Timur's time, great construction works were carried out in the cities of the region called Movarounnahr and Khurasan (Shamukaramova, 2021).

4) Green spaces at the time of Timur.

The capital of Timur's empire was the city of Samarkand (Uzbekistan). During this period Samarkand was an important intellectual center with the most famous scholars, Islamic universities, huge markets, and luxurious green areas (Karomatov, 2003; Shamukaramova, 2021). According to the famous traveler and scholar Ibn Khaldun, in Samarkand *"there was almost no street, no yard without running water, only a few houses had no garden. People used clean water that flowed in watercourses on the streets. [...] On the orders of Amir Timur, more than ten beautiful gardens were laid out"* (Fischel, 1952; Minorsky 1954; Marozzi, 2006). The famous historian Ibn Arabshah wrote the following about the gardens of Amir Timur: *"Timur had many green spaces and high and strong palaces built in Samarkand. Each of the greenery was neat, beautiful, and luxurious. He ordered the strengthening of the foundations of the gardens and decorating them with perennial fruit trees. [...] He also had a castle built in each of the gardens"* (Ibn Arabshah, Book 2:82-83).

5) Spatial arrangement of the gardens of Amir Temur.

According to historians, Amir Timur believed that the environment of the city should show the power of his empire. In the "Autobiography of Timur" (*Tuzuk-i-Timuri*) emperor said: *"I invited physicians, astrologers, and architects (surveyors) to me because these people contribute to the glory and prosperity of the state. [...] The architects drew magnificent building plans and plans for green spaces for me"* (Csiky, 2016). Thus, full-blown specialists were involved in the creation of gardens. Unique green spaces were created, and names were given to them. The first information about these green places can be found in the works of famous historians and travelers.

The gardens of Amir Timur are also depicted in the miniatures of medieval artists (Wikipedia: Timur). These gardens were divided into two types depending on their structure: rectangular and non-geometric (Golombek, 1995; Bakhtiyorov, 2022).

Figure 2. Miniature "Timur sitting in a Garden"

Source: Historical manuscript "Zafarnoma"

5.1. Rectangular gardens: such a park has a geometric rectangular shape, and each side is about 1 km long. The green area is divided into four equal parts by fast-flowing ditches. At each corner of the high walls surrounding the complex, there was a minaret. In the center, there is a palace. The gates of such parks are built towards the city. In such gardens, foreign diplomats were received, or public festivals were held on major holidays. Paths and ditches separated different parts of the garden. The garden itself is surrounded by a high wall. The size of the ponds is also remarkable. I will talk about this below in the arrangement of the gardens. Rectangular green spaces were thus usually laid out on the outskirts of the city, far from noisy markets, squares, and craft towns. The residential areas of Central Asian cities are traditionally characterized by dense development. There is no space left there to plant large green areas. Only a small number of trees such as maple, poplar, mulberry, etc. are left for planting. They were much appreciated by the townspeople for shade and cooling during the summer heat (Ibid).

5.2. Gardens with non-geometric structure: Such gardens were green spaces created in the midst of forests and thickets. Such parks were intended for the emperor's hunting, and most of them were strictly controlled to keep them natural. Only a small part of them had small palaces or tents for recreation. Ponds were dug and fountains were installed. In this type of garden, there was rich flora and fauna (Ibid).

6) Timur's gardens - the best example of greenery

Timur laid out gardens mainly around the city of Samarkand (today Samarkand region, Fig.3). Spanish ambassador Ruy González de Clavijo (Castilian traveler and writer under King Henry III of Castile) wrote in his travel diaries: *"Samarkand is surrounded by luxurious green spaces and vineyards, (which extend for 7-15 km). The city itself is located in the middle of these green areas. Many large and rich buildings were built in the gardens on the outskirts of the city. Moreover, the aristocrats have their villas in these gardens"* (Simpole, 2009; (Berdimurodov, 1992).

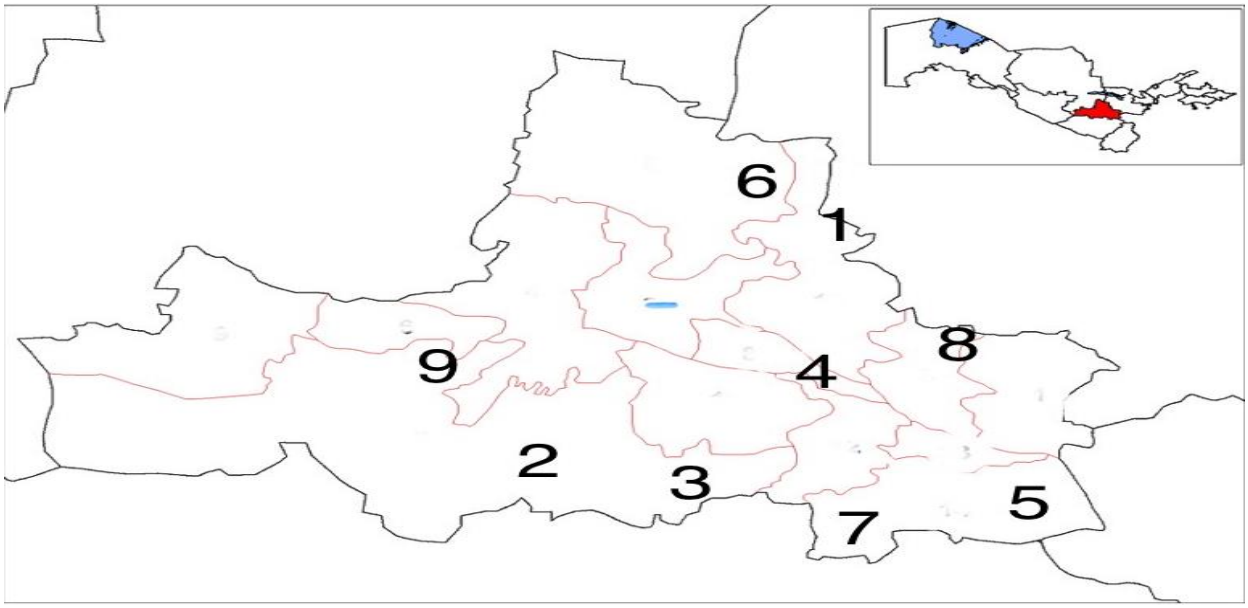

Figure 3. Map of Samarkan (current view)

Source: Wikipedia.

**The numbers on the map below represent the approximate geographical location of Timur's gardens.*

N1: High Garden. Location: Northern part of Samarkand. (Chupon Ota area). Structure: In the center of the garden stood a luxurious Tabriz white marble mansion, surrounded by vineyards, fig groves, and orchards. Timur had this garden created for one of his grandsons. This park is now a tourist zone (Samarkand Tourism Development Department).

N2: Garden of Paradise (1378). Location: West of Samarkand. Structure: A luxurious white marble palace from Tabriz was built on an artificial hill surrounded by a moat in the center of the garden. The palace was entered by several lifting bridges. On one side of the garden, there is a zoo where various animals are kept. Timur dedicated this garden to one of his wives (her name was Khairunisa).

N3: Garden called "Davlatobod" (i.e., State Well-being). Location: South of Samarkand. Structure: During archeological excavations, it was found that the garden occupies an area of 1350x900 m, is surrounded by a high wall, has moats, 4 ponds, and a palace. The palace is built on an artificial hill (12 m high) surrounded by a canal (20 m wide). One enters it through two lifting bridges. After returning from triumphant battles Emperor Timur rested here and sometimes received foreign ambassadors in this garden (Sukharev, 1936; Alimov, 1967).

N4: "Enchanting" Garden (1397). Location: East of Samarkand. Structure: It is surrounded on all sides by a straw wall 900 meters high. In the middle of the 4 gates of the garden, there was a luxurious palace. The palace has three floors, and, on each floor, there is a fountain. On the walls of the palace, there were paintings from the wars that the emperor had fought. This garden was created in honor of Timur's other wife named Tukalkhanim. The entrances were separate. Towers were built at the four corners of the garden. Along the avenues, there were many fruit trees and flowers ("Gardens of Timur in Samarkand", paperback). In 1404, the Spanish ambassador De Clavijo wrote that this garden was decorated with various precious stones and that there were six elephant statues on which stood a throne (Berdimurodov, 1992).

N5: Garden called "Mirror of the World". Location: 42 km from Samarkand (a mountain called Zarafshan). Structure: there was a palace and a fortress. The area of greenery is very large. For example, the missing horse was found after 6 months.

N6: Garden of "Maydon" (i.e., Square). Location: Samarkand, on a hill called "Chupon Ota". Structure: According to historical sources, this garden had a luxurious terrace and a throne made of precious stones.

N7: New Garden (1404). Location: South of Samarkand. Structure: This garden was rectangular, surrounded by a high wall, and a tower rose in each corner. In the center was a larger castle than in the other gardens, and in front of it was a large pond.

N8: Maple Garden. Location: East of Samarkand. On the hill called "Konigil". Structure: There were many beautiful maple trees in the garden. In the center was a palace in the shape of a cross.

N9: Garden of the Wind (1397). Location: West of Samarkand. Structure: In this garden, the palace was rectangular and had 1500 steps on each side. The walls were covered with marble and the floor was made of ebony and ivory. Overall, the residents and guests of Samarkand were allowed to visit these green areas freely. These green areas

surrounded the capital like a green belt and their area was larger than that of the city.

7) Summary

Thus, the creation of green spaces has been considered an important measure since ancient times. The geographical area in which a particular people lived, their cultural and scientific development, literature, and art as well as the level of agriculture and irrigation systems were reflected in the gardens that were created in the past (Berdimurodov, 1992; Ibid). The gardens of Timur were one of them. Thus, the creation of "green spaces" in the capital of the Timurid Empire can be an example of "place" and "spatial planning" in a geographical context. Thus, the case study has derived the following from the spatiality of Timur's gardens. It is possible to coordinate green space and housing in urban planning. Based on the image of the gardens, it became clear that these gardens were mainly located on (even artificial) hills. Residential areas were separated from them. One of the current problems of urban densification or redesign is that green areas are displaced or eliminated. Such problems exist in Uzbekistan as well, and they deserve to be examined in separate studies, in particular with GIS (Ruas, et al., 2011; Fernández, et al., 2017; Zhao et al., 2019).

The green gardens were laid out like a green belt for the city (Ibid). Thus, when green spaces are planned in this way, the inhabitants of any part of the city are close to nature. As a result, the overall well-being of city residents will increase. The important point in Timur's quote was that he gathered professional experts to build a thriving city and green spaces in one place. It became clear that the most important factor for efficiency in planning a prosperous city and green spaces is related to the potential of management.

Therefore, geography mainly focuses on place and time (Lawton, 1983), regardless of era and region. Therefore, another objective of this paper is to highlight the prominent role of geography in green spaces and planning (Concept of Place). This is because, with the help of geography, it is now possible to study the various changes that have taken place in each time or period. By using geographic methods to study the things that are related to the changes in a certain time, hypotheses are made that can be used in the present. However, I will not go deep into historical geography. I will deal with the green fields and related problems in Uzbekistan today. Therefore, an institute of geographers should be established in Uzbekistan. What I emphasize is that, based on the current conditions in Uzbekistan, it is possible to use the example of Timur's gardens to spatially examine the potential and possibilities of cities for green spaces with the help of geographical research.

Thus, Emperor Timur succeeded in raising Uzbek statehood to a higher level. It was historical support for national development. It is appropriate to use the political and economic principles of this great ruler in creating green areas and solving environmental problems, adapting them to today's requirements. The conclusion is that historical works based on geography can be studied and applied to well-being, urban planning, spatial planning, and even regional planning.

4. New Uzbekistan - Green spaces and related topics

In a world of growing population and urbanization (UN, 2021), forests and urban green spaces are important elements in making cities more sustainable, greener, and healthier (Lee et al., 2015). This is because many ecosystem services have positive effects on physical and mental health. However, climate change and other global challenges are forcing stakeholders to consider how to deal with complex public health crises in urban environments (Cartier, 2021). Urban geographic contexts include how people perceive and use forests and urban green spaces (Gebel and Ding, 2012). From this point of view, this study presents the influence of green spaces and forests on urban life. In the following, an attempt is made to analyze the compact study of forests and green spaces in Uzbekistan in the context of urban geography.

Before I begin my research, I would like to give you brief information about Uzbekistan. This country is located in Central Asia and its territory is 447,400 km2; of which 425,400 km2, or 95%, is a land area (Wikipedia, 2018). The population of Uzbekistan is growing rapidly. Currently, their number is almost 36 million (State Committee on Statistics, 2022). In terms of land use, there are three major categories of land in Uzbekistan. 1) Land designated for agriculture - 46.1%. 2) Land from the forest fund - 21.7%. 3) Reserve land - 27.6%. So, the land is mainly used for agriculture. However, in recent years the land used for agriculture has decreased, but agriculture still occupies the largest part of the land fund in Uzbekistan.

5. Policy on the design of green spaces

Decree No.5863 of the President of the Republic of Uzbekistan dated October 30, 2019 "On Adoption of the Concept of Environmental Protection of the Republic of Uzbekistan by 2030" was adopted. Based on this decree, the establishment of "green spaces" and "green public parks" in the regions has begun. The moratorium on cutting valuable tree and shrub species that are not part of the State Forest Fund was extended indefinitely. The decree contains the following condition. If the height of newly constructed buildings and structures exceeds 12 meters or the total area exceeds 500 square meters, at least 25% of the total area must be green space (Lex.Uz). In recent years, systematic measures have been taken to green settlements, protect trees and other plants, and expand green areas. This includes increasing the number of

fines and compensation for cases of tree cutting. Since 2022, there has been a government decree to operate a platform called "Green Space." This platform is to include accurate data on the soil-climate characteristics of regions, the number, type, and location of existing trees, and the degree of greening in cities. (However, it is not yet possible to obtain the data from this platform) Environmental police forces have been established in the city of Tashkent and in the central cities of the provinces (Lex.Uz; Governmental Press).

6. Classification of green spaces in Uzbekistan

1) Forests

Uzbekistan is a forest-poor country, but forest ecosystems play an important role in both economic and conservation relations. Forests account for 8.0% of the total land area (SGD, 2021). However, in terms of forestry, the following should be highlighted: 1) Shrubs (*Haloxylon ammodendron*) are planted in and around the arid soil of the Aral Sea. 2) Programs for the development of agroforestry are being implemented in the mountainous regions. 3) As a result of the natural regeneration of forests, the forest area is increasing rapidly. The areas of the forest fund are located in the mountain zone (about 121 thousand ha), the desert zone (about 72 thousand ha) and the riverside forests (88.8). Thus, the largest forest area is located in the desert areas (83.3%) and mountain areas (15.7%). The following figure shows the territorial and quantitative distribution of the areas included in the Forest Fund (Forestry Committee, 2022).

Figure 4. Land of forest fund put into use in 2021 (hectare)

Photo credit: Google

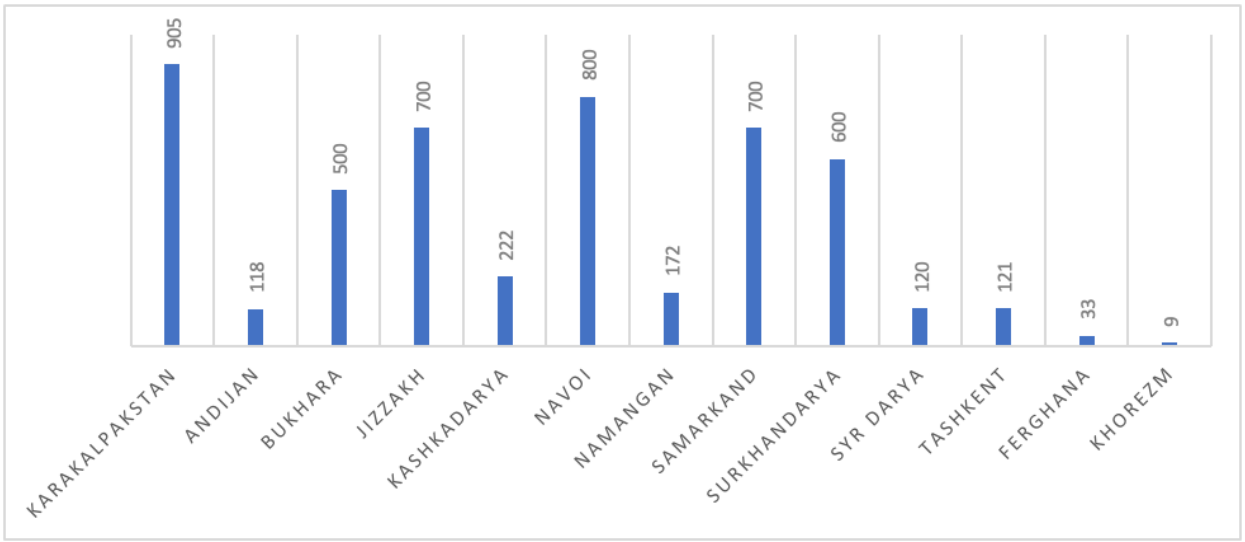

Figure 5. Land of forest fund put into use in 2021 (hectare)

Source: Forestry System Development Concept, Annex 1, 2022 (lex.uz).

Thus, from the figure, it is clear that the largest forest areas from the administrative-territorial point of view are located in Karakalpakstan (54.8%, number 1 in figure 6) and in Navoi region (20.8%, number 2 in figure 6).

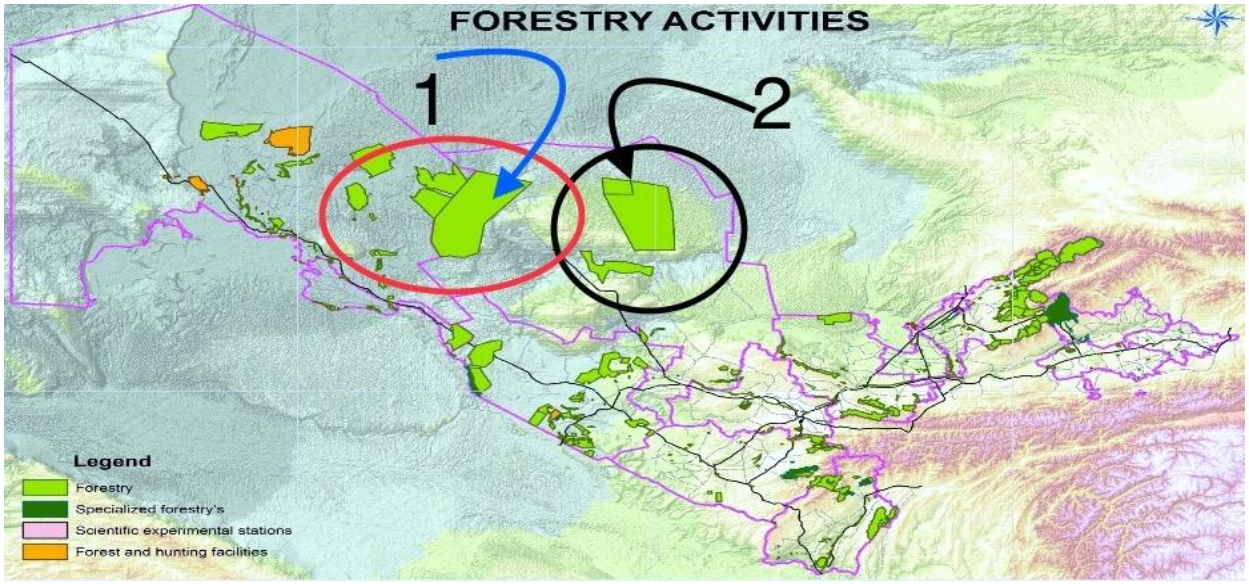

Figure 6. Biggest forest land use areas

Source: CBD, 2018

In 2021, the Kyzylkum (Fig. 7) and Nurota state reserves, which are part of the territory of Navoi province were designated as "specially protected areas." In addition, the establishment of the national nature park "Central Kyzylkum" and the state reserve "Oktog" (*White Mountain*) has begun. In Karakalpakstan, the reserve "Borsa kelmas" (*Hill of Death*) is established. The reason is that it is becoming increasingly necessary to reduce the negative impact on natural objects and complexes where rare animals live. The answer to question of why such a large area of forest is established as a green zone in these two regions can be answered as follows. The most common form of land use for agricultural purposes in Uzbekistan is pastures. Pastures are mainly located in the desert zone (78.1%). These two areas also correspond to the large Kyzylkum desert in Central Asia (Figure 7). Therefore, the newly protected green areas are mainly located in these areas (Forestry Committee, 2021).

Figure 7. Kyzylkum Desert

Source: Google map

2) Recreational parks

In Uzbekistan today, there are a total of 188 green parks in the form of cultural and recreational centers (see Fig. 4). If this indicator is divided by region, the capital city of Tashkent accounts for the largest number of such parks (Fig. 8). These parks are open to the public at certain times (often between 8 a.m. and 10 p.m.).

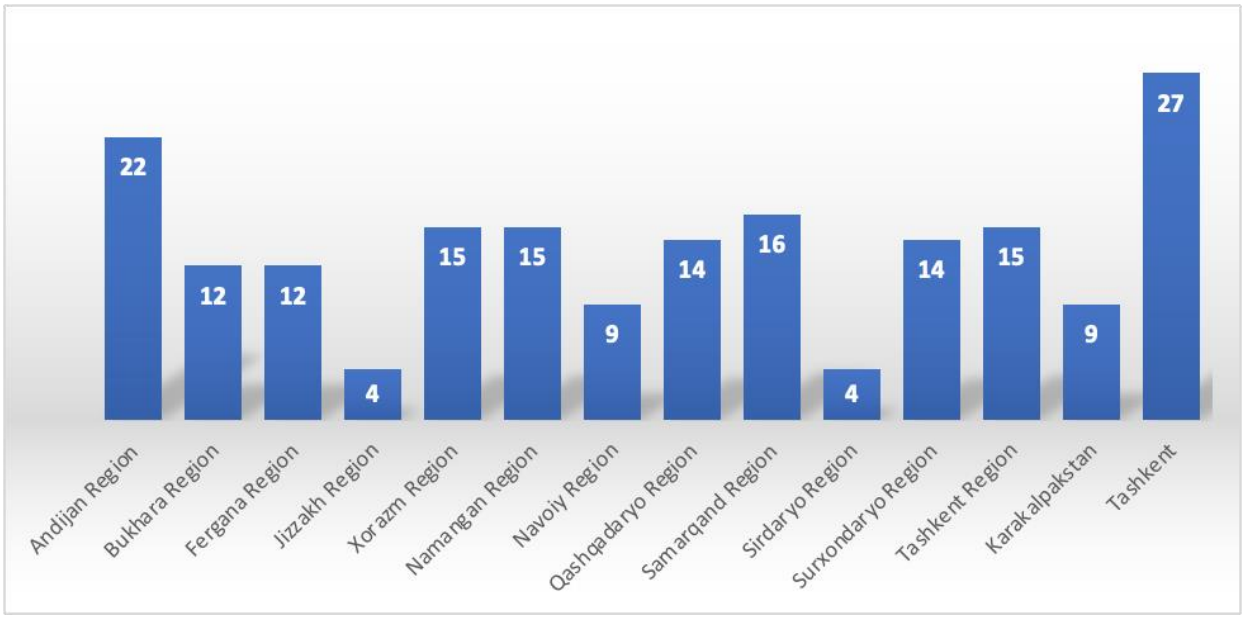

Figure 8. Number of green parks in regions

Source: National Statistics Committee, 2021

7. The spatiality of green space issues

1) Tree cutting

The problem of greening and the lack of green areas in Uzbekistan has become one of the main problems in recent years. The country has had a problem with illegal tree-cutting since the 2000s. Urban development and plant diseases are mainly prevented by cutting trees or affecting green areas. Due to problems with the supply of natural gas and electricity in Uzbekistan, people in the provinces (especially in rural areas) are cutting trees as an "alternative" to energy shortages. According to experts, rapid deforestation increases soil erosion, disrupts the water cycle, and affects the lives of millions of people. Below, I will briefly describe some of the problems with the spatiality of green spaces. I would like to emphasize that due to limited data, it is not possible at this time to produce a map showing how many trees have been cut and to which area they belong. A map and database based on GIS should be created in the future for each region.

1.1. Tashkent (capital): In Tashkent, the cutting of trees is observed most frequently, more than in other provinces. According to some analyzes, there is no comprehensive solution for capital in terms of urban development. The Tashkent state plan was developed in the 1970s (after the 1966 Tashkent earthquake). The large trees that were cut down because of the large buildings in Tashkent have resulted in the capital turning into a desert (Aslanov, et al. 2021; Tufliev et al. 2021). For instance, large maple trees in the large green avenue called "Amir Timur" (which was created in 1882) were cut down for no apparent reason. However, according to one of the assumptions, the trees in the avenue "obstructed" the surrounding architecture and the emperor Timur monument (data from social media). Finally, in 2022 there is a "great shortage" of parks and green spaces.

1.2. Kashkadarya region: the situation in many districts of this region is very complicated. Especially in desert-like rural areas, the winter is harsh. This is because the trees have already been cut down. In the hilly areas of some densely populated districts, the population survives by cutting trees in the mountains. This, in turn, seriously harms the ecology and the mountain landscape.

1.3. In other regions, the situation is almost similar. In the provincial cities, which were considered evergreen areas, the number of trees is decreasing sharply. The main reason for this is the implementation of urban development projects. In densely populated districts (mainly villages), people have to buy coal or firewood at high prices during the winter months. The main reason for this is the implementation of urban development projects. The main reason for cutting trees is closely related to the lack of gas and electricity supply to heat the houses. As a result, it becomes too hot in the summer and other related problems occur

2) Urbanization, green areas, and solutions

Urbanization in Uzbekistan leads to the expansion of cities. Compared to other countries and

cities, this is happening much faster in Uzbekistan (data from social media). Cities are becoming less densely populated, suburban commutes are getting longer, and people are driving more. All this leads to a spatial change (reduction, displacement, or elimination) of green areas and thus to an increase in pollution. At the same time, this can lead to problems related to public health (Ibid). Situations such as the reduction of green spaces or illegal logging are related to the following factors. In urban and rural areas, energy networks and waste disposal are not well organized, so people often use individual heating on cold days. That is, people need firewood to get warmth. The result is degradation in every sense of the word (ESMAP, 2018). Seasonal pollutants build up in the city's air. This harms the health of the population. As a result, the city's residents are suffering more and more from heat and dust storms due to climate change.

Currently, the government is pursuing a policy of integrated landscape management to combine ecosystem services with higher productivity of forests, tree plantations, pastures, croplands, and irrigated lands. The government and local authorities are paying close attention to the development and expansion of green spaces in and around cities, and sufficient funds are being allocated for this purpose. For example, in Tashkent alone, there are 23 recreational parks and the area of greenery per capita is 5.5-meter square (State Committee for Statistics, 2021). However, the current models of urban development led to higher spending on urban infrastructure and a decrease in arable land around cities. This requires a significant expansion of green space in the city. Thus, the methods of urban geography can be used to solve the following tasks for the successful design of green spaces in cities: 1) It is possible to spatially study the negative effects of extreme heat, floods, and dust storms on the urban environment and inhabitants. Then it develops effective solutions. 2) It is possible to help update green space management plans in state urban planning in view of development.

3) Environmental Issues

Within the framework of the "Green Space" initiative, the State Forestry Committee of Uzbekistan has started the practical planting of shrubs on an area of 500,000 hectares (more than 930,000 soccer fields). This is because shrub planting reduces wind speed. According to the State Committee, more than 1.6 million tree and shrub seedlings were planted nationwide in 2020 under the greening program. (782 thousand in the provinces, 103 thousand in the capital). Nevertheless, the possibility of obtaining accurate data on how many trees are distributed in which area and how much "place" they occupy is currently limited.

However, on November 5, 2021, it was observed that a very dense and strong dust storm covered the southern regions (especially Tashkent and Syrdarya). According to meteorological observers, such a strong storm has not occurred since 1871. According to experts, the amount of dust reached 18,000 micrograms per cubic meter of air. In addition to dust, other harmful substances were also detected in the air (Social Media News, 2021). This extreme weather phenomenon is related to the Aral Sea problem. Most of the dust comes from the Aral Sea, which has dried up and turned into a desert due to changes in water supply for agricultural development since the 1960s. A huge desert has appeared in the dry part of the Aral Sea, saturated with toxic pollutants from industrial and agricultural waste. This situation led to a strong migration to cities and the emergence of an urban area with "unhealthy" air (UN, Development Program).

In addition, the Surkhandarya region (southern Uzbekistan) suffers from warm and dry winds called *Afghan winds* (Wikipedia). These winds move dust at a speed of 20-25 m/s. The wind poisons the air and threatens public health (UzNature.Uz, 2021). In the agricultural sector, it damages fertile soil layers. It leads to a decrease in agricultural productivity, which is a "blow" to the economic sectors of the region (Mukhitdinov, 1976; Mirzajonov, 1980)

Solutions: To combat the environmental threats Uzbekistan faces, the country has begun to attempt the transition to a green economy. If successfully implemented, the green economy would have a direct positive impact on urban life. This is because there are "poor areas" in Uzbekistan where water scarcity is increasing and there is a risk of desertification or salinization. For instance, although the area of forest plantations around the Aral Sea has reached 1.6 million hectares (UNESCO, 2020), 2 million hectares of land around the Aral Sea are affected by desertification and land degradation (Forestry Committee press).

4) The problem of desertification

Every minute 9 square meters of the territory of Uzbekistan become desert. Ecological and gynecological problems are increasing day by day. But combating desertification is not on the agenda for the time being (Institute of Seismology of Uzbekistan, 2021). According to the Institute of Seismology, one of the factors leading to desertification is the lack of rational organization of agriculture. Another cause is the improper grazing of livestock. When livestock are sent to graze, they eat the plants down to the roots. This accelerates the degradation process. Comprehensive monitoring of the progress and causes of the desertification process is needed.

Solutions: Geographical studies should be used to determine when and where cattle can be grazed and where agriculture can be practiced by creating appropriate maps and GIS databases. However, since there is no special institution in Uzbekistan dealing with the problem of desertification, the solution to this problem remains an urgent task for geographers. The establishment of the Institute of Geography will

increase the possibility of the scientific study of desertification, water problems, and the soil zone. Such an institute of geography can contribute to policies beneficial to Uzbekistan's future economy and public health. Finally, the GIS database will be very effective in reducing soil degradation to zero and in establishing a certification system for the energy efficiency of buildings in Uzbekistan.

8. Importance of geographical studies

It is necessary to prepare maps of places where windbreak and snow break forests are to be established in Uzbekistan's southern and southwestern regions. Geographic approaches and the applications of GIS will be of great use. With the help of GIS, it would be useful to create maps of the relevant zones where chemical cleaning against pests and diseases is to be carried out and to create a database. In addition, it is necessary to create an entomological and Phyto pathological map of all existing trees along the sites. In Uzbekistan, the seepage water is located near the ground. When there is less rainfall, the leachate rises and washes out the salt, causing salinization. There is not enough water to wash away the salinity. It is advisable to use geographic surveys to map areas where there is a high probability of water seeping into the ground and develop a policy accordingly. In this case, green lines of maple trees should be designated in these areas. This is because, firstly, the width of the maple leaf provides sufficient shade, and secondly, the veins retain rainwater.

9. Conclusion

Uzbekistan is a region that has the opportunity to create green spaces. It only requires the organization of green spaces through urban planning projects. According to the recommendations of WHO, 60 square meters of green space is needed. This shows how important green spaces are. The presence of green spaces in urban areas helps reduce car noise, exhaust fumes, and other harmful substances emitted by cars. “Green investments” are needed to establish green spaces. In addition, it is important to create “green jobs”, reduce air pollution, introduce renewable energy sources, and modernize cities. Since agriculture plays a major role in the issue of green spaces, it is necessary to reduce the destruction of land and forests by agriculture and livestock grazing. It is important to make appropriate maps and create a transparent database. Effective use of geography is the reason for developing successful policies in urban planning reform and land management. Therefore, it is necessary to study the issue of green areas in detail geographically. I emphasize that the government should give priority to the green areas of the city. Taking some central cities as examples, it would be appropriate to study the following in future studies: (1) Studying the location of the spatial points of green space use, who uses them, and the sequence of actions. (2) Learning sustainable spatial planning. (3) Analyzing problems related to green space management. (4) Investigating how important the role of existing green spaces is to city life. If this is done, it will help to collect some geographical data on the subject. It will be easier to determine the necessary measures to be used in planning urban green spaces. Thus, with the help of theoretical and applied geographic research, effective strategies can be developed to combat desertification, use forests wisely, and build green cities.

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