ISNN:2181-1296

SHAROF RASHIDOV NOMIDAGI
SAMARQAND DAVLAT UNIVERSITETI

САМАРКАНДСКИЙ ГОСУДАРСТВЕННЫЙ
УНИВЕРСИТЕТ ИМЕНИ ШАРОФА РАШИДОВА

SAMARKAND STATE UNIVERSITY NAMED
AFTER SHAROF RASHIDOV

ILMIY AXBOROTNOMA

НАУЧНЫЙ ВЕСТНИК
SCIENTIFIC JOURNAL

ANIQ VA TABIIY FANLAR SERIYASI

Matematika, Mexanika, Informatika
Fizika, Kimyo, Biologiya, Geografiya

№ 3/2 (157)
2026

ISSN 2181-1296

ILMIY AXBOROTNOMA

НАУЧНЫЙ ВЕСТНИК SCIENTIFIC JOURNAL

2026-yil, 3-son (157/2) ANIQ VA TABIIY FANLAR SERIYASI

Matematika, Mexanika, Informatika, Fizika, Kimyo, Biologiya, Geografiya

Samarqand viloyat matbuot boshqarmasida ro‘yxatdan o‘tish tartibi 09-25.
Jurnal 1999-yildan chop qilina boshlagan va OAK ro‘yxatiga kiritilgan.

BOSH MUHARRIR **R. I. XALMURADOV, t.f.d., professor**
BOSH MUHARRIR O‘RINBOSARLARI: **H.A. XUSHVAQTOV, f-m.f.d., dotsent**

TAHRIRIYAT KENGASHI:

Sh.A.Alimov	- O‘zFA akademigi	**M.X.Ashurov**	- O‘zFA akademigi
S.N.Lakayev	- O‘zFA akademigi (SamDU)	**B.J.Axmedov**	- O‘zFA akademigi
M.M.Kamilov	- O‘zFA akademigi	**Q.G‘.G‘ulomov**	- O‘zFA akademigi
A.G.Yagola	- Moskva davlat universiteti professori (Rossiya)	**A.A.Zaxidov**	-Texas Nanotexnologiya instituti professori (AQSh)
Alberto Del Bimbo	-Florensiya universiteti professori (Italiya)	**N.B. Ferapontov**	- Moskva davlat universiteti professori (Rossiya)
Sh.Tugizov	-Kaliforniya universiteti professori (AQSh)	**V.L.Popov**	-Berlin texnika universiteti professori (Germaniya)
A.S.Soleev	- f.-m.f.d., professor (SamDU)	**N.F.Bunkin**	- Moskva davlat texnika universiteti professori (Rossiya)
I.A.Ikromov	- f.-m.f.d., professor (SamDU)	**Haji Akber Aisa**	-Xinjiang tibbiyot universiteti professori (Xitoy)
B.X.Xo‘jayarov	- f.-m.f.d., professor (SamDU)	**E. A. Abduraxmonov**	- k.f.d., professor (SamDU)
L.Sabirov	-f.-m.f.d., professor (SamDU)	**N. K. Muxamadiyev**	- k.f.d., professor (SamDU)
A.Jumaboyev	-f.-m.f.d., professor (SamDU)	**L. A. Bulavin**	- Kiev milliy universiteti
X.Bozorov	-k.f.d., professor (SamDU)	**X. Q. Xaydarov**	- b.f.d., professor (SamDU)
O.Q.Quvondiqov	-f.-m.f.d. professor (SamDU)	**Z. I. Izzatullayev**	- b.f.d., professor (SamDU)
A.Z.Xasanov	-f.-m.f.d. professor (SamDU)	**A.B.Hasanov**	-tex.f.d., professor (SamDU)
Muhammad Suzuri bin Hitam	- Terengganu universiteti professori (Malayziya)	**Sh. T. Xoliqulov**	- q.-x.f.d., professor (SamDU)
K.D.Kuliyev	- f.-m.f .n. professor (SamDU)	**S. B. Abbosov**	- g.f.d., professor (SamDU)
A.M.Xolxo‘jayev	-f.-m.f.d., professor (SamDU)	**M.E. Mo‘minov**	-f.-m.f.d., professor (SamDU)
J.Abdullayev	-f.-m.f.d., professor (SamDU)	**I.I.Jumanov**	-tex.f.d., professor (SamDU)
A.R.Axatov	-tex.f.d., professor (SamDU)	**N.S.Mamatov**	-tex.f.d., professor (TIQXMMI)
D.B.Xursanov	- g.f.f.d., dotsent (SamDU)	**A.Sh.Yarmuxamedov**	-f-m.f.n., dotsent (SamDU)
F.Nazarov	-tex.f.d., dotsent (SamDU)	**X.S.Xaydarov**	-f-m.f.n., dotsent (SamDU)

Obuna indeksi – yakka tartibdagi obunachilar uchun **- 5583,**
tashkilot, korxonalar uchun **- 5584**

M U N D A R I J A
C O N T E N T S

№	Maqola nomi	Article title	Bet/ page
1.	Etil asetoasetat-xloroform klusterlaridagi o'zaro ta'sirlarni o'rganish uchun tebranish spektrlari va kvant-kimyoviy hisoblar va turli topologik tahlillar **Jumabayev A., Absanov A., Bulavin L., Ernazarov Z., Jurayev U., Safarov A., Boliyev A., Usmanov M.**	Vibrations spectra and quantum-chemical calculations and various topological analyses to study interactions in ethyl acetoacetate-chloroform clusters **Jumabaev A., Absanov A., Bulavin L., Ernazarov Z., Juraev U., Safarov A., Boliev A., Usmanov M.**	**5-17**
2.	$(CH_3)_2O{\cdot}HF$ kompleksining spektroskopik va izotopik parametrlarini hisoblash va tahlil qilish **Xujamov U., Asfin R., Boliev A., Usmonov M.**	Calculation and analysis of spectroscopic and isotopic parameters of the $(CH_3)_2O{\cdot}hf$ complex **Khujamov U., Asfin R., Boliev A., Usmonov M.**	**18-25**
3.	Mo-Nb tizimidagi ikkilik qattiq eritmalarining Xoll koeffitsiyenti va solishtirma elektr qarshiligining haroratga bog'liqligi **Kuvandikov O., Granovskii A., Hamraev N., Rajabov R., Hamraeva N.**	Temperature dependence of the hall coefficient and electrical resistance of binary solid solutions in the Mo-Nb system **Kuvandikov O., Granovskii A., Hamraev N., Razhabov R., Hamraeva N.**	**26-35**
4.	O‘zbekistonning ayrim hududlari tuproqlari va oziq-ovqat mahsulotlarida radionuklidlar **Axmedova G., Tuxtayev U., Ernapasova M., Fayzulloyeva M.**	Radionuclides in soils and food products of certain regions of Uzbekistan **Axmedova G., Tuxtaev U., Ernapasova M., Fayzulloeva M.**	**36-44**
5.	Fayllar faolligini nazorat qilish orqali ichki tahdidlarni aniqlash tizimi arxitekturasini takomillashtirish **Muxamadiyev F.**	Enhancing the architecture of an insider threat detection system through file activity monitoring **Mukhamadiev F.**	**45-55**
6.	Suv muhitlarini tozalash uchun magnitli boshqariladigan sorbentlar asosi sifatida FE_3O_4/ALGNP superparamagnit nanokompozitining sintezi va strukturaviy-morfologik tavsifi **Abilkosimova G., Aronbaev D., Aronbaev S.**	Synthesis and structural–morphological characterization of a superparamagnetic FE_3O_4/ALGNP nanocomposite as a basis for mag-netically controlled sorbents for water purification **Abilkosimova G., Aronbaev D., Aronbaev S.**	**56-64**
7.	Integral manbali nochiziqli KdV(+1) va KdV(−1) tenglamalari kombinatsiyasidan tashkil topgan tenglamani integrallash **Ermamatova F., Xasanov G.**	Integration of the equation composed of a combination of nonlinear KdV(+1) and KdV(-1) equations with an integral source **Ermamatova F., Khasanov G.**	**65-73**
8.	Andijon va Osh agglomeratsiyalari Farg‘ona vodiysining transchegaraviy urbanizatsiya tizimi sifatida **Nizamiev A., Isayev A., Nurmatov N.**	Andijan and Osh agglomerations as a transboundary urbanisation system of the Fergana valley **Nizamiev A., Isaev A., Nurmatov N.**	**74-78**
9.	$BaTiO_3$ asosidagi perovskit materiallarning sintezi, strukturaviy tavsifi va optik xossalari **Baxranova M., Muhamadiyev N., Xalilov K.F.**	Synthesis, structural characterization and optical properties of $BaTiO_3$-based perovskite materials **Bakhranova M., Mukhamadiev N., Khalilov K.F.**	**79-89**
10.	Turli sintez sharoitlarida olingan $SrTiO_3$ perovskit nanopartikullarining strukturaviy va optik xossalari **Hayitova M.M., Muhamadiyev N.K.**	Structural and optical properties of $SrTiO_3$ perovskite nanoparticles as a function of synthesis conditions **Hayitova M.M., Mukhamadiev N.K.**	**90-94**
11.	Kvertsetin–Mo^{3+} kompleksining sintezi va struktur tavsifi **Qosimov S.E., Nazmutdinov R.R., Muhamadiyev N.Q., Muhamadiyev A.N., Xakimov F.X.**	Synthesis and structural characterization of the quercetin–Mo^{3+} complex **Kosimov S.E., Nazmutdinov R.R., Mukhamadiev N.Q., Mukhamadiev A.N., Khakimov F.X.**	**95-101**

№	Maqola nomi	Article title	Bet/ page
12.	Tabiiy stabilizator yordamida olingan Fe_3O_4 va $CoFe_2O_4$ nanostrukturalarining struktural, morfologik, elektron va magnit xususiyatlarini o‘rganish **Fayziyeva G., Uzokov J., Muhamadiyev A., Usmonova H., Begmatov R., Muhamadiyev N.**	Study of structural, morphological, electronic and magnetic properties of Fe3O4 and CoFe2O4 nanostructures obtained with the help of a natural stabilizer **Fayzieva G., Uzokov J., Mukhamadiev A., Usmonova Kh., Begmatov R., Mukhamadiev N.**	**102-113**
13.	Fe konsentratsiyasining ZnO nanostrukturalarining optoelektron xossalari va fotokatalitik faolligiga ta’sirini o‘rganish **Arzimurodova X., Muhamadiyev N., Usmonova H., Uzokov J.**	Study of the effect of fe concentration on the optoelectronic properties and photocatalytic activity of ZnO nanostructures **Arzimurodova Kh., Mukhamadiev N., Usmonova H., Uzokov J.**	**114-121**
14.	Montmorillonit va laponit: ularning interkallanish istiqbollari va asosida adsorbentlar yaratish **Masharipova Z.R., Abdikamalova A., Kenjaev A., Masharipov K., Alieva M., Mamodoliyev I.**	Montmorillonite and laponite: prospects of their intercalation and the development of adsorbents based on them **Masharipova Z.R., Abdikamalova A., Kenjaev A., Masharipov K., Alieva M., Mamodoliyev I.**	**122-129**
15.	Tabiiy sirt faol moddalar asosida mezog‘ovak kremnezem superkondensatorlar olish va ularning fizik kimyoviy xossalarini baholash **Vokhidov A., Uzokov J., Muhamadiyev A., Muhamadiyev N.**	Preparation of mesophose silica supercapacitors based on natural surfactants and evaluation of their physicochemical properties **Vokhidov A., Uzokov J., Mukhamadiev A., Mukhamadiev N.**	**130-139**
16.	Suspenziyani doimiy bosim ostida radial filtr orqali filtrlash jarayonining sonli yechimi **Saydullaev U., Juraev N.**	Numerical solution of suspension filtration through a radial filter under constant pressure **Saydullaev U., Juraev N.**	**140-150**
17.	Impregnatsiyalangan yong‘oq danagi asosida olingan faollashtirilgan uglerodning organik va noorganik ifloslantiruvchilarni adsorbsiyalash sig‘imini oshirish **Ergasheva D., Muhamadiyev A., Muhamadiyev N., Uzokov J.**	Improving the adsorption capacity of activated carbon derived from impregnated walnut shells toward organic and inorganic pollutants **Ergasheva D., Mukhamadiev A., Mukhamadiev N., Uzokov J.**	**151-161**
18.	Fulleren C_{60} molekulasi yuzasida CH, CH_2 va CH_3 uglevodorod parchalarining adsorbsiyasi **Jabborov Kh.I., Rasulov A. Kh., Alyabev D.V.**	Adsorption of hydrocarbon fragments CH, CH_2 and CH_3 on the surface of the fullerene C_{60} molecule **Jabborov Kh.I., Rasulov A. Kh., Alyabev D.V.**	**162-167**
19.	Kvant hisoblash, kriptografiya va blokcheyn texnologiyalarini integratsiyalashgan xavfsiz aloqa tizimini modellashtirish **Muhamediyeva D.T., Tagayev F.A.**	Modeling a secure communication system integrating quantum computing, cryptography, and blockchain technologies **Muhamedieva D.T., Tagaev F.A.**	**168-177**
20.	Ilmiy ekspertiza va nazorat jarayonlarini raqamlashtirishning funksional modeli va foydalanish senariylarini ishlab chiqish **Latifov F.M., Xonimqulov N.A., Mahmanov O.Q.**	Development of a functional model and use scenarios for digitalization of scientific expertise and control processes **Latifov F.M., Khonimkulov N.A., Mahmanov O.Q.**	**178-186**
21.	Magnezioferrit mineralining magnit va elektr xossalarini eksperimental hamda DFT usulida o‘rganish **Kuvandikov O.K., Shodiyev Z.M., Xasanov X.B.**	Experimental and DFT study of magnetic and electrical properties of the mineral magnesioferrite **Kuvandikov O.K., Shodiev Z.M., Khasanov Kh.B.**	**187-194**

UDC: 911.375(575.1+575.2) https://doi.org/10.59251/2181-3973.2025.v1.138.1.3959

ANDIJAN AND OSH AGGLOMERATIONS AS A TRANSBOUNDARY URBANISATION SYSTEM OF THE FERGANA VALLEY

A.Nizamiev[1], **A.Isaev**[2], **N.Nurmatov**[2]
[1]Osh State University, Osh, Kyrgyzstan.
[2]Andijan State University, Andijan, Uzbekistan.

A.Nizamiev Osh State University, Osh, Kyrgyzstan.

Received: 22.06.2026
Revised: 28.06.2026
Accepted: 17.07.2026
Published: 30.07.2026

Publisher: Samarkand State University named after Sharof Rashidov.

Abstract. The accelerating urbanization of the Fergana Valley has produced one of the densest settlement systems in Central Asia, yet the agglomerations that anchor this system are habitually examined within national borders, as if the state frontier that bisects the valley had also severed the functional ties between neighbouring cities. This article questions that habit. It treats the Andijan agglomeration in Uzbekistan and the Osh agglomeration in Kyrgyzstan as a single, politically divided, transboundary urbanization system and asks how the Uzbek–Kyrgyz boundary reshapes the geometry and intensity of each. Drawing on official demographic statistics, field reconnaissance, comparative agglomeration indices and GIS-based boundary mapping, the study delimits the influence zones of both cores and measures their concentration through an agglomeration centralisation coefficient. The results show that Andijan forms a classic monocentric agglomeration whose pull radius reaches 50–60 km, whereas Osh, stripped of its historical western hinterland by the border, displays a truncated and far more centralised structure. Pendulum migration, retail gravitation and the Kara-Suu cross-border market nonetheless bind the two cities along a 47–50 km corridor. The scientific contribution is the conceptualisation of the pair as a bi-national agglomeration; the practical value lies in cartographic and planning implications for managing cross-border interaction within a shared, resource-scarce basin.

Keywords: agglomeration, cross-border interaction, Fergana Valley, monocentric agglomeration, pendulum migration, settlement system, transboundary urbanization, urbanization.

Andijon va Osh agglomeratsiyalari Farg‘ona vodiysining transchegaraviy urbanizatsiya tizimi sifatida

Annotatsiya. Farg‘ona vodiysida urbanizatsiyaning jadallashuvi Markaziy Osiyodagi eng zich aholi joylashuv tizimlaridan birini shakllantirgan, biroq ushbu tizimning tayanchi bo‘lgan agglomeratsiyalar odatda milliy chegaralar doirasida o‘rganiladi. Maqolada O‘zbekistondagi Andijon agglomeratsiyasi va Qirg‘izistondagi Osh agglomeratsiyasi siyosiy jihatdan bo‘lingan, ammo yagona transchegaraviy urbanizatsiya tizimi sifatida ko‘rib chiqiladi hamda O‘zbek–Qirg‘iz davlat chegarasi har ikkala agglomeratsiyaning shakli va ta‘sir doirasini qanday o‘zgartirishi tahlil qilinadi. Rasmiy demografik statistika, dala kuzatuvlari, qiyosiy agglomeratsiya koeffitsiyentlari va GAT asosidagi chegaralarni kartografiyalash yordamida har ikki yadroning ta‘sir zonalari ajratilib, ularning markazlashuvi agglomeratsiya markazlashuv koeffitsiyenti orqali baholandi. Natijalar shuni ko‘rsatadiki, Andijon ta‘sir radiusi 50–60 km ga yetadigan klassik monotsentrik agglomeratsiyani hosil qiladi, Osh esa chegara tufayli g‘arbiy hinterlandidan mahrum bo‘lib, kesilgan

va ancha markazlashgan tuzilishga ega. Shunga qaramay, mayatniksimon migratsiya, savdo tortilishi va Qorasuv transchegaraviy bozori ikkala shaharni 47–50 km uzunlikdagi koridor bo‘ylab bog‘lab turadi. Tadqiqotning ilmiy hissasi ushbu juftlikni binatsional agglomeratsiya sifatida konseptuallashtirishdan iborat.

Kalit so‘zlar: agglomeratsiya, aholi joylashuv tizimi, Farg‘ona vodiysi, mayatniksimon migratsiya, monotsentrik agglomeratsiya, transchegaraviy o‘zaro ta‘sir, transchegaraviy urbanizatsiya, urbanizatsiya.

Андижанская и Ошская агломерации как трансграничная система урбанизации Ферганской долины

Аннотация. Ускоряющаяся урбанизация Ферганской долины сформировала одну из самых плотных систем расселения Центральной Азии, однако агломерации этой системы обычно изучаются в пределах национальных границ. В статье Андижанская агломерация (Узбекистан) и Ошская агломерация (Кыргызстан) рассматриваются как единая, хотя и политически разделённая, трансграничная система урбанизации. На основе официальной демографической статистики, полевых наблюдений, сравнительных коэффициентов и ГИС-картографирования определены зоны влияния обоих ядер и рассчитан коэффициент централизации агломерации. Показано, что Андижан образует классическую моноцентрическую агломерацию с радиусом влияния 50–60 км, тогда как Ош, лишённый границей своего западного хинтерланда, имеет усечённую и более централизованную структуру. Маятниковая миграция, торговое тяготение и рынок Кара-Суу связывают оба города вдоль коридора длиной 47–50 км. Научный вклад состоит в концептуализации этой пары как бинациональной агломерации.

Ключевые слова: агломерация, маятниковая миграция, моноцентрическая агломерация, система расселения, трансграничная урбанизация, трансграничное взаимодействие, урбанизация, Ферганская долина.

Introduction. The Fergana Valley is one of the most densely populated and most intensively cultivated lowlands of Central Asia, and its urbanization has advanced unevenly across the three states—Uzbekistan, Kyrgyzstan and Tajikistan—that share it. Within Uzbekistan the valley provinces are the leaders of national urbanization, and Andijan region alone, with an urbanization level of roughly 52 per cent, concentrates a large share of the country’s urban population [1]. The valley’s settlement system is, however, a paradox: it is intimate enough that Andijan lies only about fifty kilometres from Osh, yet the two cities are routinely treated as if they belonged to entirely separate urban worlds [2].

That separation is, to a considerable degree, an artefact of how agglomerations are studied. National statistical conventions stop at the frontier, and so does most of the literature on the urbanization of the basin. The agglomeration—the functional cluster of a core city and the settlements drawn into its daily orbit—is almost always delimited inside a single republic, even where the built-up fabric, the labour market and the retail trade visibly spill across the border. The present study reframes the question. It treats the Andijan agglomeration and the Osh agglomeration as two halves of one transboundary urbanization system, and it asks a specific question: how does the Uzbek–Kyrgyz boundary reshape the form, the reach and the cross-border interaction of each?

The relevance of this question has grown sharply in recent years. After a long period of closure, the Do‘stlik–Dostyk crossing between Andijan and Osh was reopened to regular traffic in 2019, and in 2022 the two states ratified a final treaty delimiting most of their common border. As the

frontier hardened legally but softened functionally, pendulum migration, petty trade and the bi-national bazaar at Kara-Suu revived. Planning for this corridor therefore needs an analytical lens that does not stop at the customs post. The aim of this paper is to supply one—by delimiting, comparing and mapping the two agglomerations as a single settlement system, and by drawing out the practical implications of their cross-border interaction.

Literature review. The notion of the urban agglomeration has a long pedigree. Gottmann's study of the north-eastern seaboard of the United States gave the discipline its vocabulary for coalescing urban regions [3], while the Soviet and post-Soviet school of geourbanistics, associated above all with Lappo and Pertsik, formalised the agglomeration as a measurable object—distinguishing monocentric from polycentric forms, defining the role of pendulum migration, and proposing coefficients of agglomeration development and centralisation [4; 5]. This apparatus remains the natural starting point for any analysis of a monocentric agglomeration such as Andijan.

For the Fergana Valley specifically, a productive body of work has accumulated. Studies of the stages and economic-geographic drivers of urbanization in Uzbekistan have clarified why the valley urbanised later but now leads the country [2], and detailed regional research has described the Andijan agglomeration as a monocentric structure built on the Andijan core, stretching meridionally for some thirty kilometres and exerting influence across most of the province [6]. Parallel work on the population and labour resources of the valley provinces has mapped the demographic pressure that feeds this urbanization [1], and geoecological studies have catalogued its environmental costs. What unites almost all of this literature is a methodological boundary: the agglomeration is delimited within Uzbekistan, and the Kyrgyz settlements a few dozen kilometres to the east simply fall off the map.

The border itself, however, has its own rich literature. Megoran's biography of the Uzbekistan–Kyrgyzstan boundary and Reeves's ethnography of border work both show how the Soviet national delimitation of the 1920s cut through a single settled fabric, awarding the Uzbek-majority town of Osh to the Kyrgyz republic and, in the process, depriving it of much of its natural hinterland [7; 8]. These studies explain why Osh's agglomeration cannot be understood without reference to the frontier. Yet they treat the border as a political and social object, not as a force that deforms an urban agglomeration's geometry. The gap, then, is clear: no existing study reads Andijan and Osh together as one cross-border agglomeration system. This article addresses that gap.

Research methodology. The analysis rests on four data streams. Demographic and settlement data for the Uzbek side were drawn from the official statistics of the Statistics Agency under the President of the Republic of Uzbekistan [9]; the Kyrgyz figures come from the National Statistical Committee of the Kyrgyz Republic [10]; comparative urbanization indicators were checked against United Nations urbanization estimates [11]; and these were supplemented by field reconnaissance along the Andijan–Kara-Suu–Osh corridor. National boundary geometry for the cartographic work was processed in a geographic information system, and the two agglomerations' influence zones were delimited and overlaid on the real Uzbek–Kyrgyz frontier.

To compare the internal structure of the two agglomerations, an agglomeration centralisation coefficient was computed, expressing the share of the whole agglomeration's population that is held by its core:

$$Kc = P_n / P_a \,, \tag{1}$$

where Kc is the centralisation coefficient, P_n is the population of the nucleus (the core city) and P_a is the total population of the agglomeration. A value approaching unity indicates an agglomeration overwhelmingly dominated by its core; a lower value indicates a more balanced settlement system in which satellite towns carry a substantial share of the population. The influence zone of the Andijan agglomeration was delimited following the four-tier gradation of daily linkages established in regional research [6], while that of Osh was traced from its continuous built-up area together with the surrounding Kara-Suu district. The principal limitation is that the influence boundaries are schematic rather than cadastral, and that systematic data on cross-border commuting remain sparse.

Analysis and results. The Andijan agglomeration is a textbook monocentric agglomeration. Its core, the city of Andijan, has passed 477 thousand inhabitants, while the wider agglomeration approaches one million; the built-up axis runs meridionally for about thirty kilometres from Poytug' in the north to Asaka in the south, and the city's pull radius reaches 50–60 km, embracing Asaka, Shahrixon, Marhamat, Xo'jaobod and a ring of smaller towns through four descending tiers of influence [6]. Applying formula (1) with $P_n \approx 477$ thousand and $P_a \approx 1{,}000$ thousand yields a

centralisation coefficient of roughly 0.48—the signature of a strong but not overwhelming core, balanced by a genuine network of satellite towns.

The Osh agglomeration tells a different story. The core city held about 322 thousand inhabitants at the 2021 estimate, and the contiguous built-up area, taken together with the neighbouring Kara-Suu district, is usually put at around 400 thousand. Here the centralisation coefficient rises to roughly 0.80. That high value is not a sign of metropolitan strength; it is the cartographic fingerprint of the border. Osh was historically the market centre for a hinterland that the 1924–1929 delimitation placed on the Uzbek side of the new frontier, and the boundary has since amputated the western half of its natural orbit [7]. Deprived of those satellite settlements, the Osh agglomeration appears compact and intensely centralised—a truncated agglomeration rather than a balanced one.

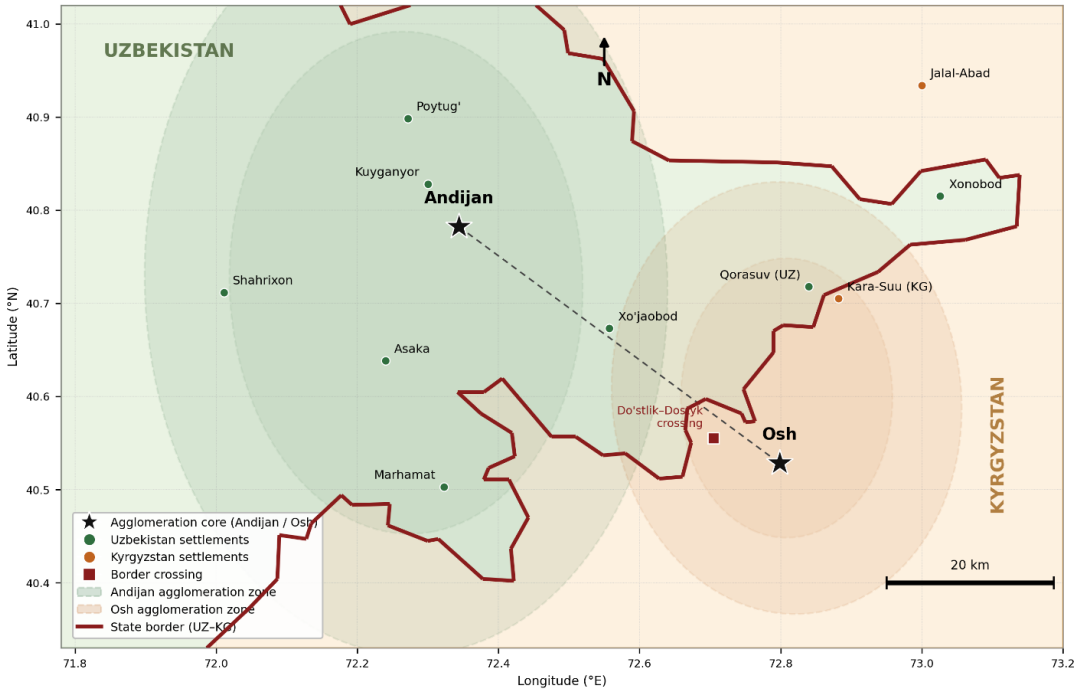

Figure 1. The Andijan and Osh agglomerations and the Uzbekistan–Kyrgyzstan state border in the Fergana Valley (compiled by the authors on real national boundary data).

Table 1. Comparative parameters of the Andijan and Osh agglomerations

Parameter	Andijan agglomeration	Osh agglomeration
State	Uzbekistan	Kyrgyzstan
Core-city population (thousand, approx.)	477	322
Agglomeration / built-up population (thousand, approx.)	1,000	400
Structural type	Monocentric	Monocentric (truncated)
Linear / meridional extent of the core	30 km	20–25 km
Radius of influence	50–60 km	30–40 km
Centralisation coefficient Kc (formula 1)	0.48	0.80
Dominant cross-border node	Qorasuv (UZ)	Kara-Suu (KG)

Source: compiled by the authors from [1; 6; 9; 10] and field data.

Read side by side, the two coefficients quantify exactly what the map in Figure 1 shows. The Andijan zone fans out symmetrically across its province; the Osh zone is sheared off along its western edge, pressed against the frontier. Yet the same map also reveals that the two agglomerations do not end at the border—they reach toward one another. The corridor that runs from Andijan through Qorasuv on the Uzbek side to Kara-Suu and Osh on the Kyrgyz side measures only about 47–50 km,

and along it the cross-border interaction is tangible. The Do‘stlik–Dostyk crossing, reopened in 2019, carries frequent marshrutka traffic; the twin Kara-Suu bazaars form a single bi-national retail gravity field; and pendulum migration, the classic indicator of agglomeration integration, links labour markets on both sides.

Taken together, these findings support reading Andijan and Osh as one transboundary urbanization system rather than as two unrelated agglomerations. The combined population drawn into the corridor exceeds 1.4 million, and the two cores share not only a labour and retail field but also a single set of environmental constraints—competition for the same scarce irrigation water, the same air-shed, and the same fragmenting agricultural land. The 2022 border treaty, by stabilising the frontier, has if anything strengthened the case for treating the pair as a bi-national agglomeration, because predictable borders make cross-border interaction easier to plan for.

Conclusion and recommendations. This study set out to read two agglomerations that are conventionally studied apart as a single transboundary urbanization system, and the evidence supports that reading. Andijan is a classic monocentric agglomeration with a balanced satellite network and a centralisation coefficient near 0.48; Osh is a truncated agglomeration whose coefficient near 0.80 is a direct measurement of the hinterland that the Uzbek–Kyrgyz border removed. The frontier does not sever the system, however—pendulum migration, the Kara-Suu market and the short Andijan–Osh corridor keep the two cores in continuous cross-border interaction.

Several practical recommendations follow. First, the two municipalities and their national agencies would benefit from a shared, GIS-based monitoring framework that maps the corridor as one settlement system rather than two provincial fragments. Second, infrastructure along the Qorasuv–Kara-Suu axis—roads, the Do‘stlik–Dostyk crossing capacity, and market facilities—should be coordinated bilaterally, since its users are bi-national by definition. Third, pendulum migration and cross-border labour mobility deserve to be measured and managed jointly, not treated as informal residue. Fourth, the shared water, land and air resources of this corner of the Fergana Valley call for joint environmental management. Finally, and most generally, master plans on both sides of the border should explicitly recognise Andijan and Osh as a bi-national agglomeration—a recognition that would let the considerable urbanization energy of the corridor be guided rather than merely observed.

References

1. Qodirov R.B. Effective use of population and labour resources of the provinces of the Fergana Valley: Doctor of Science (DSc) dissertation, 11.00.02 – Economic and social geography. Tashkent: National University of Uzbekistan, 2021. 232 p.
2. Qurbonov P.R. Main stages of the development of urbanization processes in Uzbekistan // Scientific Journal of Fergana State University. 2023. Vol. 29, No. 3. DOI: 10.56292/SJFSU/vol29_iss3/a165.
3. Gottmann J. Megalopolis: The Urbanized Northeastern Seaboard of the United States. New York: The Twentieth Century Fund, 1961. 810 p.
4. Lappo G.M. Geography of cities (Geografiya gorodov). Moscow: Vlados, 1997. 480 p.
5. Pertsik E.N. Geourbanistics (Geourbanistika). Moscow: Academia, 2009. 432 p.
6. Qosimov X.S. Economic-geographic aspects of the development of the cities of Andijan region: PhD dissertation, 11.00.02 – Economic and social geography. Nukus: Berdakh Karakalpak State University, 2024. 150 p.
7. Megoran N. Nationalism in Central Asia: A Biography of the Uzbekistan–Kyrgyzstan Boundary. Pittsburgh: University of Pittsburgh Press, 2017. 320 p.
8. Reeves M. Border Work: Spatial Lives of the State in Rural Central Asia. Ithaca: Cornell University Press, 2014. 312 p.
9. Statistics Agency under the President of the Republic of Uzbekistan. Demographic indicators of Andijan region. Tashkent, 2024. URL: https://stat.uz.
10. National Statistical Committee of the Kyrgyz Republic. Resident population of Osh city and Osh region. Bishkek, 2024. URL: https://stat.gov.kg.
11. United Nations, Department of Economic and Social Affairs, Population Division. World Urbanization Prospects: The 2018 Revision. New York: United Nations, 2019.

SAMARQAND DAVLAT UNIVERSITETI ILMIY AXBOROTNOMASI

НАУЧНЫЙ ВЕСТНИК SCIENTIFIC REPORTS

Texnik muharrir **Sh.Xoliqulov**

Muharrirlar:

I.Sulaymonov - fil.f.d., dotsent
E.Arziqulov - f.-m.f.d., dotsent
O.Yusupova - fil.f.n., dotsent

Mas'ul muharrir:

A. Sh. Yarmuxamedov - f.-m.f.n.

Muassis: Samarqand davlat universiteti Manzil: 140104,
Samarqand shahri, Universitet xiyoboni, 15.
Telefon: (0 366) 240-38-47, Faks: (0 366) 239-13-87 e-mail:
axborotnoma.uz
SamDU «Ilmiy axborotnoma» jurnali tahririyati kompyuterida terildi. Bosishga 30.07.2026-yilda ruxsat etildi. Qog'oz o'lchami A-4. Nashriyot hisob tabog'i 10,00
Buyurtma raqami 860. Adadi 30 nusxa.

ISSN 2181-1296