

**COMPARATIVE GEOGRAPHIC AND CARTOGRAPHIC ANALYSIS  
OF POST-WAR CHANGES IN THE BORDER STRIP OF THE PSOU  
RIVER SECTION OF THE GEORGIAN-RUSSIAN STATE BORDER**

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**Abstract.** Subject of the study is a comparative geographic and cartographic analysis of the post-war changes in the border strip of the Psou River section of the Georgian-Russian state border. An important section of the northwestern section of the state border of Georgia is the border across the Psou River, which occupies the second place in the border region of the country in terms of length (after the Alazani River) among the border rivers. As a result of long-term transformational processes, the border along this river was formed on the basis of a historical connection with a neighboring state and represented a sufficient contact area, characterized by intensive economic ties. As a result of the well-known events of the 90s of the last century, this section of the border has not been controlled by Georgia for the last 30 years, which created socio-economic problems on the border zone (Georgia side) and caused depopulation of settlements. Therefore, the geographical study and analysis of this space is a topical issue.

Based on studies conducted on electronic versions of topographic maps published in the 70-80s of the last century, a geographic and cartometric analysis of this section of the border zone was carried out. Obtained data is compared with modern satellite images and orthophotomaps. The results of the study are presented in tables and graphs.

**Keywords:** *State border, Psou river, topographic maps, border zone, geography.*

An important part of the northwestern section of the state border of Georgia is the border passing through the Psou River, which is territorially located in the Gagra zone. Psou ranks second in length among the border rivers in the country's border zone (after the Alazani River) [3]. As a result of long-term transformational processes, the border along this river was formed on the basis of a historical connection with a neighboring state and represented a fairly contact area, which was also characterized by an intensive economic connection. As a consequence of the well-known events conducted in 90s of the 20th century, this section of the border was not controlled by Georgia for the last 30 years, which created socio-economic problems in the border zone (from Georgia), which caused the lowering of settlements. Therefore, the geographical study and analysis of this space is a topical issue.

The formation of the state border of Georgia in the part of Abkhazia has a long history and was characterized by significant transformations (changes in geographical location) [1]. In 1921, Soviet power was established in Abkhazia and the Abkhazian SSR was proclaimed on its territory within the boundaries of the Sukhumi district until 1904. In 1922-1928, the Transcaucasian SFSR demanded from the Russian SFSR to transfer the border to the Psou River, north-west of the Abkhazian SSR on basis of the 1920 agreement. It was implemented in 1929[3].

Since the beginning of the 90s, important socio-economic changes have been taking place on the section of the Psou River in the Georgia-Russia state border zone, which is associated with the consequences of the war in Abkhazia, provoked by the Russian Federation.

The data obtained by our study on electronic versions of topographic maps published in the 70s and 80s are compared with modern satellite images and orthophotomaps. As a result of the geographic and cartometric analysis of the research results, the data obtained are presented in tables.

When conducting research, topographic maps and their electronic counterparts, as well as Google Earth maps were mainly used.

When processing information obtained from different scales, cartographic forms of comparison and analysis were used (graph-analytical method, determination of plan and height coordinates, etc.), methods of mathematical analysis and approximation.

The land border of Georgia with the Krasnodar Territory of the Russian Federation is 84.25 km long (according to a map at a scale of 1: 50,000) and Psou river cover 53.77 km of it.

In order to simplify the coordination of the location of points of the state border line and bring them into a single system of mutual location, we carried out picketing along the border line from the selected place of the starting point of the river section (Fig. 1). When picketing, the distance between the pickets (5 km) was determined taking into account the significant

length (53.77 km) of this section of the state border. The boundary line from the starting point of the river section follows the Psou valley in such a way that its left side is on the territory of Georgia, and the right side is on the territory of Russia [3].

Drawing the border along the river also has a negative side - drawing the border in this way often leads to an artificial division of settlements, which is also associated with geographical and economic difficulties. For example, in the Psou section as a border line, the choice of a river type in the border area of Georgia caused the problem of the village of Aibga, which is still divided into two parts - the left one is under the jurisdiction of Georgia, and the right one belongs to the Russian Federation, although it is a single economic complex. Due to the complexity of the terrain, the road connecting the left bank of the Aibga with the Black Sea coast passed along the right bank of the river. By this decision, part of Georgia was also forced to unite with its own state through the Russian Federation. If in the Soviet period such a situation created only economic difficulties and was associated with excessive spending of the time budget, then after the restoration of Georgia's jurisdiction in Abkhazia, this will also be given political significance. Therefore, our country will be forced to build the most difficult 14-kilometer section of the road connecting Aibgi with the Leselidze resort. The village of Aibga, whose territorial affiliation has repeatedly changed in the recent past, has faced the same problem in the modern period, since it has become the subject of a territorial dispute between the Russian Federation and the so-called. “the government of Abkhazia” [2].

In this part of the border, the first section of the right side ( $\approx 18$  km) is occupied by settlements and agricultural land adjacent to them. Here, on the Georgian side, the main settlement is the village Leselidze - characterized by a quarterly layout, developing along the coast in the direction from S/A to N/W (Fig. 1). From the South East to Northwest the village is limited by the railway line, which it crosses a little. At the same place in the northern the village of Salme, begins the villages that are part of Kheivani Community - and in it the village Kultubani.

At  $\approx 9$  km from PK 0, begins the village of Sulevo, which is part of the Leselidze community and has a quarterly layout, which is bordered on the north side by the left Pkhista River, tributary of the Psou, beyond which the village of Salkhino begins, which is part of the Mikelripshi community and stretches along the Psou River (for example, a school) and private estates extends almost to the village and Tsodniskari. The community center of the village of Mikelripshi is more spread to the east, its quarters are located along the main road, and the village of Demerchentsi, which is part of its community, is actually a suburb and does not have administrative and other buildings.

An improved dirt road ends on the left side of the Psou River, near the village of Tsabliani, which actually consists of several dwellings. The river enters a narrow valley, the width of which

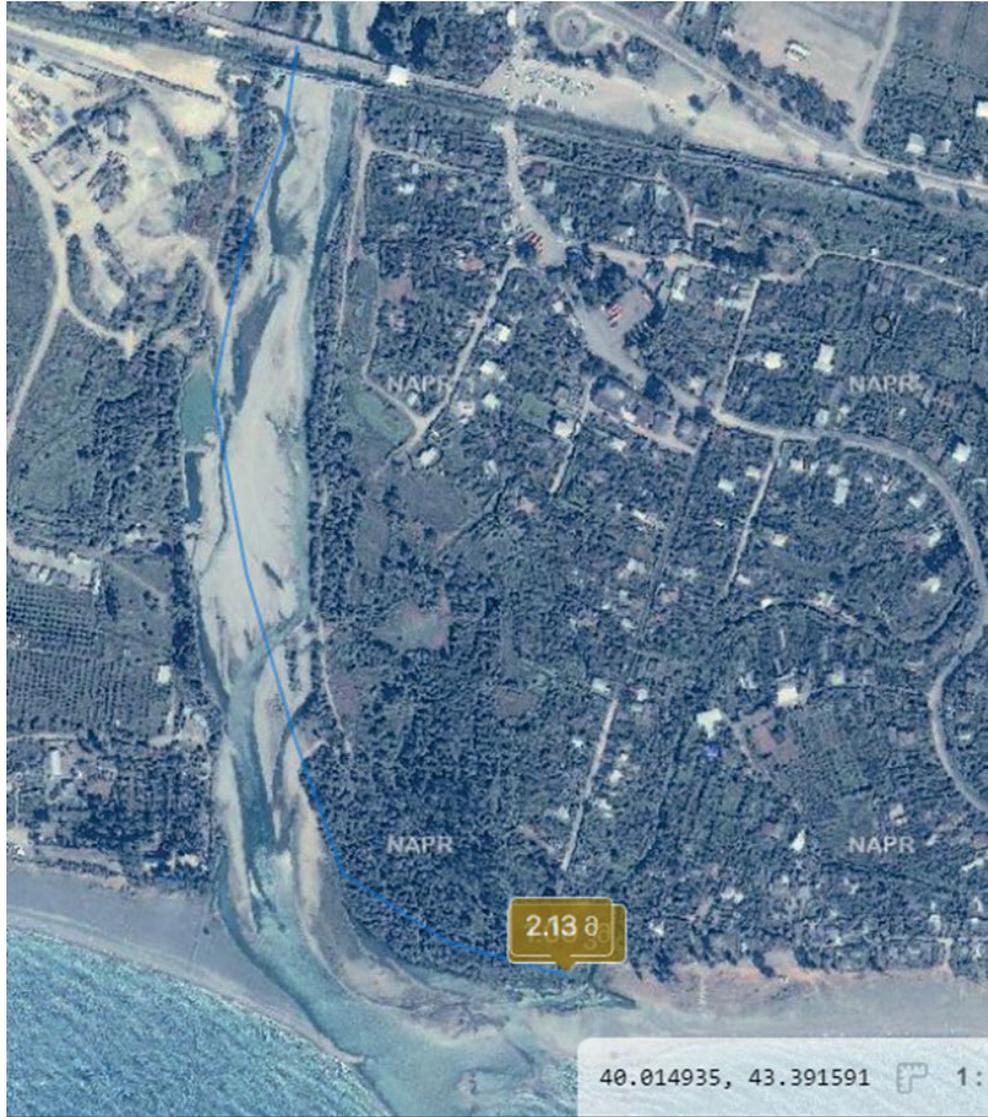


Fig. 1. River Location of the mouth of the Psou on a satellite image  
(the blue line shows the border on a topographic map at a scale of 1:50000)

fluctuates between 50-100m. The right side stretches in a wider strip and a dirt road is laid here. This continues for about 6.5 km, after which a dirt road crosses the iron bridge on the right side, that continues to the village of Aibga. The Georgian part of Aibga is located on both sides of the river Katarkha, connected with each other and with the right side by bridges. The village of Aibga is the last village of this outlier, the northern tip of Georgia is also located here - on the bridge across the Psou River ( $\varphi=43.5862$ ;  $\lambda=40.2420$ ; X=600267.439; Y=4826663.049) [4, 5].

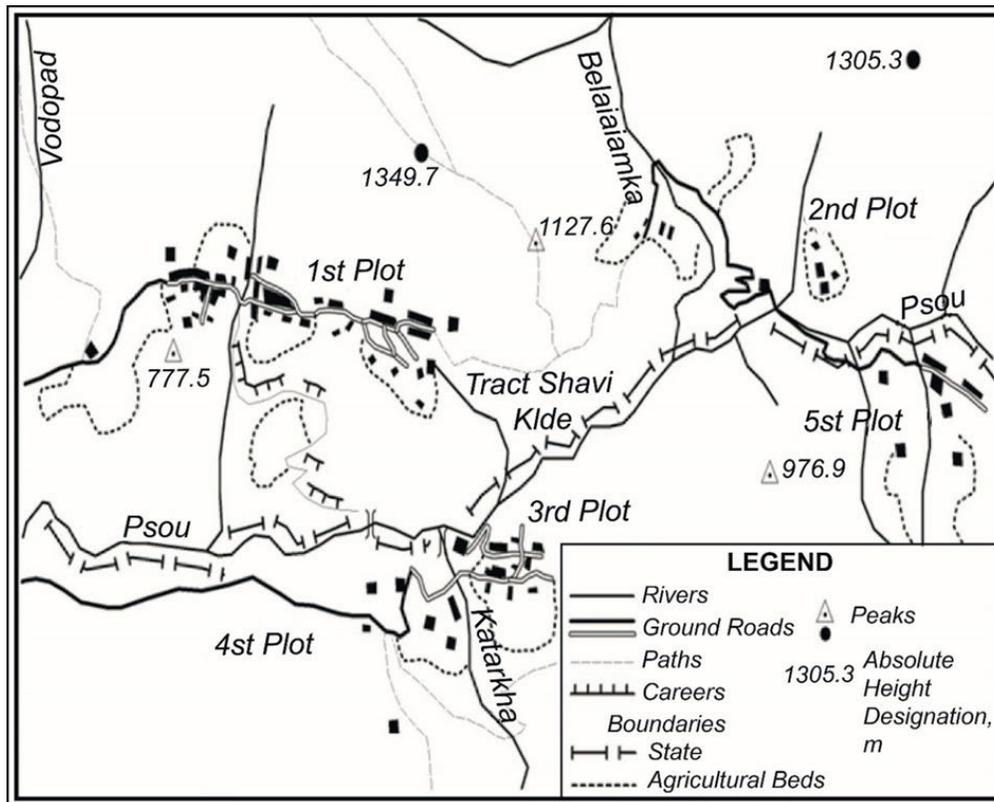


Fig. 2. Village location of Aibga (According to the topographic map of the 1970-80s).

(D. Nikolaishvili, R. Tolordava)

The road network in this section of the state border zone is unevenly developed. This is especially true for its quality. So, for example, if in the coastal strip (the village Leselidze), the coastal street, and the highway running along the right side of the railway (Tbilisi-Leselidze) are asphalted, then the internal roads are paved. For the rest of the part, the asphalt road goes only in a northerly direction, through the centers of settlements, and ends at the village of Tsabliani. From the northern shore of Mikelripshi, an asphalt road separates from it, which ends at the agricultural farm. The rest of the territory is covered with dirt, improved dirt and field roads [4, 5].

The border zone, the depth of which was 2 km on the Georgian side, has now been expanded to 11 km from the state border and includes eight settlements - Bagripshi, Khashpshi, Khishkha, Mekhadiri, Mkialripshi (Mikelripshi), Lapstakha, Giatchripshi and Tsandripshi. According to the data of 1959, the number of the population in these villages looked like (table 1), [6].

Table 1. Number of population in border zone villages

N	Name		Destination	Number of population	
	Georgian	Abkhazian		1959	2011
1	Leselidze	Giatchripsh	township/resort	646 (2964)*	1500
2	Salme		village	1268	1659 **
3	Soul		village	1050	880**
4	Kheivani		village	3040	1303
5	Gantiadi	Tsandripsh	township	5281	5170
6	Khashupse	Khashpstar	village	303 (975) *	271
7	Baghnari	Khishkha	village	520 (1050) *	334
8	Nakaduli	Makhadir	village	682 (1565) *	1779
9	Mkialripshi	Mkialripsh	village	250 (1348) *	326
10	Tsalkoti	Lapstarkha	village	638	724**

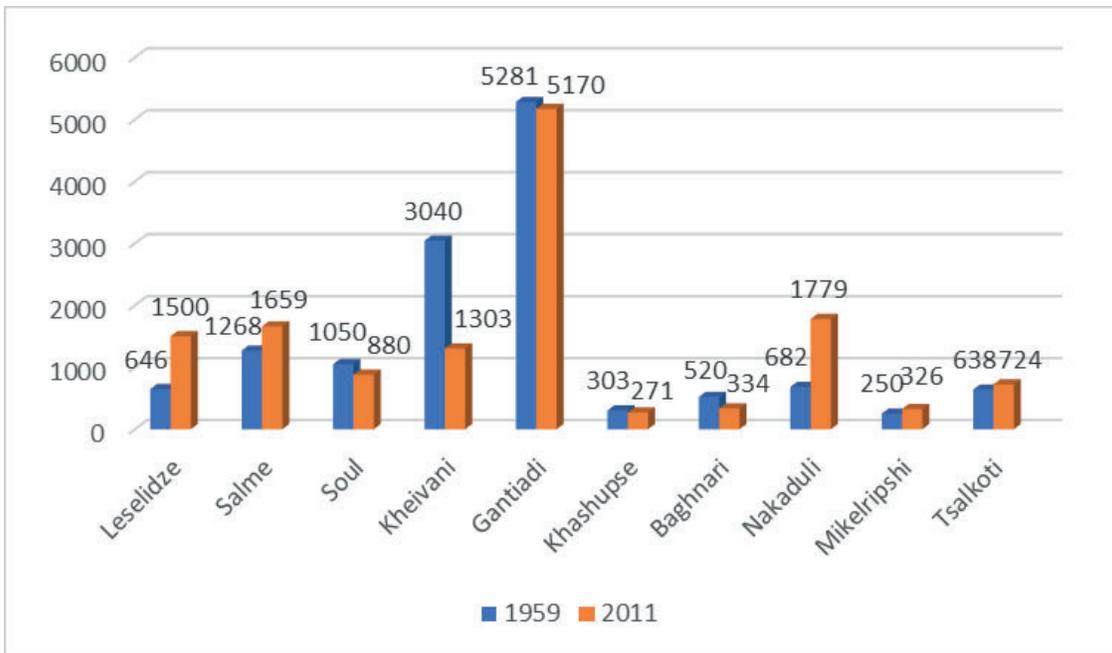


Fig. 3. Population change of settlements located in the border zone in 1959-2011

60-year (1959-2020) dynamics of the population change in the border area can be observed on the example of Mikelripshi village (Table 2).

Table 2. Population change in the border village of Mikelripshi in 1959-2020.

1959	1970	1979	1989	2003	2011	2015	2016	2017	2018	2019	2020
5281	7206	6990	7358	4387	5170	5096	5069	5038	5010	4989	4963

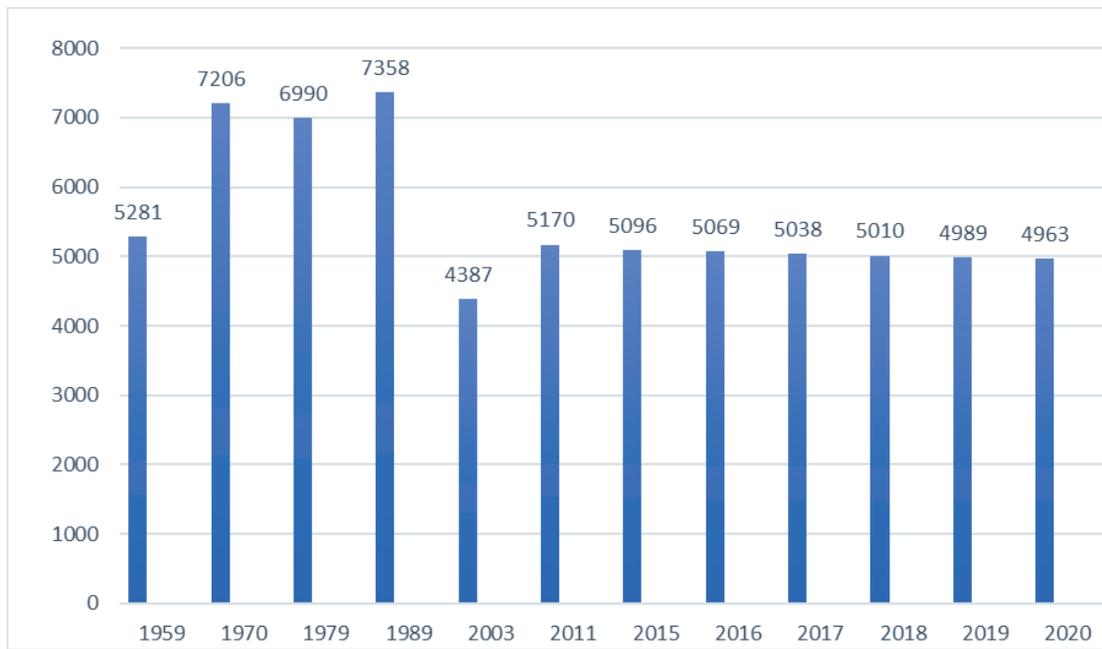


Fig. 4. Dynamics of population change in the village of Mikkelrifsh 1959-2020

As for economic activities the analysis of satellite images and orthophotos showed that the changes on the right bank of the Psou river (in terms of renewal) are more impressive than on the Georgian one. This is especially noticeable in the coastal zone and along the Psou river, where agricultural activity is observed - new plantations, country houses, etc. are laid. (for example, a settlement was built on a free area of up to 8 hectares on the opposite side of the village of Mikelripshi (Fig. 5).

On the part of Georgia, there is a suspension of agricultural activities and a trend of afforestation. For example, a satellite image shows that houses in one of the districts on the left side of Aibga are completely destroyed [5] (Fig. 6).



Fig. 5. New building on the right bank of Psou

Table 3. Absolute heights and rectangular coordinates of border pickets and intersections with important objects

N	Picketage	Object name	Coordinates		H
			Y	X	
1	P K 0	Crossing point of the river border with the baseline of territorial waters, the beginning of this section of the border	4804122.50	581748.94	-0.46
2	P K 0+260	North-western tip of the island	4804413.98	581625.04	
3	P K 0+940	Crossing point of river and railway bridge R.4x160	4805067.05	581598.10	
4	P K 0+1110	Motor bridge over the river (ir $\frac{120-10}{80}$ )	4805224.60	581627.30	



Fig.6. The modern situation of Aibga village

5	P K 0+1590	Right unnamed tributary of Psou	4805694.12	581657.05	
6	P K 0+2130	Beginning of an island	4806238.05	581689.24	
	P K 0+2346	Tip of an island	4806492.45	581701.88	
7	P K 0+2860	3.59 km long river dams on the right side of Psou, 100m from the river	4806859.38	581934.04	
8	P K 0+3940	Nameless pool located 230 m to the right from Psou	4808009.88	582061.13	45.0
9	P K 0+4640	The confluence of the left nameless tributary of the Psou	4808514.62	581712.51	50.0
10	P K 1		4808606.30	581831.98	47.8
11	PK 2		4812465.66	584223.43	
12	P K 2+1790	The confluence of Pkhista river, which is the right tributary of the Psou river	4814007.62	584483.42	65.0

13	P K 2+2360 P K 2+2710	Beginning of an island Tip of an island	4814512.76 4814787.76	584665.04 584775.27	
14	P K 2+4880	Windmill located on the left side of Psou river	4816715.01	585553.91	145.0
15	P K 3		4816820.56	585678.65	
16	P K 3+130	The confluence of the left nameless tributary of the Psou	4816916.31	585719.71	230.0
17	PK 3+3970	Motor bridge 45-4/10	4819632.76	588104.24	
18	PK 4		4820546.49	588496.72	
19	P K 4+4890	The confluence of Arkva river which is the left tributary of Psou river	4824590.97	589354.84	233.0
20	PK 5		4824632.88	589447.74	271.0
21	P K 5+940	Motor bridge ( $\frac{13-4}{10}$ )	4824565.57	590308.08	270.0
22	P K 5+1190	Small island	4824459.20	590566.74	275.0
23	PK 5+1680	The confluence of the right nameless tributary of the Psou	4824288.18	590974.76	
24	P K 6	The confluence of Vodopad river which is the right tributary of Psou river	4825069.38	593841.76	440.0
25	P K 6+3850	Motor bridge ( $\frac{26-3}{3}$ )	4825407.27	597141.82	480.0
26	P K 6+4350	Wooden bridge ( $\frac{6-4}{10}$ )	4825395.48	597596.14	484.0
27	P K 6+4390	The confluence of Katarkha river which is the right tributary of Psou river	4825411.85	597665.17	484.0
28	PK 7		4825556.90	598130.60	
29	P K 7+1710	The confluence of the left nameless tributary of the Psou	4826370.45	5994741.7	550.4
30	P K 7+2590	Motor bridge ( $\frac{12-2}{3}$ )	4826663.44	600261.42	613.0

31	P K 7+3900	The confluence of Mendelikha river which is the left tributary of Psou river	4826644.63	601563.29	622.2
32	PK 8		4826092.26	602195.08	
33	P K 8+710	The confluence of the left nameless tributary of the Psou	4825778.05	602763.83	696.0
34	P K 8+1090	The confluence of Arashkha river which is the right tributary of Psou river	4825858.41	603126.33	
35	PK 8+2990	The confluence of Katarkha river which is the right tributary of Psou river	4825109.76	604645.76	775.0
36	PK 9		4825898.65	606107.92	
37	P K 9+150	The confluence of Glubokaia river which is the left tributary of Psou river	4825759.80	606169.22	940.0
38	PK 10		4824051.45	610018.81	
39	PK 11		4823340.19	614551.37	
40		Headland of Psou river	4823341.53	614854.86	2111.0

On topographical maps with a scale of 1:50000, having created a 5 km picket line along the border, it was possible to bring 40 geographic objects into a single system. As well as coordinate 40 geographic objects along the Psou river section of the Georgian-Russian state border with the determination of their physical and geographical characteristics.

Based on electronic versions of topographic maps of different scales, published in the 70-80s of the last century and on orthophotos obtained in the recent period (2015-2020), a geographical-cartometrical analysis of the border zone was carried out. Some indicators of post-war social-economic transformations are determined by the method of comparison of received data.

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საქართველო-რუსეთის სახელმწიფო საზღვრის მდინარე ფსოუს  
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*წარდგენილია ცხუმ-აფხაზეთის მეცნიერებათა აკადემიის I საერთაშორისო კონფერენციის სამეცნიერო კომიტეტისა და გეოგრაფიისა და ტურიზმის ინსტიტუტის მიერ*

**აბსტრაქტი.** საქართველოს სახელმწიფო მიჯნის ჩრდილოეთ-დასავლეთ მონაკვეთის მნიშვნელოვან ნაწილს წარმოადგენს მდინარე ფსოუზე გამავალი საზღვარი, რომელიც ქვეყნის სასაზღვრო სივრცეში სიგრძით მეორე ადგილს იკავებს (მდ. ალაზნის შემდეგ) სასაზღვრო მდინარეებს შორის. საზღვარი ამ მდინარეზე ხანგრძლივი ტრანსფორმაციული პროცესების შედეგად, მეზობელ სახელმწიფოსთან ისტორიული ურთიერთობის საფუძველზე ჩამოყალიბდა და საკმაოდ კონტაქტურ მონაკვეთს წარმოადგენდა, რომელიც ინტენსიური ეკონომიკური კავშირითაც გამოირჩეოდა. გასული საუკუნის 90-იანი წლების ცნობილი მოვლენების შედეგად საზღვრის ამ მონაკვეთზე ბოლო 30 წელია საქართველოს მხრიდან კონტროლი ვერ ხორციელდება, რამაც სასაზღვრო ზონაში (საქართველოს მხარის) სოციალურ-ეკონომიკური პრობლემების შექმნა და დასახლებული ადგილების დაცლა გამოიწვია. აქედან გამომდინარე, მოცემული

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ნაშრომში გასული საუკუნის 70-80-იან წლებში გამოცემული ტოპოგრაფიული რუკების ელექტრონულ ვერსიებზე ჩატარებული კვლევების საფუძველზე ჩატარებულია სასაზღვრო ზონის მოცემული მონაკვეთის გეოგრაფიულ-კარტომეტრიული ანალიზი, მიღებული მონაცემები შედარებულია თანამედროვე სატელიტურ სურათებთან და ორთოფოტოებთან. კვლევის შედეგები ასახულია ცხრილებსა და გრაფიკებში.

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