Geolinguistics in the linguocognitive learning model: The experience of teaching hydronyms in universities in Kazakhstan

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Abstract

The article examines the role of hydronyms as linguistic and cognitive units in the system of teaching geolinguistics at universities in Kazakhstan. The study was conducted within the framework of descriptive and cognitive approaches, based on the ethnographic analysis methodology (according to Spradley, 2013) and methods of interpreting linguistic data (according to Sudaranto, 2015). The empirical base includes written sources (toponymic dictionaries, maps, regional reference books) and oral materials collected during semi-structured interviews with native speakers and students of linguistics. The analysis covers three areas: (1) etymology and semantics of hydronyms, including the origin of the names and their relation to the natural and climatic conditions of the region; (2) morphological structure and cognitive schemes reflecting the features of conceptualization of water bodies in linguistic consciousness; (3) philosophical and cultural understanding of hydronyms, where the names of water bodies are interpreted as a reflection of human interaction with nature, the spiritual world, and the social environment. The results of the study show that hydronyms carry culturally significant concepts, such as: human and nature (water as a symbol of life, path, purification); human and the sacred (the connection of water with religious and mythological concepts); linguistic diversity, where elements of Kazakh, Russian, Turkic, and Arabic languages are combined in the structure of hydronyms. Teaching geolinguistics based on a linguocognitive approach and the analysis of hydronyms contributes to the development of spatial thinking, ethnocultural competence, and an interdisciplinary view among students of philological and pedagogical fields. This is especially relevant in the context of multilingualism and cultural diversity in Kazakhstan.

Keywords: Geolinguistics, Higher education, Hydronyms, Interdisciplinary training, Kazakhstan, Linguocognitive model, Toponymy.

1. Introduction

The study of names and their meanings is the subject of onomastics, a branch of linguistics focused on the study of proper names. Names play a central role in linguistic interaction and reflect the most important aspects of the cultural and cognitive picture of the world. As Cornilescu, A. notes, names in English most often represent nominal groups (NP) classified as proper names (proper nouns) [1]. They have both unique denotative and rich connotative significance, as also described by Dickins [2].

A specific area within onomastics is toponymy, the study of geographical names, derived from the Latin words "topos" ("place") and "onoma" ("name"). The term toponomastics, which was officially recognized at the International Congress of Onomastic Sciences in 2011, is used to describe this field. Toponymy encompasses the naming of natural, anthropogenic, and administrative entities, including water bodies (hydronyms). These names are documented and standardized at the national level in topographic indexes (gazetteers) and follow the guidelines established by the UN Group of Experts on Geographical Names (UNGEGN).

In the Kazakh context, hydronyms are of particular value not only as elements of geographical identification but also as linguistic and cognitive signs that form students' understanding of space, culture, and language. The teaching of geolinguistics using the analysis of hydronyms makes it possible to integrate linguistics, cognitive science, and cultural studies, forming an interdisciplinary approach in higher education.

The importance of standardization of geographical names at the state level is emphasized in a number of regulatory documents of the Republic of Kazakhstan aimed at preserving historical and cultural heritage, ensuring territorial integrity, and developing Kazakh identity. Thus, Kazakhstan has a number of legislative acts regulating toponymic issues, including the Law "On Languages in the Republic of Kazakhstan" and resolutions on the standardization of geographical names.

Geographical names, in particular hydronyms, are not only tools for spatial orientation but also important cultural artifacts formed by the interaction of language, history, and the environment. The hydronyms of Kazakhstan (for example, Yesil, Yertis, Shu, Sarysu, Koless) reflect the ancient ideas of the people about water as a source of life, a border, a sacred object, and a resource. These names often have Turkic, Arabic, Iranian, and Slavic roots, which indicates the complex linguistic and ethnocultural history of the region.

To understand hydronyms, it is necessary to take into account the cognitive and cultural context of their origin: by whom and for what purpose they were named, in what historical epoch and linguistic environment. An integrated approach, including field research, dialogue with the local population, and the study of old maps and written sources, allows us to uncover the semantics of names and their philosophical and cultural implications.

Despite the availability of research, there is currently no complete and systematic data on the percentage distribution of toponyms (including hydronyms) in rural districts or districts of Kazakhstan, taking into account linguistic sources, morphological structures, and philosophical and cultural meanings. In this regard, this study aims to:

1. Identification of toponymic units and identification of the source of origin and language;
2. Description of morphological constructions of names;
3. Interpretation of meanings and philosophical representations in the names of villages and districts recorded in the hydronymics of the Republic of Kazakhstan.

2. Literature Review

In the context of higher education, the linguistic and cognitive study of hydronyms is becoming an effective tool for developing students' geolinguistic competence, interdisciplinary thinking, and research skills. The inclusion of the topic of hydronymy in training courses in linguistics, geography, and local history contributes to the formation of a holistic perception of language as a form of conceptualization of the environment among future specialists.

Li, S., Kit, C., and Cheng, L. emphasize the importance of coordination, communication, and information transfer in modern linguistics, based on computational linguistics data: the frequency of proper names, including toponyms and anthroponyms, in newspaper texts reaches 33.92% [3]. This indicates the significant role of names, both personal and geographical, in human life and in the structure of language. According to Bakhtiyarovna [4], toponymy is the science that studies geographical names (toponyms), their origin, meaning, functioning, and typology [4].

The special significance of toponymy lies in the fact that it performs the functions of preserving cultural heritage and forming national identity [5]. Toponyms not only reflect the features of the landscape, history, and worldview of the people but also serve as a mechanism for the preservation and development of local languages. In this context, the use of local languages in naming geographical features plays a key role in strengthening national identity and linguistic diversity.

Based on the concept of Chafe [6], language is considered a symbolic expression of human experience [6]. Language is inseparable from action and serves as a form of cultural representation. In this context, the naming of geographical objects, such as hydronyms, functions as a cultural and cognitive act that reflects the mental and behavioral models of an ethnic group. Therefore, hydronyms in Kazakhstan, Irtysh, Yesil, Shu, Tobyl, and others carry cognitive information about the environment, the value system, and the historical development of society.

Studying hydronyms as part of a university course in geolinguistics allows students to understand the connection between language, space, and culture, as well as develop skills in linguistic and cognitive analysis. This is especially relevant in the multiethnic and multilingual environment of Kazakhstan, where issues of preservation and reinterpretation of cultural and linguistic heritage are becoming a priority.

Morphological analysis is one of the key grammatical aspects of language, along with syntax. According to Haspelmath and Sims [7] A's definition, "morphology is the science that studies morphemes and their arrangement in the formation of words," that is, this field of linguistics studies the structure of words and ways of word formation. In the context of linguistics and the teaching of hydronymy at the university, the morphological analysis of toponyms (in particular, hydronyms) plays an important role in identifying the semantic structure and cognitive features reflecting the cultural heritage of the people [7].

Lieber [8] identifies the main morphological processes: zero derivation, affixation, reduplication, abbreviation, composition, and reverse derivation [8]. The affixation process is especially significant in Kazakh and Russian hydronyms one of the basic mechanisms of word formation. For example, Kazakh names of reservoirs often contain the affixes -su, -ozen (river), -kol (lake), reflecting the functional and geographical significance of the object: Koksu ("blue water"), Shalkarkol ("big lake"). In Russian, the suffixes -ka, -ec, -ovo function in a similar way: Lake, River, Syrdarya (Arabic origin with adaptation).

As noted by Van Goethem [9] the morphological process includes fixation, reduplication, acronymization, and conversion [9]. In the teaching of geolinguistics and the linguocognitive analysis of hydronyms, these processes enable students to uncover the internal structure of the name, its etymology, and the semantic image embedded in the culture of the people.

According to Tektigul et al. [10] language is an instrument of cultural representation through which cultural symbols are formed and transmitted [10]. In this sense, hydronyms act as verbal representations of natural objects and mental constructions. Kayumova [11]. emphasizes that representation can be expressed through words, images, narratives, emotions, and ideas, that is, everything that we find in hydronyms as parts of a textual, cultural, and linguistic system [11].

One of the most interesting regions of the Republic of Kazakhstan for studying hydronyms is East Kazakhstan, particularly the territories adjacent to the Irtysh, Bukhtarma, and Ulba rivers, as well as the lakes Zaisan, Alakol, and Markakol. East Kazakhstan has long served as a crossroads of cultures, ethnic groups, and religions — from Turkic and Kazakh tribes to Russian immigrants, Uighurs, Tatars, and other ethnic groups. This diversity is reflected in the region's hydronymic landscape, where the names of reservoirs serve as linguistic and cultural markers associated with historical experiences, mythology, natural symbols, and religious beliefs.

Hydronyms, as elements of linguistic representation, form an understanding of the mental and cultural map of a region. The names of rivers and lakes are often of ancient Turkic, Arab-Persian, or Russian origin, demonstrating processes of linguistic and cultural interaction. For example, the name of the Irtysh River traces back to the ancient Turkic word artysh, which means "flowing" or "to flow." Lake Alakol means "mottled lake" (ala mottled, kol lake), reflecting visual perception of the object. Such hydronyms become valuable material for analyzing cognitive mechanisms of naming, cultural associations, and the linguistic picture of the world.

The regional context of East Kazakhstan serves as a basis for linguistic and cognitive research. In teaching linguistics at the university, hydronyms are utilized as a means of mastering interdisciplinary approaches, including morphological, semantic, and cognitive analysis. This enables students to view toponymy not only as a linguistic phenomenon but also as a form of cultural and historical self-expression of the community.

Some studies in the field of toponymy, on which this work is empirically based, are represented by the works of [12].

Crețan [13] explores toponymy using an analysis of the vocabulary used by the inhabitants of the village of Bigar, located in Banat (southern Romania) [13]. The population speaks Czech of Bohemian origin. Local place names are classified into four languages: Czech, Serbian, Romanian, and German. The Czech language is mainly used in microtoponyms. The study systematized more than 150 toponyms, analyzed in terms of geographical features, linguistic origin, structure, and motivation of the name.

Lindsay [14] study on the toponymic system in Yogyakarta is based on the socio-cultural differentiation of territories, in particular, the juxtaposition of "palace" and "non-palace" regions [14]. This juxtaposition reflects the influence of cultural centers on the formation of place names. In Kazakhstan, hydronyms located near sacred sites (mausoleums, religious complexes), which often carry religious and ethnic symbolism, can be considered in a similar way. For example, hydronyms such as Auliye suy and Kieli bulak demonstrate a connection between the name and the cultural and religious significance of an object, which is of particular interest in the framework of linguistic and cognitive analysis.

The work of Mateos [15] shows that toponyms reflect not only geographical features, but also the mental, cultural and spiritual codes of an ethnic group [15]. This position is directly correlated with the Kazakh experience, where many

hydronyms were formed under the influence of Turkic, Arabic, and Persian cultural traditions. For example, the names of the rivers Sarysu, Shu, Talas, Yrgyz, etc., have a multi-layered etymology, including natural descriptions, mythological images, and historical associations. The analysis of such names in the university course of geolinguistics allows students to develop interdisciplinary thinking that combines linguistics, history, geography, and ethnology.

The work of Aipova et al. [16] are also relevant for the Kazakh scientific and educational context, as they emphasize the role of ancient Turkic place names in the formation of ethnocultural consciousness [16]. In the conditions of independent Kazakhstan [17] it is impossible to rethink and teach national history without referring to historical names recorded in the inscriptions of the Orkhon-Yenisei script, as well as in legends and ethnographic materials. The use of a cognitive-discursive approach to the study of such hydronyms makes it possible to identify deep mental structures peculiar to ancient and modern native speakers of the Kazakh language.

Research in the field of toponymy, including hydronymy, in the context of Kazakhstan is actively developing thanks to the work of such scientists as [18]. Their scientific works emphasize that the naming of water bodies is not only a geographical necessity but also a reflection of linguistic consciousness, ethnocultural experience, and historical memory of the people.

Thus, in their works, Yeginbayeva et al. [19] noted that the hydronyms of Kazakhstan were formed under the influence of Turkic, Arabic, Mongolian and Russian language traditions, as well as as a result of interaction with the natural environment Yeginbayeva et al. [19]. Ayapbekova et al. [20] studied hydronyms in the light of regional peculiarities, highlighting such motivational features as: physical and geographical features (ozen, kol, bulak), mythological and sacred meanings (Karasu, Kieli bulak), as well as socio-historical memory (hydronyms associated with the names of khans, batyrs, and significant historical events).[20].

The works of Kaimuldinova et al. [21] emphasize the role of hydronyms as cognitive markers through which it is possible to identify the peculiarities of people's thinking, their attitude to water as a source of life, border, and sacred space [21]. He also points out that the linguistic and cognitive analysis of hydronyms can be effectively used in an educational environment, particularly in the courses of geolinguistics and cultural linguistics at universities.

The study by Kenbayeva et al. [22] examines the methodology of teaching linguistic disciplines using regional toponymic data, including hydronyms, as a means of activating students' cognitive activity and forming their interest in their native land [22].

Unlike previous studies, special attention in the framework of onomastic research is paid to hydronymy, the science of naming water bodies. This field is also actively developing in the Kazakh scientific tradition. In particular, Rasulov et al. [23] explore hydronyms in the context of historical and cultural heritage and cognitive linguistics [23].

In a number of her works, Butanaev [24] emphasizes that the hydronyms of Kazakhstan reflect human ideas about nature, the sacred meanings of water, as well as historical processes, including the resettlement of peoples, land development, and interaction with the environment [24].

In turn, Jalgasbayevna [25] in research on regional onomastics, hydronyms are identified as an important component of the linguocognitive picture of the world. She considers water names not only from the point of view of their etymology and morphological structure but also as markers of collective memory and ethnocultural identity [25]. For example, hydronyms such as Sarysu, Karasu, and Zhaiyk carry rich semantics related to color, sanctity, the direction of the current, or geographical location.

In line with research similar to Stenberg's work, Kazakhstani researchers also analyze the history and spatial distribution of hydronyms, considering them as an important element of cultural and ethnolinguistic heritage. Thus, Karibaev et al. [26] study the historical evolution of settlements along the major rivers of Kazakhstan (Irtysh, Syrdarya, Zhaiyk, Ili, etc.), identifying links between geographical features and the origin of water names [26].

One study conducted by Meyliev and Kholbekov [27] analyzed data on more than 1,500 water bodies in Kazakhstan, including rivers, lakes, and tributaries. Using cartographic sources, field materials, and archival documents, she conducted an inventory of the hydronyms, clarifying their origin, lexico-semantic structure, and correspondence to the natural or anthropogenic environment [27]. Lexemes of Turkic, Arabic, Persian, and Russian-speaking origin were identified, and key types of motivation, geographical features, animal and plant images, names of historical figures, and sacred meanings were also identified.

The results of the analysis showed that the distribution of hydronyms is closely related to both the natural environment and the historical and ethnic characteristics of the settlement of the peoples of Kazakhstan, as well as economic activity. For example, the names of the rivers Karasu, Taldy, and Zhamansu indicate the features of the water or terrain, while Auliye-Bulak or Bekarys contain sacred and anthroponymic elements.

3. Materials and Methods

This study, devoted to the analysis of hydronyms within the linguocognitive learning model, was conducted using a descriptive-qualitative method and an ethnolinguistic approach in the context of teaching geolinguistics at universities in Kazakhstan [28]. The basis was data on the hydronyms of the Atyrau region, collected from linguistic, cartographic, and ethnographic sources, as well as through interviews with local residents, teachers, and students.

The research included a morphological and semantic analysis of the names of water bodies, the determination of their cognitive and cultural significance, as well as the identification of the didactic potential of hydronyms in the formation of geolinguistic and linguocultural competence of students. The theoretical basis was formed by the works of Khusinova, J. M. on semantic representation, which made it possible to interpret hydronyms as important representatives of the linguistic picture of the world and means of activating interdisciplinary thinking of students [29].

The sources of the study and the selection criteria were administrative data for the Atyrau region, which includes 7 districts, comprising 72 rural districts and more than 150 settlements, including villages and towns.

4. Results and Discussion

The results of a study of hydronyms, conducted based on an analysis of the names of villages and towns in the Atyrau region, allow us to classify the data according to two main criteria: (a) the source of origin of the name and (b) the linguistic basis, with an appropriate percentage distribution.

4.1. Sources of the Names' Origin

From the perspective of sources of origin, the toponyms of rural and settlement names in the Atyrau region primarily derive from natural and geographical objects, among which a specific group consists of hydronyms associated with water bodies. This underscores the significant role of water resources in shaping spatial cognition and the cultural and linguistic heritage of the region. The diagram below illustrates the frequency of various sources of place names in the studied region and serves as a visual analysis tool within the framework of the linguocognitive model for teaching geolinguistics at Kazakhstani universities.
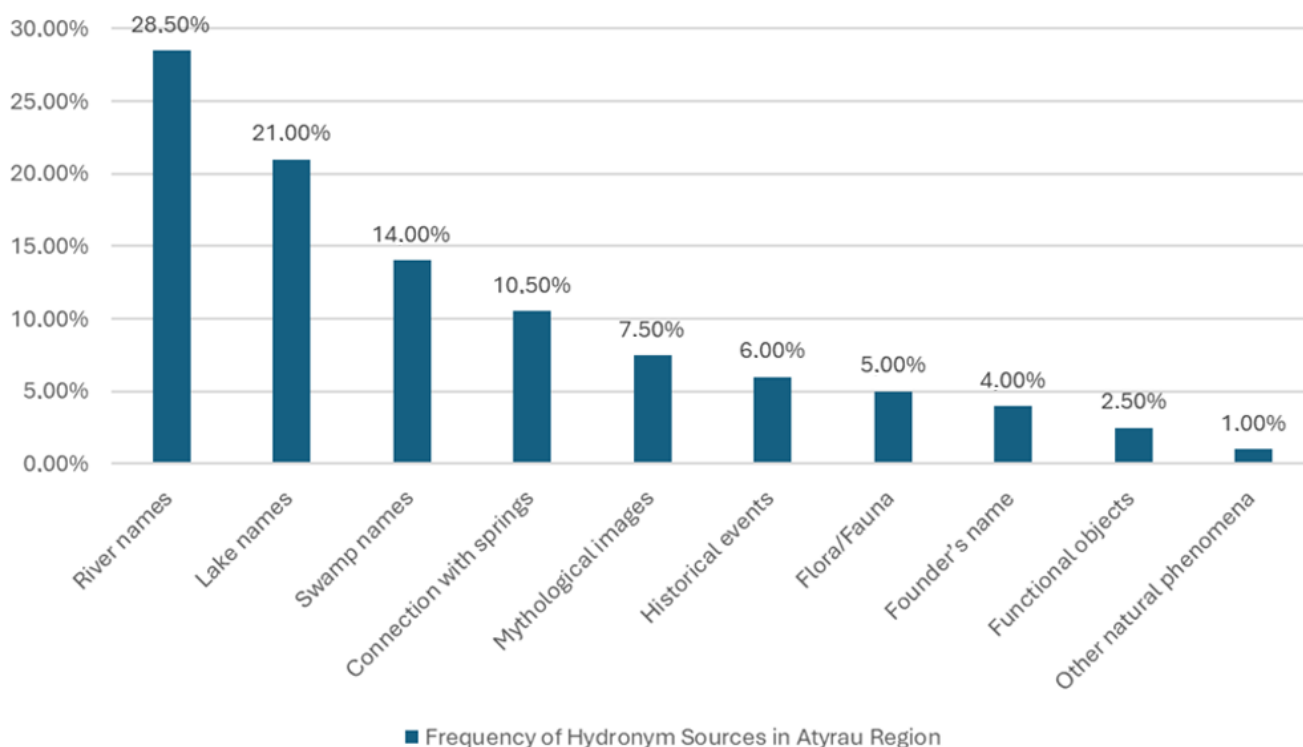

Figure 1.
Frequency of Hydronym Sources in Atyrau Region.

The analysis of the diagram reflecting the frequency of occurrence of sources of names of water bodies in the Atyrau region allows us to identify ten key categories. Hydronyms derived from river names are in the first place they account for 28.5% of all names, reflecting the leading role of river systems in the physical, geographical, and cultural structure of the region. The second place is occupied by names associated with swamps (21%), followed by lake toponyms (14%), which indicates the importance of stagnant and swampy reservoirs in the national picture of the world. Approximately 6% of hydronyms trace back to historical events and names of personalities, consolidating elements of cultural memory into toponymy. This is followed by names reflecting the functional purpose of water (5%), as well as hydronyms based on the color symbolism of water (5%) and sound associations with natural phenomena (4%). A smaller proportion includes categories related to mythological images (4%), ethnolinguistic borrowings (3%), and religious symbols (2%). Such typologization demonstrates that hydronyms not only capture physical and geographical realities but also reflect cognitive patterns, cultural and historical experiences, and value attitudes of the local population, making them an important object for teaching geolinguistics in educational institutions in Kazakhstan.
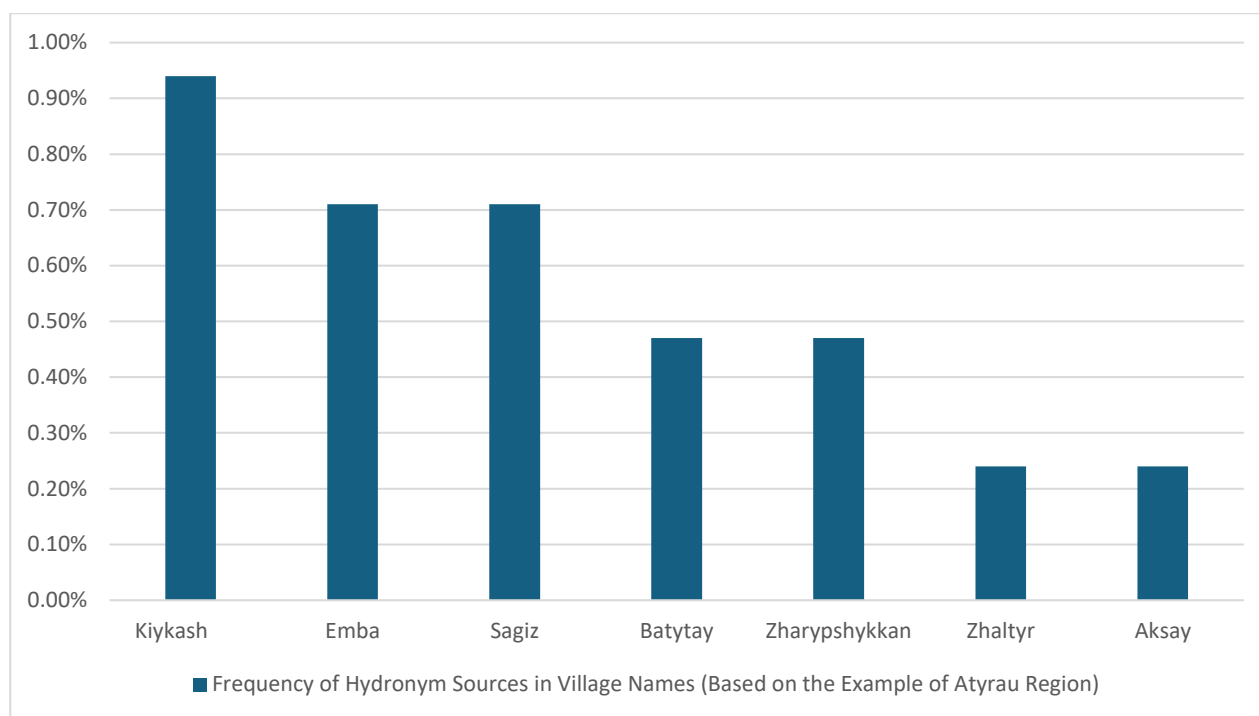
Figure 2.
Frequency of Hydronym Sources in Village Names (Based on the Example of Atyrau Region)

Based on the Figure 2, eight hydronyms were recorded in the Atyrau region, which served as sources for the formation of the names of villages and settlements: Ural (Yayyk) and Kigach (0.94% each), Emba and Sagyz (0.71% each), Bagyrlay and Zharypshykkan (0.47% each), Zhaltyr and Aksai (0.24% each). Despite their low frequency (less than 1%), these hydronyms are valuable material for analysis within the framework of the linguocognitive model of teaching and learning geolinguistics in universities in Kazakhstan, as they reflect the influence of natural objects on the formation of regional toponymy.

4.1.1. Discussion of the Morphological Aspect in the Affixation of Hydronyms in the Linguocognitive Model

Morphology, as a branch of grammar, studies the structure of words, including word formation processes such as affixation. Within the framework of the linguocognitive approach to teaching geolinguistics, the analysis of the morphemic structure of hydronyms allows students to better understand the relationship between form, meaning, and ethnocultural context. As Nida [30] noted, morphology is the study of morphemes and their combinations in words, and Kridalaksana [31] clarified that affixation is the process of converting a lexeme into a complex word, in which the form, grammatical category, and often, the meaning change.

Using the example of hydronyms recorded in the Atyrau region, one can trace the active use of affixation, both prefix and suffixation in the formation of names of water bodies. In the Kazakh language, suffixes forming toponyms with hydrochemical meanings are most common.

4.1.1.1. Suffixation (-ly, -li, -dy, -di, -ty, -ti, -kol, -ozen)

Suffixation in Kazakh hydronyms plays a key role in conveying the meaning associated with water, natural features, and the function of the object. For example:
- Zhaiyk+ozen → Zhaiykozeni ("Zhaiyk river")
- Kara+kol → Karakol ("black lake")
- Ak+su → Aksu ("white water")
- Tuschy+kol → Tuschykol ("fresh lake")

Suffixes such as -kol (lake), -su (water), -ozen (river) are productive and maintain stable semantics. From the point of view of linguocognitive analysis, they provide a mental categorization of objects according to natural characteristics, facilitating the assimilation and identification of objects by students in the study of geolinguistics.

4.1.1.2. The Prefix in Hydronyms

Although the prefix in the Kazakh language is less characteristic, individual elements, for example, reinforcing or descriptive components (ak-, kara-, tushchy-, sortan-), can perform a function similar to prefixes indicating the quality or color of water:
- Aksu — white water
- Sortankol — brackish lake
- Kyzylsu — reddish water

4.1.1.1. Allomorphy in Suffixes

Suffixes like -ly/-li, -dy/-di, -ty/-ti exhibit allomorphic alternations depending on the phonetic environment.:

- Tastyozen — "stone river" (tas is a stone, -you are the one with the sign)
- Kumdykol — "sandy lake" (kum — sand, -dy — agrees with the suffix)
- Shomishtisai — "spoon-shaped valley"

The morphological analysis of the hydronyms presented in Table 1 allows future geolinguists to identify patterns in word formation, recognize images of nature in the linguistic picture of the world, and apply a cognitive approach in the analysis of lexemes. The practice of morphological analysis in the educational process of the university contributes to the formation of linguistic intuition and competencies in toponymic mapping of the region.

Table 1.
Morphological analysis of the hydronyms of Atyrau region.

No.	Hydronymic	Basic Form	Affix(s)	Morphological type	Meaning / Semantics
1	Zhaiyk River	Zhaiyk	River	Suffixation	Zhaiyk River (with possessive affix)
2	Aksu	White	water	Composite	White water (color + water)
3	Karakul	Black	lake	Composite	Black Lake
4	Tushchykol	salt	lake	Suffixation	Freshwater lake
5	Sortankol	Saltwater	lake	Suffixation	Brackish lake
6	Kumdykol	Sand	lake	Suffixation + allomorph	A lake containing sand
7	Taztyuzen	Stone	River	Suffixation + allomorph	A river with a lot of stones
8	Shomishtisai	shomish	Sai	Suffixation + allomorph	The valley that looks like a spoon

5. Conclusion

The processes of acculturation, assimilation, as well as cultural and historical transformations taking place in the Atyrau region played an important role in the formation of the system of naming water bodies (hydronyms). The use of linguistic means in the names of rivers, canals, lakes, and other water bodies reflected the unique features of the region, becoming the result of a collective memory ingrained in the minds of the local population. These names act as elements of the intangible cultural heritage, preserving philosophical attitudes, local traditions, geographical knowledge, and the linguistic picture of the world.

The hydronyms of the Atyrau region can be classified according to two main criteria: the source of the name and the origin of the language. The source of the name can be influenced by various factors: the direction of water flow, features of the relief and coastline, names of legendary personalities or historical figures, as well as flora and fauna characteristic of aquatic ecosystems. Such a variety of motives indicates a close connection between nature and the cultural consciousness of the population.

From the point of view of linguistic origin, traces of multilingualism are noticeable in the formation of the region's hydronyms. The names are based on Kazakh, but there is also an influence of the Russian language, especially in official maps and documentation. In addition, in some cases, Turkic, Persian, and Arabic elements can be traced, reflecting the historical layers of linguistic contact and interethnic interaction.

Morphological analysis of hydronyms shows the active use of word formation processes such as prefixation, suffixation, and confixation. Prefixes, for example, "su-" (water) or "kara-" (dark), are often added to root bases to specify the features of the object. Suffixes like {-an}, including those in the form of allomorphs, are used to form nouns from verb and adjective bases. Confixes (for example, "ke-an" or "pa-an") allow for expanding semantics and structurally designating the type of object or its relation to the environment.

The hydronyms of the Atyrau region not only perform a nominative function but also carry an important cultural and semantic load. They reflect the philosophy of man's relationship with nature, with other people, and with higher powers. The names of water bodies capture the relationship between the natural landscape and the linguistic picture of the world, emphasizing respect for the environment, religious beliefs, and ethnic identity.

In the context of teaching linguistics at universities in Kazakhstan, especially in Atyrau, the analysis of hydronyms is becoming an important part of the linguocognitive learning model. The study of the naming system of water bodies contributes to the formation of students' holistic understanding of language as a tool for reflecting cultural and natural realities. This not only enriches their knowledge of their native land but also develops interdisciplinary analysis skills that combine linguistics, geography, history, and cultural studies.

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