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HYDRONYMIC TOPONYMS OF INDO-IRANIAN ORIGIN IN THE MIDDLE IRTYSH BASIN

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ABSTRACT

The article examines the systematization and description of toponyms associated with water bodies in the Middle Irtysh region whose origins may be linked to Indo-Iranian languages. Although the etymology of some names remains debatable, their analysis provides valuable insights into the chronological layers of Kazakhstan's toponymy and the history and culture of populations that once inhabited the area. The research identifies historically localized toponyms potentially connected to Indo-Iranian language speakers who, according to several scholars, lived in this territory during the Bronze and Early Iron Ages. Before the appearance of writing and cartography, orientation in sparsely populated mountainous areas relied primarily on oral place names that briefly indicated key landscape features. Hydronyms, along with the names of ancient tracts and prominent mountains near communication routes and early settlements, demonstrate strong continuity over time. Many settlement names originated from nearby rivers or geomorphological characteristics, reflecting environmental specificity and practical significance. In some cases, a toponym extended to adjacent features, such as a river name transferring to a gorge. Toponyms thus emerged in the process of mastering mountainous landscapes, forming "toponymic corridors" that corresponded to ancient trails, passes, and valleys suitable for habitation and movement. The scientific novelty of the study lies in analyzing and interpreting Indo-Iranian origin toponyms related to water bodies in the Middle Irtysh region, based on materials from the Pavlodar, East Kazakhstan, and Abai regions. This approach makes it possible to trace historical connections, assess the impact of Indo-Iranian populations on the toponymic landscape, and deepen understanding of migration processes and cultural exchange. The methodology employs interdisciplinary and comparative analysis within a broader historical and cultural context to ensure a well-grounded research framework.

KEYWORDS: Toponymy; Hydronyms; Middle Irtysh Region; Indo-Iranian Languages; Chronology; Historical Geography; Migration; Cultural Exchange.

1. INTRODUCTION

Toponymy as a scientific discipline studies geographical names - toponyms - including their origin, development, current state, semantic meaning, spelling, and pronunciation. Depending on the specific type of geographical feature being named, toponyms are classified into several categories: oronyms (names of landforms), hydronyms (names of water bodies), oikonyms (names of settlements), and others (Basik, 2006). Toponyms that have emerged and spread across a particular territory during specific historical periods serve as important chronological evidence of the events occurring at that time. Their formation is influenced by various factors such as the characteristics of the terrain, local flora and fauna, migration processes, ethnic composition, and interethnic interactions of the population. It often happens that the ethnic groups who once gave names to certain geographical objects disappear from the historical stage, and the languages they spoke vanish, while the toponyms themselves continue to exist to this day.

According to researchers, the most stable and ancient layer of toponymy in any region consists of hydronyms-the names of rivers, lakes, and other water bodies (Khalitov, 2002). Therefore, their study is of particular interest, as it holds scientific significance not only from a linguistic perspective but also provides valuable material for understanding the history and culture of populations from which few other sources of information have survived. Within the historical, geographical, and toponymic landscape of the Republic of Kazakhstan, a special place is occupied by the Priirtysh region, located in the eastern part of the country. This region encompasses the present-day Pavlodar, East Kazakhstan, and Abai (established on June 8, 2022) regions.

Since ancient times, rivers have played a crucial role in human life, serving not only as sources of water and food but also as routes of communication and trade. From early periods, the valley of the Irtysh River-with its fertile soils, pastures, and deposits of valuable natural resources-attracted people from both nearby lands and distant territories. This is evidenced by the rich archaeological materials discovered in the area, including individual finds, settlement sites, and burial complexes dating from the Lower Paleolithic to the Late Middle Ages and modern times. These artifacts were left by representatives of various ethno-linguistic groups, some of whom later became part of the modern Kazakh people. The development and study of

toponymy in Kazakhstan as a whole were greatly influenced by the works of Soviet researchers. They not only collected and systematized geographical names found throughout the territory of Kazakhstan but also, whenever possible, analyzed them from an etymological perspective (Konkashpayev, 1984). In the 1990s, during the period of Kazakhstan's independence, the establishment of the State Onomastic Commission by the Resolution of the Council of Ministers of the Kazakh SSR (No. 156) on April 20, 1990, marked the beginning of a new stage. The priority tasks at that time were the restoration of original names and the creation of new ones. From that period onward, a large number of monographs, dictionaries, and educational manuals were published. These works systematized the extensive body of toponyms, standardized and codified geographical names, and explored their etymology from new perspectives (Makhpirov, 2012). A distinct research direction emerged-the study of toponymy of specific regions and provinces of the Republic of Kazakhstan, including those located in the eastern part of the country, in the Middle Irtysh region (Popova, 2020). Historical and linguistic research has revealed the existence of several chronological layers in the toponymy of Kazakhstan. The prominent Belarusian geographer and founder of the Belarusian toponymic school, Vadim Andreevich Zhuchkevich, identified three main strata: the most ancient, pre-Kazakh (probably Iranian); the Turkic-speaking (Kazakh, with certain Arabic and Mongolian elements); the Russian-speaking (Zhuchkevich, 1968).

According to the well-known Kazakh researcher Yerkebai Koichubaev, who made a significant contribution to the study of Kazakh toponymy, five clearly distinguishable layers can be identified within the territory of the Republic of Kazakhstan: the most ancient layer, characterized by elements of archaic languages; the ancient layer, containing Turkic-Mongolic and Turkic-Iranian linguistic elements and old morphological endings; the Turkic layer, reflecting the main features of the Turkic language family and its various characteristics; the layer representing features of modern Turkic languages; the layer reflecting Russian toponymic influence (Koichubaev, 1974). V. U. Makhpirov conducted an analysis of toponymic strata, in which he identified three principal layers of ancient Turkic toponyms: proper Turkic geographical names; geographical names of non-Turkic origin; toponyms of Iranian linguistic origin (Makhpirov, 1990). Thus, researchers note the presence of several toponymic layers within the territory of modern Kazakhstan,

one of the most ancient being the stratum associated with Iranian linguistic elements. The study of this layer poses particular challenges. For example, according to some scholars, the hydronymic formants *ab* and *ar* are of Indo-Iranian origin and mean “water,” “river,” or “stream” (Kochergina, 1987). At the same time, as noted by V. N. Popova, the hydronymic formant *ar* appears in languages of various linguistic systems and forms part of numerous hydronyms (Popova, 2001), which complicates determining their precise origin. Although scattered information about toponyms of Indo-Iranian origin can be found in many scholarly works, there are virtually no specialized studies devoted exclusively to this issue. Of particular note is Yu. Kiselev’s publication “Toponyms of Kazakhstan of Indo-Iranian and Indo-Aryan Origin as the Most Ancient Substratum Layer in Toponymy” (Kiselev, URL). Despite its rather popular-scientific nature, the work is based on a substantial body of academic literature as well as geographical and etymological dictionaries.

2. LITERATURE REVIEW

The problem of developing practice-oriented thinking in science education inevitably leads us to three interrelated domains: the epistemology of causal explanation, the cognitive psychology of visual representations, and the didactics of scientific modeling. In this section, we systematize the theoretical foundations underpinning our approach, demonstrating that visualization of causal relationships is not merely a matter of visual aid but constitutes a distinct class of external cognitive artifacts that transform the pathway from empirical observation to explanatory modeling and, ultimately, to prediction and action.

Hydronyms, as one of the oldest categories of toponyms, are valuable sources for studying the historical, ethnolinguistic, and cultural processes that took place in a given territory. They often preserve traces of ancient linguistic layers and migration waves, allowing researchers to reconstruct the historical picture of regional settlement (Superanskaya, 1985). The term hydronym refers to the names of water bodies—rivers, lakes, springs, swamps, and so on (Podolskaya, 1988). In the territory of the Middle Irtysh region, which includes the modern Pavlodar, East Kazakhstan, and Abai regions, a significant part of toponyms has an ancient origin, dating back to the Indo-Iranian linguistic stratum (Kuznetsov, 2007). As noted by Yerofeeveva (2010), hydronyms often reflect not only natural features but also ancient ethno-cultural connections

between peoples who inhabited this region in different historical periods.

Studies by Ermolenko (2018) and Akhmetzhanov (2020) indicate that in the Irtysh basin, many hydronyms have lexical and phonetic parallels with Old Iranian and Indo-Aryan languages such as Avestan, Sogdian, and Sanskrit. These toponyms point to the presence or influence of Indo-Iranian tribes who migrated into the territory of Kazakhstan during the Bronze and early Scythian periods (Klyashtorny, 1994).

A linguistic analysis of hydronyms in the Middle Irtysh basin reveals roots and morphemes characteristic of the ancient Iranian language. For instance, elements such as *ard*, *darya*, and *rud*, meaning “water” or “river,” appear in the names of local water bodies (Mukhametzyanov, 2015). Toponymic layer studies show that such hydronyms as Irtysh, Uba, Naryn, and Bukhtarma likely contain ancient Iranian bases that were later adapted into Turkic languages (Aubakirov, 2019). According to Trofimov (2017), Indo-Iranian hydronyms in Eastern Kazakhstan reflect complex ethno-cultural interactions between Iranian-speaking and Turkic-speaking tribes, as well as the gradual transformation of the region’s linguistic landscape. These hydronyms serve as “linguistic artifacts,” representing the deep stratification of ethnic and cultural influences (Baskakov, 1981).

Thus, hydronymic toponyms of Indo-Iranian origin in the Middle Irtysh basin are a key component of historical-linguistic reconstruction. Their systematic study not only clarifies the stages of ethnic contact but also reveals the patterns in the formation of Kazakhstan’s toponymic landscape, especially in its eastern regions (Sadvakasova, 2022).

3. METHODOLOGY

In the present study, the main sources include dictionaries of geographical names, toponymic dictionaries, cartographic materials, and scholarly works on toponymy by various authors. Such a diverse corpus of sources necessitates the application of a comprehensive methodological approach, incorporating general scientific methods (description, comparison, generalization), as well as comparative-historical and etymological methods. It is worth noting that researchers often raise the question of how toponymic continuity is maintained within a given region. According to V. N. Belenov, “archaeology may serve as evidence of such continuity,” meaning that if “a chain of continuous archaeological cultures has been established for a particular territory,” this “constitutes a sufficient

condition for the application of the principle of toponymic continuity," although it is "not a necessary one" (Belenov, 2019). The territory of the Priirtysh region has been inhabited since ancient times, as evidenced by numerous archaeological monuments from the Paleolithic, Mesolithic, Neolithic, and Eneolithic periods (approximately 800,000 – 3,000 BCE) discovered in the area (Zakharenko, Kosayakov, Mertz, 2000). The linguistic affiliation of the peoples who left behind archaeological sites from these periods cannot be reliably reconstructed. Nevertheless, as noted by E. Koichubaev, a number of geographical names found within the territory of Kazakhstan contain formative elements such as *nar*, *tal*, *sal*, *gar*, *kan*, and *kol*, which may be attributed to the most ancient toponymic layer (Koichubaev, 1974). Scholars begin to speak with greater confidence about the linguistic affiliation of the population living in the Priirtysh region starting from the Bronze Age (late 3rd – early 1st millennium BCE). This period corresponds to the Andronovo cultural-historical community and its successor, the Karasuk culture, whose archaeological sites have been discovered over different years in Northeastern and Eastern Kazakhstan (Zakharenko, Kosayakov, Mertz, 2000).

Some scholars - linguists, historians, and archaeologists-adhere to the hypothesis of an Indo-Iranian or Aryan affiliation of the Andronovo tribes (Denisov, 2001). At the same time, many linguists, Turkologists, ethnographers, and historians, studying the early stages of the development of Turkic-speaking peoples, have concluded that the ancestors of the Turks appeared as early as the Eneolithic period, inhabiting the vast steppe and forest-steppe zones of Eurasia (Archaeology of Kazakhstan, 2006). The archaeological cultures of the Bronze Age were directly connected with the formation of the proto-nomadic culture, which later developed during the Early Iron Age (late 1st millennium BCE – mid-1st millennium CE). During this period, Eastern Kazakhstan was inhabited by tribes of the Saka-Massagetae cultural group (8th–3rd centuries BCE), followed by those of the Hunno-Sarmatian period (3rd century BCE – 5th century CE). The latter are associated with the early state formations that emerged on the territory of Kazakhstan-the Xiongnu (Huns), Wusun, and Kangju. The highly developed and distinctive culture of this period is evidenced by numerous burial mounds, sanctuaries, temporary camps, settlements, urban sites, economic structures, artifacts of visual art, and everyday objects discovered through archaeological excavations (Zakharenko, Kosayakov,

Mertz, 2000). According to researchers, at the beginning of the Early Iron Age, the population of the region spoke Turkic, Iranian, and Ugric languages (Archaeology of Kazakhstan, 2006). However, for example, the Wusun tribes are generally considered to have already belonged to the Turkic-speaking peoples (History of Kazakhstan from Ancient Times to the Present Day, vol. 1, 1996: 268). The Great Migration period (2nd–5th centuries CE) significantly altered the population composition across Kazakhstan, as well as Central and Eastern Europe. By the 5th century, numerous Turkic-speaking tribes had spread from Northern Mongolia to the Danube River, while in the south, their nomadic territories reached the upper Amu Darya River (History of Kazakhstan from Ancient Times to the Present Day, vol. 1, 1996: 268). In the history of Kazakhstan in general, and in the Priirtysh region in particular, a new stage of development began-one associated with the medieval Turkic states, which also left their mark in archaeological monuments (Zakharenko, Kosayakov, Mertz, 2000). These processes were reflected not only in archaeological materials but, as previously noted, also in toponymic data. The following section examines geographical names related to water bodies, which, according to various researchers, are of Indo-Iranian origin and may therefore be associated with the populations that inhabited this region during the Bronze and Early Iron Ages. The aim of this study is to systematize and analyze the toponyms of the Priirtysh region that, according to researchers, are connected (or may be connected) with ancient Iranian linguistic elements, in the context of the historical development of the region.

4. RESULTS AND DISCUSSION

Here's how you can clarify those specialized linguistic terms in your manuscript for interdisciplinary readers: **Formant** – In linguistics, a formant refers to a distinctive sound pattern or element within a word that contributes to its meaning. In the context of toponyms, it can indicate recurring syllables or morphemes that are characteristic of a particular language or linguistic layer. **Substratum** – A substratum is a language or linguistic feature that remains in a region after the original speakers have been replaced by another population. In toponymy, substratum elements often appear in place names, preserving traces of earlier languages. **Indo-Iranian hydro-root** – This term refers to the original root or core element in water-related names (rivers, lakes, streams) that comes from Indo-Iranian languages. It helps trace the

linguistic origin and historical spread of hydronyms in a region. You could add a short explanatory sentence in the methodology or footnotes, e.g.: "For clarity, we define 'formant' as a recurring syllable or morpheme in hydronyms, 'substratum' as linguistic elements from earlier languages preserved in place names, and 'Indo-Iranian hydro-root' as the core element of water-related toponyms derived from Indo-Iranian languages."

Given that different researchers have interpreted the etymology of particular toponyms in various ways, all available viewpoints on the origins of the names of the following geographical objects are presented here for the sake of objectivity.

Akmaydan – a lake located in the Pavlodar district of Pavlodar Region. According to V. N. Popova, the name derives from Turkic elements: *ak* meaning "white, pure, flat, open," and *maydan* meaning "an elevated open space, a square" (Popova, 2001). At the same time, it should be noted that the term "maydan" (also spelled *maidan*, *majdan*) exists in the languages of many Eurasian peoples and originates from Iranian languages, where its primary meaning is "place" or "square" (Bukałov & Karpenko, 2017).

Alakol – lakes in the Bayanaul and Zhelezinka districts of Pavlodar Region, and in the Urjar district of Abai Region. It is generally accepted that the hydronym derives from Turkic, meaning "motley lake" (*ala* – "motley, variegated," *köl* – "lake") (Konkashpayev, 2001). However, some scholars believe that the first part of the hydronym may trace back to the Indo-European root *al-* meaning "source (outflow), to flow, river, water," which is related to the Old Iranian *hal/har* and the Aryan *sar-/sal-* meaning "stream, flowing water, river" (Kiselev, URL).

Aral – lakes in the Maisky and Akkuly (formerly Lebyazhinsky) districts of Pavlodar Region. In the Turkic and Mongolic language systems, *Aral*, meaning "island" or "interfluve," is among the most widespread terms (Galas, 2017). According to V. N. Popova, the hydronymic formant *ar/ur* serves as a substrate element relative to the adopting languages and may originate from the Indo-European *auer*, meaning "flow, stream." In the region, there are also lakes named *Aralsor* and *Araltube* (Popova, 2001). On Lake Alakol in the Urjar district of Abai Region lies the island *Ulken Araltobe*. Yu. Kiselev proposed an alternative etymology, suggesting that *Aral* derives from two Indo-European hydronymic bases: *ar* ("to move, to set in motion, to arrive, to reach") and *al* ("flow, source, river, body of water"); he also allowed a connection between the first element *Ar* and the Proto-Indo-European *uru*, meaning "wide,

vast" (Kiselev, URL).

Argut – a river, tributary of the Irtysh, located in the Samara district of East Kazakhstan Region (Aitkhodzhaeva, Zhanabaeva, Aitkhodzhaeva, 2006: 11). According to E. Koichubaev, the name derives from the ancient ethnonym *Argun* (with *-t* indicating the plural form) (Koichubaev, 1974: 38). The word's etymology may also be linked to the Old Iranian verbal prefix *ar-* meaning "to move, to set in motion, to reach" (where *ar-* often indicates downward movement, a common element in compound forms), and the suffix *-gat(u)*, from the Indo-Iranian *ga* ("going") and *gati* ("movement, flow, course, way," including that of water) (Kiselev, URL).

Badambike – a river in the Bayanaul District of Pavlodar Region. According to V.N. Popova, in southern Kazakhstan *badam* derives from the Iranian word for "almond," while the second component may be related to the Kazakh *biik* meaning "height." Thus, *Badambike* can be interpreted as "a river with high (beautiful) banks where almonds (or elder bushes) grow" (Popova, 2001). Yu. Kiselev suggested that the first element *bad-* might be identical to the Old Indo-Aryan *badha* – "pressure, impact," *bhidya* – "violent flow, destruction," *bhid-* – "to dig, to split, to break," *bheda* – "splitting, rupture, destruction," or to the Proto-Iranian *bad* – "to dig, to pierce," *baid* – "to break, to tear." As for the second part of the hydronym, *-am*, he compares it to the Old Indo-Aryan *am* – "to go," *ama* – "impetus, force," and the Iranian *ama* – "strength," or *ama* – "this, here." Alternatively, *-am* may correspond to the Indo-European *am-* – "riverbed," or to the Iranian *dam* – "to swell, to rise, to grow." Thus, in Kiselev's interpretation, *Badam* means "the channel of a turbulent, destructive stream," "a violent stream swelling during snowmelt," or "the riverbed cutting through mountain fissures" (Kiselev).

Bozsha – a river in the Tarbagatai District of East Kazakhstan Region and in the Maisky District of Pavlodar Region. All researchers agree that the hydronym is of Turkic origin. According to V.N. Popova, it is associated with *boz* – "grayish (whitish) terrain covered with feather grass swaying in the wind," or *Boz + asha* – "a grayish (*boz*) fork, an area at the confluence with feather grass vegetation" (Popova, 2001). G.A. Aitkhojayeva, S.A. Zhanabayeva, and S.A. Aitkhojayeva interpret *boz* as "a grassy steppe with arid feather grass vegetation" (Aitkhojayeva, Zhanabayeva, Aitkhojayeva, 2004). According to R. Koichubaev, *boz* refers to "steppe grass suitable for grazing livestock," typical for many regions of Kazakhstan (Koichubaev, 1974). Yu. Kiselev, however, connects the hydronym with the

Iranian *baez*, *baz* – “dense, thick (of grass), lush, abundant,” and finds analogues in other Indo-European languages with the meanings “thick grass,” “pasture,” etc. He emphasizes the need to distinguish *boz* meaning “forage grass” from the Kazakh *boz* meaning “light gray, whitish” (Kiselev).

Burghan (*Burgen*) – a name applied to many rivers, channels, and distributaries, including one in the Ayagoz District of Abai Region (Toponymy of Kazakhstan: Encyclopedic Reference, 2010). According to R. Koichubaev, the name derives from the Kazakh “*povërnutaya*,” meaning “a river branch diverted from the main channel by digging new ditches or canals” (Koichubaev, 1974: 74–75). At the same time, Yu. Kiselev relates the first part of the hydronym *bur-* to the Iranian *bar* – “to move quickly, to swirl, to boil (as in a whirlpool),” and to the Avestan “to move rapidly, to rush (of water).” The second element *-gan* may be linked to the Iranian *gan* – “to swell, to rise, to fill (with water),” or the Sanskrit *gunaya* – “to increase, to multiply, to attract.” A possible connection is also noted with the Indo-Iranian *ga* – “to go, movement (of water).” Hence, Kiselev interprets the hydronym *Burghan* as “boiling, swirling, rising, flowing (water)” (Ogludjema, 2023: 48; Kiselev).

Zharly – a river located in the Zaisan District of East Kazakhstan Region. According to G.A. Aitkhozhayeva, S.A. Zhanabayeva, and S.A. Aitkhozhayeva, the name derives from the Kazakh word *zharly* meaning “steep, precipitous,” with the suffix *-ly* denoting belonging or association (in this case, to the river), thus the name can be interpreted as “a river with steep banks” (Aitkhozhayeva, Zhanabayeva, Aitkhozhayeva, 2004). An alternative interpretation proposed by Yu. Kiselev links the hydronym to the Indo-Iranian hydro-root *jara* – “rapid movement,” *jiri* – “flowing water,” and *jhari* – “waterfall, river, stream.” The element *-ly* is a Turkic possessive and adjectival suffix (Kiselev).

*Irtys*h – a river that constitutes the main water artery and gives its name to the studied region. The etymology of this hydronym has been thoroughly examined by V.N. Popova and K.T. Saparov; therefore, only key interpretations will be outlined here. The majority of researchers associate the origin of the name with Turkic-speaking peoples: M. Kashgari interpreted it as “one who crosses faster”; V.P. Semenov linked *ir* to the Kyrgyz “earth” and *tysh* to “dig”; K. Koichubaev connected it with the Turkic *artysh* meaning “mountain pass”; K.T. Saparov proposed *ir* – “saddle” or “mountain,” and *tysh* (Tatar) or *tys* (Kazakh) – “beyond, outside, external,” also suggesting a link to *ortas* – “rocky

mountain”; and B. Aspandiyarov considered *Irtys*h / *Ertys* to be of Turkic origin. An alternative hypothesis was put forward by A.P. Dulzon, who derived *Irtys*h from the Ket language (*Irtis* < *Irchis* < *Irsis*/ses meaning “river”), later supported by A.A. Burykin, who saw a link between *Irtys*h ~ *Erces*, with *er* in Ket meaning “sable,” thus “the sable river” (Popova, 2011; Burykin, 2011). V.N. Popova, who studied the toponymy of the Pavlodar region, divided the hydronym into two components. She associated the first element *Ir* with the Old Indian *ar-arna* – “boiling, turbulent, surging stream.” From *ar* (or *air*) emerged the forms *ar* and *ir*, both meaning “to flow,” “to move swiftly.” According to her, this meaning accurately reflects the upper mountainous section of the *Irtys*h, from its headwaters to the village of *Izvestkovoye*. From this segment, the river likely acquired its name, which later spread to the entire watercourse. In summary, Popova concluded that the toponym *Irtys*h consists of two components: the Iranian *ir/ar* and the Ket *tysh/chis/sis/ses* (“river”), thus meaning “a river with a rapid and turbulent current” (Popova, 2001).

Olenty (*Olenty*) – a river flowing through the Pavlodar Region. Local Kazakh inhabitants interpret *Olenty* as “variegated grassland.” A popular saying preserves this interpretation: “*Shiderty'nin sui – bal, Olenty'nin shöbi – bal*” (“the water of *Shiderty* is like honey, the grass of *Olenty* is like honey”). However, K.T. Saparov proposes an Indo-European etymology, interpreting *Olenty* as “a widely overflowing river (stream)” (Saparov, 2011).

The Middle *Irtys*h Basin constitutes one of the key territories of Northern and Eastern Kazakhstan where diverse linguistic and cultural traditions converged throughout antiquity. Among these historical layers, hydronymic toponyms of Indo-Iranian origin stand out as particularly valuable indicators of early ethno-linguistic processes. Hydronyms, due to their conservative nature and resistance to change, preserve linguistic elements that often predate later ethnocultural transformations. Therefore, the study of Indo-Iranian hydronymic toponyms in the Middle *Irtys*h region enables scholars to reconstruct the deep historical background of population movements, cultural contacts, and linguistic interactions across the Eurasian steppe. Indo-Iranian hydronyms found in this region frequently exhibit lexical and phonological features that correlate with ancient Iranian and Indo-Aryan language groups, including Avestan, Old Persian, and Sanskrit. These parallels point to the presence or influence of Indo-Iranian-speaking populations during the Bronze and Early

Iron Ages-periods associated with the Andronovo cultural-historical community and its successors. The Indo-Iranian linguistic substratum is often reflected in hydronyms containing roots related to water, flow, depth, brightness, or sacredness. Such semantic categories are consistent with Indo-Iranian cosmological notions in which rivers and springs held ritual and symbolic significance. This makes hydronyms particularly informative when investigating the worldview and economic practices of early populations. Archaeological evidence supports the linguistic hypothesis, indicating that the Middle Irtysh Basin was a corridor for cultural transmission between the Eurasian Steppe, the Altai region, and southwestern territories influenced by Iranian-speaking peoples. Settlements attributed to early Indo-Iranian groups demonstrate a close relationship with major river systems, confirming the central role of water in subsistence strategies, trade routes, and ritual activities. Hydronyms, in this context, become linguistic markers that align with material culture patterns, reinforcing interdisciplinary interpretations.

Methodologically, the study of hydronymic toponyms involves etymological analysis, historical phonology, and comparative linguistics. Scholars examine the morphology and semantic components of the toponyms, compare them with Indo-Iranian lexical roots, and evaluate their distribution within the geographic landscape. In the Middle Irtysh Basin, several hydronyms exhibit stable Indo-Iranian elements, such as stems denoting "river," "source," or "wetland." Additionally, the presence of names linked to mythological or ritual terminology suggests that the region was not only a settlement area but also a space of significant cultural importance for Indo-Iranian groups. Geospatial mapping of hydronyms further contributes to understanding their historical implications. The concentration of Indo-Iranian hydronymic markers near ancient trade routes, seasonal pastures, and river crossings indicates strategic use of water resources and highlights the region's role as a connective zone between different cultural spheres. Moreover, the persistence of these hydronyms into the medieval and modern periods demonstrates their strong cultural resilience, even after the arrival of Turkic-speaking populations. The coexistence of Indo-Iranian and Turkic toponymic layers reflects a complex history of cultural integration, adaptation, and reinterpretation.

In addition to linguistic and archaeological perspectives, hydronyms of Indo-Iranian origin contribute to broader historical reconstructions. They help trace the spread of early Indo-Iranian religious

concepts, such as the sanctification of rivers and the symbolic association of water with purity and life. These motifs resonate with similar traditions observed in Zoroastrian texts and Vedic literature, suggesting cultural continuities that extended deep into Central Asia. Thus, hydronyms serve not only as geographic identifiers but also as reflections of intangible heritage, revealing elements of belief systems and ritual behavior.

The significance of studying Indo-Iranian hydronymic toponyms in the Middle Irtysh Basin extends beyond regional history. This research contributes to the overall understanding of Indo-Iranian dispersal across Eurasia and provides data relevant to debates concerning the origins, migration routes, and interactions of ancient populations. By integrating linguistic, archaeological, and geographic methods, scholars can construct a more comprehensive picture of cultural dynamics in the Middle Irtysh region.

In conclusion, hydronymic toponyms of Indo-Iranian origin represent a crucial component of the historical and linguistic landscape of the Middle Irtysh Basin. Their analysis reveals deep-rooted connections between language, geography, and cultural identity, offering valuable insights into the early stages of ethnocultural development in Northern and Eastern Kazakhstan. As enduring markers of past civilizations, these hydronyms continue to inform contemporary scholarship and contribute to the reconstruction of Eurasia's complex historical tapestry.

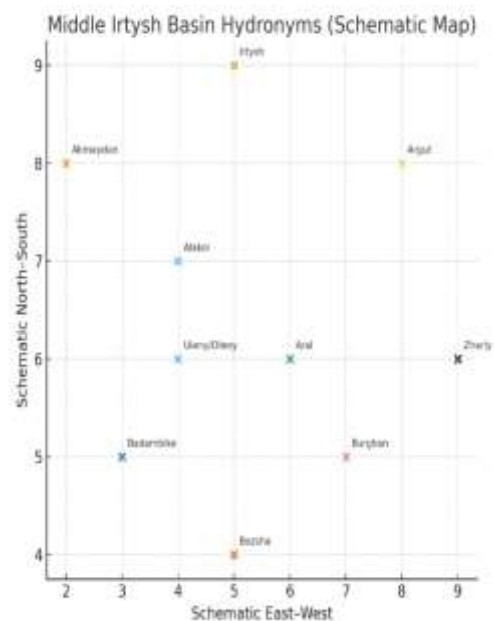


Figure: 1

The map presents a schematic visualization of key hydronyms of the Middle Irtysh Basin, highlighting their spatial distribution across the Pavlodar, Abai, and East Kazakhstan regions. Each water-related toponym is plotted to illustrate relative geographic positioning while emphasizing the linguistic diversity reflected in their origins. The selected hydronyms demonstrate the interaction of Turkic, Indo-Iranian, and, in some cases, Ket substrate elements within the regional toponymic system. Although the map is not based on precise cartographic coordinates, it provides a structured overview that supports comparative linguistic analysis and facilitates further research on historical hydronymic layers in the Middle Irtysh area. (picture 1)

5. CONCLUSION

The conducted research demonstrates that the toponymy of the Middle Irtysh region contains a significant layer of place names that can be associated with one of the most ancient toponymic strata of Kazakhstan, characterized by Indo-Iranian linguistic elements. Their origin appears to date back to the Bronze and Early Iron Ages, corresponding to the period when Indo-Iranian-speaking populations may have inhabited this territory. Although the available material does not yet allow for definitive conclusions, the results provide convincing evidence of the presence of substratum toponyms of Indo-Iranian origin within the hydronymic system of the Middle Irtysh. This study expands our understanding of the historical and cultural landscape of the region and sheds light on the linguistic continuity observed in the hydronymic system. The analysis of hydronyms and associated geographical names from the Pavlodar, East Kazakhstan, and Abai regions reveals several lexical elements that demonstrate typological parallels with Indo-Iranian linguistic roots. These findings not only

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reflect the natural and geographical characteristics of the region but also highlight ancient cultural interactions, migration patterns, and historical connectivity between the peoples of the Eurasian steppe and early Indo-Iranian communities.

The results contribute to the broader understanding of Kazakhstan's historical toponymy, offering valuable linguistic and cultural evidence for tracing early Indo-Iranian influence in Central Eurasia. The identification of ancient linguistic substrata in hydronyms helps refine reconstructions of prehistoric settlement patterns and intercultural contacts.

Further investigations should focus on a more detailed comparative analysis of hydronymic structures using linguistic reconstruction, GIS-based mapping, and archaeological correlation. A comprehensive interdisciplinary approach involving linguistics, archaeology, and ethnology will allow for a more complete understanding of the ancient toponymic landscape of the Middle Irtysh region and its role in the historical development of Eurasia.

Author Contributions: For research articles with several authors, a short paragraph specifying their individual contributions must be provided. The following statements should be used "Conceptualization, X.X. and Y.Y.; methodology, X.X.; software, X.X.; validation, X.X., Y.Y. and Z.Z.; formal analysis, X.X.; investigation, X.X.; resources, X.X.; data curation, X.X.; writing—original draft preparation, X.X.; writing—review and editing, X.X.; visualization, X.X.; supervision, X.X.; project administration, X.X.; funding acquisition, Y.Y. All authors have read and agreed to the published version of the manuscript." Please turn to the CRediT taxonomy for the term explanation. Authorship must be limited to those who have contributed substantially to the work reported.

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