

Digital Terminology Resources For The Karakalpak Language: Ecological Term Variation And Unification

Otebaeva Dilbar - Karakalpak State of University

ABSTRACT

This article explores the systematization and digital preservation of ecological terminology in the Karakalpak language, with particular emphasis on terminological variation, doublets, and unification. The development of ecological terminology is characterized by the coexistence of international terms and indigenous linguistic forms, as well as lexical, structural, and morphological variation. The study examines such terminological sets as adaptaciya – beyimlesiw – iykemlesiw (adaptation), awqatlıq zat – azıqlıq zat (nutrient), pataslanıw – ılaslanıw (pollution), biologiyalıq sistema – biosistema (biological system/biosystem), and biologiyalıq aylanıw – biologiyalıq aylanıs (biological cycle). It also compares ecological terminology in Karakalpak, Kazakh, and Uzbek, focusing on the forms ekosistema – экожүйе – ekotizim (ecosystem) and biologiyalıq kóptúrlilik – биологиялық саналуандық – bioxilma-xillik (biological diversity). The findings suggest that a digital terminology database can provide an integrated record of preferred terms, their variants, definitions, usage contexts, equivalents in related languages, and source references. Such a database would facilitate information retrieval, support comparative linguistic research, contribute to the long-term preservation of Karakalpak terminological resources, and provide a methodological basis for future terminological unification.

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Introduction

The development of digital technologies has created new opportunities for preserving linguistic resources, systematizing lexical material, and incorporating language data into scientific research. In particular, the electronic collection and storage of terminology from different fields of knowledge facilitate access to specialized linguistic materials and support their systematic analysis. As ecological science develops and new environmental concepts emerge, the terminology associated with this field continues to expand.

A term constitutes a specialized part of the vocabulary that reflects the development of scientific and professional knowledge. The emergence of new concepts creates a need for corresponding designations. At the same time, a single concept may be expressed by several terms, international and indigenous forms may coexist, and lexical or grammatical differences may produce alternative terminological forms. These processes contribute to terminological variation and present challenges for the organization of specialized vocabulary.

D. S. Lotte emphasizes the importance of systematic organization, conceptual precision, and correspondence between terms and the concepts they designate in the construction of scientific and technical terminology [4, p. 18]. H. Dadaboyev also relates the development of terminology to the lexical resources and word-formation

potential of national languages [2, p. 56]. These principles are relevant to the study of Karakalpak ecological terminology, which develops through interaction with international scientific vocabulary, terms borrowed through Russian, terminology shared with related Turkic languages, and the internal word-formation resources of Karakalpak.

Consequently, the digital preservation of ecological terminology should not be understood merely as the electronic storage of words. It also requires the identification of terminological relationships, the classification of variants, the clarification of conceptual meanings, and the systematic recording of linguistic information. The aim of this article is to examine terminological variation in Karakalpak ecological terminology, compare selected terms with their equivalents in Kazakh and Uzbek, and demonstrate the potential of a digital terminology database as a tool for preserving and unifying specialized vocabulary.

Digital Preservation and the Systematization of Ecological Terminology

Ecological terminology is not a completely static system. The development of environmental sciences, the emergence of new concepts, and the expansion of international scientific communication contribute to the introduction and circulation of new terms. These processes increase the need to collect terminological data, identify alternative forms, and preserve relevant information in an organized digital environment.

One of the principal advantages of digital preservation is the possibility of integrating different types of terminological information into a single system. For each ecological term, a database may include the following fields:

- preferred or recommended term;
- alternative forms, variants, and doublets;
- definition and conceptual description;
- examples of usage and relevant contexts;
- equivalents in Kazakh and Uzbek;
- international or widely used equivalent;
- bibliographic source and other relevant references.

This structure makes it possible not only to preserve terms but also to compare them, trace their usage, and investigate their relationships. Such an approach is particularly important when the same concept is represented by different forms in dictionaries, research articles, educational materials, and other specialized texts.

A digital database can therefore serve two complementary purposes: the preservation of terminological resources and the preparation of materials for subsequent unification. By recording alternative forms alongside their definitions and usage contexts, researchers can evaluate whether the forms are genuine synonyms, structural variants, or terms that differ in meaning or scope.

Types of Terminological Variation in Karakalpak Ecological Terminology

Several types of terminological variation can be identified in Karakalpak ecological terminology. Their classification is important for designing a database capable of representing both the linguistic form of a term and its relationship to a scientific concept.

International and indigenous-language forms

One example is the terminological set *adaptaciya* – *beyimlesiw* – *iykemlesiw*, corresponding to the concept of adaptation.

Adaptaciya is an international scientific term used in numerous languages. The forms *beyimlesiw* and *iykemlesiw*, by contrast, are based on the lexical resources of Karakalpak. Their coexistence illustrates different strategies for naming the same or closely related concept: the adoption of an international designation and the use of indigenous linguistic resources.

However, the existence of several forms does not automatically mean that they are interchangeable in every context. Their conceptual scope, frequency, and use in scientific texts should be investigated before one is recommended as the preferred term.

A digital database should therefore record all three forms and provide information about their definitions, sources, and usage. Where sufficient evidence is available, it may also identify a preferred form while retaining the alternatives as searchable entries.

Lexical doublets

Another type of variation involves forms that differ in their lexical components. Examples include awqatlıq zat – azıqlıq zat (nutrient) and pataslanıw – ılaslanıw (pollution).

In the first pair, the components awqat and azıq are semantically related and participate in the formation of expressions associated with nourishment. In the second pair, pataslanıw and ılaslanıw represent alternative lexical forms associated with contamination or pollution.

Such examples require careful terminological analysis. Although the forms may be used to express similar meanings, their equivalence should be established through definitions, contextual evidence, and examination of their use in relevant scientific sources.

For digital preservation, it is therefore insufficient to list these forms without further explanation. The database should document their lexical differences, definitions, contexts of use, and relationships to the corresponding scientific concepts.

Structural variation

Structural variation can be illustrated by the pair biologiyalıq sistema – biosistema (biological system/biosystem) [1, p. 79].

The first expression is a free word combination consisting of an adjective and a noun. The second is a compact form constructed with the international combining element bio- and the noun sistema. Although the forms are structurally different, they may refer to closely related concepts. Their relationship should be established through terminological definitions and contextual analysis rather than assumed solely on the basis of their lexical composition. Recording both forms in a digital database would make it possible to compare their structure, conceptual scope, and distribution across different sources. This information could subsequently support decisions concerning the preferred form within Karakalpak ecological terminology.

Morphological variation

The pair biologiyalıq aylanıw – biologiyalıq aylanıs (biological cycle) illustrates a difference in the morphological formation of the final component. The expressions share the component biologiyalıq, while aylanıw and aylanıs differ in their morphological structure. Whether these forms function as full terminological equivalents should be determined through an analysis of their meanings and actual usage. This distinction is important because morphological similarity or difference alone cannot establish whether two expressions represent terminological variants or separate concepts. Thus, a digital terminology database should represent not only the written forms of ecological terms but also their lexical, structural, morphological, and semantic characteristics. Such classification would facilitate more precise analysis and reduce the risk of treating distinct concepts as interchangeable.

Comparative Analysis of Ecological Terminology in Turkic Languages

The comparison of related Turkic languages is important for understanding the formation and development of ecological terminology. Recording equivalent terms in a shared digital system makes it possible to identify different approaches to naming scientific concepts, including the retention of international forms, the use of indigenous vocabulary, and the combination of international and national elements.

Biological diversity biologiyalıq kóptúrlilik биологиялық саналуандық bioxilma-xillik
The first set, ekosistema – экожүйе – ekotizim, demonstrates three approaches to terminological formation. In the Karakalpak form ekosistema, the international term is retained. The Kazakh form экожүйе uses national-language elements, while the Uzbek form ekotizim combines the international component eko- with the indigenous element tizim. These forms illustrate different linguistic strategies for representing the same broad scientific concept.

A comparative digital database could link the three forms to a shared conceptual entry while preserving their individual linguistic characteristics. It could also include definitions and references to the sources in which each form occurs.

A similar pattern can be observed in the set *biologiyalıq kóptúrlilik* – биологиялық саналуандық – *bióxılma-xillik*, corresponding to biological diversity [3, p. 65].

These expressions reflect different approaches to expressing the concept of diversity in ecological and biological terminology. Their comparison can help researchers examine the use of national lexical resources, the adaptation of scientific vocabulary, and the development of terminology in related Turkic languages.

However, comparative similarity should not be treated as sufficient evidence of complete terminological equivalence. Definitions and contextual usage must also be considered when establishing cross-linguistic correspondences.

In this respect, digital preservation creates opportunities for systematic comparative research. Instead of storing isolated terms in separate documents, researchers can connect equivalents across languages, compare their definitions, and trace their occurrence in dictionaries and scientific publications.

Digital Terminology Databases as a Basis for Unification

One of the main challenges in digitizing ecological terminology is determining how terms should be organized and evaluated. Electronic storage alone does not resolve terminological inconsistency. A database must also provide a methodological framework for classifying variants and identifying appropriate forms for scientific communication.

Terminological unification can be understood as the process of selecting and recommending a suitable form for expressing a particular concept within a defined terminological system. This process does not necessarily require the elimination of all alternative forms. Variants may need to be preserved because they occur in historical sources, different professional contexts, or established linguistic practices.

For Karakalpak ecological terminology, the following sequence can be proposed: Collection of terms → identification of concepts → establishment of term–concept relationships → classification of variants and doublets → semantic comparison → assessment of usage frequency → selection of a preferred form → addition of cross-linguistic equivalents → documentation of sources. This model provides a methodological basis for organizing terminological data and preparing it for subsequent analysis.

The selection of a preferred term should take several criteria into account: Semantic precision: the term should express the intended scientific concept accurately. Conceptual clarity: the relationship between the term and the concept should be unambiguous. Compliance with the norms of Karakalpak: the form should be compatible with the language's linguistic and word-formation patterns.

Established usage: the frequency and distribution of the term in scientific, educational, and official texts should be considered.

Systematic consistency: the term should fit into the broader network of ecological terminology. International correspondence: its relationship to internationally recognized terminology should be examined. Practical usability: the form should be suitable for use in scientific communication and educational materials. For example, all three forms in the set *adaptaciya* – *beyimlesiw* – *iykemlesiw* may be retained in the database. Nevertheless, the system can distinguish a preferred term from alternative forms when linguistic evidence and terminological analysis justify such a distinction.

The difference between unification and standardization must also be taken into consideration. Unification focuses on organizing terminological alternatives and recommending appropriate forms. Standardization is a broader normative process through which terminology may be formally established according to relevant standards or institutional requirements.

Consequently, a digital terminology database cannot replace formal standardization procedures. It can, however, provide the necessary linguistic evidence, comparative data, and documented analysis on which future normative decisions may be based.

Conclusion

The digital preservation and systematization of ecological terminology represent important directions for the development of Karakalpak terminological research. The coexistence of international and indigenous-language terms, together with lexical, structural, and morphological variation, demonstrates the need for an organized approach to terminological data.

The examples adaptaciya – beyimlesiw – iykemlesiw, awqatliq zat – azıqlıq zat, pataslanıw – ılaslanıw, biologiyalıq sistema – biosistema, and biologiyalıq aylanıw – biologiyalıq aylanıs illustrate different forms of variation that should be examined when constructing a digital terminology database. The comparison of ekosistema – экожүйе – ekotizim and biologiyalıq kóptúrlilik – биологиялық саналуандық – bioxilma-xillik further demonstrates the value of cross-linguistic analysis for identifying different approaches to terminological formation in Karakalpak, Kazakh, and Uzbek. A well-structured digital database should include the preferred form of a term where justified, its variants, definition, usage contexts, equivalents in related languages, and bibliographic sources. Such an approach would facilitate the retrieval and comparison of terminological information, support the preservation of linguistic resources, and provide a more reliable basis for terminological unification. Ultimately, digital preservation should be understood not merely as the electronic collection of terms but as the creation of an information system that represents their conceptual meanings, linguistic characteristics, and relationships with other terms. This approach can contribute to the systematic study, long-term preservation, and further development of ecological terminology in the Karakalpak language.

References

1. Alikhanov, B., Samoylov, S., & Ibragimov, R. (2004). O'zbekcha-ruscha-inglizcha ekologik izohli lug'at [Uzbek–Russian–English explanatory dictionary of ecological terms]. Tashkent: Chinor ENK.
2. Dadaboyev, H. (2019). O'zbek terminologiyasi [Uzbek terminology]. Tashkent: Yoshlar uyi. Русско-казахский терминологический словарь-справочник [Russian–Kazakh terminological reference dictionary]. (2009). Almaty.
3. Lotte, D. S. (1961). Основы построения научно-технической терминологии [Principles of constructing scientific and technical terminology]. Moscow: Izdatelstvo Akademii nauk SSSR.
4. Lotte, D. S. (1971). Краткие формы научно-технических терминов [Short forms of scientific and technical terms]. Moscow: Nauka.