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Corpus-Based Semantic Analysis of al-Māʾ in the Qur'an: Islamic Ecological Contexts

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Abstract

This study examines the use of *al-Māʾ* in the Qur'an through a digital corpus-based approach, mapping its distribution and contextual-semantic variations to inform interpretation from the perspective of Islamic ecology. It employs a qualitative descriptive approach using the Quranic Arabic Corpus (QAC). A search for the stem ماء yielded 59 tokens across 57 unique verses and 39 surahs. The unit of analysis was the individual token, with each occurrence counted separately. Two tokens occur in each of QS Hūd [11]:44 and QS Muḥammad [47]:15, accounting for the difference between the total number of tokens and unique verses. The analysis comprised concordance examination, frequency and distribution analysis, and token-level semantic categorization. The findings identify seven contextual categories: Life and Ecological Growth (28.8%), Provision and Sustenance (25.4%), Punishment and Destruction (16.9%), Creation and Biological Origin (10.2%), Figurative/Symbolic (8.5%), Purification (6.8%), and Divine Sign and Power (3.4%). These patterns indicate that *al-Māʾ* occurs in diverse contexts involving life, provision, purification, biological origin, punishment, and symbolism. The corpus-based approach provides a systematic empirical basis for examining the contextual diversity of *al-Māʾ* and interpreting its significance from an Islamic ecological perspective.

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1. INTRODUCTION

Water is one of the elements that has an important position in the construction of the meaning of life in the Qur'an [1]. The term *al-Māʾ* in the Qur'an refers not only to water as a physical substance but also occurs in various contexts related to life, rainfall, plant growth, purification, and humanity's relationship with creation [2]. Previous research has examined *al-Māʾ* through lexical and contextual perspectives, highlighting its associations with life, divine grace, purification, and the order of creation. Therefore, understanding *al-Māʾ* requires more than identifying its lexical equivalent, "water"; it also requires examining how the term is used within the textual contexts of the Qur'an [3].

In the semantic study of the Qur'an, the meaning of a phrase cannot always be understood based solely on the dictionary definition, because its use is shaped by the context and relationship of the phrase with other linguistic elements [4]. This is also seen in research on *Al-Ma'*. Gunarti and Ahmadi, for example, use Toshihiko Izutsu's semantic approach and show that the concept *Al-Ma'* in the Qur'an includes physical, symbolic, spiritual, and philosophical dimensions. Other research on *Al-Ma'* using linguistic and thematic analysis to identify the function and context of its use in the verses of the Qur'an [5]. The findings show that the study *Al-Ma'* has evolved beyond lexical definitions, but the systematic mapping of patterns of utterance use across the entire corpus of the Qur'an still leaves room for different approaches.

Previous studies on Qur'anic vocabulary have employed approaches such as library research, content analysis, thematic analysis, and semantic analysis of selected verses [5]. These studies provide valuable linguistic and interpretive insights, but the literature reviewed for this study leaves room for a more systematic integration of corpus-wide lexical distribution, token-level contextual classification, and interpretation from the perspective of Islamic ecology. In particular, examining the frequency and distribution of *al-Māʾ* across Qur'anic verses and classifying its contextual uses can provide an empirical basis for interpreting its diverse functions in the Qur'an. Rather than replacing conventional interpretive approaches, a digital corpus-based analysis complements them by systematically documenting patterns of word use and relating the findings to Islamic ecological perspectives.

Development *Digital Humanities* provide a relevant approach to those needs. In Islamic studies and Qur'anic studies, computational technology can be used not only to digitize texts, but also to perform computer-based textual analysis [6]. Research on *Digital Humanities* in the study of the Qur'an shows that Qur'anic texts and manuscripts can be analyzed using digital techniques such as *text tagging*, text processing, and computational approaches [7]. In addition, sources such as the Quranic Arabic Corpus provide Qur'anic texts that are complemented by morphological annotations, syntax, and semantic ontologies, thus allowing corpus-based linguistic research to be carried out systematically [8],[9]. Corpus-based studies of Qur'anic texts have also shown that analysis using devices such as AntConc can be used to identify the distribution and semantic function of a lexical form based on the context in which it appears [10],[11].

Based on these developments, there is room to develop the study of *al-mā'* from conventional semantic analysis to a digital corpus-based approach. This research does not intend to replace linguistic analysis and interpretation, but rather to use it after the pattern of pronunciation usage has been empirically mapped from the corpus. This approach allows the research to identify the distribution of *al-mā'*, the context of its occurrence, as well as the lexical relationships formed with other words in the Qur'anic text. The results of the mapping are then used as a basis for interpreting the ecological dimension of *al-mā'* in an Islamic perspective. Thus, the contribution of the research lies in the incorporation of textual analysis based on the digital corpus with the interpretation of Islamic semantics and ecology, so that the reading of the concept of water in the Qur'an is not only interpretive but also supported by the usage patterns obtained from the overall textual data.

This study aims to examine the use of *al-Māʾ* in the Qur'an through a digital corpus-based approach by mapping the frequency and distribution of the retrieved tokens, identifying recurring linguistic and contextual patterns through concordance analysis, and interpreting these patterns from the perspective of Islamic ecology. The analysis draws on the 59 tokens retrieved through a search for the stem ماء in the Quranic Arabic Corpus (QAC). Each token is assigned one primary contextual-semantic category based on its dominant function in the verse. Accordingly, this study addresses three research questions: (1) How are the retrieved tokens of *al-Māʾ* distributed across Qur'anic surahs, verses, and contextual-semantic categories? (2) What recurring linguistic and contextual patterns characterize the use of *al-Māʾ*, based on the words, phrases, and verse contexts identified through concordance analysis? (3) How can the identified distribution and contextual patterns be interpreted from the perspective of Islamic ecology, particularly in relation to life and ecological growth, provision, creation, purification, destruction, and divine signs?

2. METHOD

2.1 Research Design

This study uses a qualitative-descriptive approach based on the digital corpus (*corpus-based qualitative descriptive approach*). This approach is used to analyze the use of words *Al-Ma'* in the

Qur'an through the identification of its distribution of appearance, textual context, and lexical relationships, which are further interpreted using the semantic perspectives of the Qur'an and Islamic ecology. The corpus-based approach was chosen because the research focuses not only on the interpretation of specific verses, but also seeks to examine patterns of use of words *Al-Ma'* based on the overall textual data that meets the search criteria. A similar approach has been used in corpus-based research on the Qur'an to identify the distribution and semantic function of a lexical form based on the context of its use [10].

2.2 Data Source

The research data consist of Arabic Qur'anic texts obtained from the Quranic Arabic Corpus (QAC), version 0.4 [12]. QAC provides morphological annotations and search facilities that allow words to be identified by stem, lemma, or root. The corpus was selected because its morphological annotations support systematic identification of lexical forms and examination of their Qur'anic contexts. This study uses the stem ماء (*mā'*) as its operational search criterion because the research focuses on the use of the lexical item *al-Mā'* (water), rather than the full set of words associated with a morphological root. According to QAC documentation, stem-based searches ignore diacritics and can retrieve occurrences regardless of attached prefixes and suffixes [12]. This criterion allows the study to examine the contextual uses of the target lexical form while retaining its morphological and orthographic variations. The retrieved results are subsequently checked against their Qur'anic locations and contextual information before semantic categorization. The data were accessed on 15 September 2026, subject to confirmation that this was the actual date of data extraction.

2.3 Data Identification and Extraction

Data were retrieved from the Quranic Arabic Corpus (QAC) by searching for the stem ماء. The search yielded 59 tokens, which were recorded with their surah and verse locations, surface forms, stem annotations, glosses, and complete verse texts. To verify the retrieved data, each search result should be checked against its corresponding Arabic Qur'anic text and QAC morphological annotation, ensuring that the recorded form and location are consistent with the corpus entry.

All retrieved tokens were retained if QAC identified them as instances of the target stem. Variations in surface form, including forms with attached articles, prepositions, or pronominal suffixes, were preserved as they appeared in the corpus, while the stem annotation was recorded separately. These attached elements were not treated as part of the stem itself. No token was excluded solely because its surface form differed from the unprefixed form ماء.

The unit of analysis was the individual token, with each occurrence counted separately, even when multiple tokens appeared in the same verse. The verse served as the contextual unit for subsequent concordance analysis, while surah and verse locations were used to examine the distribution of occurrences. Accordingly, the 59 tokens were reported as occurrences across 57 unique verses and 39 surahs. The extracted data formed the basis for subsequent frequency calculations and contextual-semantic categorization.

2.4 Concordance Analysis

Concordance analysis was carried out to identify patterns of use of the word *al-mā'* based on the textual context of each of its occurrences in the corpus. A total of 59 tokens that had been identified based on stem ماء were examined by considering the words and phrases that accompany the target pronunciation and the context of the verse as a whole. The analysis showed that the use *of al-mā'* appeared in various contexts, including life and growth of the earth, sources of sustenance, purification, creation of creatures, water availability, flood events, eschatological contexts, and the

use of metaphors in parables. The results of this concordance were then used as a basis for conducting distribution analysis and contextualization in the next stage.

2.5 Frequency and Distribution Analysis

Frequency and distribution analysis was carried out to illustrate the pattern of stem ماء usage in the research data. The frequency was calculated based on the number of tokens included in each usage context that had been identified through concordance analysis. To maintain the consistency of the calculation, each token was assigned one main context category based on the dominant function of the pronunciation of al-mā' in the analyzed verse. The frequency of each category was calculated as the number of tokens assigned to that category, while its percentage was calculated relative to the total number of tokens analyzed using the following formula:

$$P_i = \frac{n_i}{N} \times 100\%$$

By being a percentage of the -category, is the number of tokens in the -category, and is the total number of tokens analyzed. The results of the distribution are used to identify the most dominant context of use of al-mā' in the corpus. The distribution then becomes the basis for the analysis of lexical relations and semantic interpretation in the next stage.$P_i in_i iN$

where $P_i$is the percentage of tokens in category$i$, n_i is the number of tokens assigned to category (i), and (N) is the total number of tokens analyzed ((N=59)). Each token was assigned to one primary contextual-semantic category. Therefore, the sum of the category frequencies equals 59, and the percentages sum to 100%, subject to rounding.

2.6 Semantic Categorization

Semantic categorization is performed to organize the use of al-mā' that has been identified through concordance analysis into categories that have similar meanings or contextual functions. Categorization is done manually at the token level, with each occurrence of the stem ماء assigned one main contextual category based on the dominant function or meaning of al-mā' in the context of Qur'anic verses. This approach leverages the linguistic information available in the Quranic Arabic Corpus (QAC), which provides morphological, part-of-speech, as well as lemma annotations for words in the Qur'an.

The categorization process is carried out inducively based on the patterns found in the data, while the conceptual categories obtained from the literature review are used as an initial reference and not as a predetermined final category. Thus, the final category is determined based on the pattern of use of al-mā' found through concordance analysis. When a token can be associated with more than one semantic context, the category that represents its main contextual function is chosen so that each token has only one main category and the calculation of frequencies between categories remains mutually exclusive.

After the initial coding process is completed, all categorization results are systematically reviewed to evaluate the consistency of token placement and the clarity of boundaries between categories. Cases that are considered ambiguous are re-examined by comparing the context of their concordance with the operational definition of the category used. This review process also considers the morphological and linguistic information of the QAC, which distinguishes stems, lemmas, and various part-of-speech in the analysis of Qur'anic words. The results of the categorization that have been reviewed are then used to analyze the distribution of contextual-semantic use of al-mā'. The

distribution then becomes the basis for the analysis of the lexical network and the interpretation of the pattern of use of al-mā' in the Qur'anic corpus.

3. RESULTS AND DISCUSSION

3.1. Distribution of *al-Mā'*

The QAC search for the stem ماء (*māʾ*) returned 59 tokens distributed across 57 unique verses and 39 surahs. The difference between the token and verse counts results from two occurrences within each of QS Hūd [11]:44 and QS Muḥammad [47]:15. Surah-level distribution shows that QS Hūd [11] contains the highest frequency, with four tokens (6.8%). QS al-Baqarah [2], al-Raʿd [13], and al-Qamar [54] each contain three tokens (5.1%). Eleven surahs contain two tokens each, while the remaining 24 surahs contain one token each. Table 1 reports the token count and corresponding verse locations for every surah, allowing the distribution to be checked against the total of 59 tokens, 57 unique verses, and 39 surahs.

3.2. Concordance Patterns

Concordance analysis of the 59 tokens revealed several recurring contextual patterns. In general, *al-Māʾ* occurs in contexts related to ecological growth, provision and sustenance, purification, the origin of living beings, punishment and destruction, and figurative expressions or similes. In the context of ecological growth, water is associated with the revival of the earth, plant growth, and the production of fruits, as illustrated in QS al-Baqarah [2]:164, QS al-Naḥl [16]:65, and QS al-Ḥajj [22]:63. In the context of provision and sustenance, water is associated with drinking and other necessities of life, as seen in QS al-Baqarah [2]:22 and QS al-Naḥl [16]:10.

Other occurrences associate *al-Māʾ* with purification, particularly in QS al-Māʾidah [5]:6 and QS al-Anfāl [8]:11. Water also appears in descriptions of the creation and origin of living beings, as illustrated in QS al-Anbiyāʾ [21]:30, QS al-Nūr [24]:45, and QS al-Ṭāriq [86]:6. In contexts of punishment and destruction, water is associated with flood narratives and destructive events, as in QS Hūd [11]:43–44 and QS al-Qamar [54]:11–12. Finally, *al-Māʾ* appears in figurative expressions and similes, including those in QS Yūnus [10]:24, QS al-Raʿd [13]:17, and QS al-Kahf [18]:45. Together, these examples illustrate the diversity of contextual functions associated with *al-Māʾ* in the Qur'anic corpus.

3.3. Semantic Distribution

Based on the results of the semantic categorization of 59 tokens, the use *of al-mā'* is grouped into seven main contextual categories.

Table 1. Semantic Distribution

Category: Semantics	Frequency	Percentage	Example Sentences
Life and Ecological Growth	17	28,8%	QS. 2:164; 16:65; 22:63
Provision and Sustenance	15	25,4%	QS. 2:22; 16:10; 56:68
Punishment and Destruction	10	16,9%	QS. 11:43–44; 54:11–12
Creation and Biological Origin	6	10,2%	QS. 21:30; 24:45; 86:6
Figurative/Symbolic	5	8,5%	QS. 10:24; 13:17; 18:45
Purification	4	6,8%	QS. 4:43; 5:6; 8:11
Divine Sign and Power	2	3,4%	QS. 2:74; 11:7
Total	59	100%	

The Life and Ecological Growth category is the group with the largest number of appearances, which is 17 tokens or 28.8%. This category includes contexts when water is related to giving life to the earth, growing plants, producing fruit, or supporting environmental sustainability. Examples are

found in QS. Al-Baqarah [2]:164 and QS. Ar-Rūm [30]:24. The Provision and Sustenance category occupies the next position with 15 tokens (25.4%). In this context, water is related to beverages, agricultural products, resources, and forms of providing necessities, as in QS. Al-Baqarah [2]:22 and QS. Al-Wāqi'ah [56]:68.

The Punishment and Destruction category includes 10 tokens (16.9%). The use *of al-mā'* in this category is mainly related to flood events and water imagery as part of punishment, as seen in QS. Hūd [11]:43–44 and QS. Al-Qamar [54]:11–12. The Creation and Biological Origin category totals 6 tokens (10.2%) and includes verses that link water to the origin of living things, e.g. QS. Al-Anbiyā' [21]:30 and QS. Aṭ-Ṭāriq [86]:6. Furthermore, the use of Figurative/Symbolic amounts to 5 tokens (8.5%), especially in the form of similes. Yūnus [10]:24 and QS. Ar-Ra'd [13]:17.

The Purification category consists of 4 tokens (6.8%) and is found in the context of purification or purification, while Divine Sign and Power amounts to 2 tokens (3.4%) and is related to contexts that display water as part of the divine sign or power, including QS. Al-Baqarah [2]:74 and QS. Hūd [11]:7. Overall, the distribution shows that the use of *al-mā'* has a fairly wide variation in contextual functions in the corpus analyzed.

3.4. Integrated Interpretation

The findings indicate that *al-Māʾ* performs diverse contextual functions in the Qur'an, with Life and Ecological Growth and Provision and Sustenance accounting for 32 of the 59 tokens (54.2%). This distribution highlights the prominence of water in contexts concerning the continuity of life and the provision of necessities. However, the remaining categories show that water also occurs in contexts of purification, biological origin, punishment, and figurative expression. The findings therefore suggest that its significance in the Qur'an cannot be reduced to a single material or ecological function; rather, its interpretation depends on the linguistic and thematic context of each verse.

These findings complement previous semantic studies of *al-Māʾ*. Rahma et al. [3] examine the term through qualitative semantic analysis, while Gunarti and Ahmadi [5], employing Toshihiko Izutsu's approach, identify physical, symbolic, spiritual, and philosophical dimensions of its meaning. The present study extends these interpretive perspectives by systematically mapping retrieved tokens and classifying their contextual functions across the corpus. Rather than replacing qualitative interpretation, the corpus-based approach provides a transparent account of the distribution and contextual diversity underlying semantic analysis. Differences in the number of occurrences reported across studies should nevertheless be interpreted in light of their respective retrieval criteria and analytical scopes.

From the perspective of Islamic ecology, the prominence of water in contexts of ecological growth and provision provides a textual basis for discussing its significance in sustaining life and supporting human needs. This reading is consistent with environmental perspectives in Islamic thought that connect Qur'anic teachings about creation with human responsibility toward the natural world [16]. At the same time, the occurrence of water in contexts of punishment and destruction cautions against treating its Qur'anic significance as exclusively beneficial or material. These categories do not independently establish a complete environmental ethic; rather, they identify contextual patterns that can inform ecological interpretation when considered alongside relevant Qur'anic teachings and environmental ethics scholarship. The principal contribution of this study is therefore to connect systematic corpus-based mapping with contextual semantic interpretation, providing an empirical foundation for further discussion of water in the Qur'an from an Islamic ecological perspective.

4. CONCLUSION

This study identifies 59 tokens of *al-Māʾ* (ماء) across 57 unique verses and 39 surahs in the Qur'anic corpus retrieved through a stem-based search. Contextual-semantic categorization identifies seven categories: Life and Ecological Growth (17 tokens; 28.8%), Provision and Sustenance (15; 25.4%), Punishment and Destruction (10; 16.9%), Creation and Biological Origin (6; 10.2%), Figurative/Symbolic (5; 8.5%), Purification (4; 6.8%), and Divine Sign and Power (2; 3.4%). Life and Ecological Growth and Provision and Sustenance together account for 32 tokens (54.2%), indicating the prominence of these contextual functions in the analyzed data. The principal contribution of this study is to combine digital corpus retrieval, frequency analysis, concordance examination, and manual contextual-semantic categorization to document the distribution and diversity of *al-Māʾ* in the Qur'an. From an Islamic ecological perspective, the findings provide a textual basis for discussing water in relation to ecological growth, the provision of life's necessities, and the interdependence of creation. These interpretations remain dependent on the contexts of the relevant verses and should not be inferred from frequency distributions alone. This study has two main limitations. First, the dataset is restricted to tokens retrieved through the QAC search for the stem ماء; therefore, it does not necessarily encompass all lexically or morphologically related expressions concerning water. Second, semantic categorization was conducted manually and consequently involves interpretive judgments by the researcher. Future research may extend the dataset to related lemmas and lexical forms, examine collocation and co-occurrence patterns, construct lexical networks, and compare *al-Māʾ* with related Qur'anic terms. Such analyses could provide a broader account of the lexical relationships surrounding the concept of water in the Qur'an.

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