

The Degree of Inclusion of Biogeography Concepts in Geography Textbooks for the Upper Basic Stage in Jordan Heterocycles

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Abstract

Objective

The present study aimed to investigate the degree of inclusion of biogeography concepts in geography textbooks for the upper basic stage in Jordan. The researchers employed the descriptive analytical approach to achieve the study objectives. A list of biogeography concepts was developed and validated by a panel of experts, including faculty members from several Jordanian universities as well as educational specialists from the Ministry of Education holding doctoral degrees in social studies curricula and instruction. The reliability of the content analysis instrument was established using Holsti's coefficient. Based on the validated list, the content of geography textbooks for the upper basic stage was analyzed. The findings revealed that the highest degree of inclusion of biogeography concepts was found in the ninth-grade geography textbook, whereas the tenth-grade geography textbook demonstrated the lowest degree of inclusion. In light of these findings, the researchers recommend increasing the integration of biogeography concepts within the content of geography textbooks for the upper basic stage in Jordan.

Keywords: Degree of Inclusion, Biogeography Concepts, Geography Textbooks, Upper Basic Stage, Jordan.

Introduction

Geography regarded as a window through which humanity can observe the magnificence of creation and the intricate balance governing life on Earth. It is a discipline that reveals the harmonious organization of natural and human systems, making it a valuable means of developing learners' cognitive abilities, including comparison, analysis, observation, and inference. Through geography, individuals gain a deeper understanding of the complex interactions among environmental components and learn how to utilize environmental resources effectively. Within the educational field, geography constitutes a core school subject that seeks to provide learners at various educational levels with a comprehensive understanding of both physical and human geographical phenomena. It emphasizes analyzing the reciprocal relationships between these phenomena and addressing the issues arising from their interaction (Al-Adwan, 2023). Consequently, geography serves as an essential educational tool for achieving numerous educational outcomes. It is not merely a subject for transmitting geographical information; rather, it aims to develop responsible citizens who possess informed perspectives regarding the relationship between humans and the environment and who strive to establish positive interactions with their surroundings while respecting ecological balance. This objective is achieved through fostering awareness of spatial variations and enhancing learners' abilities to understand and discuss geographical, geomorphological, and spatial changes over time. By adhering to these principles, geography education promotes sustainable development behaviors, strengthens students' awareness of the reciprocal relationship between humans and the environment, and reinforces the belief that a clean environment is a fundamental human right (National Center for Curriculum Development, 2020).

In light of current national educational orientations that emphasize critical and analytical thinking, as well as curriculum frameworks that focus on understanding spatial variations, environmental balance, and sustainable development practices, the researchers argue that geography curricula should explicitly address concepts related to biogeography. This branch of geography represents an integration of natural and human environmental elements, and its concepts are essential for achieving a comprehensive understanding of environmental issues and their conservation.

According to Watts, biogeography is "the study of the patterns of present-day life forms distributed across the Earth's surface, atmosphere, and aquatic environments." It seeks to explain the mechanisms through which living organisms organize themselves into distinct groups and examines the challenges posed by the environment and the responses of organisms to those challenges. Furthermore, it is particularly concerned with environmental changes that may significantly alter ecological relationships within relatively short periods (Watts, 1971, p. 5).

Similarly, Cox et al. (Cox et al, 1976, pp. 1–3) define biogeography as "the study of the spatial and temporal

distribution patterns of living organisms and the processes that determine these patterns.” Biogeographers attempt to identify the environmental factors underlying the geographical distribution of organisms and their characteristics. Such investigations require consideration of geological, climatic, soil, and topographical conditions. **Researcher** understand living organisms as geographical phenomena. Anderson (1951, p. 1), in her book *Geography of Living Things*, extends this definition by emphasizing that biogeography is not only concerned with the distribution of plants and animals across the Earth’s surface but also with the effects of such distributions on humans and the vital relationships between humans and both living and non-living components of their environment.

Biogeography is increasingly recognized as an interdisciplinary science that extends beyond documenting the distribution of living organisms. It functions as a comprehensive analytical and planning tool by examining geographical patterns of species distribution and linking them to factors such as sea-level changes, river systems, habitat conditions, spatial isolation, and energy availability within ecosystems. The scientific value of biogeography lies in its ability to explain changes in biodiversity and community composition across latitudinal and altitudinal gradients and throughout geological time.

By integrating knowledge from plant geography, zoogeography, mycology, geology, climatology, and paleontology, biogeography contributes to understanding major evolutionary processes, including extinction events and continental drift. In contemporary applications, the discipline utilizes Geographic Information Systems (GIS) and mathematical modeling techniques to predict future species distributions and address ecological challenges with spatial dimensions. Consequently, biogeography plays a critical role in environmental planning, biodiversity conservation, forecasting the impacts of global environmental changes on biomes, predicting the spread of invasive species and infectious diseases, and supporting agricultural planning (University of Mumbai, 2023).

The formal integration of biogeography concepts into geography textbooks can enhance students’ understanding of biodiversity distribution and prepare them to address future environmental challenges. Such knowledge enables learners to appreciate the significance of biological diversity on Earth, develop scientifically grounded perspectives, and engage with modern technological tools and global environmental databases (Morales, 2022). Likewise, (Al-Adwan, 2023) emphasizes that geography education across different educational stages contributes to preparing responsible citizens capable of actively participating in their environment through the acquisition of knowledge, skills, and scientific habits of mind necessary for environmental management and problem-solving while also fostering positive attitudes and values essential for balanced personality development.

Biogeography has attracted increasing scholarly attention in recent years. (Whittaker et al., 2005) conducted a study entitled *Conservation Biogeography: Assessment and Prospect*, which examined the role of biogeography in shaping conservation strategies. The study highlighted the global threat to biodiversity and the accelerating rate of species loss, arguing for the recognition of conservation biogeography as a major scientific field capable of addressing biodiversity loss through geographical theories and analytical approaches. Using a descriptive analytical review of the literature and spatial models applied in protected-area planning, the study concluded that conservation effectiveness depends heavily on the quality of taxonomic and distributional data and recommended adopting more flexible models that integrate spatial patterns with functional ecological processes such as climate change and biome collapse.

(Richardson et al., 2010) reviewed the foundations, concepts, and challenges of conservation biogeography and traced the development of geographical theories applied to biodiversity conservation. Employing a descriptive analytical synthesis of sixteen specialized scientific contributions, the study examined species distribution modeling, conservation prioritization, invasive species management, and climate change challenges. The findings emphasized the need to improve data quality and develop dynamic models capable of responding to rapid environmental changes. The study also highlighted the importance of spatial modeling for predicting species distributions and supporting effective biodiversity management and policy-making.

(Soyal, 2014) reviewed the fundamental concepts and modern applications of biogeography and investigated how organisms and biological communities vary across geographical gradients such as latitude and elevation. The findings demonstrated that understanding processes such as dispersal, extinction, and spatial variation in species abundance is essential for explaining current distribution patterns. Furthermore, the study concluded that integrating biogeographical information with remote sensing technologies significantly enhances predictions regarding organisms’ responses to environmental changes and strengthens applications in conservation and sustainable resource management.

(Tekić, 2014) examined the theoretical foundations of biogeography as an interdisciplinary field located at the intersection of geography and biology. Through a comprehensive descriptive and analytical review of biogeographical concepts, with particular emphasis on the development of biogeography education in Croatia, the study highlighted the significance of biogeography in understanding contemporary environmental issues. The

findings recommended strengthening the presence of biogeography within educational curricula to address growing environmental challenges.

(Ramirez & Wang, 2022) investigated the status of biogeography education within school and university curricula across selected countries in Asia, the United Kingdom, and the United States. The study aimed to assess university students' knowledge of biogeography and propose recommendations for strengthening its role in addressing global environmental issues such as biodiversity loss and shifts in species distributions. Using a mixed-methods approach that combined curriculum analysis and a survey of 298 students at the National University of Singapore, the study found that biogeography receives limited attention as an independent field within K–12 education. Its concepts typically appear only implicitly within biodiversity-related topics in geography and biology curricula. The findings also revealed low levels of student understanding, with only 8% of participants reporting familiarity with the field and only 25% providing accurate definitions linking species distributions to spatial and temporal dimensions.

The present study shares similarities with previous research in its focus on biogeography concepts (Whittaker et al., 2005; Richardson et al., 2010; Soyal, 2014) and with the work of (Ramirez & Wang, 2022) in exploring the status of biogeography education within school curricula. However, it differs from previous studies by specifically identifying biogeography concepts and examining the degree to which these concepts are included in geography textbooks for the upper basic stage in Jordan. Therefore, the current study contributes to the literature as the first study, to the researchers' knowledge, that investigates the inclusion of biogeography concepts in Jordanian geography textbooks at this educational stage.

Study Problem and Questions

Given the importance of biogeography and its role in examining the interactions between humans and their surrounding environment, as well as the growing global concern regarding the biosphere as the Earth's life-support system, there is an increasing recognition of biogeography as a significant analytical and knowledge-based field within contemporary geographical thought. This recognition has led to the development of numerous concepts that highlight the urgent need for educational curricula to incorporate scientific knowledge that enables students to understand and analyze environmental realities effectively.

With the Ministry of Education in Jordan moving toward curriculum reform and the introduction of revised geography textbooks for the upper basic stage, it has become increasingly important to ensure that these curricula align with contemporary scientific developments and international educational standards. However, within the limits of the researchers' knowledge, there is a noticeable scarcity of local studies that have examined biogeography concepts and their inclusion in school curricula. This gap in the local educational literature has left limited understanding of how these concepts are presented within geography textbooks. Therefore, the need emerged to conduct the present study to investigate the degree of inclusion of biogeography concepts in geography textbooks for the upper basic stage in Jordan.

The study seeks to answer the following questions:

1. What are the biogeography concepts that should be included in geography textbooks for the upper basic stage in Jordan?
2. What is the degree of inclusion of biogeography concepts in geography textbooks for the upper basic stage in Jordan?

Significance of the Study

The significance of the present study can be summarized as follows:

- Addressing conceptual confusion among learners by providing a theoretical foundation that clarifies the distinctions between biogeography and related disciplines such as biology and environmental science, thereby reducing common misconceptions associated with the field.
- Providing a validated list of biogeography concepts that has undergone expert review and validation procedures, making it a reliable theoretical reference that researchers and specialists may utilize in future studies related to biogeography concepts.
- Contributing to the evaluation and improvement of school textbook content to ensure its alignment with contemporary global issues, such as climate change and biodiversity loss, thereby enhancing the compatibility of Jordanian curricula with international scientific and educational trends.
- Addressing the delayed exposure of students to biogeography, which is often not encountered until higher education, by establishing a solid conceptual foundation during the basic and secondary education stages.
- Providing guidance for educational decision-makers and curriculum developers, particularly those involved in curriculum development and evaluation, regarding the importance of incorporating biogeography

Limitations of the Study

The present study is subject to the following delimitations:

1. The study is limited to the geography textbooks prescribed for the ninth and tenth grades of the upper basic stage in Jordan and taught during the 2025/2026 academic year.
2. The generalizability of the study findings is limited by the validity and reliability of the study instrument and the scope of the analyzed textbooks.

Terms Definitions

Biogeography Concepts: Biogeography concepts refer to the set of fundamental ideas and terms related to the geographical distribution of living organisms (plants and animals), ecosystems, and the factors influencing their distribution across space and time, as well as the analysis and evaluation of the interrelationships among these components.

Geography Textbooks: Geography textbooks refer to the official textbooks prescribed by the Jordanian Ministry of Education for ninth- and tenth-grade students during the 2025/2026 academic year.

Upper Basic Stage: The Upper Basic Stage refers to the educational stage comprising the ninth and tenth grades within the Jordanian educational system.

Methodology and Procedures

The researchers employed the descriptive analytical approach through content analysis of the geography textbooks prescribed for the ninth and tenth grades of the upper basic stage in Jordan. The analysis was conducted in light of a list of biogeography concepts developed by the researchers, as this approach was deemed appropriate for achieving the objectives of the present study. The study population and sample consisted of all geography textbooks prescribed for the ninth and tenth grades in Jordan during the 2025/2026 academic year. A total of four textbooks were analyzed, with two textbooks assigned to each grade level: Part One for the first semester and Part Two for the second semester. Instrument of the Study: List of Biogeography Concepts (Content Analysis Card) To conduct the content analysis of the geography textbooks, the researchers followed the methodological procedures suggested by Tu'aymah (2015). First, relevant books, scholarly publications, academic journals, and previous studies related to biogeography were reviewed to identify the major domains and concepts of the field.

Subsequently, the study sample was selected, consisting of the geography textbooks prescribed for the ninth and tenth grades during the 2025/2026 academic year. Based on the literature review, a content analysis instrument was developed in the form of a list of proposed biogeography concepts to be included in geography textbooks for the upper basic stage in Jordan.

The instrument was constructed by identifying the major domains of biogeography, namely: (Environmental Biogeography, Conservation Biogeography). A set of concepts associated with each domain was then included in the analysis framework. The selection of these concepts was informed by previous studies in the field, particularly those conducted by Whittaker et al. (2005), Richardson et al. (2010), and Soyal (2014).

To establish content validity, the list of biogeography concepts was submitted to a panel of experts and specialists for review. The panel included faculty members from several Jordanian universities specializing in physical geography, social studies curricula and instruction, and science curricula and instruction. In addition, a number of educational experts from the Jordanian Ministry of Education holding doctoral degrees in social studies curricula and instruction participated in the review process. Based on the experts' comments and recommendations, the necessary revisions and modifications were made to the instrument before its final implementation.

To ensure the reliability of the content analysis, the researchers adopted the inter-rater reliability method. An additional analyst holding a Ph.D. in Social Studies Curriculum and Instruction, with extensive experience in content analysis, was invited to participate in the analysis process. A preliminary meeting was held between one of the researchers and the external analyst to establish a common understanding of the objectives, procedures, categories, and coding rules of the analysis. Reliability coefficients were then calculated for each textbook separately through both intra-rater (stability over time) and inter-rater agreement measures. (Holsti, 1969) formula was employed to calculate the coefficient of agreement, which served as the reliability coefficient for the content analysis. Table (1) presents the reliability coefficients obtained for the analyzed textbooks. The reliability coefficient was calculated using Holsti's:

$$[\text{Reliability Coefficient}] = \frac{2M}{N_1 + N_2} \times 100\%$$

Where:

- M = Number of coding decisions on which both analysts agreed.
- N_1 = Total number of coding decisions made by the first analyst.
- N_2 = Total number of coding decisions made by the second analyst.

This formula was used to determine the degree of agreement between the two analysts and to ensure the reliability of the content analysis procedure (Holsti, 1969).

Table 1. Reliability Coefficients Across Time and Analysts

Textbook	Intra-Rater Reliability (%)	Researcher–Analyst Reliability
Grade 9 Geography Textbook	91.4%	88.5%
Grade 10 Geography Textbook	90.2%	87.4%
Overall Reliability	91.7%	88.9%

Table (1) shows that the intra-rater reliability coefficient reached 91.7%, while the Researcher–Analyst Reliability coefficient was 88.9%. These coefficients indicate a high level of agreement and consistency in the content analysis process and are considered acceptable for conducting the study and ensuring the reliability of its findings. The content of the geography textbooks was analyzed according to the following procedures:

- The objective of the analysis was determined as identifying the degree of inclusion of biogeography concepts in geography textbooks for the ninth and tenth grades in Jordan, based on the list of biogeography concepts developed for the purposes of the study.
- The categories of analysis were established to include the major domains of biogeography, namely Environmental Biogeography and Conservation Biogeography. These categories were operationally defined in a manner consistent with the objectives of the study and the nature of the content being analyzed.
- The unit of analysis was specified as the word, which represented a corresponding concept within the framework of natural science concepts. Accordingly, each occurrence of a concept in the textbooks was recorded and analyzed.
- The content analysis encompassed lesson texts, individual and group activities, maps, graphs, textual captions accompanying illustrations and images, as well as assessment questions, including lesson review questions and unit review questions.
- The following components were excluded from the analysis: the table of contents, introduction, general unit overview, “What Will I Learn?” sections at the beginning of each unit, the main idea box, and the glossary of terms presented at the beginning of each lesson.
- Frequency counts were adopted as the unit of enumeration. Each occurrence of a biogeography concept within the analyzed content was counted once. Frequencies and percentages were then calculated and organized into tables to determine the degree of inclusion of each concept in the geography textbooks.

Result

The following section presents the results obtained by the researchers and their interpretation in light of the study objectives and research questions.

Question One: What biogeography concepts should be included in geography textbooks for the upper basic stage in Jordan?

To answer this question, a list of biogeography concepts was developed by the researchers following an extensive review of relevant books, scholarly articles, academic journals, and previous studies related to the topic of biogeography. The preliminary list was then submitted to a panel of experts and specialists for evaluation regarding the accuracy, validity, and appropriateness of each concept within its designated domain. Based on the experts’ feedback and recommendations, the necessary revisions were made until the final version of the list was established. The final list comprised 51 biogeography concepts, distributed across two major domains: (Environmental Biogeography, Conservation Biogeography). The finalized list served as the framework for identifying the essential biogeography concepts that should be included in geography textbooks for the ninth and tenth grades of the upper basic stage in Jordan. Table 2 presents the domains and concepts included in the final list.

Table 2. Biogeography Concepts Recommended for Inclusion in Geography Textbooks for the Ninth and Tenth Grades in Jordan

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Main Field	Subfield	No	Concept
Environmental Biogeography	Biological Processes and Characteristics	1	Biotic Dispersal
		2	Biotic Homogenization
		3	Biodiversity
		4	Environmental Adaptation
		5	Ecological Niche Expansion
		6	Ecological Resilience
		7	Extinction
		8	Ecological Succession
		9	Disturbance
		10	Competition
		11	Predation
		12	Symbiosis
		13	Biological Productivity
		14	Parasitism
		15	Biological Rarity
		16	Endemism
		17	Species Geographic Range
	Biological Tools and Data	18	Remote Sensing
		19	Geographic Information Systems (GIS)
		20	Biogeographical Mapping
		21	Biogeographical Maps and Atlases
		22	Environmental Modeling and Analysis
Biogeography for Environmental Conservation	Biotic Environmental Degradation	23	Habitat Degradation
		24	Biodiversity Loss
		25	Invasive Species
		26	Urbanization
		27	Population Growth
		28	Deforestation
		29	Forest Fires
		30	Pollution

		31	Global Warming
		32	Climate Change
		33	Ozone Depletion
		34	Acid Rain
		35	Soil Degradation and Erosion
		36	Natural Resource Depletion
		37	Environmental Impacts of Mining
		38	Land Use
		39	Desertification
		40	Soil Erosion
		41	Overgrazing
		42	Overhunting
		43	Water Scarcity
		44	Unsustainable Agricultural Practices
		45	Urban Sprawl
		46	Environmental Impacts of Conflicts
		47	Ecosystem Services
		48	Environmental Impact Assessment
		49	Ecological Restoration
		50	Protected Areas
		51	Sustainable Development

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Question Two: What is the degree of inclusion of biogeography concepts in geography textbooks for the upper basic stage in Jordan?

To answer this question, the content of the geography textbooks prescribed for the ninth and tenth grades in Jordan was analyzed using the list of biogeography concepts developed by the researchers for this purpose. The analysis framework consisted of 51 biogeography concepts distributed across two major domains: Environmental Biogeography and Conservation Biogeography.

Table 3 presents the frequencies, percentages, and levels of inclusion of the identified biogeography concepts within the analyzed geography textbooks. To determine the degree of inclusion of biogeography concepts in the geography textbooks included in the study sample, a statistical classification criterion was adopted. The range was calculated by subtracting the lowest percentage obtained by a concept from the highest percentage obtained, and the resulting range was divided into three levels of inclusion (High, Moderate, and Low) using class interval length according to

the following formula (Abu Ghalioun, 2015):

$$[\text{Class Interval Length}] = \frac{\{\text{Highest Percentage}\} - \{\text{Lowest Percentage}\}}{3}$$

$$[= \frac{23.97 - 0.00}{3} = 7.99]$$

Research Article

Accordingly, the following criteria were adopted for interpreting the degree of inclusion: (Low Inclusion: 0.00% – 7.99%, Moderate Inclusion: 8.00% – 15.99%, High Inclusion: 16.00% – 23.97%).

These criteria were used to classify the degree of inclusion of each biogeography concept identified in the analyzed geography textbooks.

Table 3. Frequencies and Percentages of the Degree of Inclusion of Geography Concepts for the Ninth and Tenth Grades in Jordan

Main Field	Subfield	No	Concept	G9	G10	Total	percent	Degree of Inclusion
Environmental Biogeography	Biological Processes and Characteristics	1	Biotic Dispersal	0	0	0	0.0	Low
		2	Biotic Homogenization	0	0	0	0.0	Low
		3	Biodiversity	6	36	42	7.24	Low
		4	Environmental Adaptation	1	0	1	0.17	Low
		5	Ecological Niche Expansion	0	0	0	0.0	Low
		6	Ecological Resilience	0	0	0	0.0	Low
		7	Extinction	1	7	8	1.38	Low
		8	Ecological Succession	0	0	0	0.0	Low
		9	Disturbance	1	0	1	0.17	Low
		10	Competition	0	0	0	0.0	Low
		11	Predation	0	0	0	0.0	Low
		12	Symbiosis	0	0	0	0.0	Low
		13	Biological Productivity	3	0	3	0.52	Low
		14	Parasitism	0	0	0	0.0	Low
		15	Biological Rarity	0	0	0	0.0	Low
		16	Endemism	1	0	1	0.17	Low
		17	Species Geographic Range	0	0	0	0.0	Low
		18	Remote Sensing	0	26	6	1.03	Low

		Biological Tools and Data	19	Geographic Information Systems (GIS)	0	27	27	4.65	Low
			20	Biogeographical Mapping	0	0	0	0.0	Low
			21	Biogeographical Maps and Atlases	0	0	0	0.0	Low
			22	Environmental Modeling and Analysis	0	0	0	0.0	Low
Biogeography for Environmental Conservation		Biotic Environmental Degradation	23	Habitat Degradation	0	1	1	0.17	Low
			24	Biodiversity Loss	2	1	3	0.52	Low
			25	Invasive Species	0	1	1	0.17	Low
			26	Urbanization	1	0	1	0.17	Low
			27	Population Growth	19	4	23	3.97	Low
			28	Deforestation	1	6	7	1.21	Low
			29	Forest Fires	0	6	6	1.03	Low
			30	Pollution	93	46	139	23.97	High
			31	Global Warming	1	14	15	2.59	Low
			32	Climate Change	12	43	55	9.48	Moderate
			33	Ozone Depletion	0	0	0	0.0	Low
			34	Acid Rain	4	5	9	1.55	Low
			35	Soil Degradation and Erosion	10	5	15	2.59	Low
			36	Natural Resource Depletion	7	4	11	1.90	Low
			37	Environmental Impacts of Mining	0	0	0	0.0	Low

				38	Land Use	1	3	4	0.69	Low	cle	
				39	Desertification	42	6	48	8.28	Low		
				40	Soil Erosion	0	0	0	0.0	Low		
				41	Overgrazing	3	7	10	1.72	Low		
				42	Overhunting	0	1	1	0.17	Moderate		
				43	Water Scarcity	9	1	10	1.72	Low		
					44	Unsustainable Agricultural Practices	10	4	14	2.41		Low
					45	Urban Sprawl	6	4	10	1.72		Low
					46	Environmental Impacts of Conflicts	3	0	3	0.52		Low
					47	Ecosystem Services	0	0	0	0.0		Low
		Biotic Conservation Planning		48	Environmental Impact Assessment	0	40	40	6.90	Low		
				49	Ecological Restoration	2	0	2	0.34	Low		
				50	Protected Areas	1	8	9	1.55	Low		
				51	Sustainable Development	13	41	54	9.31	Low		
Total						523	327	580	100.0			

Discussing

The construction of this list and its classification into main domains reflects the integrative nature of biogeography as a scientific field. The inclusion of these concepts in geography textbooks aimed to establish a knowledge structure that moves learners from a superficial level of understanding biogeography to a deeper level of conceptual awareness. This enables students to effectively engage with the biosphere, contribute to environmental conservation, and propose solutions to environmental challenges. It also encourages the use of maps, digital atlases, Geographic Information Systems (GIS), and remote sensing technologies to monitor vegetation cover, wildlife distribution, and spatial relationships among environmental components, as well as to analyze biogeographical data. This, in turn, enhances conceptual understanding and reduces common misconceptions that often arise from superficial treatment of environmental concepts, in a manner appropriate to learners' cognitive developmental stages.

Moreover, these concepts support the design of training programs aimed at enhancing geography teachers' competencies in teaching biogeography as a branch of physical geography. They also contribute to the reassessment of school textbook content to ensure alignment with contemporary global issues such as climate change and biodiversity loss, thereby ensuring that the Jordanian curriculum remains consistent with international standards and global scientific developments.

The data presented in Table (3) indicate that the total frequency of biogeography concepts in the geography textbooks for the ninth and tenth grades reached 580 occurrences. The most frequently included concept was "Pollution," which appeared at a high level of inclusion, accounting for 23.97% of the total within the conservation biogeography domain. This was followed by "Climate Change," which appeared at a moderate level with a percentage of 9.48%, "Sustainable Development" at 9.31%, and "Desertification" at 8.28%, all of which also belong to the conservation biogeography domain.

In contrast, the remaining biogeography concepts were included at low levels, each recording less than 7.99%. It was also observed that several biogeography concepts did not appear at all in the textbooks included in the study sample, as shown in the previous table. The researcher attributes this low frequency and limited inclusion of biogeography concepts to the traditional philosophical structure of the curriculum, which continues to place strong emphasis on environmental geography topics. The researcher also argues that this imbalance in content is not consistent with global trends that emphasize the need to empower students with biogeographical concepts and related analytical skills.

The relatively higher frequency of some concepts is explained by the curriculum's focus on environmental issues closely related to learners' daily lives. This has contributed to the noticeable prominence of concepts within the second domain, Conservation Biogeography, such as global warming, climate change, and pollution, which are directly linked to human-environment interactions and the sustainable use of natural resources. Finally, the researcher considers this finding to provide a strong methodological justification for the importance of the present study..

Conclusion

This study aimed to examine the degree of inclusion of biogeography concepts in geography textbooks for the upper basic stage (ninth and tenth grades) in Jordan. Based on the analysis conducted in light of a validated list of 51 biogeography concepts distributed across two main domains, the findings revealed a generally low level of inclusion of biogeography concepts in the analyzed textbooks. The results indicated that most biogeography concepts were represented at a low level, while only a limited number of concepts appeared at moderate levels, namely climate change, sustainable development, and desertification. Pollution was the only concept that achieved a high level of inclusion. In contrast, a considerable number of essential biogeography concepts were completely absent from the textbooks, particularly those related to ecological processes, biogeographical tools, spatial analysis, and conservation modeling.

The study also showed an imbalance in the distribution of concepts between the two grade levels, with the ninth-grade textbooks containing a higher frequency of biogeography-related content compared to the tenth grade. This suggests inconsistency in the progressive development of biogeographical knowledge across the curriculum. Overall, the findings suggest that geography textbooks in Jordan emphasize selected environmental issues rather than providing a comprehensive and systematic coverage of biogeography as an integrated scientific field. This limited representation may restrict students' ability to develop a deep understanding of spatial ecological relationships, biodiversity patterns, and modern environmental analysis tools such as GIS and remote sensing.

In light of these findings, the study concludes that there is a clear need to enhance the integration of biogeography concepts in geography curricula for the upper basic stage in Jordan. Strengthening this inclusion would contribute to improving students' conceptual understanding, supporting environmental awareness, and aligning geography education with contemporary global scientific and environmental trends.

Recommendations

In light of the study results, the following recommendations are proposed:

1. Directing curriculum planners and geography textbook authors at the Ministry of Education to adopt the validated list of biogeography concepts developed in this study and utilize it in updating and enriching geography textbooks for the upper basic stage.
2. Recommending that curriculum developers at the Jordanian Ministry of Education increase the relative weight of biogeography concepts within geography textbooks to ensure more balanced and comprehensive coverage.
3. Conducting a comparative analytical study on the degree of inclusion of biogeography concepts in geography textbooks in Jordan and those of leading Arab or international educational systems, in order to benefit from global best practices in curriculum development.
4. Conducting a study to assess the level of geography teachers' knowledge of biogeography concepts at the upper basic stage, and designing a professional development program to enhance their teaching competencies in this field.

5. Conducting a similar study to evaluate the degree of inclusion of biogeography concepts in the geography textbook for the twelfth grade (academic track).

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The researchers declare that there is no Financing funded the research.

Conflict of Interest

The researchers declare that there is no conflict of interest.

Ethical Approval

The Ethics Committee of the Human Research Ethics Board (IRB), approved the ethical procedures of the research, taking into account the voluntariness, anonymity, and informed consent of the participants.

Data Availability Statement

The data used in this research is confidential and thus cannot be shared with third parties.

Declarations

Author Contributions. Futoon Mahmoud Izzat Batayneh., Khalid Fayyad Mohammad Al-Ezzi, review of the literature, ideation, and creation of the original manuscript. review-editing and writing, Methodology, data analysis. All authors have read and approved the published on the final version of the article.

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