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## THE TOPIC OF ECOLOGY IN 21ST CENTURY LITERATURE AND THE RELEVANCE OF ITS TEACHING

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### ABSTRACT

*This article comprehensively examines the appearance of the theme of ecology in the Kazakh literature of the 21st century and the importance of teaching it in schools. Currently, issues such as global warming, depletion of natural resources, and environmental disasters are among the most pressing problems facing humanity. The formation of an ecological culture of young people is of great importance in solving these problems. Literature is a powerful tool that influences the spiritual development of a person. Therefore, by introducing works of environmental content from modern Kazakh literature into the school curriculum, there is a high potential to increase students' love for nature and responsibility. The article presents effective methods and approaches for teaching the topic of ecology, using the works of modern poets and writers as examples: R. Nurgali's story "Kylmys" (crime), A. Nurpeisov's novel "Songyi faryz" (The last duty), R. Mukanova's story "Mangilik bala bevene" (Eternal child), A. Altai's story "Kentavr" (Centaur), Zh. Sakhiev's story "Aidagy zhasyrynbak" (Hiding on the Moon), S. Aksunkaruly's work "Ecologialyk pikirtalasta okylgan olen" Poems read at ecological discussions, S. Zhubatyrulvly's novel "Abyrzhy", K. Akhmetova's poem "Kala ecologyasy" City Ecology, A. Elgezek's poem "Men ishpegen u bar ma?" Is There a Poison I Haven't Drunk? This study highlights the importance of building environmental awareness through the teaching of literary works and suggests methods that can help change students' attitudes towards the environment. In addition, the article deeply analyzes the content features of literary works on environmental topics and their educational value. Literature plays a special role in developing students' creative thinking and fostering a sense of compassion for nature. Research and practical recommendations in this area will help improve the quality of environmental education.*

**KEYWORDS:** Ecology, Climate change, Environmental pollution, Biodiversity decline, Ecological culture, Environmental education, Sustainable development, Natural resource depletion

## 1. INTRODUCTION

The topic of ecology is currently particularly relevant, as issues such as environmental pollution, depletion of natural resources, and climate change directly affect the quality of life of humanity. The President of the Republic of Kazakhstan, K. Tokayev, has stated that the issue of ecology is one of the priority areas of the country's development, and that it is necessary to bring testing grounds into line with environmental and sanitary requirements (Tokayev, 2024). Among the global environmental problems of the 21st century, **the following can be mentioned**

**Climate change** In the last decade, there has been an increase in global average temperatures, and according to statistics, in 2024 the global average temperature increased (warmed) by 1.5 degrees compared to 2023. Such a change increases the frequency and intensity of natural disasters.

**Biodiversity decline** The rate of species extinction on Earth is 100 times higher than natural levels, threatening the stability of ecosystems.

**Air pollution** According to the World Health Organization, more than 90% of the world's population lives in polluted air, which causes millions of premature deaths each year.

In the modern era of globalization, environmental protection and environmental issues have gained special importance at the global level. Scientific and technological progress and the process of urbanization have led to the depletion of natural resources and environmental pollution. To solve these problems, it is important to form an ecological culture. Ecological culture is a set of spiritual, moral and intellectual qualities that form a person's responsible attitude towards the environment and the ability to treat nature with compassion. American ecologist and scientist Lester Brown paid special attention to the issues of environmental protection and rational use of natural resources in his works. In his opinion, environmental education is the main path to sustainable development and nature conservation (Brown, 2011). British scientist David Orr emphasizes the special role of the education system in the formation of environmental culture and calls for environmental protection by educating the younger generation (Orr, 2004). According to German scientist Ernst Ulrich von Weizsäcker, ecological culture should not be limited to education alone, but should be embedded in the everyday life skills of humanity (Weizsäcker, 2013). According to the Kazakh scientist A.Zh. Beisenova, ecological culture is a set of knowledge, experience and actions aimed at maintaining a harmonious relationship between nature and man (Beisenova, 2018). In

addition, the well-known ecologist S.A. Azimbayev notes the importance of a careful attitude to nature and the formation of environmental responsibility.

Environmental culture and responsibility should be instilled in a child from kindergarten and fully instilled in his mind while he is still in school. Only then will the world be able to protect itself from various natural disasters that may occur in the future. **Let's look at world practices in educating school-age children in the right relationship with the environment**

**Environmental education in Japan** Although environmental education is not taught as a specific subject in Japanese schools, a culture of respect for the environment and conservation is an important part of the curriculum. Students are taught values such as living in harmony with nature, keeping the environment clean, and conserving resources starting in elementary school. For example, in schools, students clean their own classrooms, which instills a sense of hard work and respect for the environment.

**Finland** In Finland, environmental education is integrated into the curriculum. Students take nature trips, explore the environment, and participate in environmental projects. This approach increases students' interest in nature and builds environmental awareness.

**Germany** Environmental education in German schools is implemented through the "Eco-Schools" program. This program develops environmental responsibility by involving students in projects aimed at protecting the environment.

**Kazakhstan** Kazakhstan has a legal framework for environmental education and upbringing. For example, documents such as the "Concept of Environmental Education of the Republic of Kazakhstan" (2002), "Concept of Environmental Safety of the Republic of Kazakhstan for 2004-2015" (2003), the "Green Kazakhstan" national project (2021), and the "Clean Kazakhstan" national project (2024) have been adopted. These documents emphasize the importance of forming an environmental culture and set the direction of environmental education in the education system.

Environmental education is an important direction in schools in Kazakhstan. This education is aimed at instilling in students a love for nature, a responsible attitude to the environment, and an ecological culture.

One of the main tools for environmental education for school-age students is literature and works of art. Yes, literary works can play an important role in forming the environmental culture

of students. Literature is a powerful tool that influences the emotional and spiritual development of a student. In this direction, literary works awaken a sense of compassion for nature by artistically conveying environmental issues and increase students' responsibility for protecting nature. American writer and philosopher Henry Thoreau, advocating living in harmony with nature, emphasized the role of literature in forming environmental consciousness (Thoreau, 2019). Her work "Walden; or, Life in the Woods" is aimed at instilling love and responsibility for nature. Rachel Carson, the author of the book "Silent Spring", raises environmental issues through literary works and shows the importance of environmental education (Carson, 2002). Kazakhstani scientist A.S. Beisenova, studying the theoretical and pedagogical foundations of environmental education and upbringing, emphasizes that the formation of environmental culture begins in childhood and that literature plays an important role in this process. Teacher S. Zhumabekova emphasized the importance of using the rich treasury of examples of the Kazakh people's oral literature in education and researched the role of literary works aimed at protecting nature and environmental education in forming students' environmental culture. The author, using examples of Kazakh folk literature, suggests effective ways to provide children with environmental education. Summarizing the opinions of these scientists, **the impact of literary works on students can be classified as follows**

**Emotional impact** Stories about environmental disasters and the degradation of nature through literature force students to think deeply. This changes their attitude towards nature.

**Formation of values** Poems and stories with an ecological content contribute to the inculcation of values such as environmental protection and resource conservation.

**Developing creative thinking** Through analyzing literary works and writing essays, students look for ways to solve environmental problems.

**Understanding the environment** Through literature, their understanding of ecosystems, natural phenomena, and ecological balance expands.

## 2. METHOD

This study is based on a qualitative method and uses an eco-structural approach. The research stages are as follows. First, identifying sources, that is, collecting data on literary works on environmental topics or that address environmental issues. The main sources include literary works (stories and

novels) on environmental topics. These include R. Nurgali's story "Kylmys" (crime), A. Nurpeisov's novel "Songyi faryz" (The last duty), R. Mukanova's story "Mangilik bala bevene" (Eternal child), A. Altai's story "Kentavr" (Centaur), Zh. Sakhiev's story "Aidagy zhasyrynbak" (Hiding on the Moon), S. Aksunkaruly's work "Ecologialyk pikirtalasta okylgan olen" Poems read at ecological discussions, S. Zhubatyruvly's novel "Abyrzhy", K. Akhmetova's poem "Kala ecologyasy" City Ecology, A. Elgezek's poem "Men ishpegen u bar ma?" Is There a Poison I Haven't Drunk? Additional data were obtained from various literature on ecocritical theory and environmental education. Second, data classification. At this stage, all primary and secondary data are classified according to the research formula. Third, data analysis, that is, analyzing the primary data using ecocritical theory and relating it to environmental education. The fourth step is to draw conclusions based on the results of the analysis and interpretation.

## 3. DISCUSSION AND RESULT

### 3.1. *The Reflection of Environmental Issues in 21st Century Literature*

What is the role of fiction in instilling environmental responsibility and awareness in people and developing environmental education? To what extent is compassion for nature generally reflected, promoted, and manifested in our literature? Kazakh literature is also responding to this issue to its fullest extent.

**Abdizhamil Nurpeisov's novel "Songy paryz" (The Last Duty) романы.** In this trilogy, he was able to depict the ecological consequences of the ancient Aral Sea region, and the path it took to get there, on a large scale in artistic prose. "Both the earth and man are being destroyed," says the novel. In the vast steppes of Kazakhstan, only a few deer, once millions of them, are left. Those few deer have nowhere to drink. The loose, salty sand from the receding seabed is badly affected by winter storms. Deer that can't stand the sandstorms hide in the barns of villages where they used to roam. The tragedy of the end of time has befallen man himself. "The sea is drawn, the land is reduced, the country is empty." The whole fate of Jadiger tells his contemporaries: «... Black sheep, come to your senses! Look to your right and to your left! Even if you think of nothing else, if you think of what will happen to this world that has come to ruin? If you think of what will happen to the miserable generation that will come after you, after you have left this world»[8]. Is the Aral Sea the only one with a small landmass and a deserted people?

That is why "The Last Duty" says that humanity, regardless of the elder or the younger, the leader or the black foot, is obliged to repay its debt to nature and society. How should this duty be fulfilled? Nurpeisov's novel puts the issue bluntly. Everything is in the hands of man.

**Sailaubai Zhubatyrovich's novel "Abyrzhy".** In addition, in two volumes of his novel "Abyrzhy", which was included in the 200-volume anthology of the "Syrdariya Library" in 2009, and in other works, the writer describes the artistic reality of the fate of the Aral Sea and the Aral Sea's hardships with deep psychological and philosophical reflection.

«-... How is the island? - said a visitor who came here.

- Continues to die happily!
- How is he like that?!
- The same psychology... Only the slogans have changed a little...

- Oh, what happened to the awakened, free worldview of your free Central Asia?! - the "party" scolded Alkuat. - Where is the high promise to people and God? Where is that thirty billion water promised to the Aral Sea?...

- "I can't understand it myself," Alkuat excused himself, as if he were the only one to blame for everything. "No one cares about lies these days. Irresponsibility? Hypocrisy?.. I'm ashamed to remember that now... And in the poor sea, as in the past, there is no language..." [9].

This topical topic is gaining deserved support not only in the prose genre, but also in modern Kazakh poetry. The poems and poems of poets A. Tazhibayev, K. Myrzaliev, K. Myrzabekov, I. Orazbayev, K. Salykov, Zh. Abdirashev, U. Esdauletov, E. Raushanov, published in periodicals, are proof of this.

**Rymgali Nurgali's story "Kylmys" (crime).** It is known that during the Soviet period, the peaceful Kazakh steppe, namely the Semipalatinsk region, became a nuclear test site. The writer realistically describes how the once sunny, carefree, and carefree country was suddenly turned into a state of turmoil and chaos, and the campaign was moving the people to another place in the autumn. "This explosion occurred on August 5, 1953. A week later, the people returned to their former settlements: the stray dogs and cats that had remained in the village had their fur matted, their skin was red and cracked, the road was covered with long, unruly grass that had grown up to the roofs of the houses. The people, who were initially surprised by this phenomenon, gradually got used to it, stopped paying attention, and did not notice the first sign of the many disasters that were to

come later." [10:470], - in the excerpt, we see a scene from the village after the explosion.

Story: "Whether it was the result of the atomic bomb that exploded on the ground for fifteen years and the water bomb that exploded underground for twenty-five years, or some other tragedy, it's hard to tell. In the small village of Kaynar, the number of people who have died from cancer, leukemia, internal bleeding, and suicides has skyrocketed in recent years." [10:471], - finished. We can see the depth of emotion behind these words. The writer is deeply concerned about the psychological and biological changes that people will experience as a result of the atomic bomb.

**Roza Mukanova's story "Mangilik bala beynesi" (Eternal Child).** The main character, Layla, is a disabled girl born in Karaul, right in the middle of the explosion field caused by atomic tests. Her prototype is a resident of the city of Semey named Enlik. The general psychological and emotional atmosphere in the story is sad and gloomy. The number of people affected by the test is decreasing day by day. The sounds of grief are not absent in Karaul. The daily deaths of villagers and their families seem to weigh heavily on the village and the region. The only person who suffers from this tragedy, which is caused by human hands and leaves an indelible scar on the soul, is also a human being. In the story, the wounded Laila constantly confides in the moon, telling her all her sorrows and sorrows. [11]. Similarly, we can mention A. Altai's story "The Centaur" about the fate of a baby born not as a human, but as a centaur, due to a landfill. These works prove that humanity's aggression against nature comes back to haunt it.

**The story "Aidagy zhasyrynbak" (Hide and Seek on the Moon) by Yunus Sakhiev.** This story, written for children in the fantasy genre, is also full of concerns about the future of planet Earth. According to the main character's father: "After the solar system first emerged from cosmic dust, the planets went through similar stages of transition to a habitable state. The Moon also had an atmosphere. Life was once thriving here too. The Moon's intelligent beings, who had reached the peak of cultural development, polluted the atmosphere, leading to its disintegration. As a result of the increase in the ozone hole, the electromagnetic flux of solar radiation, as well as short-wave X-rays and ultraviolet rays, destroyed life on the planet. The surface of the moon became bare and extremely hot, all greenery dried up, and springs, lakes, seas and oceans were poisoned and flew into space. Space rocks from deep space have wrinkled the planet's surface. The moon's

surface is covered with shimmering craters. The sunlit side of the planet has dried up, and the inner water on the night side has frozen into eternal ice. The moon has slowed down its rotation on its axis. Our scientific research has proven this..."[12:23] Through this paragraph, the author warns students that if we do not stop polluting the earth, life on our planet may also become extinct—"The future purity of nature is in your hands," my uncle said at that time, after listening to Sartai and me, "explain this to your friends." ...[12:24]

The works of modern Kazakh poets and writers often raise issues of nature and ecology. For example, Akberen Elgezek's poem "Men ishpegen u bar ma?" (Is There Any Poison I Haven't Drink?) deeply describes the connection between man and nature:

"The flowers that bloom in spring,  
It withers away without a touch...  
Flowers fade like faded hope,  
Like ashes blown by the wind..."[13]

These lines clearly show the fragility of nature and the impact of human activity. The poet conveys the need to protect nature in artistic language.

In addition, Kazybek Isa's poems reflect on the destruction of nature and the negative impact of environmental disasters on humanity:

"Rivers flowing with waterfalls,  
She was overcome with tears and cried.  
The forest fires are extinguished,  
The green world has withered." [14]

Here it is clear that the destruction of nature depends on human activity. The poet sharply raises the issue of ecology and invites the reader to think.

The ecological theme also occupies a special place in the poems of Serik Aksunkaruly. His works criticize the degradation of nature and humanity's indifference to it. His work "A Poem Read in an Ecological Debate" seems to support our words and opinions:

"When will we see our blindness,  
And make the earth a grave of worms?  
Thank God, we are dead –  
Kill everyone before they can!  
We have no heart, our animal body, our behavior  
Like a raven, if you don't eat insatiably.  
Thank God, we will die one day,  
The world dies—or" [15].

Kulyash Akhmetova in her poem "City Ecology": "We still see a lot of change,  
What has a beginning has an end.  
White snow falling at night  
In Almaty  
"It will be covered in smoke until noon." [16],- He talks about the ecology of Almaty, describing how

the white snow that fell at night turns black with smoke by noon, and the smell of gas and gasoline makes it impossible to breathe deeply.

As we see, the earth has been destroyed and the world is in a state of death due to human cruelty. Accordingly, as a result of human tyranny, environmental issues, along with poverty, gender, human rights and security, have become one of the most pressing problems on earth. In order to prevent these and similar problems and to decolonize the environment, it is very important to form a new ecological culture.

### 3.2. *The Importance of Teaching Ecology at School*

By explaining environmental issues to students, you can increase their love for nature and responsibility. The formation of an ecological culture through literary works has a positive effect on the personal development of students. "Literature-based environmental education is an alternative approach aimed at forming students' ecocentric views on nature. The goal of such a program is to change students' behavior and translate the knowledge they have gained into environmentally friendly actions." [17]. Human attitudes towards nature are often anthropocentric, meaning that human interests are considered higher than those of nature. Therefore, to solve such problems, special attention should be paid to increasing the level of education of the population. This is achieved through the effective implementation of environmental education.

Around the world, special attention is being paid to environmental education in schools, and each country has its own unique methodologies and practices. In Kazakhstan, attention is also being paid to environmental education.

### 3.3. *Environmental Education Programs*

**Preschool education** In preschool organizations, special attention is paid to the formation of children's environmental culture. At this stage, children are given the first ideas about nature, and skills in caring for the environment are formed. The methodological recommendations offer various games, observations, and experiments to develop a love for nature and form environmental awareness.

**General education schools** Environmental education is integrated into the school curriculum. In primary grades, environmental topics are covered through environmental subjects, and in higher grades, environmental topics are covered in Kazakh language, Kazakh literature, biology, geography, and chemistry lessons. In addition, extracurricular activities, environmental projects, and nature

excursions are organized.

**National strategies for the development of ecological culture** Environmental education in schools in Kazakhstan is an important component of the continuing education system and is implemented through a complex of activities aimed at forming students' positive attitudes towards nature.

Kazakhstani schoolchildren are implementing several projects of environmental significance at the republican level.

**1. "ProEco" environmental project competition**

This competition is held among students in grades 5-8 and is aimed at increasing their environmental literacy and adapting them to environmental protection activities.

**2. "Eco School" and "Eco Kindergarten" projects**

These projects, implemented in the West Kazakhstan region, aim to create environmental councils in educational institutions and involve students in environmental protection activities.

**3. "NXplorers: Green Generation Competition" environmental project competition**

This competition is held among students in grades 8-10 and aims to improve their environmental literacy. Students work in teams and develop projects to solve environmental problems. For example, initiatives such as building a greenhouse on school grounds, making fertilizer from kitchen waste, and cleaning the banks of the Tobol River have been undertaken. These projects contribute to the development of students' research and creative abilities.

These projects play an important role in shaping students' environmental culture and increasing their responsibility for environmental protection.

These experiences show that environmental education plays an important role in fostering students' love and responsibility for nature.

### **3.4. Teaching Methods and Approaches**

A number of literary works on the topic of ecology are taught in schools in Kazakhstan. Some of the works analyzed in the article are included in the school curriculum. These works are aimed at increasing students' love for nature and forming their environmental culture. In addition, they encourage students to protect nature, understand environmental problems and find ways to solve them.

Since 2000, several important works on the topic of ecology have been published in Kazakh literature. The vast majority of them are analyzed in the article.

These works demonstrate the relevance of the topic of ecology in modern Kazakh literature and call on readers to protect nature.

When teaching students about environmental issues, it is important to consider several important issues. These issues should be aimed at developing students' environmental awareness, increasing their responsibility towards the environment, and improving their creative thinking.

**1. Age of students and acceptance level**

- a. Environmental fairy tales, legends, and short stories are effective for elementary school students.
- b. Popular science works about nature and the environment are important for the middle generation.
- c. It is appropriate to present complex literary works about environmental problems and their consequences to high school students.

**2. The content and idea of ecological works**

- a. Should provide accurate information about nature conservation and environmental issues.
- b. Should instill a sense of responsibility and care for the environment.
- c. Texts should be aimed at forming students' environmental culture.

**3. Interdisciplinary connection of ecological works**

- a. Kazakh language and literature-reading and analyzing works of art.
- b. Geography-considering the global nature of environmental issues.
- c. Biology-understanding the functioning of natural ecosystems.
- d. History-the study of historical aspects of environmental issues.

**4. Difficulties in forming students' environmental awareness**

- a. Some students may not fully understand the importance of environmental issues.
- b. If theoretical knowledge is not reinforced by practice, students will be reluctant to apply environmental actions in real life.
- c. The curriculum may not allocate enough time to environmental works.

**5. Evaluating the effectiveness of teaching ecological works**

- a. Increased interest in environmental topics among students.
- b. Increased personal attitude and level of responsibility towards the environment.
- c. Implementation of individual or class environmental projects (e.g., planting trees, sorting garbage).

It is effective to use interactive methods, discussions, and creative projects in teaching literary works on the topic of ecology. Analyzing works with ecological content in literature lessons, writing essays, and preparing stage performances increase students' interest. Among the effective methods used in the global educational space, **the following can be attributed**

- **STEAM method (Science, Technology, Engineering, Arts, Mathematics)** To develop students' critical thinking and creativity by combining project work on the topic of ecology with literary works.
- **Project-Based Learning** Provide students with projects aimed at solving environmental problems. For example, analyzing a certain literary work and developing a project based on it aimed at protecting nature.
- **Interactive methods** To increase students' interest in analyzing works with ecological content through discussions, essay writing, and stage performances.
- **Multimedia tools** Deeper explanation of environmental topics through virtual tours and animated videos.
- **Environmental quests** Learning about ecology in an interesting and engaging way through quest games based on literary works.
- **Artificial intelligence** The use of artificial intelligence (AI) technologies is effective in shaping students' environmental culture. Based on AI, environmental simulations, virtual laboratories, and interactive tests can be developed to offer students various ways to solve environmental problems. In addition, with the help of AI, it is possible to automatically assess the level of knowledge of students and create individual learning trajectories. Among the capabilities offered by AI, the virtual laboratory method is highly effective.

The study involved 9th grade students from the Abai School in Almaty. In order to increase the effectiveness of the study, STEAM and project-based learning methods were actively used, along with interactive methods commonly used in schools.

Before teaching and analyzing works of art on the topic of ecology, students were given a test. The test was aimed at determining the general level of environmental knowledge of students. Sample questions: What is the most pressing environmental problem(s) on the global scale? What environmental disaster are the people of Semipalatinsk suffering from? What harm does cutting down trees cause to

nature? What is the reason for the shrinking of the Aral Sea? What is the reason for the sharp warming of the weather?

The average score of the 30 students who participated in the test was 60%. As a result of reading, analyzing works of art, and using various methods for 1 quarter, that is, 2.5 months, this indicator increased to 85% by the end of the quarter.

**Change in test results**



Figure 1: Test Results.

In addition, students were asked a question: "Do you care about environmental issues?" Initially, 57% of students answered no, but after the work was done, the proportion of those who answered "yes" to the question "Have your environmental habits changed?" was 86%.

**Survey results**

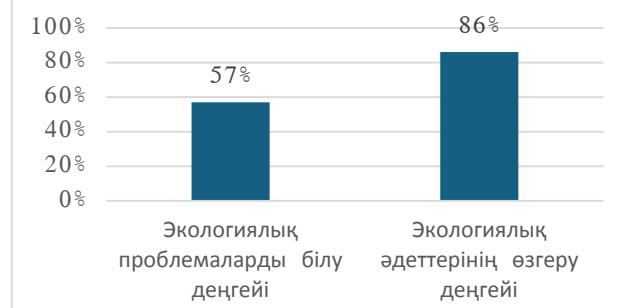


Figure 2: Survey Results.

During the study, after taking tests and surveys, the proportion of students who had participated in environmental projects, even if they were in other subjects, was 30%. After reading and analyzing several works of art on the topic of economics and identifying their main value, the students themselves extracted global ideas from each work, and as a result, the number of students participating in environmental projects increased to 70%. They began to take an active part in environmental campaigns every Saturday, such as cleaning up the school

grounds, planting trees, and helping abandoned animals.

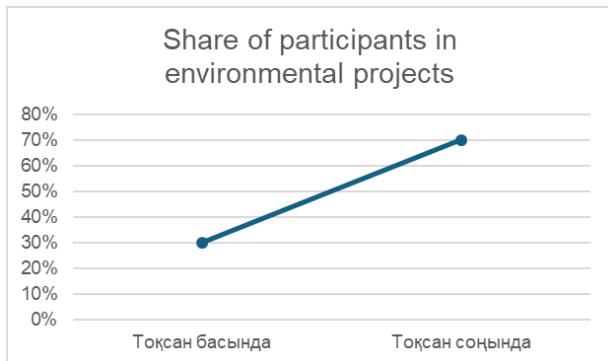


Figure 3: Environmental project participation.

Stories and novels are analyzed based on ecostructural theory to determine the effectiveness of teaching materials used in teaching literary works aimed at environmental education. According to Garrard, ecocriticism is an interdisciplinary analysis that includes the fields of literature, culture, philosophy, sociology, psychology, environmental history, politics and economics, and religious studies. Environmental education includes not only the harmony and sustainability of the environment, but also an understanding of human behavior and attitudes. "Readers' interest in works of art written on environmental themes is growing every day. These works provide an understanding of the relationship between humans and the environment. By teaching such works, it is necessary to form environmental education, environmental awareness, and culture among schoolchildren. Educational institutions should regularly organize events and hold seminars on this topic among parents and students" [18].

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Environmental education through literary works can be integrated into the teaching of Kazakh language and Kazakh literature in primary, secondary and higher grades. It can also be introduced at the university level, for example, in the subjects of modern Kazakh literature and literary criticism.

## 4. CONCLUSION

The theme of ecology in the literature of the 21st century is of particular importance for modern society. Literary works are an important tool in forming students' environmental awareness. Increasing compassion and responsibility for nature through literature contributes to students' active participation in protecting nature and solving environmental problems. In literary works, the beauty of nature and the need for its protection are artistically conveyed. Therefore, the introduction of works with ecological content into the school curriculum is an effective way to increase the environmental culture of students. In this direction, the development of students' environmental literacy through the use of global and domestic teaching practices is one of the urgent tasks. Conveying the ideas of nature protection through literature plays a decisive role in shaping the attitude of future generations to nature. In addition, environmental education should not be limited to the academic process alone, but should be closely linked to school educational work, social activities, and family education. This integrated approach will not only increase students' empathy for nature, but also allow them to comprehensively develop their level of environmental culture.

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