

Green Camp

Project code: 2024-1-IT02-KA220-SCH-000253862

WP2.1 – Data collection, analysis and best practices

Detailed analysis on environmental sustainability, organic farming and good practices of responsible consumption In Poland

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Material developed by: Garden Lab SC

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1. Entry

Education for environmental and food sustainability is one of the most pressing challenges of our time, in a global context characterized by accelerating climate change, loss of biodiversity and increasing pressure on natural resources. The project “Green Camp”, developed in the framework of the Erasmus+ programme (KA220-SCH - Collaborative Partnerships in School Education), aims to address these challenges through an innovative and practical educational approach, aimed at raising awareness among younger generations and equipping them with the necessary skills to promote a sustainable lifestyle. This report is part of Work Package 2 (WP2), dedicated to research and content creation, to analyse good practices related to environmental education and sustainable development in the partner countries: Italy, Romania and Poland. The aim is to build a solid foundation for the development of innovative and inclusive teaching materials that can be used to create training courses and interactive tools for learners of different ages and levels.

1.1 Report Objectives

1. **Analyzing the national context** related to environmental education and sustainable development in each partner country.
2. **Identification of good practices** in education on environmental sustainability, organic farming and responsible consumption.
3. **Giving a recommendation** based on research results in order to develop appropriate teaching materials.
4. **Promoting the integration of STEM/STEAM skills** with a practical approach aimed at supporting active and interdisciplinary learning.

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1.2 Report structure

The report is divided into several sections that explore the regulatory framework, existing educational initiatives, innovative technologies used in environmental education and methods for effective student engagement. Each partner will contribute with a detailed analysis of their national context, highlighting specific examples of good practice.

1.3 The vision of the “Green Camp” project

Green Camp is not just an educational project, but a catalyst for change. Through activities such as workshops on organic farming, composting sessions, educational visits to sustainable farms and workshops on recycling, the project aims to transform

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environmental awareness into concrete actions. The integration of interactive digital tools and innovative methodologies ensures that the project results will have a lasting impact not only on the students involved, but also on their communities.

In conclusion, this report constitutes a fundamental step towards building a replicable educational model that can inspire other schools and organisations at European level to adopt sustainable and innovative teaching practices.

2. Methodology

2.1 Data sources and data collection methods

The report was developed based on desk research. Existing data such as reports, articles, databases, scientific publications and websites were used. They were collected and analyzed to obtain information necessary to develop the issues specified in the structure of the report.

2.2 Criteria for selecting good practices

When selecting the good practices presented in the report, the following criteria were mainly taken into account:

- having elements of innovation at least on a local level,
- effectiveness of the application, i.e. whether it brings specific and positive results,
- durability and repeatability, i.e. it can be repeated in similar conditions and is durable over time,
- compliance with values and standards, i.e. compliance with applicable regulations, ethical standards and the principles of sustainable development and/or social responsibility,
- adaptability, i.e. it can be transferred and adapted to other conditions,
- community engagement, i.e. involving the local community or other stakeholders,
- documentation and transparency, i.e. whether it is documented and transparent.

Based on these criteria, the good practices in the field of education of children and youth in Poland presented in the report were selected.

3. Regulatory framework and national policies

3.1 Environmental Education Legislation

Ecological education is one of the key areas of contemporary education. Due to the inseparable connections between ecology and economy and consumption, it is necessary to constantly increase knowledge about the influences, connections and effects of human activity on the natural environment. Nowadays, ecology is one of the key areas that should be taken into account when planning any economic and social activity.

Ecological education itself is defined as a psychological and pedagogical process of influencing a person in order to shape their ecological awareness. In a broader context, it is understood as a concept of educating and raising society in the spirit of respect for the natural environment in accordance with the slogan of thinking globally – acting locally¹.

The importance of environmental education has been recognized at the highest levels of legislation. Therefore, both at the level of the European Union and individual countries, there are legal solutions regulating issues related to environmental education.

In Poland, there are several key legal acts in force that regulate environmental education issues. These are:

1) **Constitution of the Republic of Poland²:**

Article 5 refers to the Principle of Sustainable Development:

The Republic of Poland guards the independence and inviolability of its territory, ensures the freedoms and rights of persons and citizens and the security of its citizens, guards the national heritage and ensures environmental protection, guided by the principle of sustainable development.

Art. 74: specifies the obligations related to caring for the environment:

1. Public authorities pursue policies that ensure ecological security for current and future generations.
2. Environmental protection is the responsibility of public authorities.
3. Everyone has the right to information about the condition and protection of the environment.
4. Public authorities support citizens' actions to protect and improve the environment.

2) **Act of 27 April 2001 – Environmental Protection Law**

¹Dobrzańska B., Dobrzański G., Kiełczewski D., "Protection of the natural environment", Warsaw 2008.

² CONSTITUTION OF THE REPUBLIC OF POLAND. Text adopted on 2 April 1997 by the National Assembly

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Section VII, entitled "Environmental education, environmental protection research and advertising", contains standards related to the place of environmental education in school curricula and orders binding the mass media in this area, as well as guidelines on the information that should be contained in advertisements for goods, products and services in the field of environmental protection, i.e.³:

Article 77.

1. Environmental protection and sustainable development issues are included in the core curricula of general education for all types of schools.
2. The obligation referred to in paragraph 1 also covers organizers of courses leading to obtaining professional qualifications.

Article 78.

The mass media are obliged to shape a positive attitude of society towards environmental protection and popularise the principles of such protection in publications and broadcasts.

Article 79.

Administration bodies, institutions coordinating and managing scientific and research activities, as well as universities, scientific and research institutions whose scope of activity includes fields of science or scientific disciplines related to environmental protection, are obliged to include research on environmental protection issues in the established programmes and in their activities and to develop such research.

Article 80.

Advertisements or any other type of promotion of goods or services should not contain content promoting a consumption model that is contrary to the principles of environmental protection and sustainable development, and in particular should not use the image of wildlife to promote products and services that negatively impact the natural environment.

Art. 80a.

1. Advertisements and other types of promotion containing information about the product within the scope specified in Article 167 paragraph 1 should be legible and should take into account the requirements specified under Article 167 paragraph 4 point 3.
2. The minister responsible for the economy, in consultation with the minister responsible for the climate, guided by ensuring that consumers can easily assess the features of a product that are important from the point of view of environmental protection, may specify, by way of a regulation, detailed requirements for including information about the

³Act of 27 April 2001 – Environmental Protection Law, Journal of Laws of 2001, No. 62, item 627, as amended.

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product in advertising and promotional materials, referred to in Article 167 paragraph 1, including:

- 1) a numerical designation enabling the identification of the product or group of products and their name;
- 2) requirements regarding the readability of product information.

Art. 8Ob.

Supervision over compliance with the requirements referred to in Article 80a paragraph 2 is exercised by the Trade Inspection.

Art. 8Oc.

Social organizations may apply to the relevant administrative bodies for measures to cease advertising or any other type of promotion of a product or service if the advertising or any other type of promotion is contrary to Article 80.

3) **Act of 14 December 2016 – Education Law**

In Article 1, point 15 it is stated that the education system ensures "the dissemination of knowledge about the principles of sustainable development among children and young people and the shaping of attitudes conducive to its implementation on a local, national and global scale⁴".

4) **Act of 3 October 2008 on the provision of information on the environment and its protection, public participation in environmental protection and environmental impact assessments**, which in Article 4 states that "everyone has the right to information about the environment and its protection under the conditions specified by law⁵". Section II of the Act specifies in detail the principles of providing information on the environment and its protection.

5) Moreover, Environmental Education is also included in the core curricula of general education and in the regulations of the Minister of National Education.

The Ministry of Climate and Environment conducts educational campaigns aimed at raising ecological awareness. Information about the campaigns conducted, as well as data and interesting facts about ecology are available on government websites: <https://www.gov.pl/web/edukacja-ekologiczna>.

⁴Act of 14 December 2016 Education Law Journal of Laws 2017 item 59, as amended

⁵Act of 3 October 2008 on providing information on the environment and its protection, public participation in environmental protection and on environmental impact assessments, Journal of Laws 2008 No. 199 item 1227, as amended.

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3.2 National Sustainable Development Strategies

In the Polish legal and economic system, sustainable development is understood as "intergenerational solidarity consisting in finding solutions that guarantee further growth and allow for the active inclusion of all social groups in development processes, while giving them the opportunity to benefit from economic growth"⁶. This understanding is based on the definition contained in the 1987 Report of the World Commission on Environment and Development, Our Common Future, which states that "sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs".⁷

In Poland, the principle of sustainable development has been included in the Constitution and therefore has the rank of a fundamental right.

I. The key Polish strategic document in the field of sustainable development is the Strategy for Responsible Development until 2020 (with a perspective until 2030) – SOR. It is a 418-page document adopted by the Council of Ministers on 14 February 2017. It is an update of the country's medium-term development strategy, i.e. the National Development Strategy 2020.

It is a binding, key document of the Polish state in the area of medium- and long-term economic policy. This document contains a new vision and model of the country's development, which is a response to the challenges facing the Polish economy.

These challenges have been defined by the formula of five development traps, i.e. the traps:

- a) average income – as a result of the exhaustion of the previous levers of growth and competitiveness, new development engines are needed. It is important to continue the growth of productivity while increasing the level of wages, without a significant loss of competitiveness,
- b) lack of balance – the previous development model was largely based on foreign capital. Currently, Poland is in a different phase of development, and concerns about long-term stability were raised by the lack of sufficiently strong domestic capital,
- c) average product – too many companies base their competitiveness on delivering simple products at the lowest possible price, and our country does not have many economic champions. The challenge is to include Poland in the mainstream of the fourth industrial revolution,

⁶<https://www.gov.pl/web/rozwoj-technologia/zrownowatyny-rozwoj>

⁷There.

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- d) demographic – the loss of young, highly qualified employees combined with low fertility may lead to both a reduction in labour supply and a crisis in the social security system,
- e) institutional weakness – low efficiency of state institutions.

Additionally, barriers to the development of the State were defined, such as:

- a) social stratification,
- b) persistent spatial differences in the level of socio-economic development.

The strategy defines the basic conditions, goals and directions of the country's development in the social, economic, regional and spatial dimensions in the perspective of 2030.

SOR presents a new development model: responsible and socially and territorially sustainable development. It is based on individual territorial potential, investments, innovations, development, export and highly processed products. The new development model assumes moving away from the current support for all sectors/industries in favor of supporting strategic sectors that can become the engines of the Polish economy. Its fundamental challenge is to rebuild the economic model so that it serves the entire society. The Strategy contains recommendations for public policies. It also provides a basis for changes in the development management system and for updating or drawing up new strategic documents such as integrated strategies and development programs.

The SOR recommendations aim to set a path for changing the structure of the economy to make it more innovative, efficiently using physical and human capital resources. This goal is to support increased responsibility of state institutions for shaping economic, social and territorial processes.

Regional policy is intended to increase the effectiveness of public intervention, in particular with regard to weaker regions, subregions, cities and rural areas, without, however, renouncing the use of the potential of highly developed territories.

The main objective of the SOR is to "Create conditions for the growth of incomes of Polish residents while increasing cohesion in the social, economic, environmental and territorial dimensions."

The expected effect of the Strategy implementation will be an increase in the wealth of Poles and a decrease in the number of people at risk of poverty and social exclusion. The most important assumed result is an increase in the average household income to 76–80% of the EU average by 2020 (the goal has been achieved), and by 2030 approximation to the EU average, while striving to reduce income disparities between individual regions.

The Strategy also lists specific objectives:

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I. Sustainable economic growth increasingly based on knowledge, data and organizational excellence (areas: Reindustrialization, Development of innovative companies, Small and medium-sized enterprises, Capital for development, Foreign expansion);

II. Socially sensitive and territorially sustainable development (areas: Social cohesion, Territorially sustainable development);

III. Effective state and institutions serving growth and social and economic inclusion (areas: Law in the service of citizens and the economy, Pro-development institutions and strategic development management, E-state, Public finances, Efficiency of using EU funds) and areas influencing the achievement of the Strategy's objectives: Human and social capital, Digitalization, Transport, Energy, Environment, National Security.

The strategy is implemented using a project approach. The document introduced a wide range of initiatives, including over 180 strategic and flagship projects that serve to achieve strategic goals. It also established a system of coordination and implementation, assigning roles to individual public entities and ways of cooperation with the world of business, science and society.

The expected effect of the implementation of the SOR will be an increase in the wealth of Poles and a decrease in the number of people at risk of poverty and social exclusion. From the point of view of the entire economy, the most important expected long-term effects are primarily a change in the structure of Poland's GDP as a result of the increased role of innovation in its creation, which should contribute to a faster convergence of Poles' income to the EU average.⁸

The full text of the document is available at: <https://www.gov.pl/web/fundusze-regiony/informacje-o-strategii-na-rzecz-odpowiedzialnego-rozwoju>

Other key documents in force in Poland that include topics related to sustainable development are:

II. State Environmental Policy 2030 (PEP 2030) – development strategy in the area of environment and water management.

This document clarifies and operationalizes the Strategy for Responsible Development until 2020. At the same time, it constitutes the basis for investing European funds from the financial perspective for 2021–2027.⁹

⁸<https://www.gov.pl/web/fundusze-regiony/informacje-o-strategii-na-rzecz-odpowiedzialnego-rozwoju>

⁹<https://www.gov.pl/web/srodowisko/polityka-ekologiczna-panstwa-polityka-ekologiczna-panstwa-2030>

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The aim of PEP 2030 is to develop the potential of the environment for citizens and entrepreneurs. It sets environmental and horizontal goals for the directions of intervention included in the SOR¹⁰:

1. Specific objective I: Environment and health. Improving the quality of the environment and ecological safety;
2. Specific objective II: Environment and economy. Sustainable management of environmental resources;
3. Specific objective III: Environment and climate. Mitigation of and adaptation to climate change and disaster risk management;

2 horizontal objectives: (1) Environment and education. Developing ecological competences (knowledge, skills and attitudes) of society, (2) Environment and administration. Improving the efficiency of environmental protection instruments.

PEP 2030 is pointing to the key importance of electronic databases, which will enable direct access to the latest information from the environment via the Internet. They are to enable automatic exchange of information also for the needs of other data sets, maintained by entities interested in their further use. This means that, in line with the expectations of the market and society, public administration will use public data with a high degree of referentiality and interoperability, creating aggregated access points to information¹¹.

The full text of the document is available

at: <https://www.gov.pl/web/srodowisko/polityka-ekologiczna-panstwa-polityka-ekologiczna-panstwa-2030>.

III. **National Energy and Climate Plan (NECP) for 2021–2030** – is a document prepared on the basis of Regulation (EU) 2018/1999 of the European Parliament and of the Council of 11 December 2018 on the Governance of the Energy Union and Climate Action.

This document presents the assumptions and objectives as well as policies and actions for the implementation of the 5 dimensions of the Energy Union, i.e.¹²:

- 1) energy security,
- 2) internal energy market,
- 3) energy efficiency,
- 4) reducing emissions,
- 5) research, innovation and competitiveness.

¹⁰<https://www.gov.pl/web/ia/polityka-ekologiczna-panstwa-2030-pep2030>

¹¹There.

¹²<https://www.gov.pl/web/klimat/krajowy-plan-na-rzecz-energii-i-klimatu-na-lata-2021-2030---twarz-2019-r>

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The following climate and energy goals have been set for Poland to achieve by 2030:¹³:

- a) -7% reduction in greenhouse gas emissions in non-ETS sectors compared to 2005 levels,
- b) 21-23% share of renewable energy in gross final energy consumption (the 23% target will be achievable if Poland receives additional EU funds, including those earmarked for a just transformation), taking into account:
 - 14% share of renewable energy in transport,
 - annual increase in the share of renewable energy sources in heating and cooling by 1.1 percentage points on average per year,
- c) an increase in energy efficiency by 23% compared to PRIMES2007 forecasts,
- d) reduction of the share of coal in electricity production to 56-60%.

The full text of the document is available at: <https://www.gov.pl/web/klimat/krajowy-plan-na-rzecz-energii-i-klimatu-na-lata-2021-2030---twarz-2019-r>.

An update of this document, the National Energy and Climate Plan 2030, has been developed and submitted for public consultation in October 2024, together with an environmental impact forecast made available in February 2025.¹⁴

IV. Sustainable Transport Development Strategy 2030– a document adopted by the resolution of the Council of Ministers of 24 September 2019. The strategy presents the national transport policy. Its main objective is to increase the country's transport accessibility and improve the safety of road users and the efficiency of the transport sector by creating a coherent, sustainable, innovative and user-friendly transport system at the national, European and global level.¹⁵

This objective is to be achieved through the following activities:

- a) building an integrated and interconnected transport network for a competitive economy,
- b) improving the way the transport system is organised and managed,
- c) changes in individual and collective mobility (including the promotion of public transport),
- d) improving the safety of road users and transported goods,
- e) reducing the negative impact of transport on the environment,
- f) improving the efficiency of using public funds for transport projects.

¹³There.

¹⁴<https://www.gov.pl/web/klimat/krajowy-plan-na-rzecz-energii-i-klimatu>

¹⁵<https://www.gov.pl/web/infrastruktura/projekt-strategii-zrownowazowany-rozwoju-transportu-do-2030-roku2>

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The full text of the document is available

at: <https://www.gov.pl/web/infrastruktura/projekt-strategii-zrownowazowany-rozwoju-transportu-do-2030-roku2>.

V. Strategy for the Sustainable Development of Rural Areas, Agriculture and Fisheries 2030 (SZRWRiR 2030) –document adopted by Resolution No. 193 of the Council of Ministers of October 17, 2023.

Its main objective is the multifunctional economic development of rural areas, ensuring the country's food security and increasing the added value of agriculture, as well as a sustainable increase in the income of its inhabitants while minimizing economic, social and territorial stratification and improving the condition of the natural environment.¹⁶.

The main objective has been divided into specific objectives that specify the individual dimensions of the intervention, i.e.:

- a) Specific objective I: Strengthening food security and resilience to crises.
- b) Specific objective II: Improving the quality of life, infrastructure and the environment.
- c) Specific objective III: Development of entrepreneurship, non-agricultural jobs and an active society.

In addition SZRWRiR 2030 strongly emphasizes the need to use modern digital technologies in the development of rural areas and agriculture¹⁷.

The achievement of the above-mentioned goals will be carried out through the following activities:¹⁸:

- maintaining the principle that the basis of the agricultural system will be family farms,
- supporting the sustainable development of small, medium and large farms,
- greater than before use of the potential of the agri-food sector thanks to the development of new skills and competences of its employees, as well as by using the latest technologies in production and applying digital solutions and creating conditions for creating innovative products,
- building a competitive position of Polish food on foreign markets, the hallmark of which will be high quality and reference to the best Polish traditions, as well as

¹⁶<https://www.gov.pl/web/ia/strategia-zrownowazowany-rozwoju-wsi-rolnictwa-i-rybakcji-2030-szrwir>

¹⁷There.

¹⁸<https://www.gov.pl/web/rolnictwo/strategia-zrownowazowany-rozwoju-wsi-rolnictwa-i-rybakcji-2030>

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adapting agri-food products to changing consumption patterns (e.g. growing interest in organic food),

- conducting agricultural and fisheries production with respect for the principles of environmental protection and adapting the agri-food sector to climate change, including in terms of water availability,
- dynamic development of rural areas in cooperation with cities, which will result in stable and sustainable economic growth, providing every rural resident with decent work and city dwellers with access to healthy, Polish food,
- creating conditions for improving the professional mobility of rural residents and their use of opportunities for development and change of qualifications resulting from the emergence of new sectors of the economy (such as bioeconomy).

The adopted document allows for a coherent and complementary addressing of the scope of public interventions financed from national and Community funds in the EU financial perspective 2021-2027, thus playing an important role in the process of programming EU funds implemented at the national and regional level.

The full text of the document is available

at: <https://www.gov.pl/web/rolnictwo/strategia-zrownowazowany-rozwoju-wsi-rolnictwa-i-rybakcji3>.

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VI. Transforming Our World: The 2030 Agenda for Sustainable Development- is a universal development plan for the world. The document was adopted by 193 UN member states, including Poland, during the UN General Assembly in New York in September 2015. Agenda 2030 sets out five major transformational changes defined as the 5P principle (People, Planet, Prosperity, Peace, Partnership)¹⁹:

Planet (Planet)

Creating a lasting foundation for sustainable development by integrating social, economic and environmental aspects of development, building a development model that will support economic growth and greater social inclusion and rationally use natural environmental resources, thereby achieving a better quality of life and solving the problem of poverty.

Prosperity

Transforming economies to create jobs and ensure inclusive development, including shifting towards sustainable consumption and production models, using new technologies

¹⁹<https://www.gov.pl/web/rozwoj-technologia/agenda-2030>

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and business potential, ensuring access to good education, health care, clean water, electricity, transport, telecommunications, facilitating business activity, investment, trade; intensifying sustainable urban development.

Peace

Building peace and effective, fair, open and accountable institutions that guarantee the strengthening of the role of law, social inclusion and co-decision-making, strengthening the role and responsibility of institutions that should support the rule of law, property rights, freedom of speech and media, political freedom, access to justice, non-discrimination against anyone.

Partnership

A new global partnership based on solidarity, cooperation, responsibility and transparency of actions taken, this applies to partnerships between governments, local and regional administrations, academia, business and all interested parties and groups.

According to Article 21 of the Agenda, responsibility for its implementation rests with each country separately at the national, regional and global levels, taking into account the realities, opportunities and level of development, based on respect for national development policies and priorities. The coordination of the implementation of the 2030 Agenda in Poland at the national level is ensured by the Ministry of Development and Technology. The task of the coordinator is to apply an integrated approach (in accordance with the provisions of the Agenda), i.e. to maintain the coherence of the priorities of the new model of Polish development policy with global challenges and goals and joint management for both processes. An integrated approach means concentrating various actions undertaken by individual entities – government, local government, economic entities and social partners – around the designated strategic goals²⁰.

Currently, Poland is in 12th place in the world in terms of implementing the 2030 Agenda, out of 195 UN countries. The Central Statistical Office is responsible for measuring progress in the implementation of the 2030 Agenda in Poland.²¹

Current data on the degree of implementation of global indicators for monitoring the Sustainable Development Goals (SDGs) with data for Poland can be found at: <https://sdg.gov.pl/>.

²⁰<https://www.gov.pl/web/rozwoj-technologie/polska-perspektywa>

²¹<https://kampania17celow.pl/agenda-2030/>

4. Analysis of the education system

4.1 Integration of environmental education into school curricula

Ecological education is present in the Polish curriculum, at various levels of education. The scope and method of implementing ecological classes may vary depending on the educational stage and type of school. Content related to ecological education is included in the core curriculum of various subjects, such as biology, geography, chemistry, physics, as well as natural science education in grades I-III. The content of teaching in the field of ecological education is also included in the core curriculum of subjects such as ethics, a modern foreign language, and the basics of entrepreneurship. This results from the approach that ecological education should not be treated as a separate subject, but as an integral part of teaching in various fields. This approach aims to provide students with the knowledge that ecological issues are linked to all fields of science, as well as to make them aware of the complexity of ecological issues, in particular in the field of climate change. At the same time, students should be instilled with respect for the natural environment from an early age. In the course of education, special emphasis should be placed on understanding the relationship between humans and the environment, shaping pro-ecological attitudes and developing practical skills, such as waste segregation or saving energy. Ecological education aims not only to impart knowledge, but also to shape attitudes and habits that will have an impact on future generations.

According to the provisions introduced by the Ministry of National Education, from September 1, 2020, teachers in Polish schools are obliged to discuss the most important climate and environmental protection issues with students during classes. Environmental education classes in schools should pursue the following goals:

- providing knowledge about the environment and its problems,
- shaping ecological awareness and responsible attitudes,
- developing skills in analysing and solving environmental problems,
- encouraging environmental protection activities in everyday life.

The implementation of the indicated goals takes place in schools in various forms, in particular: lessons and field activities, educational projects and ecological competitions, cooperation with ecological organizations, participation of students in pro-ecological actions, such as cleaning up the world or planting trees.

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Depending on the subject, it is possible to implement different aspects of environmental education and convey different content. Examples of teaching content in the field of environmental education, depending on the subject²²:

1. Primary school:

- Subject Technology – adopting a pro-ecological attitude; attitude of responsibility for the current and future state of the environment; shaping skills of segregating and reusing waste found in the immediate environment; eco-technologies helpful in environmental protection; ecological handling of technical products, especially used ones.
- Subject: Geography – the impact of human activity on the atmosphere, as exemplified by smog, hydrological investments on the geographical environment, agriculture, mining and tourism on the geographical environment, transport on living conditions and degradation of the natural environment, human-environment conflict of interests, revitalization processes and pro-ecological activities.
- Biology subject – the student presents lichens as indicator organisms, assesses the degree of air pollution with sulfur oxides using the lichen scale; presents renewable and non-renewable natural resources and proposals for rational management of these resources in accordance with the principle of sustainable development.
- Chemistry subject – student: indicates the causes and effects of the decrease in ozone concentration in the Earth's stratosphere; proposes ways to prevent the expansion of the "ozone hole"; lists environmental factors that cause corrosion; describes the oxygen and carbon cycle in nature; designs and conducts an experiment to confirm that air is a mixture; describes the composition and properties of air; lists the sources, types and effects of air pollution; lists procedures to protect the air from pollution.

2. Secondary school:

- biology subject – the student: explains what ecological tolerance is; plans and conducts an experiment to investigate the scope of ecological tolerance in relation to a selected environmental factor, justifies the need to use various forms of nature protection, including Natura 2000; justifies the need for international cooperation (CITES, Convention on Biological Diversity, Agenda 21) to protect biological diversity; presents the essence of sustainable development).

²²<https://www.gov.pl/web/edukacja/tresci-dotyczace-edukacji-ekologicznej-obecne-w-polskich-szkolach>

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- subject geography – hydrosphere: water resources on earth, seas, sea currents, river networks, glaciers; environmental problems of the modern world: tropical cyclones, tornadoes, storms, floods, tsunamis, soil erosion, volcanism, seismic shocks, formation of sinkholes, climate change, desertification, changes in the range of glaciers, limited water resources on Earth, threats to geodiversity and biodiversity.
- chemistry subject – student: lists the basic types of air, water and soil pollution /e.g. heavy metals, hydrocarbons, fuel combustion products, freons, dust, nitrates (V), phosphates (V), orthophosphates (V)/, their sources and impact on the natural environment; describes the types of smog and the mechanisms of its formation; proposes ways to protect the natural environment from pollution and degradation in accordance with the principles of sustainable development.

In ecological education, the form and attractiveness of classes are extremely important, in particular it is necessary to combine theory with practice so that students can directly experience environmental problems and see the effects of their actions. Active teaching methods that engage students in the learning process are preferred, e.g. experiments, research projects, field activities, simulations and educational games. Experiential education brings particularly good results, within which you can organize trips to national parks, nature reserves, ecological education centers and other places where students can directly commune with nature; conduct practical classes, such as planting trees, establishing school gardens, waste segregation and composting. Interesting and engaging forms of ecological education include, among others, cooperation with ecological organizations that can support schools in implementing ecological education programs, organizing meetings with experts and ecological activists, as well as involving parents, representatives of local government and local entrepreneurs in activities for ecological education or organizing pro-ecological campaigns in which the entire local community can participate.

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The tools supporting environmental education in schools are the activities of individual ministries:

- a) The Ministry of National Education finances the organization of subject-specific Olympiads in geography and ecological knowledge for students. The Ecological Knowledge Olympiad has a particularly long tradition in Poland. It has been organized since 1985. In 2025, its jubilee, 40th edition began. Finalists and laureates of the central stage of the Olympiad are entitled to exemption from the qualification

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procedure for almost 60 Polish universities.²³ This is a very attractive form of promoting the deepening of knowledge in the field of ecology for students, which can bring them tangible benefits.

b) The Ministry of Climate and Environment conducts information and educational campaigns aimed at increasing ecological awareness in society, including among children and school youth. These include:²⁴

- The "Our Climate" campaign, the main goal of which is to raise public environmental awareness about individual actions that can be taken to protect the climate.
- **"Clean Air – a healthy choice. Your choice!"**– an information and promotion campaign aimed at raising ecological awareness of the causes of air pollution and its consequences for human health. The campaign was also intended to encourage Poles to take action to reduce the emission of harmful pollutants into the air and to take advantage of funding under the Clean Air Programme;
- **"High five for segregation"**– information and educational campaign promoting pro-environmental attitudes on the positive aspects of waste segregation;
- **"WE CREATE ATMOSPHERE"**– an educational campaign aimed at encouraging Polish residents to take action to reduce the emission of air pollutants harmful to health;
- **"The house that saves for me"**– an information and promotional campaign aimed at promoting passive, energy-efficient construction and renewable energy sources;
- **"Our Garbage"**– a social campaign aimed at promoting and encouraging Poles to properly segregate waste;
- **"A Pole saves more heat"**– social campaign on energy efficiency;
- **"Eco-Kids"** and a campaign on biodiversity – a nationwide campaign aimed at children. The aim of the campaign was to shape positive patterns of conduct and behavior in relation to nature, to convey to young recipients that humans and all elements of nature depend on each other and need each other.
- **"We turn off the electricity, we turn on saving"**– a social campaign aimed at encouraging Poles to save energy;

²³http://ekoolimpiada.net.pl/?page_id=632

²⁴<https://www.gov.pl/web/edukacja-ekologiczna/kampanie2>

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- **"Eco-chic"**– an educational campaign aimed at showing individual actions towards ecology that everyone can take;
- **"Don't litter your conscience"**– a social campaign encouraging proper waste segregation and showing that waste is not garbage but valuable raw materials.

In the process of environmental education, an important element is also monitoring the effects of environmental education, which can be done, among others, by regularly assessing students' knowledge and attitudes in the field of ecology and analysing the effects of activities undertaken by schools for environmental education.

4.2 Teacher training in sustainable development

In order to effectively conduct ecological education, it is necessary to properly prepare teachers. It is necessary to constantly develop their competences and skills necessary to conduct ecological education, in particular through training, workshops, sharing good practices and exchanging experiences. It is equally important to provide teachers with access to current and attractive educational materials, such as textbooks, films, multimedia presentations and interactive applications.

Teachers can develop their competences in conducting ecological education, among others, thanks to the offer:

- Education Development Centre (ORE), which is a public teacher training institution with a nationwide scope run by the Minister of Education. ORE organizes various training courses and workshops for teachers, including those related to ecological education and sustainable development, e.g. as part of projects called Safe+ or Global Education. Current training offer: <https://ore.edu.pl/>.
- Center for Civic Education (CEO), the largest Polish educational public benefit organization. CEO runs educational projects and teacher training, including those focusing on global education and sustainable development. Current training offer: <https://ceo.org.pl>.
- Projects dedicated to schools and teachers, implemented by national, regional or local non-governmental organizations, institutions or local government units which offer training and workshops for teachers aimed at raising environmental awareness and promoting sustainable development.

5. Good practices in environmental education

5.1 Innovative school programs

Currently, numerous activities are being undertaken to expand and popularize ecological education in schools. The initiators of these activities include individual ministries.

- 1) Ministry of Climate and Environment – the Team for Ecological Education, including climate education and promotion of ecological living conditions, developed 40 lesson plans for primary and secondary schools, concerning issues of climate protection and change. The scenarios were created by a group of experts, consisting of scientists, practitioners, educators. Representatives of youth organizations were responsible for coordinating the work – the Youth Climate Council, the Youth Climate Strike and the Polish Council of Youth Organizations PROM²⁵.

The developed materials form an introductory program to the problems of climate change in six thematic areas²⁶:

- climate science,
- feedback loops with particular emphasis on biodiversity,
- adaptation and mitigation,
- energy,
- the social impact of climate change,
- sources of climate information.

The scenarios are available for download at: <https://www.gov.pl/web/edukacja-ekologiczna/scenariusze-lekcyjne>.

- 2) In November 2024, the Ministry of Climate and Environment organized a conference entitled: "Field nature education for children and youth". The inspiration for its organization was the need to change the current situation, i.e. the fact that students of Polish schools participate in outdoor activities too rarely, and do not carry out direct observations of nature during lessons to a sufficient extent. Therefore, it is necessary to introduce field nature education into school practice – on a broader scale. The good practices, inspirations and practical workshops presented during the conference equipped teachers with new tools and ideas that they can use in their daily work with students, and the school yard may be enough to organize outdoor activities.²⁷.

²⁵<https://www.gov.pl/web/edukacja-ekologiczna/scenariusze-lekcyjne>

²⁶There.

²⁷<https://www.gov.pl/web/edukacja-ekologiczna/terenowa-edukacja-przyrodnicza-dzieci-i-mlodziezy>

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- 3) The Ministry of Climate and Environment has prepared a webinar for teachers and students of secondary schools, along with lesson plans, on the topic of biodiversity – "Protect biodiversity". The prepared materials can be used to conduct thematic classes as part of biology and geography lessons, as well as homeroom hours.²⁸
- 4) Programmes of the National Fund for Environmental Protection and Water Management (NFOŚiGW), implemented under the priority programme "Ecological Education for 2021–2028", by nationwide beneficiaries, including activities aimed at shaping pro-environmental behaviours of the general public, including children and youth²⁹.
- 5) "EkoEksperymentarium" – an ecological education platform for children and youth, which combines knowledge from the core curriculum with tasks developing future competences. The ecological education program offered to teachers is based on gamification and fun³⁰.
- 6) "Eco-education" A program of the Nasza Ziemia Foundation, developed for kindergartens and primary schools, as well as for young people and adults, which includes issues such as responsible use of water and energy and waste management. The program provides free educational materials for use in lessons³¹.
- 7) "Eko Platforma" – a project of the Partnership Fund implemented with the resources of the Provincial Fund for Environmental Protection and Water Management in Krakow, which promoted pro-ecological attitudes among kindergarten and primary school students. As part of the project, a set of scenarios of ecological classes for kindergartens and schools was developed, which is available in electronic form on the website of the Fund³².

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Modern technologies are used in the implementation of school programs in the field of ecological education, including mobile applications, educational games and virtual trips. Thanks to this, learning is interactive, and for children and young people more attractive and memorable. Practical education is used during lessons, i.e., establishing school gardens, conducting field research and organizing clean-up campaigns.

²⁸<https://www.gov.pl/web/edukacja-ekologiczna/dla-szkol>

²⁹<https://www.gov.pl/web/nfosigw/edukacja-ekologiczna->

³⁰<https://ekoeksperymentarium.pl/>

³¹<https://naszaziemia.pl/eko-edukacja/>

³²<http://www.ffp.org.pl/programy-ekologiczne/eko-platforma-edukacji-ekologicznej>

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5.2 Successful extracurricular initiatives

Environmental education is supported by numerous extracurricular initiatives that show the practical dimension of ecology in everyday life. These include:

- school ecological clubs that organize various campaigns that activate and engage children and young people, such as: planting trees and shrubs, establishing and maintaining school gardens, world clean-up campaigns, collection of secondary raw materials,
- educational activities and programs of national and landscape parks, including: field trips, nature workshops, ecological camps, ecological competitions and olympiads,
- the activities of non-governmental organizations such as Greenpeace³³, WWF Poland³⁴, Club Gaia³⁵, conducting educational initiatives, including those aimed at children and young people or involving them, such as: social campaigns, workshops and training, research projects, cultural events (e.g. shows, performances), volunteering,
- nature workshops for children– activities organized in the field, e.g. in forests, meadows or rural farmsteads, so that children can get to know fauna and flora. If there are no green areas in the area, organizers come to facilities with plant and animal specimens³⁶.

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By getting involved in various activities, children and young people have the opportunity not only to expand their ecological knowledge, but also to shape pro-citizen attitudes and gain experience in cooperation on a larger scale.

5.3 School-Community Collaboration Projects

The activities of schools are embedded in local communities, thanks to which they can support or create initiatives and activities for the benefit of local residents.

- joint social projects– implemented by local organizations and businesses that join forces to implement environmental protection projects and in which schools and educational institutions are involved,

³³<https://www.greenpeace.org/poland/>

³⁴<https://www.wwf.pl/>

³⁵<https://klubgaja.pl/>

³⁶https://czasdzieci.pl/domowa-akademia/rodzice-artykuly/id,855-lekcje_inne_niz.html

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- local ecological initiatives – organised in cities and municipalities, involving school children and youth, such as: ecological festivals, upcycling workshops, educational projects in libraries and community centres,
- Tree Planting and Green Urban Areas – tree planting campaigns and creating urban parks, i.e. spaces that improve air quality and preserve biodiversity in cities,
- joint cleaning campaigns – including green areas, parks, forests and rivers. Such campaigns engage students, teachers, parents and residents and teach responsibility for the environment,
- establishing and maintaining community gardens – school students, together with residents, establish community gardens in which they grow vegetables, fruit and herbs, thus becoming a place for meetings, education and intergenerational integration,
- environmental monitoring – schools are involved in monitoring the local environment, e.g. by measuring the quality of air, water or soil. The results of these measurements are made available to residents and used to take action to improve the condition of the environment,
- recycling and upcycling projects – joint organisation by schools and local communities of collections of secondary raw materials, as well as upcycling workshops where children and young people learn how to give a second life to waste in line with the idea of a closed-loop economy,
- building and hanging nesting boxes for birds and bats, creating flower meadows or planting native species of trees and shrubs, activities for biodiversity, carried out together with representatives of the local community.

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Polish schools implement numerous pro-ecological initiatives that involve the entire local community or are rooted in the activities of that community.

6. Organic farming and nutrition education

6.1 The state of organic farming in the country

The definition of organic farming can be found in Council Regulation (EC) No 834/2007 on organic production and labelling of organic products and repealing Regulation (EEC) No 2092/91. According to its content, organic farming is "a system of farm management and food production that combines the best environmental practices, a high level of

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biodiversity, the protection of natural resources, the application of high animal welfare standards and a production method that meets the requirements of certain consumers for products produced using natural substances and natural processes"³⁷. The provisions of Polish legislation are also based on this definition, i.e. the Act of 23 June 2022 on organic farming and organic production, Journal of Laws 2022, item 1370, as amended³⁸.

Organic farming uses natural cultivation and breeding methods, such as: crop rotation, organic fertilisers that improve soil fertility (compost, manure), biological plant protection methods, organic seed and natural resources, waste recycling to create a closed cycle of matter on the farm, and animal breeding in conditions that ensure their welfare (compliance with animal welfare standards is required by both the EU regulation and the Polish Act on Organic Farming).

The development of organic farming is a way to meet the needs and expectations of consumers who are increasingly consciously buying food and are increasingly willing to choose organic products. This in turn creates new market opportunities for farmers, also in the so-called premium product segment, such as organic vegetables. However, in Poland, compared to EU data, the level of expenditure on organic food is relatively low and amounts to only about 10 euros per person per year.³⁹

The organic farming sector is developing in Poland, showing an upward trend, both in terms of the number of farms and the area of organic crops. The renewed development of organic farming, after several years of stagnation, has been visible since 2019.⁴⁰. A characteristic feature of Polish organic farming is that the dominant role in the structure of organic agricultural land is played by crops, especially cereals, fodder plants, meadows and pastures. Animal production, on the other hand, is less developed than plant production.

In Poland, there is a certification system for organic farms that guarantees that organic products meet certain standards.

From the report on the state of organic farming, that as of December 31, 2021, there were 21,795 organic producers operating in Poland (which means an increase of 7.5% compared to 2020), and in 2022 the number of organic producers increased to 22,882 (an increase of 5%). In 2022, there was also an increase in the number of entities operating in the field of preparing organic food (from 1,174 entities in 2021 to 1,216 in 2022). The total area of

³⁷<https://www.roedl.pl/pl/warto-wiedziec/warto-wiedziec/food-law/rolnictwo-ekologiczne-definicja-ustawa>

³⁸<https://isap.sejm.gov.pl/isap.nsf/DocDetails.xsp?id=WDU20220001370>

³⁹<https://agroprofil.pl/wiadomosci/raport-ke-polskie-rolnictwo-ekologiczne-odstaw-od-innych-krajow-ue/>

⁴⁰There.

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agricultural land on which the organic production method was used has shown an upward trend since 2019: in 2021 it increased to 549,442.93 ha, while in 2022 it increased to 554,631.7 ha⁴¹. The largest number of organic farms is located in eastern Poland (Warmia and Mazury, Podlasie, Mazovia) and in the West Pomeranian Voivodeship.⁴²

The development of organic farming is included in strategic documents at both the EU and national levels. The EU strategy "From Farm to Fork" assumes that by 2030 the area of organic crops in the European Union should exceed 30% of the area of agricultural land. The National Strategic Plan provides for a more likely scenario, according to which such crops will occupy 7% of the area of Poland.⁴³

Polish organic farming faces various challenges, including: fragmented agrarian structure; the need to increase consumer awareness of the benefits of organic products; an increase in demand for organic food, which is not met by domestic supply; and insufficient financial support for organic farmers.

In conclusion, it is worth emphasizing that organic farming is also developing in conjunction with modern technologies. The current trend in organic farming is Agriculture 5.0, i.e. based on digitalization and artificial intelligence. In line with this trend, artificial intelligence or the Internet of Things is used in agriculture, with an even greater emphasis on automation and data analysis (Big Data). All this is to lead to greater precision, and consequently crop efficiency, in the interests of sustainable development based on environmentally friendly solutions.⁴⁴ These trends also apply to Poland. According to forecasts, in 2025 organic farming in Poland will increasingly integrate modern technologies with traditional practices.⁴⁵

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6.2 Educational programs on sustainable food

In Poland, there are many educational programs that focus on the topic of sustainable food, aimed at children, youth and adults. These are the following programs:

1. "Lubell Academy"

An educational program aimed at students in grades VI-VIII, covering topics of healthy eating and zero waste principles – rational use of food and waste reduction. It offers ready-

⁴¹<https://foodfakty.pl/rolnictwo-ekologiczne-w-polsce-raport-ijhars>

⁴²<https://dlaroslin.pl/content/767-co-to-jest-rolnictwo-ekologiczne-na-czem-polega-rolnictwo-ekologiczne>

⁴³There.

⁴⁴<https://florahumus.pl/trendy-w-rolnictwa-na-2025-rok-co-przyśnie-przyszlosc/>

⁴⁵<https://plantini.pl/blog/trendy-w-uprawach-ekologiczne-co-bedzie-modne-w-2025-roku>

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made lesson plans for teachers, educational materials and a substantive base. The aim of the program is to shape healthy eating habits and promote a balanced approach to food.⁴⁶.

2. Food Educators

The program focuses on promoting healthy and sustainable food choices and careers in the agri-food industry. It is aimed at young people aged 6 to 18. The program offers lesson plans based on active student engagement, combining elements of teamwork, role-play, experimentation and discussion. Materials cover issues such as regenerative agriculture, sustainable food choices and food waste. The program aims to raise students' awareness of the interactions of food with the human body, facilitates understanding of how to obtain the right nutrients through a healthy diet, and also builds practical skills such as reading product labels in supermarkets⁴⁷.

3. Planet Friendly Diet – WWF Poland

This is an educational program for primary schools that teaches about the impact of food production on the environment and climate. It encourages the adoption of a planet-friendly diet, which is an important aspect of sustainable food.⁴⁸.

4. Food – in the garden and kitchen – Krzyżowa Foundation

This program offers educational materials on sustainable food management, covering topics such as seasonality, waste and food sovereignty. It is aimed at both teachers and educators outside of school. The educational materials are available online for free. These materials are aimed at different audiences – preschoolers, children and youth in primary and secondary schools, students⁴⁹.

5. "Respect for Food" and FEAST (Food Education and Sustainability Training)

Educational programs developed by a non-governmental organization, aimed at strengthening social ties, improving life skills and increasing awareness of healthy eating and food waste. The latter program is aimed at children in schools, youth at risk of social exclusion and families in need of support⁵⁰.

The educational programmes mentioned above are intended to contribute to raising awareness of sustainable food among children and young people in Poland.

⁴⁶<https://glos.pl/program-edukacyjny-akademia-lubella-o-zero-waste-i-odzywianiu-od-lutego-znow-w-szkolach-dlaczej-warto-wziac-w-nim-udzial>

⁴⁷<https://www.foodeducators.eu/pl>

⁴⁸<https://www.wwf.pl/edukacja/dieta-Przyjazna-planecie>

⁴⁹<https://www.krzyzowa.pl/pl/projekty/projekty-ekologiczne/publikacje-ekologiczne/zywnosc-w-ogrodzie-i-kuchni>

⁵⁰<https://respectforfood.com/>

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6.3 Examples of school gardens and related projects

School gardens and related educational projects are a valuable initiative that supports both environmental education and the development of practical skills of school children and youth. Examples of such activities:

1. Educational Garden in Zagórów.

The PolakPotrafi.pl project involves creating a permaculture garden with elements of a natural playground for a kindergarten in Zagórów. Children take an active part in creating the garden, which teaches them through play and experience.⁵¹

2. The “Our School Gardens” project in Krakow.

This project involves the creation of a sensory garden on the premises of Primary School No. 110 in Krakow. The garden includes zones of sight, hearing, taste and smell, and its creation was the result of cooperation between the school, the Krakow University of Technology and local partners⁵².

3. "Gardens at Schools" - Krzyżowa Foundation.

Krzyżowa Foundation runs educational garden projects at schools, which serve as a tool for education, integration and adaptation of the local community. Students, teachers and parents cooperate in planning and maintaining the gardens⁵³.

4. School Vegetable Gardens in Toruń.

In Toruń, many primary schools are establishing their own vegetable gardens, where students learn about gardening and plant care. These projects are part of broader ecological activities in schools, such as planting trees and cleaning up areas⁵⁴.

The examples of school initiatives presented above show that school gardens in Poland are an important element of environmental and social education, integrating children with nature and promoting sustainable development.

⁵¹<https://polakpotrafi.pl/projekt/ogrod-edukacyjny>

⁵²https://www.krakow.pl/aktualnosci/288304,26,komunikat,zielen_i_zmysly___czy_final_projektu___nasze_szkolne_ogrody_.html

⁵³<https://www.krzyzowa.pl/pl/projekty/projekty-ekologiczne/ogrody-przy-szkolach-2/ogrody-przy-szkolach>

⁵⁴<https://sp18torun.edu.pl/projekty-ekologiczne-w-szkolach-podstawowych-w-toruniu>

7. Responsible consumption practices

7.1 Initiatives to raise awareness of sustainable consumption

The dynamic economic development of the world is causing a growing awareness of the need for sustainable consumption. This trend is also present in Poland. Many activities and initiatives are being undertaken in our country to raise awareness of sustainable consumption. These include:

1. educational and information campaigns on the impact of our consumer choices on the environment and society (example topics: food waste, overconsumption, recycling, sustainable shopping),
2. zero waste movement – a dynamically developing initiative promoting the idea of waste minimization and reuse of objects. In Poland, there is the Polish Zero Waste Association, which conducts, among others, educational campaigns (e.g. I throw in. I don't throw away), workshops, trainings, webinars, cultural and educational initiatives, business projects, and is also actively involved in work on developing pro-ecological legislative solutions⁵⁵,
3. food banks – institutions working to reduce food waste by collecting and distributing surplus food to people in need. To this end, they cooperate with shops and retail chains, non-governmental organizations and local government authorities. The Polish structure of food banks looks like this: individual banks operate locally. There are 31 such banks in Poland, which are grouped into the Federation of Polish Food Banks⁵⁶.

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In addition, various thematic initiatives are being implemented in the field of sustainable consumption. These include, among others, the following activities:

- Buy Responsibly Foundation, which has been running educational and informational projects on responsible consumption since 2002, including campaigns such as “Buy Responsibly Fruit” and “Buy Responsibly Shoes”. The foundation works with teachers, NGOs and entrepreneurs to promote sustainable consumer practices⁵⁷,

⁵⁵<https://zero-waste.pl>

⁵⁶<https://bankizywnosci.pl/>

⁵⁷<https://www.un.org.pl/fundacja-kupuj-odpowiedzialnie>

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- Ekonsument.pl portal– an educational platform run by the Kupuj Odpowiedzialnie Foundation, which publishes materials on sustainable consumption and promotes environmentally friendly places in Polish cities⁵⁸,
- 17 Sustainable Development Goals Campaign: The campaign includes the promotion of Goal 12, which concerns sustainable consumption and production. The campaign implements various educational and information initiatives to increase public awareness of sustainable consumer practices⁵⁹,
- Consumer Education for Sustainable Development, e.g. educational projects such as the Dolceta portal offer materials and lesson plans on sustainable consumption for different age groups. The aim is to reorient consumer behaviour towards more ecological attitudes⁶⁰.

The above-mentioned activities and initiatives contribute to raising social awareness of sustainable consumption in Poland.

7.2 School Waste Reduction Programs

Polish schools implement various programs and initiatives aimed at reducing waste and promoting pro-ecological attitudes among students. Examples of programs implemented in schools:

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1. Waste Hunters Academy

A nationwide educational program for students in grades 1–3 of primary schools, run by PreZero, engages over 36,000 students from almost 650 primary schools in Poland. Students learn about waste segregation, the benefits of reusable products and the impact of waste on the environment. The program uses interactive educational materials, films and games to teach children responsibility for the environment. The program is under the patronage of the Minister of Education⁶¹,

2. "Zero Waste School"

The program was implemented by 4 primary schools in Widzew for students from grades IV–VIII thanks to the support of the Veolia Polska Foundation. It promoted the idea of "zero waste", i.e. minimizing waste production. Students learned, among other

⁵⁸<https://www.un.org.pl/fundacja-kupuj-odpowiedzialnie>

⁵⁹<https://kampania17celow.pl/inicjatywy/>

⁶⁰<https://www.e-mentor.edu.pl/artykul/index/numer/39/id/832>

⁶¹<https://lowcyodpadow.pl/>

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things, how to reduce the use of plastic, how to compost organic waste and how to give old objects a second life, as well as how to follow the 5R principle, i.e.: refuse, reduce, reuse, recycle and compost. The program used gamification and mobile applications to engage students⁶²,

3. Active Education Program for Selective Waste Collection

The Association of Municipalities of the Płock Region conducted an educational program that engaged kindergarten and school communities in environmental activities, promoting waste segregation and reuse.⁶³,

4. Lesson of No Littering

An educational project carried out by the Nasza Ziemia Foundation in cooperation with Henkel Polska, the aim of which was to educate children about waste wastage and promote responsible waste management practices. In the first edition of the project, 936 schools signed up to participate⁶⁴,

5. Tips for Recycling in Schools

The GoGreen platform offers educational tips and materials to help schools implement effective waste recycling programs. These tips range from educating students to engaging staff and parents in the waste separation process⁶⁵.

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The presented programmes and initiatives contribute to raising environmental awareness among students and promoting sustainable waste management practices in Polish schools.

7.3 Circular Economy Projects

According to the definition, the "circular economy" is a business model that minimizes the use of raw materials and the generation of waste. Its goal is to reduce greenhouse gas emissions and the level of energy use. It creates closed loop processes in which waste is treated as raw materials in subsequent stages of production. Such action helps to create a sustainable, low-emission and competitive economy implementing the ideas of eco-design and the 6R concept based on the principles of: refuse, reduce, reuse, recover, recycle, think what you can do better. The introduction of changes in the scope of the circular economy not only serves the natural environment, but above all distinguishes the company on the

⁶²<https://www.fundacja.veolia.pl/aktualnosci/projekt-szkola-zero-waste-dla-uczniow-szkol-podstawowych-z-widzewa>

⁶³<http://zgrp.pl/programy/program-aktywnej-edukacji/>

⁶⁴<https://lekcjaniesmiecenia.pl/>

⁶⁵<https://gogreen.info.pl/dobre-praktyki/szkoly-i-placowki-edukacyjne/odpady-szkoly>

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market, reduces the costs of running a business and affects the quality of services provided.⁶⁶

The need for changes towards creating such an economic model was also indicated by the European Union in the legislative solutions in force in its territory. The direction of changes implemented in the EU was indicated at the European Union level in 2015 by the European Commission in the communication entitled "Closing the loop – an EU action plan for the circular economy". In Poland, it was confirmed at the national level by the Council of Ministers, which in 2019 adopted a resolution of the Polish strategic document entitled "Roadmap for transformation towards a circular economy"⁶⁷.

The need to transform individual sectors of the economy in line with the principles of circular economy and the needs related to it mean that many projects and initiatives related to circular economy are being developed and implemented, covering both enterprises and the public sector.

1. Grant Programs for SMEs

The Polish Agency for Enterprise Development (PARP) has been offering financial support for micro, small and medium-sized enterprises from Eastern Poland implementing business models related to circular economy as part of the programme "Circular Economy in SMEs, Stage I – Development of a Circular Economy Transformation Business Model" since 2024.⁶⁸

2. Examples of implementing circular economy in Polish companies

- EcoBean extends the life cycle of a product, which is coffee. The company offers a solution based on a service of collecting coffee grounds, which are then processed into raw materials and products: coffee oil, feed additives, briquettes or biodegradable pots. This is a perfect example of extending the life of a product, and processing something that would be thrown away.
- PGE has opened a recycling center for photovoltaic panels and wind turbines in Bełchatów – they deal with the use of post-industrial waste from the energy sector and the recovery of valuable raw materials from decommissioned renewable energy installations. PGE assumes the reuse of slag or gypsum as full-value products used instead of natural raw materials.
- Instead of selling multimedia devices such as routers or modems, Orange leases them for the duration of the telecommunications services. After the service expires, the

⁶⁶<https://www.parp.gov.pl/goz#definicja>

⁶⁷<https://zero-waste.pl/raportgoz/>

⁶⁸<https://www.parp.gov.pl/component/grants/grants/> Gospodarka-o-obiegu-zamkniety-m-w-msp

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product undergoes a renewal process. This is a very good example of replacing a product with a service.

- Velux factories in Poland have been equipped with biomass boilers, which convert unused wood raw material into heat energy for production. This has significantly reduced the company's carbon footprint.
- The Tauron Group, in cooperation with Solaris, will once again use lithium-ion cells previously used in urban transport vehicles, which are no longer sufficient to power the vehicles, but will still be able to serve as stationary energy storage for many years.
- DREWDOM has reduced the amount of technological waste by implementing a new technological process for preparing wood for furniture production and creating a product in the form of chips for mulching and cellulose production, made from technological waste (cuttings, which are currently used for fuel). In the new process, 100% of production waste is recycled into chips. Additionally, the company has installed photovoltaic panels, which has contributed to increased energy efficiency and reduced CO2 emissions.
- GRANIT-POL achieved its goal of waste reduction by using production waste (granite) for the production of another product – 3D decorative boards with surface microstructure.

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Transforming the traditional economy into a circular economy is a huge challenge faced by all entities operating both in the EU and Poland.

8. Innovative technologies and tools

8.1 Using digital platforms in environmental education

In ecological education, Polish schools use various digital platforms, the purpose of which is to make the teaching process more attractive and to engage students in the topic of environmental protection. These platforms offer interactive materials, lesson plans and educational games. The most popular include:

1. EcoExperimentarium

An ecological education platform for children and young people, available free of charge and without logging in. It offers online games and a series of eco-lessons on

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topics such as: saving energy and resources, biodiversity. It is addressed to students in grades 1–5 and kindergartens.⁶⁹.

2. Be.Eco

Digital University Foundation program that integrates climate science into the curriculum. The platform offers webinars, educational materials, worksheets and lesson plans, allowing teachers to include ecological topics in various subjects⁷⁰.

3. Ecological School

This tool was developed as part of the Center for Civic Education project. Thanks to it, teachers receive annual access to an online course, educational materials and ready-made lesson plans. Its aim is to develop knowledge about climate change and environmental protection, thanks to which young people will be encouraged to change their school to be more environmentally and climate-friendly. In the 2024/25 school year, the leading topic is the protection of biodiversity and the threat of climate change⁷¹.

4. ActionTrack

This is an educational platform that introduces elements of gamification to environmental science. Interactive field games allow young people to participate in engaging adventures that not only provide knowledge, but also motivate them to take real actions for the sake of nature. Science ceases to be an obligation – it becomes an exciting game that stimulates curiosity and develops ecological awareness.⁷².

In addition to platforms dedicated to ecological education, Polish schools use e-learning platforms such as Moodle, Google Classroom, Ssula.pl, ZdobywcyWiedzy.pl to provide educational materials, tasks and quizzes related to ecology.

The examples of educational platforms provided show that Polish schools use a variety of digital educational tools in the area of environmental education.

8.2 Educational Sustainability Apps and Games

The presence of mobile devices in every area of life means that they are also used in education. That is why there are a number of applications that are used in the ecological education of children and young people, as well as adults. They offer a variety of

⁶⁹<https://ekoeksperymentarium.pl/>

⁷⁰<https://beeco.edu.pl/>

⁷¹<https://globalna.ceo.org.pl/programy-edukacyjne/ekologiczna-szkola-2024/>

⁷²<https://warsztatik.edu.pl/edukacja-ekologiczna-z-eksploatacje-aplikacji-mobilnych/>

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educational tools, from interactive games to courses and monitoring, supporting awareness and actions for sustainable development. These include, among others.⁷³:

1. **Eco Calendar**– helps plan environmentally friendly activities and informs about local ecological events.
2. **Zero Waste Challenge** – motivates waste reduction through a challenge system and turns waste reduction into an exciting game. With the app, users can: track their progress in eliminating unnecessary waste, receive practical tips on how to avoid plastic.
3. **Green Energy Tracker** – allows you to monitor your home energy consumption. Among other things, it provides current data on energy consumption, suggests ways to reduce it, helps reduce your carbon footprint.
4. **Moje Odpady** – makes it easier to manage your waste collection schedule by providing up-to-date schedules for different locations.
5. **Tropimy** – an application with field games teaching ecology, addressed to children, thanks to which children: species of plants and animals, learn the principles of recycling, discover ways to care for the environment.
6. **Ecology Package for the Youngest** – interactive educational games that teach children to care for the planet through everyday habits. The application explains in an accessible way: the principles of waste segregation, the importance of saving water and energy, the need to respect nature.

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In addition to those mentioned, other interesting applications in the field of environmental education include:

1. **SDG for Children**– thatThe app, linked to the Tup Tup Tup portal, focuses on the 17 UN Sustainable Development Goals, adapting them to the level of understanding of children. It offers educational materials and activities that help the youngest understand and implement the principles of sustainable development⁷⁴.
2. **PULA** – an application based on a multi-party partnership of local entities, helping to ensure sustainable development. Its task is to promote positive actions of users, such as using public transport or circular economy services, and reward them with an alternative currency, which is Dobre Monety⁷⁵.
3. **Sustainable Development Indicators**– application of the Central Statistical Office in Poland, presenting sustainable development indicators. The application is a publicly available tool for sharing and presenting sustainable development indicators in three

⁷³<https://warsztatik.edu.pl/edukacja-ekologiczna-z-eksploatacje-aplikacji-mobilnych/>

⁷⁴<https://tuptuptup.org.pl/sdg-dla-dzieci/>

⁷⁵<https://sozosfera.pl/nauka-i-srodowisko/z-aplikacja-ma-byc-latwiej-dbac-o-zrownowatyny-rozwoj/>

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modules: national (Poland, EU member states), regional (NTS1, NTS2) and local (NTS4). The indicators have been grouped by domains within four orders: social, economic, environmental and institutional-political. The analysis of information is facilitated by data visualization tools in the form of charts and maps, as well as an extensive set of metadata, including the so-called indicator metrics⁷⁶.

4. Applications from environmental organizations, e.g. WWF and Greenpeace, which often provide mobile apps with news, project information and tips on ecological lifestyles.
5. Carbon footprint monitoring apps that help you understand how your everyday choices impact the environment and encourage you to make more environmentally friendly decisions, such as Carbon ID⁷⁷.

The presented digital solutions and applications offer a variety of educational tools, from interactive games to courses and monitoring, supporting awareness and actions for sustainable development.

8.3 Virtual/Augmented Reality Experiences in Environmental Science

Virtual (VR) and augmented reality (AR) experiences are becoming increasingly popular in environmental education, offering innovative and engaging teaching methods. These technologies allow for the simulation of realistic scenarios, visualization of complex data, and interactive exploration of the environment, which significantly enriches the educational process and thus increases student engagement and understanding.

Examples of VR/AR applications in environmental science:

1. Virtual Tours and Exploration⁷⁸.

VR technology allows students to virtually travel to places that are difficult to access or dangerous, such as forests, oceans, and protected areas. An example is an educational VR forest trip where students can learn about different species of plants and animals, and even take on their role to understand their perspective.

2. Simulations and Experiments⁷⁹

⁷⁶<https://stat.gov.pl/aktualnosci/aplikacja-wskazniki-zrownowazowany-rozwoju,121,1.html>

⁷⁷<https://magazynbiomasa.pl/aplikacja-ktora-pozwala-kontrolowac-swoj-slad-weglowy/>

⁷⁸<https://giantlazer.com/pl/ur-w-edukacji-zastosowanie-wirtualnych-doswiadczen/>

⁷⁹<https://tikwedukacji.pl/2022/05/19/uczenie-sie-w-wirtualnej-rzeczywistosci/>

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VR allows for safe experiments and simulations that would be dangerous or expensive in real life. For example, students can study the effects of pollution on ecosystems or observe climate change in a controlled virtual environment.

3. Visualizing Difficult Concepts⁸⁰

Abstract and complex concepts related to environmental science, such as biogeochemical cycles or ecological processes, can be better understood through interactive visualizations in VR. Students can manipulate models and observe processes in real time, which facilitates knowledge acquisition.

4. Commitment and Motivation⁸¹

VR increases students' interest in environmental science by making lessons more interactive and exciting. Students may be more motivated to learn when they can experience educational content in an immersive and engaging way.

5. Safe Learning Environment⁸²

VR provides a safe environment for exploration and experimentation, which is especially important in environmental science, where some experiments could be risky in real-world settings. Students can learn through practice without worrying about safety.

As the presented examples show, virtual and augmented reality experiences not only facilitate the understanding of complex environmental issues, but also inspire students to take a deeper interest in environmental protection and sustainable development, allowing them to touch a reality that they would not have access to through traditional educational tools.

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9. Student Engagement

9.1 Effective strategies for engaging different age groups

Effectively engaging students in environmental education requires a variety of methods, adapted to their age and interests. Below are some of the strategies that bring the best results:

1. Learning through experience

a) practical projects

- establishing and maintaining school gardens, composting organic waste, building birdhouses and insect houses,

⁸⁰<https://www.gov.pl/web/laboratoria/z-wirtualna-rzeczywistosc-na-ty>

⁸¹<https://www.e-mentor.edu.pl/artykul/index/numer/100/id/1620>

⁸²<https://starvr.pl/2023/06/29/innowacje-vr/>

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- organizing world clean-up campaigns, planting trees, creating educational paths in the field,
- b) experiments and research
 - testing the quality of water, soil and air, observing changes in local ecosystems,
 - analysis of the impact of human activities on the environment,
- c) field trips
 - visiting national parks, nature reserves, ecological education centers,
 - observation of animals and plants in their natural environment.

2. Use of technology

- a) educational applications
 - ecological games and quizzes,
 - carbon footprint monitoring apps,
 - virtual tours,
- b) virtual and augmented reality (VR/AR)
 - climate change simulations,
 - visualizations of complex ecological processes,
 - interactive lessons about biodiversity,
- c) Internet platforms
 - sharing educational materials, videos, infographics,
 - organizing webinars and online discussions.

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3. Activation methods

- a) games and fun
 - board games, field games, simulation games that teach about ecology in a fun way,
 - quizzes, puzzles, ecological crosswords,
- b) Artistic projects
 - creating artwork from recycled materials, designing ecological posters and leaflets,
 - organizing theatre performances and happenings on ecological themes.
- c) discussions and debates
 - analysis of current ecological problems, exchange of views, search for solutions,
 - organising Oxford debates on environmental issues.

4. Community Collaboration and Engagement

- a) intergenerational projects

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- joint activities with seniors, e.g. establishing community gardens, upcycling workshops,
- organizing meetings with experts and environmental activists.
- b) cooperation with non-governmental organizations
 - participation in actions organized by ecological organizations, e.g. cleaning the world, planting trees,
 - organizing workshops and meetings with representatives of the organization,
- c) local projects
 - analysis of ecological problems in the immediate environment, searching for solutions,
 - organizing information campaigns and actions to protect the local environment.

5. Adaptation to age groups – methods for different age groups:

- a) for the youngest (kindergarten, grades 1-3):
 - educational games and activities: using games such as EkoEksperymentarium, which teach ecological habits through play,
 - field trips: organizing trips to parks or forests where children can observe nature directly,
 - practical workshops: classes during which children plant plants or learn to segregate waste,
- b) for older students (grades 4-8):
 - ecological projects: involving students in projects such as planting trees or monitoring energy consumption at school,
 - campaigns and competitions: organizing competitions on recycling or energy saving, which motivate pro-ecological activities,
 - Virtual Tours: Using VR to explore ecosystems, increasing engagement and understanding
- c) for youth (secondary schools):
 - youth projects: creating ecological projects that integrate the school and local community,
 - Recycling laboratories: conducting experiments using recyclable materials,
 - discussions and debates: organising debates on environmental issues, which develop critical thinking and argumentation skills.

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To achieve the desired effects using the presented methods, it is necessary to take into account the following aspects:

- attractiveness and interactivity – using methods that engage students and arouse their curiosity,
- practical application of knowledge – showing how ecological knowledge translates into everyday life,
- cooperation and teamwork – organizing projects that require cooperation and involvement of students,
- positive reinforcement – appreciating students' efforts and emphasizing the importance of their actions,
- adaptation to individual needs – taking into account different learning styles and interests of students.

By using the presented methods, adapting them to the age and abilities of students and taking into account the necessary educational aspects, it is possible to achieve effective involvement in the environmental education of students at various stages of education.

9.2 Participatory approach and peer learning

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Participatory approaches and peer learning play a key role in effectively engaging students in environmental education. These methods not only increase students' interest but also help them develop critical thinking, collaboration, and problem-solving skills that are essential for dealing with environmental challenges.

1. Participatory approach consists of actively involving students in the educational process, giving them the opportunity to co-decide, plan and implement activities related to environmental protection. Educational methods used in this approach include:
 - a) Action-based Learning – Participatory methods such as Participatory Action Research enable students to actively participate in solving environmental problems. Students engage in projects such as recycling, planting trees or saving water, allowing them to see the direct effects of their actions⁸³,
 - b) projects based on community cooperation – cooperation with local communities, e.g. within environmental protection projects, allows students to practically apply the knowledge they have acquired and build ecological awareness. An example are

⁸³<https://www.earthreminder.com/empowering-students-strategies-for-eco-education-engagement/>

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initiatives in which students cooperate with ecological organizations on projects to revitalize green areas or protect biodiversity⁸⁴,

- c) Interdisciplinary approach – combining environmental education with other fields, such as social sciences or entrepreneurship, allows students to better understand the connections between the environment and society. Students can work on projects that combine ecological aspects with economic and social ones⁸⁵.

Benefits of using a participatory approach in environmental education:

- increasing student engagement and motivation,
- developing social and civic skills,
- teaching responsibility for the environment,
- enabling education to be tailored to the needs and interests of students.

Examples of educational activities using a participatory approach:

- creation of school environmental councils,
- organizing debates and discussions on ecological issues,
- joint planning and implementation of ecological projects, e.g. establishing school gardens, world clean-up campaigns,
- participating in consultations on pro-ecological activities in the school and local community.

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2. Peer learning is based on the exchange of knowledge, experiences and ideas between students who are at a similar stage of development. The educational methods used in this approach include:

- a) Peer education programs – programs like MindShift engage older students as educational leaders who lead workshops and events for younger peers. These types of initiatives strengthen social skills and a sense of responsibility in both mentors and participants⁸⁶,
- b) near-peer mentoring – programs like Project TRUE in New York City engage college students as mentors for high school students in ecological research. This approach supports the development of research and leadership skills and builds bonds between participants of different age groups⁸⁷,

⁸⁴<https://pmc.ncbi.nlm.nih.gov/articles/PMC8954176/>

⁸⁵<https://ojs.uwindsor.ca/index.php/csw/article/download/5834/4798?inline=1>

⁸⁶<https://eepro.naaee.org/research/peerresearch/peer-education-sustainable-action>

⁸⁷<https://www.frontiersin.org/journals/ecology-and-evolution/articles/10.3389/fevo.2022.803210/full>

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- c) joint research projects – students work together on research projects on local environmental problems, which promotes the exchange of knowledge and experiences between peers and develops team skills⁸⁸.

Benefits of using peer learning in environmental education:

- making it easier to understand difficult issues,
- developing communication and cooperation skills,
- building a sense of community and solidarity,
- enabling the exchange of practical tips and solutions.

Examples of educational activities using peer learning:

- work in project groups,
- conducting presentations and workshops by students for their peers,
- organizing debates and discussions,
- creating and maintaining blogs or websites on ecological topics,
- joint problem-solving and search for innovative solutions.

Combining participatory and peer learning approaches creates a dynamic and engaging learning environment where students learn from each other and take joint actions to protect the environment.

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Benefits of using these methods:

- increasing students' ecological awareness,
- development of critical thinking and problem-solving skills,
- building pro-ecological attitudes,
- strengthening social ties and a sense of community,
- preparing students for active participation in social and civic life,
- building pro-ecological attitudes and competences useful in the future.

Examples of activities using both approaches:

- students plan and implement ecological projects together, sharing tasks and learning from each other,
- organize debates and discussions in which they exchange views and arguments,
- they run workshops for their peers, sharing their knowledge and skills.

⁸⁸<https://pmc.ncbi.nlm.nih.gov/articles/PMC9942029/>

Both presented approaches are particularly effective in promoting students' active participation and building their ecological awareness and responsibility for the environment.

9.3 Examples of student-led projects

Students in Polish schools are involved in various ecological projects that aim to raise ecological awareness and promote sustainable development. Examples of projects:

1. **"MAIN (FRIDGE) – we share breakfast"**

Students from Primary School No. 162 in Łódź organized a project in which they purchased a refrigerator and created a corner for sharing second breakfasts. The aim was to support students in need and increase awareness about food waste.⁸⁹

2. **"Eco-Patrol"**

Students at one of Warsaw's primary schools regularly cleaned up nearby parks and green areas. The project improved the aesthetics of the local area and increased the ecological awareness of students and residents.⁹⁰

3. **"Green Class"**

In a Krakow school, students set up a school garden where they grew vegetables and herbs. The project aimed to educate about ecology and promote a healthy lifestyle, and the harvested crops were used in the school canteen.⁹¹

4. **"Meadow of Dreams"**

In Toruń, students transformed undeveloped school grounds into a flora and fauna-friendly place. The project included tree planting, waste segregation workshops and participation in cleaning campaigns.⁹²

5. **"We collect waste paper and take care of the tree"**

Students collected old newspapers, magazines and books for recycling. The project aimed to raise awareness about waste segregation and environmental protection.⁹³

6. **"We are cleaning the environment"**

⁸⁹https://www.esdn.eu/fileadmin/user_upload/esdw/projekty-uczniowskie-dla-klimatu.-jak-zainspirowac-mlodziez-do-dzialania.pdf

⁹⁰There.

⁹¹There.

⁹²<https://sp18torun.edu.pl/projekty-ekologiczne-w-szkolach-podstawowych-w-toruniu>

⁹³<https://www.wyszogrod.pl/aktualnosci/1509-zbiorka-makulatury-makulature-zbieramy-o-drzewo-dbamy-2>

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Students took part in cleaning urban and forest areas, learning about responsibility for the environment and improving cleanliness around the school.⁹⁴

7. "Planting trees – for a better future"

Students and teachers planted trees on the school grounds and in nearby parks and forests, greening the space and educating themselves ecologically⁹⁵.

8. "Eco-friendly bags"

Students decorated canvas bags, raising awareness of the importance of not using single-use plastic bags when shopping.⁹⁶

9. "Zero waste"

Students created presentations on a zero waste lifestyle, learning how to use and recycle resources instead of creating and multiplying them⁹⁷.

10. "Warsaw Tree Festival"

Students planted 40 trees in front of the school, participating in an action promoting greening of urban spaces⁹⁸.

The presented projects not only educate students about environmental protection, but also engage them in practical activities that have a real impact on the local community and environment.

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10. Impact Assessment

10.1 Methods for measuring the effectiveness of environmental education programs

Measuring the effectiveness of environmental education programs is crucial to assessing their impact and improving them. Methods for measuring the effectiveness of environmental education programs include various approaches and indicators that allow for assessing their impact on participants' environmental awareness and behavior.

The following methods are used to measure the effectiveness of environmental education programs:

⁹⁴<https://sp18torun.edu.pl/projekty-ekologiczne-w-szkolach-podstawowych-w-toruniu>

⁹⁵There.

⁹⁶<https://sp350.edupage.org/text/?eqa=dGV4dD10ZXh0L3RleHQyNzkmc3VicGFnZT0x>

⁹⁷There.

⁹⁸There.

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1. reach and number of recipients- effectiveness is measured by the number of people who participated in the educational program. This is a basic indicator that shows how widely the program reached its recipients,
2. types of educational activities and tools- the evaluation of effectiveness includes the analysis of the variety of forms and tools used, such as information campaigns, workshops, trainings, seminars, competitions or educational publications. The cognitive and educational value of these activities is a key indicator,
3. tangible effects- these measures include the number of publications issued, exhibitions organized or educational films produced. Material effects show what specific materials were produced within the program,
4. use of modern technologies- effectiveness assessment may include analysis of the use of digital technologies such as e-learning, internet portals or interactive maps. A modern approach to education may increase the involvement of participants,
5. ecological activity study- monitoring whether program participants take specific actions to protect the environment, such as waste segregation or energy saving. Ecological activity is a direct indicator of the effectiveness of the program,
6. environmental indicators- assessment of the program's impact on the environment, e.g. by measuring waste reduction, energy savings or water quality improvement. These indicators show the real ecological effect of educational activities,
7. beneficiary satisfaction surveys- surveys and interviews with program participants allow us to assess their satisfaction and perceived educational value. Beneficiary satisfaction is an important indicator of the quality of the program,
8. long term monitoring- assessing the long-term effects of the programme, such as changes in ecological attitudes and behaviours over the years. Long-term monitoring allows us to understand the sustainability of educational effects.

Various research tools are used to collect data on the effectiveness of environmental education programs, including:

1. in quantitative research:
 - a) surveys and questionnaires – used to measure knowledge, attitudes and ecological behaviour of participants before and after the programme and allow for obtaining statistical data that can be compared and analysed,
 - b) knowledge tests – checking the level of knowledge of participants on ecological issues, allowing for an assessment of whether the program contributed to increasing knowledge,

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- c) observation of behaviour – involves observing and recording the behaviour of participants, e.g. waste segregation, energy saving, use of public transport, allows for an assessment of whether the programme influenced the change of behaviour.
- d) statistical data analysis– the use of statistical data, e.g. on energy consumption, waste production, greenhouse gas emissions, allows for the assessment of the programme's impact on the environment.

2. in qualitative research:

- a) in-depth interviews – allow for obtaining detailed information about the experiences and opinions of participants, enabling understanding of how the program affected the participants,
- b) focus groups – involve a discussion with a group of participants about the programme, allowing for the collection of diverse perspectives and opinions.
- c) document analysis – analysis of documents related to the program, e.g. reports, presentations, educational materials, allows for the assessment of the quality of the program and its compliance with the objectives,
- d) case study – a detailed analysis of a specific case, e.g. a school that implemented the program. It allows for understanding how the program works in practice.

3. using mixed methods– combining tools from quantitative and qualitative methods to obtain a comprehensive evaluation of the program. This allows for obtaining both statistical data and detailed information on the experiences of participants.

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Measurement indicators allow for a comprehensive assessment of the effectiveness of environmental education programmes, taking into account both quantitative and qualitative aspects of their impact.

10.2 Student Behavior Change Indicators

Evaluating the effectiveness of environmental education programs requires the use of indicators that will allow for measuring changes in the behavior of students participating in environmental education classes. Methods for assessing behavior change may include:

- 1) assessment of ecological activity in selected areas, i.e. waste segregation, saving resources, participation in ecological projects, i.e.: monitoring whether students regularly separate waste at school and at home, checking whether students save water, energy, use public transport, etc.; the number of students participating in campaigns such as cleaning the area, planting trees or collecting recyclable materials,
- 2) assessment of ecological awareness, i.e., among others, knowledge about ecology and pro-ecological attitudes, conducted through tests and quizzes checking students'

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knowledge on topics related to environmental protection, surveys and interviews measuring changes in students' attitudes towards the environment,

- 3) community action assessment, i.e., among others, impact on the local community and promotion of ecology by examining whether students engage in ecological activities in their community, e.g. by organizing workshops or information campaigns, assessing whether students promote ecological behaviours among family and friends.

Research tools used: surveys and interviews, observation, documentation analysis, quantitative data.

The presented methods and indicators allow for a comprehensive assessment of the effectiveness of environmental education programs and changes in students' behavior.

10.3 Case Studies on Long-Term Impact

Case studies on the long-term impact of environmental education show that systematic and consistent educational activities can lead to lasting changes in students' attitudes and behaviors. Examples of environmental education programs for students:

- 1) Green Schools Program in Denmark– this program, implemented since the 1980s, consists of organizing educational trips to "green school" centers, where students learn about ecology through practical experiences. Studies have shown that students participating in the program show greater ecological awareness, are more involved in environmental protection activities and are more likely to make pro-ecological decisions in adult life. The long-term effects of the program also include changes in social and political attitudes, e.g. greater support for environmental protection policies⁹⁹.
- 2) The Eco-Schools Programme in Great Britain– This program, implemented since the 1990s, involves implementing activities for sustainable development in schools. Studies have shown that students participating in the program demonstrate greater knowledge of ecology, are more involved in environmental protection activities and are more likely to make pro-ecological decisions in adulthood. The program has also contributed to reducing energy and water consumption in schools and to reducing the amount of waste produced¹⁰⁰.
- 3) The "Ecological Education in National Parks" Program in Poland– National parks in Poland run numerous educational programs for students, including field trips,

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⁹⁹<http://mamywplaniekodowanie.blogspot.com/2018/07/zielona-szkoa-edukacja-po-dunsku.html>

¹⁰⁰<https://www.eco-schools.org.uk/>

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workshops, and competitions. Studies have shown that students who participate in these programs demonstrate greater knowledge of ecosystems, are more involved in nature conservation, and are more likely to visit national parks in adulthood. These programs also contribute to building a positive image of national parks and increasing public support for their protection.¹⁰¹

The presented case studies show that long-term environmental education can lead to lasting changes in students' attitudes and behaviours, which is crucial for environmental protection because it translates into civic awareness and consumer choices.

11. Challenges and opportunities

11.1 Barriers to implementing environmental education

The implementation of ecological education in Poland encounters a number of barriers that make it difficult to achieve the intended goals. Their causes are complex and result from various factors, both systemic and social. The main areas of barriers that have been diagnosed and described include:¹⁰²

1. systemic barriers

a) legal and political barriers, i.e.:

- lack of effective enforcement of environmental law and integration of environmental policy with the objectives of other sectoral policies. An example is unclear regulations that hinder the implementation of environmental projects,
- in politics, economic goals are often prioritized over ecological ones, which results in a lack of coherence in the implementation of sustainable development strategies,

b) lack of sufficient financial support – limited financial resources at the local and national level make it difficult to implement ecological initiatives. Many municipalities do not have sufficient funds to implement educational programs,

¹⁰¹<https://www.goryinfo.pl/edukacja-ekologiczna-w-parkach-narodowych-jak-inspiruje-mlode-pokolenia-do-ochrony-srodowiska/>

¹⁰² <http://bazekon.icm.edu.pl/bazekon/element/bwmeta1.element.ekon-element-000164916495?q=bwmeta1.element.ekon-element-3bb13684-6bbe-3b97-ae21-b2a679d59d26;6&qt=CHILDREN-STATELESS>; <https://czasopisma.uksw.edu.pl/index.php/fp/article/view/15145>; "Eco-innovation today and tomorrow – challenges, development barriers and support instruments", ed. L. Woźniak, J. Strojny, E. Wojnicka, PARP, Warsaw 2010, pp. 7-25; 179 – 198.

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- c) low implementation effectiveness – despite declarations in strategic documents, there are no effective mechanisms for implementing and monitoring ecological activities. Examples include ineffective waste segregation systems or the lack of implementation of sustainable development principles in practice,

2. social barriers

- a) low ecological awareness – Polish society has a relatively low level of ecological awareness, which affects the lack of involvement in pro-ecological activities. Many people do not understand the benefits of environmental protection,
- b) lack of proper education and promotion – insufficient ecological education in schools and local communities. There are no programs that effectively engage students and residents in environmental protection activities,
- c) consumer culture– the dominance of a consumer culture that promotes excessive consumption of natural resources and waste generation. Changing these patterns requires long-term education and promotion of sustainable practices.

3. organizational barriers

- a) weak ecological lobby – non-governmental and ecological organizations have limited influence on political and social decisions. There is no strong "green lobby" that could effectively promote and enforce pro-ecological activities,
- b) lack of cooperation – limited cooperation between local governments, businesses and non-governmental organizations. Effective implementation of environmental education requires integrated actions of various entities,
- c) inappropriate education system, i.e.:
 - insufficient preparation of teachers – many teachers do not have adequate preparation to conduct classes in the field of environmental education, there is a lack of training and workshops that would develop teachers' competences in this area,
 - curriculum overload – curriculums are often overloaded, which makes it difficult to incorporate environmental education into classes, teachers have difficulty implementing curriculums and conducting environmental education classes at the same time.

In summary, the barriers to implementing environmental education in Poland are multifaceted and include both systemic and social factors. Overcoming them requires comprehensive actions, including improving the law, increasing financing, education and cooperation between various entities.

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11.2 Areas of potential improvement and innovation

Environmental education in Poland has a huge potential for development and innovation. There are many areas where improvements can be made to make it more effective and engaging. The possibilities for improvement regarding environmental education in specific areas are as follows¹⁰³:

- 1) increasing the integration of environmental education in curriculum through better integration of environmental education as a key element in subjects such as biology, chemistry, geography and citizenship education; introduction of new subjects or modules such as "Climate Education" or "Sustainable Development" which would be compulsory at different levels of education,
- 2) development of teachers' competences by organising regular training sessions and workshops for teachers that focus on innovative methods of teaching sustainable development and by including environmental education in teacher training programmes at universities,
- 3) use of modern technologies by creating "Smart Classrooms" that integrate digital technologies with ecological education methodologies; developing mobile applications and interactive e-learning platforms that engage students in practical ecological activities,
- 4) even distribution of environmental education in the regions through adapting educational programs to the specifics of local environmental problems, e.g. protecting biodiversity in regions with national parks or waste management in industrial areas; increasing access to educational resources in less developed regions,
- 5) long-term educational programs- developing multi-annual programmes, such as "Clean City of Gdańsk", which cover various educational levels and engage entire school and local communities, introducing systematic activities to monitor changes in students' attitudes and behaviours,
- 6) promoting non-formal education- expanding cooperation between schools and national parks, state forests and environmental organizations; organizing field workshops and practical projects that engage students in environmental protection activities.

In summary, Poland has great potential to improve the effectiveness of environmental education by, among others, better integrating it into the curriculum, developing teachers'

¹⁰³ <https://op.europa.eu/webpub/eac/education-and-training-monitor/en/country-reports/poland.html>;
https://www.theseus.fi/bitstream/handle/10024/242797/Zaporozhets_Iryna.pdf;jsessionid=EC1AC853028DCA407F1D33A6F28985B?sequence=2

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competences, using modern technologies and promoting long-term and regionally adapted initiatives.

Introducing innovations in these areas can significantly improve the quality of environmental education in Poland and contribute to shaping conscious and responsible attitudes towards the environment.

12. Conclusions and recommendations

12.1 Summary of identified best practices

To sum up the information collected on environmental education in Poland, it should be said that

it plays a key role in shaping conscious and responsible attitudes towards the environment. Sustainable development and ecological education have their permanent place in the Polish legislative system, and thus are present in the economic and educational reality.

In addition, ecological education is permanently embedded in the core curriculum at all stages of education for children and young people. In order to meet the challenges posed by the need to convey knowledge about the environment, its protection and the impact of humans in an attractive and effective way, various materials and tools are prepared by both state institutions and non-governmental organizations and entities from the business sector. Emphasis is also placed on the competences of teachers, who are offered both sources of knowledge and modern learning tools. Despite the many challenges that ecological education in Poland faces, numerous good practices have been developed, which show that it is possible to act effectively in this area. The key ones include:

- 1) integration with the curriculum, i.e. including ecological issues in various school subjects, implementation of interdisciplinary projects adapted to the age and needs of students, including those taking into account individual interests and learning styles,
- 2) integration of various educational methods, including experiential learning, i.e. practical projects (school gardens, composting), experiments and field research, trips to national parks and reserves, games and simulations – the use of games such as Ekoeksperymentarium,
- 3) cooperation with local communities, including social projects, including intergenerational ones, joint initiatives, e.g. sowing flower meadows, education on organic farms, cooperation with non-governmental organizations,
- 4) use of modern technologies, including e-learning platforms and mobile applications,

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- 5) participatory approach and learning from peers, including developing and implementing student projects, debates, ecological campaigns,
- 6) development of teachers' competences through, among others, training and workshops in the field of ecological education, access to current and attractive educational materials,
- 7) developing and implementing long-term educational programmes, including those based on foreign solutions ("Green Schools" from Denmark or "Eco-Schools" in Great Britain),
- 8) informal education, i.e. introducing elements of ecological education into various areas of life, e.g. creating educational paths in forests and parks that teach about biodiversity and nature conservation, organizing social events, e.g. competitions and festivals that promote ecological attitudes and behaviors,
- 9) monitoring and evaluation of the effectiveness of conducted activities, i.e. monitoring changes in students' attitudes and behaviours, analysis of the impact of educational activities on the environment.

Taking the above-mentioned actions not only increases ecological awareness, but also has the potential to shape lasting pro-ecological attitudes among students, children and young people, as well as local communities.

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12.2 Green Camp Project Adaptation and Implementation Guidelines

The Green Camp project is a comprehensive environmental education project that supports different target groups. It has planned various activities such as workshops on organic farming, composting sessions, educational visits to sustainable farms and workshops on recycling.

Their implementation is aimed not only at increasing ecological awareness, but also at taking specific actions in the field of environmental protection. The effectiveness and high usefulness of the project in the process of ecological education will be achieved by: integrating project activities with elements of children's and youth education programs, strengthening teachers' competences, using modern technologies, applying various educational methods, including informal education, cooperation with local partners and community representatives, applying a participatory approach and mutual learning, setting directions for developing or joining long-term educational programs, conducting project monitoring and evaluation, including assessment of its effectiveness.

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The “Green Camp” project has the potential to trigger a real change in ecological awareness and behaviour among its recipients.

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3. Act of 14 December 2016 Education Law Journal of Laws 2017 item 59, as amended
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14. Attachments

14.1 Detailed list of good practices

I. Information and educational campaigns of the Ministry of Climate and Environment

1. "Our Climate"
2. "Clean Air – a healthy choice. Your choice!"
3. "High five for segregation"
4. "WE CREATE ATMOSPHERE"
5. "A house that saves money for me"
6. "Our Garbage"
7. "A Pole saves more heat"
8. "Eco-Kids"
9. "We turn off the electricity, we turn on saving"
10. "Eco-chic"
11. "Don't litter your conscience"

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II. Most popular educational platforms and applications

- | | |
|--|-------------------------------------|
| 1. "EcoExperimentarium" | 7. My Waste |
| 2. "Eco-education" Program of the Our Earth Foundation | 8. We are tracking |
| 3. "Eco Platform" Partnership Fund project | 9. Ecology Package for the Youngest |
| 4. Eco Calendar | 10. SDG for Children |
| 5. Zero Waste Challenge | 11. POOL |
| 6. Green Energy Tracker | |

III. Environmental education programs of non-governmental organizations and enterprises – examples

1. "Lubell Academy"

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2. Food Educators
3. Planet Friendly Diet – WWF Poland
4. Food – in the garden and kitchen – Krzyżowa Foundation
5. “Respect for Food” and FEAST (Food Education and Sustainability Training)

IV. Educational programs implemented in schools – examples

1. Waste Hunters Academy – PreZero,
2. "Zero Waste School" – Veolia Polska Foundation
3. Active Education Program for Selective Waste Collection – Association of Municipalities of the Płock Region
4. Lesson on Non-Littering – Our Earth Foundation

V. Projects and initiatives implemented by primary and secondary school students – examples

1. "GŁ_ (L)ODÓWKA – we share breakfast" – Łódź
2. "Eco-Patrol" – Warsaw
3. "Green Class" – Krakow
4. "Meadow of Dreams" – Toruń
5. "We collect waste paper and take care of trees" – Wyszogród
6. "We are cleaning the environment"
7. "Planting trees – for a better future" – Toruń
8. "Eco-friendly bags" – Toruń
9. "Zero waste" – Toruń
10. "Warsaw Tree Festival" – Warsaw
11. Educational Garden – Zagórow
12. "Our School Gardens" – Krakow
13. School Vegetable Gardens in Toruń
14. "Gardens at Schools" – Krzyżowa Foundation

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VI. Examples of activities and campaigns in which students from Polish schools participate

1. Nature workshops for children
2. Tree planting and urban green areas
3. Joint sales actions and cheap
4. Abecedarian feeding and care and signposting of community gardens
5. Surveillance of the environment
6. Recycling and upcycling projects
7. Building and hanging birdhouses for birds and bats,
8. Creation of flowers and planting native species of trees and shrubs
9. Działania for biodiversity

14.2 Key Contacts and Additional Resources**Key Contacts and Additional Resources**

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1. Education Development Center: <https://ore.edu.pl/>
2. Greenpeace Foundation: Poland <https://www.greenpeace.org/poland/>
3. WWF Poland Foundation: <https://www.wwf.pl/>
4. Our Earth Foundation: <https://naszaziemia.pl/>
5. Foundation for Environmental Education: <https://fdee.org/>
6. Polish Ecological Club: <http://zgpke.pl/>
7. Club Gaja: <https://klubgaja.pl/>
8. State Forests: <https://www.lasy.gov.pl/pl>
9. National Parks: <https://www.ekoportal.gov.pl/dane-o-srodowisku/polskie-parki-narodowe>
10. Landscape Parks: <https://parkikrajobrazowe.pl/>
11. It's Simple Foundation: <https://tuptuptup.org.pl/>
12. Polish Zero Waste Association: <https://zero-waste.pl/>
13. Pre Zero: <https://prezero.pl/>