

School Program AGENDA 21

Educational Materials



**Main Guidelines for the
School Program Agenda 21**

**Specification of Teaching Methods
used in the School Program Agenda 21**

Local Environmental Inventory

Lessons



School Program

Agenda 21

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1. Introduction

In 1997 a School Program Agenda 21 was conducted in several schools in Bialystok and the surrounding area. The "Greenway" Association was its creator, organiser and co-ordinator at the schools. The Program was financed by the Polish National Fund for Environmental Protection. The "Greenway" Association prepared workshops, during which teachers got acquainted with suggested methods of implementing the Program in the schools. Educational materials useful for work with students were also prepared. This publication contains basic information given to teachers during workshops, as well as several model lesson plans.

More information concerning problems with the Program realisation can be found in the brochure "Recycle Yourself, how to start a recycling project at school"(2000).



2. Main Guidelines for the School Program Agenda 21

The School Program Agenda 21 is universal and suitable for implementation in big cities as well as in small villages. The main idea of the program is to conduct an area-wide (district, village or city) environmental inventory of existing natural resources and the most serious threats to the local environment.

There are three parts of the School

Program Agenda 21:

- collecting plastic bottles (made from PET) for recycling,
- environmental inventory in the vicinity of the school,
- classes, aiming to broaden the pupils knowledge of environmental protection problems.

School Program Agenda 21

1. *Environmental inventory of school vicinity.*
2. *Special classes concerning environmental protection.*
3. *Project of collecting bottles (made from PET material).*

2.1. Program Goals

The program has an effect on several groups in several ways. Workshops for teachers provide information about environmental protection and methods of conducting interactive activities. Thanks to the activities being carried out, students obtain a number of types of information about environmental problems. Accomplishing some of the activities (analysing the composition of domestic waste, collecting PET bottles) require participation of the students' parents. From here the influence of the Program goes beyond merely the school environment to involve local society. They learn about certain problems, and form positive attitudes toward action on environmental protection.)

Goals for:

1. teachers;

Widening knowledge of environmental protection, perfecting *methodological skills (particularly in interactive teaching methods)*.

2. students:

Widening knowledge of environmental protection, changing attitudes about the natural environment, practice in social skills.

3. parents:

Forming a positive attitude toward action on environmental protection.

2.2. Program realisation

Teachers taking part in the workshops create Ecogroups in their schools. These are groups of students that – while working under the teachers' supervision – realise the particular parts of the program: take part in the action of PET bottle collection, conduct the area inventory, attend special lessons on ecological education.

It is assumed that the classes with students are run with the use of interactive methods. These let the knowledge be given more efficiently and they teach the required attitudes. The method used most often in the School Agenda 21 realisation is group work. Thus the further part of this publication contains a few remarks about this method of teaching.

The works of Ecogroups at schools have a form of a local action project. This is a version of a method of projects and the rules of its use are described in a further part of this work.

After the project has been accomplished, the students prepare reports on the action carried out. These are named "Green books". These papers, done by students, contain descriptions of the natural environment of the school's neighbourhood. Pupils have free choice of the format and they can also decide whether to add any plans, drawings, pictures or video films. Their choice is obviously restricted by the technical means provided by the schools (such as a photocopying machine or video camera).

"Green Books" are, at the same time, reports on how the Program is being implemented at the schools. This can be important when prizes are provided for the schools in which the Program is carried out in the most effective way. The contents of "Green Books" is one of the elements showing the students' achievements.

"Green Book"

1. *Information about the plant world, animal world, air, waters, and soils in the vicinity of the school.*
2. *A report on actions carried out at schools.*

2.3. Integration of the classes into schoolwork plans and teachers' qualifications

The Program is implemented in secondary schools by 14- and 15-year-olds. Students of this age are able to do complicated tasks by themselves, where initiative and responsibility are necessary. Suitable maturity is necessary as the pupils carry out many of the tasks alone. The role of the teacher should be only as an expert, adviser and co-ordinator of the students' work. The pupils are responsible for doing the tasks correctly and on time.

In deciding on how to work with students, the teachers consider:

- organisational powers of schools,
- the specific characteristics of the student groups with whom they wanted to work,
- personal preferences resulting from education, experience and interests.

To implement the program fully, weekly meetings with students for a period of 4-5 months are needed. The meetings should last at least one hour, but two-hour classes are a better solution. This way the teachers, together with the students, are able to solve problems of collecting PET bottles, to help in environmental inventories, and conduct lessons suggested in the educational materials. Unfortunately, this arrangement is only possible when additional funds to finance the children's work after school are found (e.g., grants from local authorities). Most often the teacher/enthusiasts work as volunteers in their spare time. In such cases, by necessity, the meetings are held less often, they are less regular, and the prepared educational materials are used only partially. In this case, the main impact is on "Green Book" preparation.

At schools biology teachers usually teach environmental education. This background is the most useful for preparing the Green Book. Suggested tasks concerning the environmental inventory are on a level such that persons with no special knowledge are also able to deal with them easily. It is only the teachers enthusiasm and desire to fulfil the requirements that matter. These are also the main factors determining how detailed the description of the environment is.

School Program Agenda 21 at school:

Two-hour supplementary classes held weekly for four to five months.

2.4. Specification of teaching methods used in implementation of the School Program Agenda 21

The educational materials consist of several lesson plans. These lessons are meant for students 14- and 15-year-olds. Through them students are able to learn about threats to the natural environment and ways to protect it. The problems are shown not only from the natural science point of view, but also from the social, economic and political sides. The problems discussed deal with global topics (e.g., climate warming) as well as regional ones (illegal waste dumps in the neighbourhood).

Lesson plans are usually conceived as self-contained units. Supplementary materials for both students and the teacher are provided. This allows the teacher to lead the classes with no particular knowledge on the given subject. In the majority of lessons interactive methods of teaching are used (e.g., role playing, simulations, decision trees, case studies, working in groups). Their use help to achieve several objectives. Lessons conducted in this way are more interesting, and the students often become emotionally involved in the subject discussed. Knowledge and skills are transferred in a more effective way. In the case of the School Program Agenda 21 it is especially important that such methods can change pupils' attitude towards the natural environment. The students accordingly improve their skills in communication and working together in-groups, and learn responsibility for their actions.

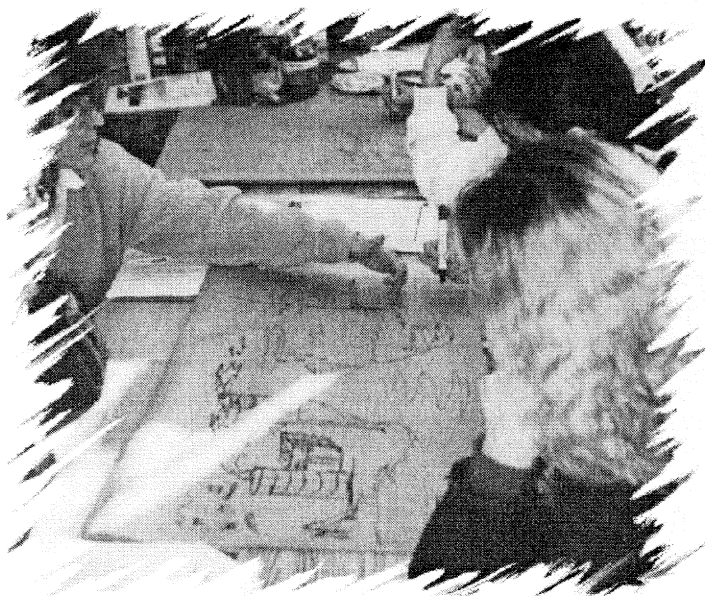
Due to interactive teaching methods, the students:

1. *work eagerly during lessons,*
2. *get involved in activities more easily,*
3. *learn independence and responsibility,*
4. *learn to co-operate with others,*
5. *practise communication skills.*

The environmental inventory of the school vicinity has the form of local action project for the students. Objectives to attain during the Program are stated, tasks for students are suggested, and dates for the main stages of the project are given. Because the teachers sometimes use such a method of teaching intuitively, special material stating rules for using the project method is prepared. Separate material deals with the problems of working in-groups, the method used most often in the suggested classes.

Local action project

A project conducted by students according to a plan, outside their classroom and often outside the school area. Their results are presented to the entire school community or to the public, e.g., during special presentations to local community, local authorities, and journalists.



3. Specification of Teaching Methods used in the School Program Agenda 21

3.1. The project method

The Project Method consists of a sometimes complex, time-consuming and labour-intensive task performed by students, whose guidelines and method of implementation are prepared and supervised by a teacher. The essence of the project is that, during the work, pupils acquire information themselves, compile it and present it to others. This method can be used while teaching most subjects in primary and secondary schools. Its main advantage is the pupils' involvement, which is much higher than in traditional classes. Skilfully motivated

pupils may take part in formulation of project aims and design of the implementation phase; pupils themselves choose the precise tasks to be done. This results in better knowledge of issues under study. During their work, students acquire knowledge of the issue, develop skills such as analysis, choice of information, and the techniques of organising and presenting it. It is also important that, while working together, they practise group behaviour such as formulation and expression of opinions, resolving conflicts and taking mutual decisions.

To sum up, the Project Method attains a twofold objective: better understanding of the issue, and development of skills that are useful in everyday social interaction.

The project's complexity requires that different groups do individual parts of the project. This has some advantages – groups have to co-operate among themselves to accomplish the goal, which consequently leads to a better class integration. However, the manner of choosing these groups must be determined. Random choice may cause the whole task to be done by the most skilful and industrious pupil, while work done by groups of pupils of the same capability may differ considerably, which will have a negative effect on the whole project.

Project instruction should consist of:

1. *Project topic and aims,*
2. *Tasks for individual pupils and their deadlines,*
3. *Sources that should be used,*
4. *The form for presenting results,*
5. *The length of presentation and a preceding consultation with the teacher,*
6. *Assessment criteria.*

Before work begins, pupils need to be made familiar with the instructions, consisting of all the information they need to carry out the project.

While presenting the instructions to pupils the so-called 'milestone method' may be used. We create a table consisting of tasks, surnames and deadlines on the board. The graphic layout of the table should be designed to make pupils realise how much responsibility they have for their part of the project.

In the Project Method the special role of a teacher has to be emphasised. He or she should not dominate the student's work; his or her role should be limited to assistance and supervision of the technical side of the project. At best, the teacher should determine the subject matter (a detailed list may be left to the students), prepare the instructions, introduce the possible sources of materials and methods of presentation, and give advice during the actual pupils' performance.

The presentation of project results is particularly important. A vast variety of forms is acceptable, such as text, albums, photographs, models, mock-ups, video films, etc. Specific problems may arise in a public performance. In this somewhat stressful situation, pupils will need to present the results of possibly many weeks' work within a dozen or so minutes.

If the project is implemented in class time, there is a need for some kind of assessment. It is very important for pupils to know the assessment criteria. This will help avoid many friction in the class, and make possible conformity between expectations and results. Not only the results (the acquired knowledge and abilities) but also the work of implementation should be assessed. A good time for assessment is during the presentation. That is why it is important, among other things, to observe the pupils' actions. They can join the process of assessment, either through self-evaluation or evaluation done by selected pupils.

In a later part of this publication we give examples of possible tasks to be done by the students. These tasks should facilitate the work of the teacher, who is the co-ordinator of Agenda 21 School Program instruction preparation.

3.2. Working in groups

It can be said that pupils best absorb information and learn how to use it when they are actively involved in the process of learning about problems and how to solve them, when they have an opportunity for work that they have chosen. Discussions about the problems and unconstrained exchange of opinions foster the process of learning. This method, where the most important thing is the independent work of pupils and they themselves try to find solutions to problems in a friendly atmosphere, is called working in-groups.

Work in small groups has the following advantages for students:

- It increases the involvement of each pupil. They analyse problems much faster, and they have many opportunities to prove their creativity and knowledge.
- It allows them to work in a positive atmosphere. It is easier to take the floor among a couple of friends than in the forum of the whole class. In the case of shy people this could be the only chance for their active involvement in the class, which may lead to better self-esteem and greater confidence.
- This style of work creates communication among pupils, and allows them to practise the skills of listening, argumentation, and proper communication.
- Pupils learn how to work in a group, to take decisions together, to play a role, to allocate tasks and responsibility to carry them out in a group setting, to resolve conflicts, and to reach compromises.

- A teacher may carefully monitor the actions of a group and give adequate help to various pupils without disrupting the course of the class work.
- If pupils acquire knowledge working in groups, where the success of each depends on the success of the group and the most important value is not rivalry but co-operation, new relations are created between pupils.

In this method, proper preparation of tasks for individual groups and the materials with which they are going to work is especially important. The students' activity should not be restricted to learning some already-prepared solutions to problems and their presentation to others. Allocated tasks should have the form of open questions, with have no obvious clear-cut answers, that need some critical thinking, analysis and personal position-taking on a problem.

A couple of problems arise when we address technical issues such as the size of the group and its composition. According to a number of research studies, the best group size prove to 4 or 5 people. Bigger groups may lead to exclusion of some students from the work and in smaller groups the activity of some pupils may not be satisfactory. A problem may arise in a large 30-student class with numerous groups. Presentation of results of their work will absorb much of the time of the lesson. It is important for pupils to conform to a strict time limit to efficiently move on to the next tasks during a lesson.

The composition of groups may be determined by a teacher, left to the choice of pupils or just established randomly. In the first case, it is good to remember that groups made up of pupils of different achievement levels are the most effective. However, there is some risk of putting the entire responsibility on the best pupil. In many cases it is the best pupil itself who encourages such a situation. If we allow pupils to make the selection themselves, the groups will be characterised by a positive atmosphere. But it may turn out that the groups are made of only very good pupils, or those who have some difficulties in learning. The results of the work of these groups may be very different. We can easily make a random selection of group members in the case of simple, short tasks when the entire class knows the rules of group work.

The important thing in preparing pupils for group work is making them aware of social phenomena that occur during their work. When people carry out tasks together, they take up certain roles. Some of them make the work efficient, e.g., a leader managing the others' work, an expert giving the right information at the right time, or a mediator who tries to moderate conflicts that threaten the closeness of the group. There are some behaviours that block the group's efforts, e.g., a critic who evaluates every proposed solution negatively, which discourages everyone and entails many problems. Or a 'carefree' person who totally ignores the work of the group. Some behaviour may sometimes improve group functioning and sometimes hamper it. This can be the role of the 'clown', who at one time relieves tension and another time paralyses an initiative with ridicule. It is good to precede this method with a lesson in which pupils get to know these roles. This can take the form of doing some group task, and then a discussion of group members' behaviour led by specially chosen observers. This will allow pupils to reflect on their own behaviour, and modify their future actions.

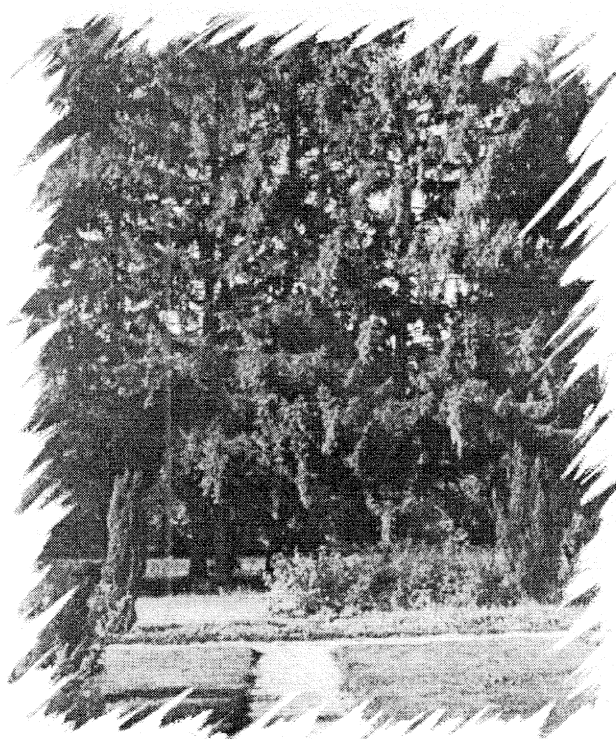
It is good when young people develop rules that are followed in their future work. This can be achieved by open, informal discussion in the class, and, if needed, by supplementing the students' comments. A sample list of rules could be similar to this one:

- We speak only to the point.
- We share all information we possess.
- We ask questions of others to better understand their suggestions.
- If we disagree, we disagree with the idea, not with people who express it.
- We do not offend others.

Early in the application of this method, it is beneficial to summarise the work of each group. Pupils may identify which behaviours helped them and which hampered them. We can then think of alternatives or modifications for the next tasks.

If needed, a teacher should always be ready to interrupt thoughts moving in an inappropriate direction, or to supply missing information. It needs to be remembered that a teacher should not impose his or her opinion on students, rather he or she should only play the role of an expert answering detailed questions. Pupils should know that they are responsible for the ultimate results of their work. A lot of attention should be paid to those students who usually have problems. We have more time for that, because less time is needed to explain issues connected with implementation of assigned tasks. Other pupils can help those who are hard of hearing or have not understood.

We can apply group work in a couple of variants. Especially valuable from the point of view of students' involvement and class integration is the variant called the jigsaw. This variant may seem to be slightly complex. Pupils divided into teams work out some issues and prepare to present them to other pupils. Then there is a second division into new groups that are composed of students from different original groups. In those groups each participant presents the results of his/her group work. In this way we avoid time-consuming speeches of group representatives and every pupil alternately teaches and learns.



4. The local environmental inventory

4.1. Tasks to be done by the Ecogroups

Every day we pass by trees that we no longer pay attention to, waste bins remove waste to 'somewhere', the near by the river is more or less polluted. We look at it all 'indifferently'. We no longer care for the phenomena that surround us. The local environmental inventory's task is to make us familiar again with the conditions of the environment, in which we live and work.

To carry out the local area inventory it is necessary to divide the environment into the following parts:

- the plant world,
- the animal world,
- air,
- waters,
- the earth's surface.

We should start the Agenda 21 School Program by providing ourselves with a fairly precise map. The easiest way is to obtain this kind of map in the district administration or the local government office. Much more difficult is preparation of the map or sketch of the area by the students who take part in the program.

We suggest that pupils who take part in the Agenda 21 School Program should create ecogroups of four to five persons, in order to perform the range of tasks quickly and effectively.

The student members of the ecogroup be informed that their work will be presented to city council members, the president or mayor of the city, the administrator of the group of villages, and/or the provincial authorities.

4.2. The plant world

We should start the description of the plant world by identifying the main tree species which grow near the school, for example, evaluating their health, making measurements, and marking them on the previously prepared map or sketch.

The Agenda 21 School Program does not require the precise recognition of species. The description of the type, e.g., poplar, maple, or willow, is sufficient. In the winter or spring the fallen leaves or fruit remaining on the trees may be helpful in recognition of species (lime, ash). One may receive invaluable help from older people who live nearby.

Tree measurements (diameter or circumference at the height of 1,3 meters and the approximate height of the tree) should be given only for „big“ trees.

The health condition of deciduous trees can be measured on the basis of dried branches, peeling bark, different kinds of growth etc., on a scale of 1 to 5, where:

- 1 – healthy trees
- 2 – injured trees (broken branches, vandalism)
- 3 – trees with peeling bark
- 4 – rotten and hollow trees
- 5 – dead trees (without bark on the trunk)

For evergreen trees like pine, spruce, silver spruce, we can assume that the percentage of green needles on particular tree indicates their health condition:

- 1 – (100-90% needles on the tree) – healthy trees,
- 2 – (90-70% needles on the tree) – rather healthy trees,
- 3 – (70-50% needles on the tree) – ill trees,
- 4 – (50-40% needles on the tree) – very ill trees,
- 5 – (40% or fewer needles on the tree) – dying trees.

Trees that are large at the so-called breast height (diameter of the height of 1.30 metres) are worth measuring with a tape measure (an extensible measuring device) first by measuring the circumference and then calculating the diameter. Tree measurements that qualify as monuments of nature are enclosed (enclosure No 1).

While students carry out the inventory of the plant world, it is advisable to draw their attention to clusters of trees and bushes, which are the gathering place of birds and other animals. It is good to take photographs and notes, and do some maintenance for that place (e.g., gather some litter).

Bushes, which grow almost everywhere, are an underestimated component of a landscape. There are many species of birds and insects and other organisms living in bushes. The fact that bushes are excellent wind barriers has been known for ages (by reducing the force of wind, the energy needed to heat buildings is much lower). It has been shown that planting bushes and trees is an effective protection against emissions of harmful substances. Leafy trees and bushes, thanks to the fact that they drop leaves for the winter, are to some extent replaceable filters. Many kinds of bushes are used like hedges, which are natural protectors.

The most common species of bushes growing near schools and residential districts include common snowberry, common barberry, and dog rose.

Ecogroups should mark on the map or sketch the position any trees or bushes, stating the dominant species, e.g. forsythia.

Photographs or hand drawings can be added to this kind of documentation. An additional task that needs to be given to ecogroups is the preparation of a herbarium of the most common plants in the region. In primary schools the recognition of species may be difficult, but it is worth trying.

4.3. The world of animals

Not everyone realises that, living in big 'clusters of blocks of flats', we are neighbours of animals that, for many reasons, have chosen a residential district for their habitat.

Invertebrates, very difficult to notice because of their small size and secluded way of living, are the most common group of animals here. Butterflies, beetles, snails, spiders, and flies find an excellent food base, shelter, place to spend the winter, and place for reproduction.

The most visible group of animals living in human districts is birds. They can build their nests and find plentiful nourishment. The most common are: sparrows, tree sparrows, crows, rooks, magpies, tits, buntings, partridges, shrikes, and birds of prey such as owls and kestrels.

An interesting and frequently noticed phenomenon is the movement of wild animals into cities. We may find many species of rodents, stone martens, brown European hares, and others in our cities.

The purpose of the description of the world of animals in the framework of the Agenda 21 School Program is to make youth aware of the complexity of the urban and rural environments. The members of the ecogroups should mark on the previously prepared maps or sketches the animals they have observed.

4.4. Air

Students should familiarise themselves with the kinds of air pollution they are exposed to every day. In residential areas one of the biggest sources of pollution is the so-called low emission source. Most of these are the chimneys of industrial plants and detached houses. It is useful to place these on the map or sketch 'active chimneys' (best done during winter when there is a heating period).

The simplest and most recommended method of testing the intensity of pollution is the coffee filter method.

We place a clean coffee filter in a jar and put the whole unit on a balcony, a windowsill at school, etc. After two weeks we compare the coffee filter in the jar and a coffee filter not exposed to the pollution. From this experiment we can specify the areas of greatest particle fallout in a given residential district. These results should be put on the district map.

But the most common and most dangerous types of pollution are exhaust fumes. They are 'responsible' for many illnesses of young people (high amounts of lead come from burned petrol) and for particular substances in the air. Each ecogroups dealing with „the air“ should check the average number of cars passing the area near the school, block of flats, etc. The following table should be helpful:

A kind of a vehicle	Monday			Thursday		
	8.00-9.00	12.00-13.00	15.00-16.00	8.00-9.00	12.00-13.00	15.00-16.00
Passenger car						
Trucks						

This measurement should be made once a month.

Another method of testing the air pollution uses lichen. This method is appropriate for older students who have some experience with microscopes. A detailed description of the method is found at the end of this publication.

4.5. Water

The evaluation of surface waters should be relatively simple. If near the school or residential area there is a river, a sample of water should be taken from which we need to specify the colour, transparency, smell, type of pollution, etc.

Determination of water transparency can be done in the following manner. We need a small disc with a black and white surface. The disc should hang from a string with knots 10 cm apart to show the depth of water. A weight is attached to the disc to make it sink (unless the disc is made of metal). Let the disc sink into the water to a depth at which you just cannot distinguish any longer between the black and white areas. The knots will show you the depth, which is the measure of transparency.

In doing a detailed specification of waters one can use techniques from specialised sources.

4.6. Soil

The evaluation of the earth's surface is connected with the problem of waste material. This problem is very important, because every one of us encounters it every day whether we realise it or not.

A big problem in many areas is the so-called unauthorised dump. These are created most frequently in deserted places, small open areas between buildings, forests and wayside ditches. It often happens that these places are located near schools. So one of the tasks of the ecogroup that deals with soil matters will be to mark on the map or sketch the 'dirty places' that are endangered by litter. To substantiate the existence of such places, one should take photographs or make drawings, with identification of the most common waste materials.

Currently, laws dealing with solid waste management partially solve the problem of waste. Decrees stating that the local governments should create conditions conducive to the selective collection of waste material are very ambiguous and in fact they do not cause major actions towards recycling (re-processing of recyclable materials). Therefore, we suggest that ecogroups should analyse the composition of waste materials from their households/farms while considering the possibility of recycling. Example instructions for carrying out this task look like this:

INSTRUCTIONS FOR CARRYING OUT A WASTE COMPOSITION ANALYSES IN THE AREA OF COMMUNE/RESIDENTIAL DISTRICT

These are instructions for carrying out the waste composition analysis in your area. Properly conducted research will be a component of the program of WASTE MANAGEMENT IN THE COMMUNE/RESIDENTIAL DISTRICT. So it is not a 'game' but a very serious task, based on which the local authorities will decide on the purchase of appropriate means of transport and containers for the waste. The local authorities realise that it is necessary for young people and teachers to take part in actions with the purpose of local environmental protection. This is why they have 'commissioned' you to carry out an indispensable part of this task.

To carry out a waste composition analyses effectively you need to do the following:

1. Talk to your parents and persuade them to help (to allow reliable segregation of waste material).
2. You will carry out this task during a 4-week period.
3. Prepare 4 (four) old plastic bags for one day. On each of them place a label: PAPER, GLASS, ALUMINUM CANS, PLASTIC BOTTLES. Together with your parents find a place where you can segregate waste materials.
4. In the plastic bag with the PAPER label put: old newspapers, cardboard boxes (unfolded), used sugar/flour bags, used sheets of paper, used envelopes, etc.
5. In the plastic bag with the GLASS label put: various non-deposit bottles, jars, small used medicine bottles, etc. (be careful not to break the glass packaging).
6. In the plastic bag with the ALUMINUM CANS label put: used cans of Coca-Cola, 7 UP, Pepsi, beer, etc. (cans may be crushed with a shoe).
7. In the plastic bag with the PLASTIC BOTTLES label put: used plastic bottles of drinks (mineral water, Coca-Cola, Pepsi etc.), bottles of used shampoo, detergents (Morning Fresh etc.), ketchup, mustard, etc.
8. All these materials should come only from your home. You should not collect these materials from your aunt, uncle or grandmother. The point is that the measurements will concern only your household.
9. You can take measurements in various ways. You can use home scales, and every Saturday weigh individual plastic bags. You can have an agreement with a teacher and other members of your ecogroup that every Friday you will bring your materials to school and weigh them there. Each weighing must be recorded in a book of measurements (the table below).
10. If in your neighbourhood there are containers designed for selective collection of waste materials, put your materials there. If there are no such containers, just throw them into the waste container.
11. Calculate your results per one inhabitant and for the whole city/village/residential district. For example, in one week your family, composed of four people, has collected 20,00 kg of paper, which is 5,00 kg per one occupant. Your residential district is inhabited by 10.500 people, so in one month the inhabitants of your residential district throw away 52.500 kg of paper. For a year this is 630.000 kg of paper!!! Comparing this result to the number of trees needed to produce 1.000 kg of paper (17 trees around 100 years old per one ton), the result is 10.710 trees!!! On one hectare of forest, about 300 of this kind of trees can grow. So in one year your residential district 'cut down' 35,70 hectares of forest, a strip of land 3,5 kilometres long and 100 metres wide!!!

Date of the measurement	Paper	Glass	Plastic bottles	Aluminium cans
14.12.1997	3,50kg	5,30 kg	0,50 kg	0,25kg

This task should make young people aware that we squander a lot of materials. All students from the school should be shown the results of the task. For this purpose posters, the school radio, the school newspaper, etc. could be used.

While buying products in the store we should think whether the glossy packaging, which tempts us with its colours, is suitable for recycling or whether it will be the next piece of waste. In the summer, searching for some shade, we buy an ice cream. Some of them are wrapped with beautiful non decomposable aluminium packaging. Do you want the evidence of your 'licking' to outlive you?

Advertisements have become the driving force of our uncontrolled consumption. We buy, then throw away, and it repeats endlessly.

In the Wroclaw office of the Polish Ecology Club, the idea for the campaign entitled „WRAPPED WORLD” had its beginning. The organisers set as their purpose raising awareness in society of the fact that it really matters what we choose when we buy simple products in a shop.

EXAMPLES:

- everything can be wrapped, even when we buy a coat hanger we can wrap it in a nice foil bag and hang it on a smaller coat hanger
- we 'have to' buy tea in bags (tea bags) because we do not have a teaspoon at home
- we can go to the market with our own bag, or we can go to the shop and buy the same tomatoes in a white polystyrene tray with a transparent foil wrap,
- plastic foil bags in shops are now everyday items. This kind of foil bag takes 200 years to decompose.

A quite interesting task for the ecogroups should be documenting (at best photographically) the quantity of rubbish in two cases:

- in a shop we buy 2 litres of oil, butter wrapped in aluminium foil or paper, a 1,5 litre drink in a plastic returnable bottle, ketchup in a glass jar, and everything is packed in a basket or canvas shopping bag.
- in a shop we buy two 1-litre bottles of oil, butter in a plastic box, a 1,5 litre drink in a PET plastic bottle, ketchup in a plastic bottle and everything or almost everything wrapped in plastic bags.

Comparing results, each ecogroup should come to the conclusion that the quantity of waste generated depends on the choices made in the store. Some goods have ecological commodity information trademarks; some of the trademarks are positive and some are negative. In an enclosure there are some examples of these trademarks.



5. Lessons

Lesson	Problem	Subjects in which activities can be conducted
1. "PET" Beneath the Grunwald, That Is, How to Deal with the Problem of Plastic Bottles	waste	Math, biology, civic education
2. The Best Investment.... That Is, How to Solve the Problem of Waste	waste	Civic education, biology
3. Cold at Home... That Is, How to Avoid the Greenhouse Effect	global warming	Biology, civic education
4. Buying a Rhinoceros... That Is, How Can the Free Market Protect Nature.	endangered species	Biology, geography, civic education, economics
5. What Happened to the Great Auk?	species extinction	Biology, history
6. Troubles of Jose Marquez... That Is, Why Do Rain Forests Decline?	destruction of the rain forest	Civic education, biology, geography
7. Blocking a Road with One's Own Body, That Is, How Far Should One Go to Preservation Nature?	Environmental organisation	Civic education
8. Who's Mad Here? That Is, The Advantages of Organic Biodynamic Farming	population pressure on natural environment	Civic education
9. To cut down trees or not to cut them down? This is a question... Discussion about the Białowieża National Park	population pressure on natural environment	Civic education, geography
10. The protection of the ozone layer as a better business than selling drugs	endangered species, free market economy and protection of environment.	Civic education, geography, basics of economy

Lesson 1

"PET" Beneath the Grunwald That Is, How to Deal with the Problem of Plastic Bottles

Subject: math, biology, civic education,

Problem: waste

Objectives:

- to present the consequences of massive use of PET packaging,
- to practice creativity and imagination,
- to improve group skills.

Methods & techniques:

- group work,
- mini-lecture,
- solution of mathematics problems.

Materials:

- a PET bottle with any drink.

Implementation:

To begin, show the students a plastic bottle of any drink (e.g., Krynka, Coca-Cola) at the bottom of which one can see the letters **P E T**. Ask the pupils what they do with this bottle after they have finished the drink. Draw their attention to the letters at the bottom. Explain that this abbreviation represents a chemical compound.

This is the full name of the most common plastic, which is used to produce disposable bottles. It is not produced in Poland. It is imported from western Europe in the form of granulate, and only here does it receive the shape of the bottle. PET has a lot of advantages; it is cheap, light, durable, easy to machine, and does not contaminate the liquid it contains. As a matter of fact, it is almost an ideal product of modern technology... But producers of drinks have one problem, which may seem to be trivial. Namely, the length of decomposition of this kind of bottle is 'over 600 years'.

At this moment, ask pupils to think what consequences this brings to society, where the overwhelming number of drinks is packaged in this kind of bottle – cheap, light and very, very durable... You can show the scale of the phenomenon saying that by just one bottler in the City of Bialystok thousands of those kind of bottles are filled. Write their ideas on the blackboard drawing attention to one problem (it will almost surely appear, but if not you will have to help the children slightly) – these bottles are scattered around almost everywhere. After each family trip to a forest a meeting of friends, wedding ceremony, baptism, party, or normal sunny day thousands of used Krynka, Hoop, Sahara, Coca-Cola, and Pepsi-Cola bottles are thrown into waste bins or sometimes into the bushes. The bottles that were produced the same year they were thrown into waste dumps will lie there for years. Thousands will remain somewhere in the forests and meadows, and at the bottom of lakes and rivers. To familiarise pupils with the timescale, say that if the armies of King Jagiello had drunk water from plastic bottles and afterwards littered them all over, those bottles would lie in the local forests up to this day... Archaeologists would find a sword eaten away by rust, rotten remains of bones, but excellently preserved PET bottles. They would have survived Jan Sobieski III's expedition to Vienna, three

partitions of Poland, four uprisings, two World Wars, and the fall of the Berlin Wall. If we continue to use PET today we will leave a quite problematic reminder to our grandchildren, great-grandchildren, great-great-grandchildren... and so on. Is this really what we want?

Now propose to the students an exercise – a quiz. If throwing away bottles is that harmful, what else can be done about them? Divide pupils into groups, where their task will be to invent the largest number of possible applications. Let all ideas be acceptable, the stranger the better, e.g., a ship made from tied bottles. After about 15 minutes, ask the group representatives to present the results of the game. The group that presents the most solutions may be rewarded with the drink 'Krynka', which was shown at the beginning of the lesson.

In the next part of the lesson, explain that one of the best solutions to the problem of PET is to use it again. There are technologies, which allow grinding the bottles, adding some complementary ingredients, and then producing foil to pack carpets. The problem with this is in the sheer number of bottles to be collected. Unfortunately the idea of buying back bottles is very hard to implement. Organising the buy-back system plus the costs of transport exceed the value of the recovered material, leaving it to those enterprises that are concerned for the environment and its rescue from the sea of plastic bottles rather than the profits.

This kind of program is called BIG-BAG ACTION

- At this time you can introduce the guidelines of this action project of the AGENDA 21 SCHOOL PROGRAM, or you can postpone it to the next class.

Finish the lesson by proposing that students should do a couple of mathematics exercises, for example:

1. If the length of one bottle is 40 cm, how many days does a Bialystok bottler need to make a chain (putting bottles end-to-end) reaching the moon (the distance between the earth and the moon is.....?)
2. If we assume that the biggest Polish lake 'Sniardwy' (area of.....km²) has a constant depth of, for example, 3 meters, how many days will it take to fill the lake with the daily production of bottled drinks of a Bialystok bottler?

These tasks may be done at home as well, but in this case, do not give them such information as the distance between the earth and the moon or the name of the biggest Polish lake.

Lesson 2

The Best Investment....

That Is, How to Solve the Problem of Waste

Subject: civic education, biology,

Problem: waste,

Objectives:

- getting acquainted with various ways of solving the problem of solid waste
- public presentation skills, analysis of written material.

Methods & techniques:

- socio-drama,
- group work.

Materials:

cards – information on pros and cons of:

- composting plant,
- incineration plant,
- waste dump,
- selective collection of waste material,
- information on European trends.

Implementation:

To start, ask the students who in their homes takes out the garbage, whether they realise the quantity of solid waste thrown away daily in the entire city, and if they know what happens to the waste afterwards. Explain that, according to experts, a statistically average Pole throws out 400 kg of solid domestic waste annually. This includes 30% food waste, 20% recyclable paper, 10% plastic materials, and 10% glass. We throw out huge quantities of rubbish. Around 20% of it goes to waste dumps or landfills. In Poland there are 800 legal waste dumps, while 10.000 waste dumps are illegal. So we have a problem – what should we do with these mountains of rubbish?

Suggest that the students take part in a role-play. They will play the role of the City Commission for Environmental Protection that is about to take a decision on spending additional funds on pro-ecological actions.

At this moment choose four 3-person groups. Their task will be to prepare 5-minute speeches, in which they are to present four potential projects as well as they can.

1. BUILDING AN INCINERATION PLANT
2. BUILDING A COMPOSTING PLANT
3. BUILDING A NEW WASTE DUMP
4. STARTING A SELECTIVE WASTE COLLECTION PROGRAM

Pupils, while preparing, can use prepared materials. The rest of the class should familiarise themselves with informational material No. 5.

When the groups are ready, their representatives deliver prepared speeches. Then, the Environmental Protection Commission makes a decision. Its chairperson (previously chosen by the students) briefly presents a decision.

Supplementary materials for students

INCINERATION PLANT

- An industrial plant where waste materials are burned at very high temperature (800-1200 C).

ARGUMENTS 'FOR':

1. Decrease in waste material volume of 70%
2. Energy production in the process of combustion
3. Small area needed for building the facility

ARGUMENTS 'AGAINST':

1. The cost of constructing the incineration plant is very high (around a dozen or more million dollars)
2. High emission of toxic substances to the atmosphere
3. During combustion highly toxic substances such as dioxins, furans, and heavy metals (lead, cadmium, mercury) are created.
4. Waste materials in Poland are very wet, so energy production during combustion is low

COMPOSTING PLANT

A facility for neutralising the waste materials, where under increased pressure and humidity the natural decomposition of biological materials in waste takes place.

ARGUMENTS 'FOR':

1. 30% volume reduction in waste otherwise going to a waste dump
2. Processes organic waste materials such as food leftovers

ARGUMENTS 'AGAINST':

1. Large area needed for building the facility
2. Not all waste materials decompose biologically, e.g., glass, plastic, metals, rubber
3. The cost of construction is high (e.g., for the City of Bialystok this would cost around four million dollars)

WASTE DUMP

An area designed for permanently storing waste materials covered with a layer of soil.

ARGUMENTS 'FOR':

1. Low construction cost

ARGUMENTS 'AGAINST':

1. Large area needed for building the facility
2. Waste of materials, because paper, glass, metals, discarded in the dump cannot be recycled
3. Possibility of environmental contamination by water draining from the dump (leach ate)

SELECTIVE COLLECTION OF WASTE MATERIALS

The system of storing and collecting waste materials for reuse in separate, special containers for glass, recycled paper, metals, and plastic

ARGUMENTS 'FOR':

1. Recycles large quantity of recyclable materials such as recyclable paper, glass, metals, etc.
2. Increases society's awareness of the problems of waste materials
3. Creates jobs for people sorting the materials
4. Low cost for implementation of collection
5. Possibility of revenue from collected materials

ARGUMENTS 'AGAINST':

1. Organisational problems with distribution of containers
2. Special transport needed
3. People living in blocks of flats are reluctant to sort their waste materials

Supplementary materials for the teacher

European Trends

In Western Europe a lot of attention is paid to the problem of waste materials. In 1993 the European Commission adopted a directive that will, in 10 years, allow only 10% of waste materials to be disposed on landfills. The rest must be burned, composted, or, preferably, **recycled**. Currently, the situation in the EU varies from country to country. In Greece for example, 99% of waste materials end up in waste dumps, while in Switzerland only 15% goes to dumps and most is recycled. Many changes are expected to be brought about by appropriate design of economic and legal rules. So-called „green taxes“ are additional charges imposed on raw materials that generate large amounts of waste materials, such as coal.

The European Investment Bank gives credits to industrial plants that recycle waste materials and to sewage treatment plants. Recycling is connected with creating programs of selective waste collection. Citizens are encouraged by publicity, and also by discounts on the cost of removal of segregated waste materials. In October 1996, an act came into effect in Germany stating that the range of **producers' responsibilities extends to treatment of the waste generated by the product**. A producer has to determine how the product will be recycled (in terms of recycled material or energy). Only if recycling is not possible it is permissible to burn it, compost it, or dispose of it at a waste dump (in which case there are 'deposit charges', which depend on the length of time a given material takes to decompose). Producers have been forced to include the cost of waste management in the prices of their products. In Germany, there is an organisation called Der Gruner Punkt, to which payments are for every ton of packaging used (currently, around 600 DM). This mechanism caused the most economic production process to be the one that creates the least waste materials possible (and even those few waste materials will be recycled). Packaging designed for repeated usage and long-lasting items have gained recognition again.

*Based on the article: „The country of rubbish“; POLITYKA magazine No 45
date of release: 9.11.1996*

Lesson 3

Cold at Home..... That Is, How to Avoid the Greenhouse Effect

Subject: biology, civic education,

Problem: global warming,

Objectives:

- Learning about the cause and the results of the greenhouse effect,
- Improving skills in analysis of written material and group work.

Methods & techniques:

- analysis of text,
- group work.

Materials:

- supplementary material – Life in a Greenhouse

Implementation:

Hand out the **Greenhouse Effect** explanatory material. Ask them to read the text and be ready to explain what the effect consists of, what its causes are and what the outcome might be.

Ask a couple of pupils to explain the issue. Try to put 'causes' and 'results' on two parts of the blackboard.

The greenhouse effect is the result of the development of civilisation, the appearance of industry, increased crop production in agriculture, the growth of cities and the production of all these things without which we cannot imagine our lives.

Ask students if they could imagine living in cold homes (without heating), without hot water, electricity or cars. Ask if they can imagine themselves starving because arable fields have been replaced with forests (that is what life looked like for a majority of Europeans around 200 years ago). Certainly none of them would like to return to that past reality (if a so-called 'cranky ecologist' appears you can explain that the majority of people are simply lazy). Then ask whether this really awaits us if we want to rescue the earth. Pupils should draw attention to the fact that there are other sources of energy or means of transport. The next part of the lesson will be devoted to presentation of the idea of alternative civilisation.

Divide a class into groups and propose that they should compile and present the vision of the world in which all the causes of the greenhouse effect have been removed. A world without: cars powered with oil, power plants burning coal, homes heated by natural gas or heating oil; a world with arable fields changed into forests.... Pupils' ideas should be connected with actual ideas or discoveries (in place of coal-burning power plants, wind power; instead of individual transport, collective transport, etc.). Let the pupils use large paper charts and markers.

After about 15 minutes ask for presentation of results. After each group's statement, give the students a couple of minutes to ask questions of the visions' authors.

Finish the lesson explaining that, unfortunately, technological innovations are very expensive. Huge amounts must be paid for scientific research (e.g., new, high-capacity batteries for electric cars) and then for bringing the ideas into effect (building new factories, employee training). Besides, this is a lengthy process. Although many actions have been taken towards decreasing carbon dioxide emissions to atmosphere, still we may not see much result in the near future. The problem is that probably our planet is not able to wait any longer....

Supplementary material for students

Life in a Greenhouse

Since the end of the nineteenth century the concentration of carbon dioxide in the earth's atmosphere has increased by 25%, and has a strong connection with increased human energy consumption. The gas is created by combustion of various fuels such as oil and coal, burning of wood, and chemical processes taking place while growing livestock and cultivating the soil.

Scientists claim that the greenhouse effect will appear within couple of decades when those presently living are still alive. It is predicted that by the year 2025 gases already present in atmosphere will increase the average temperature of the earth by 1 C. By the end of next century the temperature will be higher by 5,5 C. It seems very little, but in reality it means huge climate changes. The last time the temperature on earth was higher by 4 C than today's temperature was 40 million years ago. During the last glaciation, when ice covered the larger part of North America, the average temperature was only 5 C lower than today.

The greenhouse effect threatens the entire globe, influencing the temperature, location of rainfall, and sea levels everywhere. The greenhouse effect is a very long-lasting process. Future generations will feel the consequences of today's actions or lack of action.

The most obvious results of the effect are:

- a rising sea level (melting icebergs) will result in flooding many coastal lands, and millions of people will lose their homes...
- the rise in temperature will harm some plants: e.g., it may lower the production of rice, leading to famine in many countries,
- in some areas there will be increased rainfall, in some there will be a decrease: e.g., if in central India rainfall doubles, so in Midwest of the USA the rainfall may be decreased – these weather anomalies will affect the state of agriculture,

The predicted global warming is an unprecedented challenge for the leaders of this world. They need to take decisions, and the results of these decisions will be of key importance for future generations. In the case of greenhouse gases, politicians must decide whether to wait for more evidence or to act now....

Lesson 4

Buying a Rhinoceros... That Is, How Can the Free Market Protect Nature

Subject: biology, geography, economics, civic education,

Problem: endangered species,

Objectives:

- learning about extinction of wild animal species,
- improving skills in analysis of written material,
- understanding the interdependence between the environment and man's economic activities.

Methods:

- analysis of written material,
- group activity.

Additional materials for students:

- „The Big Hunt”,
- „Buying a rhinoceros”.

Implementation:

At the beginning of the lesson distribute to the students a text describing the extent, causes and effects of trade in wild animals. Ask the students to read it carefully and then to enumerate the endangered species one by one (see to it that they are written on the blackboard). Ask about the reason for their extinction (poachers earn their living by delivering ivory or rhinoceros horns to Asian countries, where medicine and ornaments are produced).

In the next part of the lesson ask the students what they think about the possibility of saving these animals. They will probably emphasise the necessity of creating well-guarded reserves and preventing trade in the products obtained in this manner (poaching). Explain that these have been attempted. However, these activities have not brought about the expected results. Poachers earn big profits and therefore they are well equipped for their activities. During their poaching they do not take into consideration other factors. The local people live a difficult life and help the poachers. After all, wild animals often cause trouble (e.g., elephants trample crops).

Now give the students the next handout describing a solution to this problem in the Republic of South Africa. After reading it the students should understand the idea.

At the end of the lesson ask the students once again about the effects of poachers' activities and different ways of preventing them.

Additional materials for students:*„The Big Hunt“*

In southern Africa elephants are shot from helicopters with bullets containing a sedative. A man armed with a large calibre gun then approaches a motionless animal and fires a shot between its eyes. Just to be sure the animal's throat is cut as well.

On the Atlantic whalers (boats for hunting whales) equipped with echosounders and accurate radar seek whales. When found, the animal is shot with a harpoon fired from a special cannon. Later, to prevent the sinking of a live (until this moment) whale, air is pumped under its skin.

These and other equally cruel scenes happen nearly every day somewhere in the world. What causes people to behave in this way is the desire for profit. For several years now, wild animals have occupied third position in illegal trade, after only guns and drugs.

Bears are killed for their gall bladders (\$100 to \$2000). From pulverised tigers' bones so-called tiger wine is produced (\$200 per kilogram), and the skin itself is worth several thousand dollars. A poacher receives \$100 for one kilogram of rhinoceros horn... High prices lead to the sale of therapeutic medicines produced from dried hummingbirds and bats, and restaurants being supplied with monkeys and porcupines...

Scientists expect that five out of seven species of bears will not survive until the twenty-first century. The same fate awaits tigers, rhinoceroses, elephants, blue whales and many more. Soon we will be able to see dozens of wild species only in movies or as stuffed specimens in museums of natural history.

„Buying a Rhinoceros“

The Republic of South Africa decided to undertake a profit-oriented enterprise. Well-off tourists from around the world would pay for a chance to track, view, and photograph dying species of animals. New jobs were created in hotels, road construction, and souvenir production. Village inhabitants are employed as trackers, guides and guards. Since 1989 the board of Natal's national parks has been organising wild animal auctions, including rhinoceroses. Animals can be sold in the market only after the assent of the scientists who work at the national parks. The purpose is to protect the rest of the animals. Through 1995, 328 white rhinoceroses and 36 black rhinoceroses had been sold for a million dollars. The price of a white rhinoceros goes as high as 18 thousand dollars and a black rhinoceros up to 31 thousand dollars. Private safari park owners buy them. On these so-called „hunting farms“ wild animals run free. Foreign tourists pay for taking photographs or even for shooting them.

Due to these activities animals are treated as extremely profitable merchandise that needs to be protected by all means. Poaching and illegal trade have become the kind of transgressions that deserve a high penalty and priority from the police. Those inhabitants who had been indifferent or favouring the poachers now understand that their own wealth results from the survival of wild animals.

Lesson 5

What Happened to the Great Auk?

Subject: biology, history,

Problem: species extinction,

Objectives:

- learning the history of the Great Auk
- understanding the mechanisms leading to species extinction
- improving skills in group work and analysis of written material

Methods and techniques:

- text analysis
- group work

Additional materials for students:

- handout for students – What Happened to the Great Auk?

Implementation:

At the beginning of the lesson explain the origin of the word *penguin*, which is much older than European expeditions to the Far North.

The word *pen-Gwen* derives from Celtic language. Celts were a people living two thousand years ago, inhabiting the greater part of Western Europe. At this point, you can ask the students to reflect upon the separation of the territories inhabited by those people and the areas of penguin presence. Make it known that neither did Celts travel north nor did penguins occupy European territory. The definition specified certain bird species that were numerous on our continent in the past – namely, the **Great Auk**. When, several hundred years ago, the descendants of Celts started fishing in Newfoundland the name was ascribed to the „birds in dress coats“ they encountered, nowadays widely known as penguins.

Ask the students if anyone has heard anything about the great auk. Perhaps someone might have seen a picture. Unfortunately, it is not possible to see it at the zoo any longer since the last examples of its kind were killed in 1844. >From several hundred thousand colonies there remain several dozen stuffed specimens in European museums. Tell them that we must content ourselves with a description of this animal.

Until quite lately – several hundred years ago – Great Auk colonies occupied rocky shores of the north Atlantic (from Spain and Italy in Europe to Florida in North America). It was a flightless bird as large as a goose. Its body resembled that of a penguin. It walked upright on short feet. The entire body was covered with dense down. Each side of the bird's black head was decorated with a white spot between the eye and the large beak. Its back was black and it had a white stomach.

In the next part of the lesson distribute to the groups of students the text on the extinction of the Great Auk. Ask them to identify those responsible and to explain the reasons for doing so.

After 15 minutes the groups' representatives should present the results of their work. Try to write all the names of the people responsible for the extinction on the blackboard. These include hunters, feather sellers, museum directors, zoologists, and agents and

fishermen hired by them. Together with the students, discuss those people's motives. Point to the pursuit of profits above all other factors; as well as to the dangerous wish of the nineteenth century's scholars to expand knowledge. Even now scientists are concerned about the discoveries of new species. Because of continuing research, the number of unknown species continues to diminish. Now the aim of research workers is to see that live specimens survive in the wild. It is no longer their aim to place another stuffed specimen in a showcase. If time permits and you consider it necessary, draw attention to the fact that these two contrasting approaches to the issue of rare species illustrate changes in civilisation that occurred between the nineteenth and the end of the twentieth century. These days, in the era of satellite broadcasts, we do not need to go to the zoo or to the museum in order to see a lion. Thanks to wonderful nature films we can see the lion in its own environment. Also, wildlife is not a subject of human whim anymore. We humans constitute only a part of the world of nature.

As homework, the students may prepare an appeal to all those whose selfish desires cause the extinction of wildlife (e.g., supporters of killing wild cats for their fur).

Additional materials for students

"What Happened to the Great Auk?"

Throughout the millennia auks and humans have lived next to each other. Slow-moving auks often became the victims of hunters. They were treated almost like poultry, always easy to kill and roast. Their bones were found in prehistoric hunters' garbage. As Europe's population began to grow the colonies of these birds started vanishing. In historical times they managed to survive only in the north of the continent. Mass killings began during the period of long-distance voyages. Fleets invaded coasts, and the sailors killed thousands of auks. Their meat was preserved, and down, hide and eggs were collected. These goods reached developing cities or served as supplies for expeditions preparing for a voyage. In the seventeenth century auk colonies survived only on an island in the North Atlantic, between America and Europe. During that period of time auks were not hunted for food since their meat was considered to be tasteless. But the eggs were valuable and so was the down, which was used for making warm clothing, bedcovers, etc. At the beginning of nineteenth century auks survived only in Iceland. At that time scientists became concerned with rare bird species. Ambitious museum directors and inquisitive zoologists wanted to obtain birds by any means, even if dead. And once again journeys of exploration were organised to look for the birds' colonies. Since these were not easily found the prices of the birds became higher and higher. The more searchers, the fewer auks were left alive. In 1844 three fishermen from Iceland, wanting a profit, killed the last two birds, and the history of the Great Auk came to an end.

During historical times, in addition to the Great Auk, people have also exterminated:

Aurochs, Tarpan, Sea Mammal – Steller's Sea Cow, Dromedary, Quagga (similar to the Zebra), American Passenger Pigeon, New Zealand's Moa, Tasmanian Wolf, Falkland Island Wolf, and many, many more...

Threatened with extinction at present are:

- Galapagos Giant Tortoise, Wombat, Blue Whale, Tiger, Florida Puma, Yellow-eyed Penguin, Arabian Oryx, Giant Panda, Mountain Gorilla, Monkey-Eating Eagle, Black Rhinoceros, Blue Macaw, American Bison and many, many more...

Lesson 6

The Troubles of Jose Marquez... That Is, Why Do Rain Forests Decline?

Subject: civic education, biology, geography,

Problem: destruction of the rain forest,

Objectives:

- students get to know the social and economic reasons for rain forest clearing,
- they improve their ability in analysis of written material.

Methods and techniques:

- a „story“,
- a mini-lecture.

Additional materials for students:

- handout for students: „The Troubles of Jose Marquez“

Implementation:

At the beginning of the lesson distribute a text to the students describing the plant and animal kingdoms of rain forests. If you are able to do so, you may also show a 5-10 minute film presenting an equatorial jungle. When they have read the text ask them to think about the benefits the forest brings to the people living nearby. They will probably start talking about valuable kinds of wood, fruit, animal skin and meat...

In the next part of the lesson give out the text called „The Troubles of Jose Marquez“. Ask the students to read it and answer the following questions (make sure they have understood the text correctly):

- why did Jose abandon his village,
- why couldn't he find other ways of solving his problems,
- what consequences will the migration of thousands of such distressed people have on Brazilian jungle,
- who else, apart from Jose and the ones like him, deforest the jungle and what profits do they derive from it?

While the students are giving their answers write the following phrases on the blackboard: **population growth, arable land shortage, uneven division of land, lack of means of income other than land cultivation**. Although this is a story of a fictional character, explain that millions of peasants in Africa and Asia are experiencing this situation. Deforestation occurs there at an extremely fast rate.

The advanced medical care of developed countries has, among other factors, caused population growth. More and more Brazilian or Congolese peasants look for new farming land in order to feed their families. They start using land previously considered to be of little value. They also cultivate hillsides. A growing number of inhabitants (due to the countries' improved medical care) get involved in wetland drainage, as well as burning jungles. Many African countries do not have access to their natural resources. Their industry and service sector is underdeveloped as well. Therefore, they must use what they think is their only source of income. Jungle clearance can be attributed to large companies that sell the valuable tree species. Areas where the trees have been cut

down are turned into pastures, since it is profitable for their owners to breed enormous herds of cattle (these will later reach Europeans in the form of hamburgers).

As homework, students may develop an action plan that the government of Brazil could undertake, if it were willing to stop the process of deforestation.

Additional materials for students

The Troubles of Jose Marquez

Puerto Moro is located 50 km north from Labrea City in Brazil, near one of the Amazon River tributaries. Jose Marquez's family has lived there for many generations. His father was once one of the richest peasants. He had to distribute his land among children – five sons and three daughters. Now every one of them has only a small piece of land. Jose, the youngest, received the least and could not support his family from the land. There isn't any work available for him in the village or in a nearby town. In Labrea there are no factories. There's one sawmill, a few shops, and several craft companies. Jose does not want to go to big cities near the ocean. He heard that in Sao Paulo or Rio de Janeiro people are also needy. And besides, it is so far away... It is true that owing to his great deal of work he had saved some money but it was not enough to buy even a small piece of land from the local man of wealth, don Jimenez. He is a stockbreeder who owns an enormous farm covering a great area of land in Puerto Moro. From time to time he sends his cattle by rail to the ocean. It was very profitable so he did not want to sell the land. It does not need to be mentioned that he did not even want to talk to such poor people as Jose. So Jose decided to go to the edge of the jungle. It was a two days' journey. Forest clearance was beyond his strength so he set it on fire. Fire soon reduced the trees to ashes, and, forced by the wind, passed to the heart of the forest. In the evening it was extinguished by heavy rain. Jose cleared a portion of earth and planted corn amidst burnt tree stumps. Later on, he built a house and brought his family there. Soon after, his two brothers built their houses nearby. And a little farther away were – the houses of his neighbours. It seemed to them that their families would not go hungry any more... However, during the next few years the crop yields became lower and lower. The soil was becoming barren; rainfall contributed to the loss of soil richness, and the sun and wind turned the soil into dust. Jose was forced to burn the next portion of the jungle...

Right now the jungle margin is a two days' journey from Puerto Moro.

Lesson 7

Blocking a Road with One's Own Body That Is, How Far Should One Go in Preservation of Nature?

Subject: civic education,

Problem: environmental organisation,

Objectives:

- students should think about the limits of commitment in a campaign for nature preservation,
- practice in analysis of written material.

Methods and techniques:

- case study,
- a mini-lecture,
- „for and against“.

Additional materials for students:

- Ways of exerting influence upon the authorities,

Implementation:

At the beginning of the lesson ask students to present their opinions in this matter. Would they be willing to live next to a smoking refuse incinerator, even if experts assured its total harmlessness? How would they react if they were the district's authorities facing the necessity of solving the problem of a growing refuse mountain? It is very likely that a lot of students will reject the idea of locating the refuse incinerator near the neighbourhood. Those agreeing on the necessity of its existence will suggest that it should be placed somewhere else. At this moment interrupt their discussion and explain that in social sciences there exists a term called the **NIMBY Syndrome** (Not In My Back Yard). People support initiatives as long as they do not suffer their consequences. If they do feel the effects, then they demonstrate their fierce resistance.

If the students do not agree with actions that are, in their opinion, harmful to the environment, how could they oppose them? Try to write students' proposals on the blackboard. (If the lesson about the methods of influencing authorities has already been covered, there should not be any problems with it. If not, think about presenting these issues yourself or distribute appropriate supplementary material). Inform students that sometimes, when all generally approved forms of protest fail, some people are ready to undertake more intense opposition.

In the second part of lesson put the following question on the blackboard: **How far should one go in preservation of the environment?**

Before they start answering the question tell them about incidents connected with protests against building a dam on Dunajec of Czorsztyn. Ecologists blocked the road to the construction site by forming human chains. One day, one of the truck drivers could not come stop and ran over a young man's foot. Nature conservationists of the GREENPEACE organisation tried to stop tree felling by chaining themselves to trees. The same thing has been done when a used drilling platform was to be sunk in the ocean. In the Pacific they tried to prevent French nuclear weapons tests by sailing the ship named

Rainbow Warrior into the hazardous area (the ship was sunk at a port by commandos sent by French government). In all of the above cases people risked their lives. In the United States the police recently apprehended a man who was sending letter bombs to leading scientists and managers of big companies. Several people died and a number of others suffered serious injuries. The man turned out to be a former scientist and opponent of further technological development, which he saw the main threat to life on Earth.

Now, ask students how they perceive this kind of conduct. How would they proceed in such situations? After listening to their opinions divide the class into two teams. Their task is to prepare arguments for and against the following statement: **The environment of our planet is endangered to such an extent that in order to protect it, all actions are allowed, even those that are against the law, or that risk the lives of the people undertaking them.** (See to it that the students, who clearly marked their positions, find themselves in groups that are to defend the contrary argument. It will be an excellent mental exercise and it will allow them to look at the problem from another angle. If it turns out that these matters do not stimulate their interest discontinue this part of the lesson.)

In the last part of the lesson arguments for and against the stated thesis are written on the blackboard. The lesson ends with a vote in which students declare themselves on one side or the other.

Supplementary material for students:

Methods of Influencing the Authorities:

- Letters (containing information about the problem, the sender's address, and which must be signed) addressed to politicians, state organisations, newspapers ...,
- Petitions,
- Pickets – the picketers prepare signs and show them near headquarters of appropriate authorities. Picketing cannot disturb other citizens,
- Demonstrations – to organise a march of a large number of citizens it is necessary to request approval of the district authorities; it is also necessary to inform the police (if demonstration will disturb street traffic),
- publishing leaflets, brochures, and posters,
- organising citizens, e.g., creating associations focusing on human rights protection, environmental protection... (e.g. Greenpeace).

Lesson 8

Who's Mad Here? That Is, The Advantages of Organic Biodynamic Farming

Subject: biology, civic education,

Problem: biodynamic farming,

Objectives:

- explanation of the term "organic biodynamic farming",
- demonstration of the hazards resulting from modern agricultural practices.

Methods and techniques:

- group activity,
- decision tree.

Additional materials for students:

- handouts No 1 and 2

Implementation:

At the beginning of the lesson ask students whether or not they have heard about the so-called „mad cow disease“. Do they know what causes it? What are its effects? It's very likely that they will be able to say quite a lot about it. However, sorting out the causes of this illness might be troublesome.

In Great Britain, to reduce the cost of fodder production and increase output, ground body parts of dead sheep were added to the feed. A virus found in sheep made its way into the cows that were fed with the fodder. By eating beef it is possible for humans to become infected with the deadly illness Bovine Spongiform Encephalopathy, or Creutzfeldt Jakob Disease.

In addition to this method of fodder production in modern, highly efficient agriculture, other manufacturing technologies are used that have certain risks. Genetically modified cultivable plants (very resistant and highly efficient) and breeding animal species have been introduced.

In the next part of the lesson, divide the students into groups and distribute handout No 1. Ask them to think about the reasons for the use of antibiotics in agriculture and where this may lead.

As soon as they have answered these questions ask if they would be willing to eat food produced in this way.

Afterwards, say that **organic biodynamic farming** is an alternative to this kind of intensive agriculture. While distributing handout No 2 to the groups ask them to explain what the term is based on. About 5 minutes later try to write down the definition of this kind of farming, that you have worked out together with your students.

In the last part of the lesson, with the help of a decision tree groups of students will choose the type of farming most appropriate, in their opinion, for our part of the country. While they work, go round the class and play the role of an expert sorting out the students' doubts.

Consider the fact that organic biodynamic farming has less output. Farmers will profit from the sale of smaller amount of field crops, provided they get higher prices for them. This is possible if people give priority to healthier and more expensive foods (e.g. vegetables) over cheaper and contaminated ones. Public awareness and social consciousness is therefore important in this field.

At the end of the lesson groups will present their decision trees along with the final decision. At this point, ask them once again to explain the meaning of the term organic biodynamic farming.

Supplementary materials for students

Handout No 1

Farm animals receive much more antibiotics (mostly penicillin and tetracycline) than humans do. These are used in treatment and also to avoid possible future illnesses that expose a farmer to losses. Furthermore, they promote growth of body mass in pigs, cows, and poultry. In the bodies of farm animals a great number of pathogenic micro-organisms become immunised due to the abundance of antibiotics. When they enter the human body they cause illnesses that can no longer be treated with the same antibiotics. Because of the consumption of meat containing resistant micro-organisms, 6.5 million people in the United States suffer declines in health and around 500 die annually. Cows are also given antibiotics in order to avoid udder infection. Later, the antibiotics enter their milk. In this way, the antibiotic-resistant bacteria may grow in humans. Research work is being carried out concerning a new crop variety that could also transmit immunity to antibiotic action.

Based on: K. Wojtasinski, "Koniec:ery antybiotyków", Raj, January 1997, pp. 8-11.

Handout No 2

Ecological farming is based on the complete use of natural means of land cultivation and animal husbandry. There is no application of artificial fertilisers or agricultural chemicals. Instead, natural compost and appropriate crop rotation are used. For greater self-sufficiency, a considerable amount of food for people and animals is produced on the same farm. Energy consumption is less since an effort is made to make the most of renewable sources (such as wind, sun, biogas, and water power).

This kind of farm requires more labour since extensive use of machinery may be unprofitable.

Based on: B. Taraszkiewicz, Polityka ekorozwoju jako szansa gospodarczego i społecznego rozwoju gmin na terenie obszaru funkcjonalnego ZPP, Suwalki 1993, pp. 65-66

Lesson 9

To cut down trees or not to cut them down? This is a question... Discussion about the Białowieża National Park

Subject: civic education, geography,

Problem: population pressure on natural environment,

Objectives:

- information the values of the Białowieża National Park;
- noticing the dissimilarities of interests of different social groups who are somehow connected with the existence of the Białowieża National Park;
- developing a skills to negotiate and to know the rules of proper communication.

Methods and techniques:

- simulation,
- analysis of a coincidence,

Additional materials for students:

- handout No. 1 – basic information about the Białowieża National Park;
- handout No. 2 – 5 – cards with roles for the participants of the negotiation;
- handout No. 6 – rules of negotiation.
- handout No. 7 – The structure of farms' income in the area of the Białowieża National Park.

Realization:

When foreigners search for information about the places worth visiting in Poland, they always come across some information about the Białowieża National Park. This landmark is something very special not only on a scale of our country, but of whole Europe as well. Seldom can you find places like this where you can see the forest as it was thousands of years ago, before the man with an axe appeared. Year after year such places are slowly disappearing and the ones that still can be found become even more precious.

For this reason, it seems that the problem of the full preservation of those areas should be out of question. However, when ecologists petitioned about extension the area of the Białowieża National Park, lots of controversy arose. The aim of this lesson is to have a look at the arguments of those who protest.

Students divided into teams will take roles of representatives of different social groups and through negotiation they will try to make a mutual consensus as for as the extending the Białowieża National Park is considered.

1. At the beginning of the lesson make a short introduction in which the discussed problem will be touched and then ask students to look through handout No.1 – the Białowieża National Park. You can present the information yourself or a week before the lesson you can ask one of the students to prepare the presentation about the Białowieża National Park (this is important to do it well). After presenting the facts and information make sure that students understand how precious this national park is.

2. Divide class into groups in a way that each group has a leader, namely a person who is good in leading a discussion. Explain to them the roles they should take. As representatives of the population living in the area of the Białowieża National Park, authorities, members of ecological organization and the management of the national park, they should work out their common opinion about extending the Białowieża National Park. At this point you can choose one person who will take a role of the Minister of Environmental Protection and will lead the whole discussion. If you cannot find a suitable person for this role, do it yourself. Group receive handouts No. 2-5 and they are given 10 minutes to look them through and get ready for the negotiation.
3. **NOTICE!** If students have never taken part in a lesson of this kind, familiarize them with the term 'negotiation'. Present them the basic rules of the effective negotiation and the stages according to which it should be conducted. It is advisable to discuss all the aspects of the effective negotiation during the previous lesson. It may be a good because it helps students to find a quick solution.
4. At the next stage of the lesson the person leading the whole negotiations asks representatives of the groups to state their opinions. All ideas should be written down on the board. Negotiation is to be finished when all groups agree on one common decision or when the agreement cannot be made (the length of the lesson should be taken into consideration as well). The minutes of the discussion should be signed by all the people involved.
5. You end the lesson giving feedback of this activity. Together with your students try to decide why the outcome of the negotiation was not different. Ask them if they had any problems with making agreement. What caused the greatest difficulties and what was easy to establish? Here you should call their attention to the complexity of the problem concerning the situation in the Białowieża National Park and the differences in the opinions of all participants.

People who live in the area of the Białowieża National Park may be concerned about the consequences of the Białowieża National Park's extension, but at the same time they may not notice all the benefits connected with this process. This will make a good subject for the next lesson.

Additional materials for students:

Handout No. 1. Basic information about the Białowieża National Park

The area of the Białowieża Primeval Forest has been legally protected since 1921. In 1932 the reserve of about 4,7 thousand ha was established there which later on was accepted as the Białowieża National Park. In 1969 on the strength of a decision of the Ministry of Environmental Protection this area was expanded to 10 thousand ha. In 1977 according to the decision of UNESCO it become a part of the world's system of biosphere reserves and two years later it was chosen as the landmark of world's heritage. In 1998 the Białowieża National Park was given a diploma of European Council.

Handout No. 2. The population of the Białowieża National Park

You do not want the National Park to be extended. Many of you make a living by working in a forest and you are afraid of losing your jobs. Within the borders of the National Park your property will not be at your free disposal e.g. you will not be allowed to sell the recreation areas, build any new buildings or repair the old ones without a legal permission. Local authorities will decide how much fertilizers you will be allowed to use (probably it will be less than now, which may result in the decrease of crops for many

farmers). If the entrance to the Park is forbidden, tourism will decrease as well as your benefits from it. You will not be able to earn money by picking mushrooms, blueberries, etc. or hunting.

Handout No. 3. Representatives of the local authorities

You are anxious about the extension of the National Park. It will cause the decrease of income in the local budget from the forest taxes. From your point of view, the problem is very serious because if people lose their jobs, you will be obliged to find extra money to provide them financial help. You are also aware of the fact that if you forbid to pick up mushrooms or blueberries these restrictions will be probably broken. On the other hand, you realize how exceptional the Białowieża National Park is. You would agree on the project of extending the National Park provided that the central authority helped you. You would expect some special subsidies covering the decrease of your incomes or the programme of unemployment benefits.

Handout No. 4. The management of the Białowieża National Park

Even better than all other people, you are fully aware of all the values of the Białowieża National Park. In your opinion, it would be very profitable for this area to be extended. At the same time you are aware of the consequences that may be hard to deal with for the local population. Many people may lose their jobs and the local firms responsible for cutting down trees may have serious financial difficulties. Even now you have a lot of problems with illegal deforestation, laying snares and the unauthorized hunting. You are worried that without providing help for the local population the extension of the National Park may worsen the situation.

From your point of view, the best solution would be the development of tourism in this region. All the tourist tracks should be then improved and made more attractive for visitors and some new ones should be also created. It will also include preparing brochures and guide books for tourists. For the owners of farms it would give a chance to earn some extra money too. They would be able to rent rooms for visitors or even establish new recreation centres. However, it would all entail some additional expenses and at present you do not have that much money.

Handout No. 5. The ecologists from the Association of the Protection of the Białowieża Park

You definitely want the Białowieża National Park to be extended. In your opinion, all the human activities on this region should be beneficial for the protection of the Park. You do not agree that ecological forestry is a sufficient solution. According to you, cutting down trees and trying to protect them at the same time does not make much sense.

You think that Poland should do its best to try to preserve this exceptional area, which is something that no other country possesses.

You are supported by a few important organizations such as the Environmental Protection Council, Environmental Protection Committee of Polish Academy of Sciences and the Government Committee of Environmental Protection. A special coalition that deals with problems of the Białowieża National Park has been also created. It unites the members of 8 ecological organizations.

Handout No. 6.

Rules of negotiation

- Differentiate between people and a problem,
- Concentrate on your business, not on your position,
- Look at the problem from different angles before making a final decision,
- Make sure that the outcome of negotiation is based on objective criteria

by R.Fisher, W.Ury, Dochodzac do tak, Warsaw 1994, p.41

The bases of the effective negotiation

- Do not evaluate
- Do not generalize
- Do not interpret
- Do not give "good advice"
- Present your opinions
- Get to know other people's points of view
- Show that you are involved

By J. Gut, W. Haman, Docenić konflikt, Warsaw 1993, p.34

Stages of negotiation

- Present your opinions
- Explain the reasons and the ground of your stand point
- Try to find all possible solutions
- Make an agreement

Lesson 10

The protection of the ozone layer as a better business than selling drugs

Subject: civic education, geography, basics of economy,

Problem: endangered species, free market economy and protection of environment.

Objectives:

- Students get acquainted with the notion of the ozone layer, reasons of its destruction and ways of its protection;
- Students get informed about the relations between environmental protection, politics and social life.

Methods and techniques:

- Analysis of the case;
- Poster;
- Group work.

Additional materials for students:

- Handout No. 1 – Freon smugglers;
- Handout No. 2 – The hole in the ozone layer.

Implementation:

At the beginning of the lesson distribute materials from handout No.1. Tell your students that the text is about a problem that FBI have recently dealt with. Students' first task will be to read it. Give them a few minutes to do it and then ask them to explain what the FBI's problem is about.

Then tell students that the USA is not the only country where the production of freon (CFC) has been stopped. Many other countries, mainly those affluent ones, have done the same (Great Britain and Germany stopped the production in 1996). In 1988 nearly 40 countries signed the document called "Montreal Declaration". Its purpose was to decrease the use of freon to 50% by 1999. In 1990 Poland also signed a declaration of the reduction of using CFC in the future. Nevertheless, these international declarations have not been accepted by all countries. Many of them cannot afford to stop the production of CFC and replace it with other chemicals. As soon as freon production had been limited in some countries, it became larger in those, which had not signed any declaration.

After you explain that, ask students if they know why freon causes such numerous controversies and why so many people want its production to be ceased. If students do not know how to answer these questions, tell them that when freon reaches the highest parts of the atmosphere it destroys the ozone layer.

Students can get some more information about the consequences of the hole in the ozone layer from hand-out No. 2. Divide class into groups and give them these materials. After 10 minutes go back to previously asked questions. Let some students answer them and make sure that others also understand this matter.

Tell students that disappearing of the ozone layer is considered as a **global problem**. Ask them how they understand it and why it is sometimes so difficult to solve it.

At the end of the lesson ask students how they think they can help to protect the ozone layer. It is still difficult to buy freon-free refrigerators in Poland, since they are more expensive than regular ones. The same problem concerns ozone-friendly air-conditioners. Here you may also mention the OZONE FRIENDLY or CFC FREE marks used on deodorants. Much less toxic substances are created during their production. This makes a good reason to buy only such products.

As a home task ask students to make some posters which will encourage to buy ozone-friendly goods. You may ask students to work in groups. The best posters can be then exhibited in the classroom or the school hall.

Additional materials for students:

Handout No. 1. Freon smugglers

The production and import of freon, which is used in air-conditioners and refrigerators has been banned in the USA since 1996. However, 100 mln cars with CFC air-conditioners can be still seen on all American highways. Changing the installation would cost approximately 1000 USD. For this reason the owners of older cars prefer to look for freon. Because of diminishing of its resources, its price increased from 2 to 36 USD for 1 kg. Although CFC is no longer produced in USA, it is available in other countries. As the demand for CFC is still big, Russia, China and India have multiplied the production. The Russian mafia smuggles freon from Russia to USA. This business appears to be even more profitable than pushing cocaine from Columbia. One invested dollar brings 12 dollars. At present FBI agents are obliged to catch not only drug dealers but CFC smugglers as well.

Based on: J. Kalabiński, Przemysłnicy freonu, Rzeczpospolita nr 171/1997

Handout No. 2. The hole in the ozone layer

Ozone – triatomic molecules of oxygen. It is a very important element of the atmosphere. It is the only gas that absorbs ultra-violet radiation (UV) coming from the space. When freon reaches the ozone layer in the atmosphere it destroys ozone molecules turning them into diatomic oxygen. Increasing doze of UV that comes to the Earth makes wheat, peas and soya crops much poorer. As plankton in waters of Arctic is continually devastated, it may lead to serious problems in the fishing business. UV radiation weakens the immunity from virus and parasite diseases and causes different forms of cancer. During the next few years the ozone layer is thought to become 10% thinner, which will make the doze of UV rays much larger. It will increase the probability of skin cancer by 26% (in practice it means 300 thousand new cases in the world).

The hole in the ozone layer has been formed over the area of Antarctica. Unfortunately, this problem concerns Poland as well. In winter of 1991/1992 the ozone layer over Poland was two times thinner than it should be. Later the situation slightly improved but the danger still exists.

Producers of different sorts of sun creams and sun glasses tend to boast about the efficiency of their products. In a couple of years, however, it may become dangerous to go outside on a sunny day.

Based on: G. Dobrzański (ed.), "Ochrona środowiska przyrodniczego", Białystok, p. 51-54, A. Kalinowska, „Ekologia – wybór przyszłości”, Warsaw, p. 221-232