LEARNING FOR LIFE

TEACHERS' GUIDELINE

IMPACT OF URBANIZATION ON THE ENVIRONMENT

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PROJECT DETAILS

SCHOOL YEAR	2017-2018
SCHOOL YEAR LEVEL	9th grade (14-15 years old)
TERM	
SESSIONS	30-35 hour
TITLE	**IMPACT OF THE URBANIZATION ON THE ENVIRONMENT**
SUBJECTS	Sciences (Biology, Chemistry, Physics), Mathematics, Languages, ICT
UNIFYING THREADS (DRIVING QUESTIONS)	Do you know about the importance of the water circuit in the ecosystem? Do you know about the consequences of bottlenecks in the water circuit in nature? What is the role of the biodiversity in an ecosystem? How is the diversity of biocenosis in the anthropic ecosystem relative to the natural one? What are the factors that determine this difference? What are the ways of conserving biodiversity? What impact people have on biodiversity? Can people always see, hear or feel environmental issues? What are the effects of these "invisible problems"? What impact do residents have on the urban environment?

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KEY COMPETENCES

A: TRANSVERSAL COMPETENCES

COMPETENCE (EU)	TASKS
1.Learning to learn	4-6-7-8-9-10-11-12-13-14-19
2.Sense of initiative and entrepreneurship	1-3-4-5-6-7-8-9-10-11-12-13-14-19-20
3.Social and civic	2-3-14-15-19-20

B: SUBJECT COMPETENCES

COMPETENCE (EU)	TASKS
4.Communicating in the mother tongue	2-14-16-17-18-20
5.Communicating in a foreign language	16-17
6.Digital	3-4-16-17
7.Mathematical, scientific and technological	5-6-7-8-9-10-11-12-20
8.Cultural awareness and expression	

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MULTIPLE INTELLIGENCES

INTELLIGENCE	TASKS
1. Interpersonal	1-2-3-4-5-14-15-16-19-20-21
2. Intrapersonal	1-3-4-5-6-7-8-9-10-11-12-13-14-15
3. Visual-spatial	14-16
4. Bodily-kinesthetic	
5. Musical-rhythmic	
6. Verbal-linguistic	14-16-17-18-20
7. Logical-mathematical	6-7-8-12-14-16
8. Naturalistic	6-7-8-9-10-11-12-13

DISCIPLINARY OBJECTIVES and CROSS-DISCIPLINARY OBJECTIVES

What do we want students to understand?

(COMPREHENSION GOALS)

DISCIPLINARY OBJECTIVES and CROSS-DISCIPLINARY OBJECTIVES

MAIN OBJECTIVE:

Studying and awareness of the effects of urbanization on the environment.

0.General objectives

0.1. Learning to work in teams and control teamwork

1.Science

1.1. Comparison of the natural ecosystem and the urban-industrialized ecosystem by comparing some abiotic and biotic indicators.

1.2. Identification of pollutants / pollution types.

1.3. Analysis of effects of anthropogenic impact on the environment.

2.Mathematics

2.1. Apply mathematical knowledge to draw, read and interpretate the diagrammes,

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	charts, graphs, calculation of formulas, international unit conversion **3.Foreign Language (English)** 3.1. Learn specific vocabulary: Urbanization, anthropogenic impact, indicator species, ecosystem, pollutants. 3.2. Improve reading skills 3.3. Improve communication skills (oral and writing skills). **4.ICT** 4.1. Data Processing in Tables and Graphical Representation of Investigation Results 4.2. Learning to edit information in various programs.
PROJECT PRESENTATION	The presentation of the project will be accomplished by staging a small piece of theatre that illustrates the theme of the project. The School Director will present the Title and Theme of the project, after which the students involved in the project, will play, and at the end they will invite all participants to watch the final product: the drawing / painting exhibition ("Tour of the gallery").
FINAL PRODUCT	**Posters Exhibition - Tour of the gallery**

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SEQUENCE OF TASKS

Tasks in bold are necessary, and the rest are optional, depends on the teachers involved in the project and the facilities of the school.

A. PREVIOUS TASKS

1. **Task: Team dynamics**
2. **Task: Project presentation**
3. **Task: Team planning**
4. **Task: What I know-What I need to know**
5. **Task: Specify the template of the exhibition and appoint the responsibilities**

B. RESEARCH / DEVELOPING TASKS

6. **Task: Measurement of air temperature in the central urban area and in a natural surrounding ecosystem**
7. **Task: Measuring the amount of water through rainfall in the central urban area and in a natural ecosystem around it**
8. **Task: Determining the diversity of biocenosis in the two studied ecosystems**
9. **Task: Identification of the types of pollutants in an urban / rural area and their classification**
10. **Task: Effects of urbanization on the atmosphere. Interpretation of air quality monitoring data**
11. **Task: Effects of urbanization on soil and natural resources**
12. **Task: Effects of urbanization on water resources (water analysis)**
13. **Task: Effects of Urbanization on Water Resources (Water Conservation Practices)**
14. **Task: I see, I wonder, I ask**
15. **Task: Team planning assessment**
16. **Task: Work on posters for exhibition**
17. **Task: Learn vocabulary in English**
18. **Task: Translate the posters titles and content into English**

C. FINAL TASKS

19. **Task: Organisation of the exhibition - Tour of the gallery**
20. **Task: Posters dissemination**
21. **Task: Prepare the small piece of theatre**
22. **Task: Final team planning assessment**

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INDICATORS

MAIN OBJECTIVE

Studying and awareness of the effects of urbanization on the environment

0. General objectives

0.1.1. The student achieves team objectives

0.1.2. The student achieves individual objectives

0.1.3. The student fulfils his / her responsibilities

1. Science

1.1.1. List the abiotic and biotic indicators

1.1.2. Identifying the natural ecosystem and the urban-industrialized ecosystem

1.1.3. Measurement of the temperature and the water

1.1.4. Measurement of the amount of rainwater in a central urban area and a natural ecosystem around the city

1.1.5. Explaining the importance of the water circuit in the ecosystem

1.1.6. Identifying the dysfunctions in ecosystems in the case of variation of the amount of rainfall in relation to the ideal value

1.1.7. Determination of the diversity of biocenosis of an anthropogenic ecosystem

1.1.8. Comparing the diversity of biocenosis of an anthropogenic ecosystem

1.1.9. Defining the biocenosis and present its structure

1.1.10. Identifying species from different trophic categories

1.1.11. Comparison and interpretation of the dates

1.2.1. Identifying the factors that contribute to the degradation of the environment in a perimeter around the school

1.2.2. Grouping the factors that contribute to the degradation of the environment in a perimeter around the school according to their nature (physical, chemical, biological)

1.2.3. Identifying the causes and effects of urban problems in the surrounding area of the school

1.3.1. Measurement of the CO2 concentration in the air in the central area of the city and in the industrial area

1.3.2. Measurement of the relative air humidity in the central area of the city and in the industrial area

1.3.3. Comparison the obtained data with the air quality indicators

1.3.4. Analysing the effects of lead-based paints on buildings, on soil and water

1.3.5. Determination of the water quality of the river / lake near the city

1.3.6. Comparison of the amount of water used before and after the implementation of the water conservation plan.

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2. Mathematics

2.1.1. Calculation the monthly rainfall index for the studied ecosystem according to the formula

2.1.2. Comparison of the values obtained in the two ecosystems

2.1.3. Graphical representation of the consequences of the amount of rainfall in the two types of ecosystems

2.1.4. Convert measurements for parameters used

2.1.5. Drawing charts

2.1.6. Correct execution of graphs to highlight temperature variations

2.1.7. Comparison the air quality data from the two areas of the city using a 3D column chart

3. Foreign Language

3.1.1. States the terms: urbanization, anthropogenic impact, indicator species, ecosystem, pollutants in the foreign language

3.2.1. Expresses technical terms in the foreign language

4. Mother Tongue

4.1.1. Make the presentation of the project (oral and writing skills)

4.1.2. Make the presentation of the products (oral and writing skills)

5. ICT

5.1.1. Use software to produce photos, videos, PowerPoint presentation

5.2.1. Write and edit posters

TOOLS:

- **Rubrics**
- **Evidences**

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TASKS

PREVIOUS TASKS

1. Task: Team dynamics			**Session:** 1 h
COMPETENCES	Social and civic	**INTELLIGENCES**	Interpersonal Intrapersonal
GOALS	Learning to work in teams and control teamwork		

Task description:

In order to know each other, everyone will tell his name and two qualities who begin with the same letters as his name (Ex. If the name is Paul Colbin, two qualities could be: persuasive and creative). Then, you will talk about your answers in groups and will try to identify other qualities of each other.

After you will know each other, you can choose another 3 or 4 colleagues to make a team. The teacher will help you, in order to create a real team. You may read the “Belbin for students” and define/choose your roles in your team.

See annexe: “Belbin for students”.

Websites to explore:

http://www.belbin.com/media/1336/belbin-for-students.pdf

2. Task: Project presentation			**Session:** 1 h
COMPETENCES	Social and civic Communicating in the mother tongue	**INTELLIGENCES**	Interpersonal Verbal-linguistic
GOALS	Learning to work in teams and control teamwork Improve communication skills (oral and writing skills)		

Task description:

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You are a group of people responsible for the environment of your city council and you want to carry out an awareness campaign on identification of the types of pollutants in an urban / rural area and the effects of urbanization on the atmosphere.

Therefore, you must prepare some posters for an exhibition and a presentation to introduce it to the members of the community and interested companies. You will also prepare a small piece of theatre that illustrates the theme of the project. For it, you will have 7-8 weeks.

In groups, you will analyse the possibility to identify types of pollutants in an urban / rural area. You will measure the air temperature in the central urban area and in a natural surrounding ecosystem and the amount of water through rainfall in the central urban area and in a natural ecosystem around it, determine the diversity of biocenosis in the two studied ecosystems, all these in order to identify the effects of urbanization on the atmosphere, on soil and natural resources and on Water Resources.

During this project, you will prepare, produce, publish and disseminate the posters (on paper and digital). The posters will contain the most important activities carried out to illustrate the effects of the urbanisation on the environment. The project and its products will be presented to the community (colleagues, teachers, parents, another people from the local community).

The presentation of the project will be accomplished by staging a small piece of theater that illustrates the theme of the project.

The School Director will present the Title and Theme of the project, after which you will play, and at the end they will invite all participants to watch the final product: the posters exhibition ("Tour of the gallery").

Teacher's notes:

When we present the project we need to motivate the students. The presentation of the project needs to be appealing. It is very important to create a special atmosphere to attain motivation. This is the moment when we can boost their interest. In order to present this project the participation of the customer (headmaster, parents association, representative of the Environmental Protection Agency, another local community member or a special guest) is essential.

It is also convenient, when there is more than one class, to gather all the classes from your school or from another partner or net school and to present the project to all the students together. Apart from the customer, the teachers that will take part in the project will also be present at the project presentation, supporting the students playing the small piece of theatre.

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It's recommended to create a special moment and choose a special place in order to present the project.

3. Task: Team planning			**Session:** 1 h
COMPETENCES	Social and civic Sense of initiative and entrepreneurship Digital	**INTELLIGENCES**	Interpersonal Intrapersonal
GOALS	Learning to work in teams and to control teamwork		

Task description:

You will work in teams. So, each team will define its team planning, which will consist of three parts: team objectives, individual objectives and responsibilities. In this respect, every team may write on a piece of paper some objective. After that, you will discuss together and select the most relevant objectives.

All teams will have four objectives: two will be the same for every team, and the other two will be defined by each team.

Each of you will have 2 individual objectives: one suggested by your team and the other suggested by yourself. After each of you are agree with the objectives, the teacher will assign the responsibilities for each of you.

Teacher's notes:

A special approach by the teacher, as a project coordinator, for collaborative teams, is Management by Walking About. This method assumes that the teacher reserves enough time to interact with the team, whether there is a specific reason or not.

See annexe: "Belbin for students" and 3T - TEAM PLANNING

Websites to explore:

http://www.belbin.com/media/1336/belbin-for-students.pdf

https://www.mindtools.com/pages/article/newTMM_72.htm (*Management by Walking About*)

and more

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http://www.hbs.edu/faculty/Publication%20Files/12-113_9a2bc5e8-2f70-4288-bb88-aeb2de49e955.pdf

http://www.economist.com/node/12075015

http://fortune.com/2012/08/23/management-by-walking-around-6-tips-to-make-it-work/

4. Task: What I know – What I need to know			**Session:** 1 h
COMPETENCES	Learning to learn Sense of initiative and entrepreneurship Digital	**INTELLIGENCES**	Interpersonal Intrapersonal
GOALS	Learning to work in teams and to control teamwork		

Task description:

You will work in teams. You will consider what you already know about the project and what you need to know in order to carry it out. For this purpose, each team will receive a paper with two columns: 1. I know; 2. I want to know/What I need to know. Then, you must think about what you know and what you need to know to solve the problems about the project that you must prepare.

Example:

I know (in this column you note facts, elements you already know about the subject)	I want to know/What I need to know (In this column you note all the aspects, details you want to know/are necessary for the subject).

Teacher's notes:

The teacher will pay special attention to students' answers, and based on these answers he/she will suggest suitable tasks to carry out the project. The teacher will follow the existence of cognitive anchors in student mind and experience; he will try to help the students to find these anchors. The teacher can use the method "Johary window". The teacher will initiate discussions and will establish necessary correlations in order to illustrate the importance of the planning and running of the activities.

See annexes 4T, 3T - TEAM PLANNING and "Johary window".

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5. Task: Specify the template of the exhibition and appoint the responsibilities			**Session:** 30 min
COMPETENCES	Sense of initiative and entrepreneurship Mathematical, scientific and technological	**INTELLIGENCES**	Interpersonal Intrapersonal
GOALS	Learning to work in teams and to control teamwork		

Task description:

Your team will set the design of the exhibition. Thus, you will set the number of picture/photos and their dimensions; share the tasks of making the content and the illustrations. In order to do that, it is necessary that all of you reach an agreement.

Teacher´s note:

The teacher will support students in setting the aspect of the exhibition, the number of pictures/photos and the agreement content.

RESEARCH / DEVELOPING TASKS

6. Task: Measurement of air temperature in the central urban area and in a natural surrounding ecosystem			**Session:** 2 h
COMPETENCES	Sense of initiative and entrepreneurship Learning to learn Mathematical, scientific and technological	**INTELLIGENCES**	Interpersonal Logical-mathematical Naturalistic
GOALS	Comparison of the natural ecosystem and the urban-industrialized ecosystem by comparing some abiotic and biotic indicators.		

Task description:

To carry out this work you will form three working teams; for each team, the tasks are as follows:

1. Temperature measurement in the three established city areas

2. The processing of data collected in each area by the team responsible for the area

3. The presentation of the results and conclusions resulting from the interpretation of the collected data.

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Task 1: By team, according to a teacher's schedule, you will travel to a specific area of the locality. You will determine the air temperature using the mercury thermometer installed in a radiation free area. Read the air temperature recorded by the mercury thermometer at three different moments of the day at 6 hours (morning, noon and evening, as much as possible at the same time). Each group will read the data in a specific area, agreed with the teacher, for 6 consecutive days. To record the collected data, you will use Annexe 1. After completing the task, the recorded data will be presented to the other colleagues.

Task 2: In teams, you have four days to process the data collected in the field. You will graph graphically the temperature variations for each area of the city (each team will represent the data from the distributed area) on three distinct diagrams using column diagrams.

After that, together with the other 2 teams, you will create a 3D column chart in which you will compare the temperatures in the three areas of the city in the three moments of the day. These charts will be presented to classmates in the next class, in the form of a PPT presentation. For data centralization, you'll use Annexe 2.

Task 3: Based on diagrams made with your colleagues, you will perform a Power Point presentation where you will present the factors that caused temperature variations at the same time of day in the three areas of the city. Each team will deliver the PPT for the assigned area.

Assessment tools (rubrics…): It will be assessed.

Use the Individual / Group Assessment Sheet for T6

Teacher's notes:

Students are advised to measure the air temperature in three different areas of the city, process their data and interpret them. To carry out this activity, you will form three working teams. Teams will be announced about the tasks they have to accomplish. You will support students and provide explanations about the use of annex tables and the accomplishment of each task. The evaluation will be done both individually and in groups using the Individual / Group_T6 Assessment Sheet.

7. Task: Measuring the amount of water through rainfall in the central urban area and in a natural ecosystem around it			**Session:** 2 h
COMPETENCES	Sense of initiative and entrepreneurship Learning to learn Mathematical, scientific and technological	**INTELLIGENCES**	Intrapersonal Logical-mathematical Naturalistic

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GOALS	Comparison of the natural ecosystem and the urban-industrialized ecosystem by comparing some abiotic and biotic indicators

Task description:

You will participate in an activity measuring the amount of rainwater in a central urban area and a natural ecosystem around the city. The activity will take place on teams. You will make two teams.

Activity 1 – classroom activity - 1 h

The activity will be a documentation of the measuring apparatus - the pluviometer - and how to use it. For this purpose, you will see the annual rainfall averages in the public data of the Institute of Meteorology and Hydrology.

Activity 2: outdoor activity

Each team will use a rain gauge. Under the teacher's supervision, a team will travel to a central area of the locality, and the second team, in an area around the village. Each team will mount the pluviometer on the ground as indicated. For a period of 30 days, note the value of the amount of ground water, according to the monitoring chart provided by the teacher - Annex 3.

Activity 3: classroom activity - 2h

After collecting field data, for the set period, calculate the rainfall index of the month and report on the ideal value in each of the two ecosystems.

Compare the result obtained by computation in the two ecosystems and explain the influence of the amount of precipitation on biocenosis.

Make a list of arguments for the need to know the amount of rainfall water. Make a schematic diagram of the water circuit in nature, with Appendix 4 available.

Website:

https://www.youtube.com/watch?v=Az2xdNu0ZRk

Assessment tools (rubrics…): It will be assessed.

The teacher will ask students to:

- Explains the importance of the water circuit in the ecosystem

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- Identify dysfunctions in ecosystems in the case of variation of the amount of rainfall in relation to the ideal value
- Design a plan of measures to maintain the constant level of water, according to the needs of the ecosystem

Use the Individual / Group Assessment Sheet for T6/ Se va folosi Fișa de evaluare individuală/de grup pentru T6

Teacher's notes:

- Establishing the ecosystems studied: the center of the city where the school is located and a natural ecosystem around it (eg forest, meadows).
- The amount of precipitation water is measured with the graduated rain gauge
- Unit of measurement: mm or in l / m²

Activity description

1. Present to the pupils the pluviometer and how to use it. You will indicate to the students the source of the documentation for the statistics in order to report the collected data.

2. Present the water circuit in nature using images / movies on the internet and Annexe 4

3. Ask to the two teams to mount the pluviometer on a cylindrical pole and fix it in the ground in the established ecosystems. Specify that observations are made at 24-hour intervals and the data are noted in the monitoring table - Annexe 3

4. Each team will calculate the monthly rainfall index for the studied ecosystem according to the formula:

$$\frac{q}{\frac{Q}{365}xn} = \frac{q365}{Qxn}$$

Where:

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- q is the ratio between the actual amount of precipitation in that month and the quantity that should have fallen
- Q is the annual amount of precipitation
- n is the number of days of that month
- x is the measured quantity.

The ideal value for kp is 1, so if kp> 1 moon is rainy, and if kp <1 moon is drought.

The results are communicated to colleagues and comparisons are made between the values obtained in the two ecosystems.

5. Following the data processing, the groups will draw a schematic of the consequences of the amount of rainfall in the two types of ecosystems.

Discussion questions:

1. Need for data collection.
2. Discuss the consequences of bottlenecks in the water circuit in nature.
3. Scenarios on the consequences in case of major variations from normal. ex. For the natural ecosystem: the need for water for plant development / the risk of floods and landslides.

Example: For the urban ecosystem: Drainage capacity of the sewage system / Impact of road infrastructure.

8. Task: Determining the diversity of biocenosis in the two studied ecosystems			**Session:** 4 h
COMPETENCES	Learning to learn Sense of initiative and entrepreneurship Mathematical, scientific and technological	**INTELLIGENCES**	Intrapersonal Logical-mathematical Naturalistic
GOALS	Comparison of the natural ecosystem and the urban-industrialized ecosystem by comparing some abiotic and biotic indicators		

Task description:

You will participate in an activity that will take place in the field. Within this activity, you will determine and compare the diversity of biocenosis of an anthropogenic ecosystem (local park) and of a natural ecosystem around the city (pasture or forest).

Classroom activity (1h)

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Before fieldwork, you will discuss in teams about the structure of a biocenosis, trophic categories, trophies and trophies.

Outdoor activity (1h)

You will be on the field for one hour, according to the itinerary established with the teacher, following the structure of biocenosis, the distribution of populations in space. You will take pictures and take biological samples from the area indicated by the teacher.

Classroom activity (2h)

As a result of fieldwork, in class, under the guidance of the teacher and using botanical and zoological school atlases, you will determine the plant and animal species. You will draw up a list of species for each ecosystem - Annex 5.

You will show colleagues from other teams, through a collage of photos, what you have seen on the field and you will display the list of species identified and their frequency.

You will compare the structures of the two biocenoses and identify the factors that influence biological diversity.

Assessment tools (rubrics…): It will be assessed.

The teacher will ask students to:

- Define biocenosis and present its structure
- identify species from different trophic categories
- develop an essay presenting the importance of biodiversity and conservation measures

Use the Individual / Group Assessment Sheet for T6/ Se va folosi Fișa de evaluare individuală/de grup pentru T6

Teacher's notes:

- Establish the ecosystems to be analysed and make an itinerary that students need to navigate
- Make an observation file in the field
- provide pupils with material to identify species

Activities:

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1. Students are advised to analyse in teams the diversity of biocenoses from an anthropic and natural ecosystem.
2. They present the itinerary students have to go through. The ecosite will be investigated for an hour. Each team will have to observe the distribution of populations in space, take pictures of the ecosystem in which they will contain as many species as possible and take biological samples that they will analyse in the classroom, and present them to their colleagues.
3. After returning to the classroom, each team will determine the species of plants and animals observed in the photos and taken as evidence, and will produce a list of floral and fauna inventory and make a collage of field photos.

Discussion subjects:

1. Discover the importance of biodiversity in an ecosystem. Give examples of producers in the category of producers, consumers and decomposers.
2. How is the diversity of biocenosis in the anthropic ecosystem relative to the natural one? What are the factors that determine this difference?
3. Discuss how the human factor influences biodiversity. What are the ways of conserving biodiversity?

Extension

Students can write an essay on "Biodiversity and Human Factor Influence". What impact people have on biodiversity?

9. Task: Identification of the types of pollutants in an urban / rural area and their classification			**Session:** 2 h
COMPETENCES	Learning to learn Sense of initiative and entrepreneurship Mathematical, scientific and technological	**INTELLIGENCES**	Intrapersonal Naturalistic
GOALS	Identification of pollutants / pollution types		

Task description:

You will participate in an activity that will take place in the field - outdoor. In this activity you will identify the factors that contribute to the degradation of the environment in a perimeter around the school and group them according to their nature (physical, chemical, biological) – Annexe 8.

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Before that, through the brainstorming method, you will compile a list of environmental issues that typically arise in urban areas.

You will travel for about an hour in the area around the school, following the map provided by the teacher, where you will also find examples of environmental degradation (garbage, polluted watercourse, evidence of soil erosion or compaction, Trees or green space). Observe and identify the causes and effects of the issues that appear here. By working on teams, you will explore issues related to:

- Water polution
- The air pollution
- Sound pollution
- Soil pollution (waste, chemicals, etc.)

As a result of your observations, make a list of identified problems that you will then present in the classroom. You will describe what you have seen, which have been the causes of environmental degradation and its effects. Once you identify the pollutants that caused the problems on the ground, make a classification of them.

Each identified problem will be illustrated in a drawing, which you will exhibit at the Gallery Tour.

Drawings will be made by each team, each of you representing an identified problem.

Assessment tools (rubrics…): It will be assessed.

Teacher will ask students to:

- Define urbanization and discuss environmental issues specific to urban settlements.
- Identify environmental issues specific to the surrounding area of the school and discuss their causes and effects.

Each teacher has the freedom to design the assessment tool he considers most appropriate.

Use the Individual / Group Assessment Sheet for T6/ Se va folosi Fișa de evaluare individuală/de grup pentru T6

Teacher's notes:

1. Make a map of 5-10 blocks around the school, including examples of environmental degradation (garbage, polluted watercourse, evidence of soil erosion or compaction,

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Trees or green space).

2. Make a table with 4 columns: water, air, earth, noise.

To prepare students for the field study, discuss a few minutes about the environmental issues that typically arise in urban areas. Using the brainstorming method, make a list of these issues.

When the students have finished the list, the following are added, if they have not already been mentioned:

- "urban heat island"
- Plant disappearance
- the disappearance of vegetation leads to erosion, floods and loss of habitat
- Paved surfaces (car parks, streets) increase the amount of water that drains and have an effect on its quality.

After the introduction of environmental issues in cities, students have the opportunity to study these issues.

Activity:

1. Students are informed that they will identify the causes and effects of urban problems in the surrounding area of the school.

2. They present the map or sketch of the area around the school, including examples of environmental degradation (garbage, polluted watercourse, evidence of soil erosion or compaction, areas without trees or green space). They are asked to observe and identify the causes and effects of the problems that arise here. Each team will investigate issues related to:

- Water polution
- The air pollution
- Sound pollution
- Soil pollution (waste, chemicals, etc.)

3. The area will be searched for an hour. Each group will list the issues they will present in the classroom.

4. After returning to class, each group will draw a drawing of the problems identified in the research area. In turn, they will put the images in the table above on the four columns (water, earth, noise,

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noise). Each group will describe what they saw, which were the causes of environmental degradation and its effects. The issues will be discussed later.

Questions for discussion:

1. Do you observe identical aspects in different columns? Is there the same polluting agent for two different resources, like water and air, or land and water? Why?

2. Can people always see, hear or feel environmental issues? What are the effects of these "invisible problems"?

3. What are the table examples that affect people's health? What are the effects of plants or animals? How?

4. Give examples of problems in the table and ask: "How can you prevent these problems?"

Extension

Students can write an essay on the subject:

"Water, the air, the life of animals and plants are part of the urban environment." What impact do residents have on the urban environment, give examples that you have observed today. "

10. Task: Effects of urbanization on the atmosphere. Interpretation of air quality monitoring data			**Session:** 2 h
COMPETENCES	Learning to learn Sense of initiative and entrepreneurship Mathematical, scientific and technological	**INTELLIGENCES**	Intrapersonal Naturalistic
GOALS	Analysis of effects of anthropogenic impact on the environment		

Task description:

As part of this activity, you have to measure the CO2 concentration in the air and relative air humidity in the central area of the city and in the industrial area and compare this data with the air quality indicators.

You will form two teams that will collect data from the two areas of the city.

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The first team will read the values for carbon dioxide concentration and relative air humidity for 5 days from the monitoring panel installed in the central area of the city, and the second team will measure for 5 days with An air and gas quality detector the values for carbon dioxide concentration and relative air humidity in the industrial area of the city at two different times of the day (as far as possible at the same time) that you will enter in a notebook, using the table in Annexe 6.

In the next class, you will present the data gathered from the two areas.

The first team will process your collected data, with four days available to graph the variations in the two air quality sizes. To do this, you will use column type charts. To compare air quality data from the two areas of the city, you'll use a 3D column chart. These charts will be presented to classmates in the next class.

The second team will collect information on air quality indicators and on the basis of your colleagues' charts you will present the conclusions regarding the air quality in your city and the factors that contribute to air pollution.

Assessment tools (rubrics…): It will be assessed.

Teacher's notes:

Students will note the data on the monitoring panel installed in the central area of the city and will compare this data with the air quality indicators.

Use the Individual / Group Assessment Sheet for T6

11. Task: Effects of urbanization on soil and natural resources			**Session:** 2 h
COMPETENCES	Learning to learn Sense of initiative and entrepreneurship Mathematical, scientific, technological	**INTELLIGENCES**	Intrapersonal Naturalistic
GOALS	Analysis of effects of anthropic impact on the environment		

Task description:

You will analyse the effects of lead-based paints on buildings on soil and water. For this you will form three teams and identify how many buildings in your neighbourhood are painted with lead-based paints (washable lime).

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You will document how the lead penetrates the ground and the effects of lead on the human body.

After that, you will study the location in three different districts of household waste containers, the way they are selected and the periodicity of the garbage lifting. You will analyse the air quality around the garbage containers and the degree of cleanliness around them.

The results of these studies will be presented during the next class.

Assessment tools (rubrics…): It will be assessed.

Use the Individual / Group Assessment Sheet for T6/ Se va folosi Fișa de evaluare individuală/de grup pentru T6

Teacher's notes:

Students will be documented on the effects of lead-based paints on buildings, the discharge of domestic and industrial waste, petrol storage containers on litter and natural resources.

12. Task: Effects of urbanization on water resources (water analysis)			**Session:** 2 h
COMPETENCES	Learning to learn Sense of initiative and entrepreneurship Mathematical, scientific and technological	**INTELLIGENCES**	Intrapersonal Naturalistic Logical-mathematical
GOALS	Analysis of effects of anthropic impact on the environment		

Task description:

In this activity you must determine the water quality of the river / lake near the city.

For water sampling, you will form 4 teams and you will travel alongside the teacher on the water course / lake. The teacher will conduct training for work safety and will be trained on the technique of collecting water samples from the water / lake. You will sign the work safety rules while riding the river / lake.

In teams, along with the teacher, you will be on the river / lake where you will take water samples into four polyethylene bottles with waterproof plugs, numbered 1 to 4 using sticker labels. The bottles will be filled with water from the river to the refuse, and the stopper will be fixed in such a way that no bubbles remain inside the vessel. On site, you will determine the organoleptic (water scent), water colour, water turbidity, measure the water temperature with a mercury thermometer, and measure the

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pH of the water with an electronic pH meter. All this information will be entered in an observation book using the table in Annex 7.

You have a week to document your water quality standards, compare them with the data you collect on the field, and present them to your classmates for the next hour. You will identify the pollutants that have contributed to water pollution.

Assessment tools (rubrics…): It will be assessed.

– Annexe 8 – Identification of the factors that contribute to the degradation of the environment in a perimeter around the school.

Evaluation criterias:

Data collection

- Compliance with the data collection timeframe
- Completing the table in the notebook

Data processing

- How to draw the charts
- Correct execution of graphs to highlight temperature variations

Presentation of the conclusions

- How to interpret the charts
- How to present the conclusions.

Teacher's notes:

You will be conducting the work safety training for your trip and will teach your students about the technique of collecting water samples from the water. Students sign the work safety rules while riding on the river / lake.

You will provide students with information and support for:

- Sampling water from a water source that passes through the urban area or the surrounding area.
- Water characteristics analysis: colour, transparency, presence of suspensions, temperature, pH
- Identification of possible pollutants that determined variations of the parameters analysed against the normal values.

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13. Task: Effects of Urbanization on Water Resources (Water Conservation Practices)			**Session:** 4 h
COMPETENCES	Learning to learn Mathematical, scientific and technological Sense of initiative and entrepreneurship	**INTELLIGENCES**	Intrapersonal Naturalistic
GOALS	Analysis of effects of anthropogenic impact on the environment		

Task description:

Classroom activity - 1h:

1. Within the team, describe how you use water and make a list that you will share with other colleagues. After that, draw the situations in which you think the water was wasted. You will show your drawings to other colleagues and discuss ways to use water more efficiently. Create a list of methods by which water can be preserved or may not be wasted.

2. Field activity:

(1) During a week, keep a record of the water you use. You can inspire or use the "Water Measurement" model - Annexe 9. Note the number of litres of water used for each activity. Build the water measurement plan with your teammates.

You will follow the table presented by the teacher and you will gather the amount of water used in a given period. You will colour the bottom of the table when you have consumed the amount of water in the columns above. In the case of dishwashing and laundry, you will find the amount of water you have by dividing the number of litres by the number of people.

Classroom activity - 2 h:

3. In a week, present the conclusions of how you used water over a week: effective or not. Tell your colleagues if you waste at least once. Discuss in teams and class.

Discuss the reasons why water should not be wasted.

- In the future, water sources are limited
- people's needs for water use will increase
- the cost of using water should be as low as possible.

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Think of a water conservation plan that contains a set of activities where you can conserve water at school and at home.

Identify 3 to 5 ways to conserve water. Make a poster of the identified methods.

Classroom activity - 1 h:

4. Present to your colleagues if your water conservation practices have led to differences in the amount of water used in the first week. Show the comparison between the amount of water used in the first week and the amount of water used in the second week when you implemented the water conservation plan. Which practice is easier to adapt? And which is more difficult? Want to adopt other methods of water conservation?

Create a poster showing the benefits of water conservation. Posters can include many things people can do to save water.

The posters made will be displayed at the ***Gallery Tour.***

Assessment tools (rubrics…): It will be assessed.

Ask students to:

- Show the methods by which water can be preserved.
- Compare the amount of water used before and after the implementation of the water conservation plan.

(Made in Conclusions)

Ask students to write an article showing why they think it is important to conserve water.

Teacher's notes:

Students will have to describe how they use water. They will describe or draw the situations where they think the water was wasted. They will show their drawings and discuss the methods by which they can use water more efficiently. They will create a list of the methods by which water can be preserved or not wasted.

Students will:

(6) Determine how water conservation practices save life.

(7) Identify the usual water conservation measures that they can change or adopt.

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(8) Recognizes that water conservation is important.

14. Task: I see, I wonder, I ask			**Session:** 1 h
COMPETENCES	Learning to learn Sense of initiative and entrepreneurship Social and civic Communicating in the mother tongue	**INTELLIGENCES**	Interpersonal Intrapersonal Visual-spatial Verbal-linguistic Logical-mathematical
GOALS	Analysis of effects of anthropic impact on the environment		

Task description:

This routine encourages students to make careful observations and thoughtful interpretations. It helps stimulate curiosity and sets the stage for inquiry.

Use this routine when you want students to think carefully about why something looks the way it does or is the way it is. Use the routine at the beginning of a new unit to motivate student interest or try it with an object that connects to a topic during the unit of study. Consider using the routine with an interesting object near the end of a unit to encourage students to further apply their new knowledge and ideas.

Ask students to make an observation about an object - it could be an energy source, image, artifact or topic-and follow up with what they think might be going on or what they think this observation might be. Encourage students to back up their interpretation with reasons. Ask students to think about what this makes them wonder about the object or topic.

The routine works best when a student responds by using the three stems together at the same time, i.e., "I see..., I think..., I wonder...." However, you may find that students begin by using one stem at a time, and that you need to scaffold each response with a follow up question for the next stem.

The routine works well in a group discussion but in some cases you may want to ask students to try the routine individually on paper or in their heads before sharing out as a class. Student responses to the routine can be written down and recorded so that a class chart of observations, interpretations and wonderings are listed for all to see and return to during the course of study.

See annexes 9T-13T and_VT_SeeThinkWonder

The connection between play and lesson:

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Presenting resource conservation methods has become a common practice in schools or other sectors of society. Television and other media often present the practices of water conservation. Students will better understand water conservation practices if they or someone else has experienced or experienced a moment of water crises. By involving students in saving water through its conservation plan, it will increase their experience and help them discover better practices through which they can contribute to water conservation.

Activity:

(1) Ask students to keep a record of the water they use over a week. They can inspire or use the "Water Measurement" model – Annexe 9. During the hour build the water measurement plan together. Ask students to record the number of litres of water used for each activity.

(2) In a week, ask students if they use water efficiently. Were the wastes at least once?

(3) Discuss why water should not be wasted. Students will consider the fact that in the future water sources are limited, people's needs for water use will increase and at the same time the cost of using water should be as low as possible.

(4) Ask students to think of a water conservation plan that includes a set of activities that they can conserve water at school and at home. Their plan can be supplemented with "Primary Measures of Water Conservation ".

(5) Ask students to identify from 3 to 5 methods by which they can conserve water. Ask them to write this and for the next week they will try to apply them. Train them to write down the results in their diary. Remind students that these new methods require time and effort.

Conclusion:

At the end of the week, ask students to see if their water conservation practices have produced differences in the amount of water used in the first week. Ask students to compare the amount of water used in the first week with the amount of water they used in the second week when they implemented the water conservation plan. Which practice is easier to adapt? And which is more difficult? Do they want to adopt other methods of water conservation?

Ask students to create posters showing the benefits of water conservation. Posters can include many things people can do to save water.

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15. Task: Team planning assessment			**Session:** 1 h
COMPETENCES	Social and civic	**INTELLIGENCES**	Interpersonal Intrapersonal
GOALS	Learning to work in teams and control teamwork		

Task description:

You will assess all the objectives established in the 3rd task, individual and team objectives as well as the responsibilities to reflect upon the things you are doing well and the issues that must be improved.

Assessment tools (rubrics …):

3T Team Planning

Teacher's notes:

See annexes: - 3T Team Planning and T1-T3-"Belbin-for-students"

Websites to explore:

http://www.belbin.com/media/1336/belbin-for-students.pdf

16. Task: Work on posters for exhibition			**Session:** 2 h
COMPETENCES	Communicating in the mother tongue Communicating in a foreign language Digital	**INTELLIGENCES**	Interpersonal Visual-spatial Verbal linguistic Logical-mathematical
GOALS	Improve communication skills (oral and writing skills) Learning to edit information in various programs		

Task description:

For this task you must use the computers. You will select the most appropriate application and computer tools in order to write the documents and insert pictures in it.

You will work in teams, you will produce a template for each application and show to the others.

Together you will select the most beautiful and complete template.

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You can use Photoshop, Paint or any editor program.

Your team will be responsible with one part of the poster. After the selection of the template, you will work in team to fill in the content.

You must be careful to use correct words and expressions. You must describe the pictures.

Teacher's notes:

Teacher will supervise the teams working and will give them suggestions to improve their work. The teacher will ensure logistic (computers and software).

17. Task: Learn vocabulary in English			**Session:** 1 h
COMPETENCES	Communicating in the mother tongue Communicating in a foreign language Digital	**INTELLIGENCES**	Verbal linguistic
GOALS	Improve communication skills (oral and writing skills)		

Task description:

You will be handed out a template and in teams, you will write down the names of each source of energy and each kind of waste in your mother tongue. You will do the same with the verbs. Then, all of you will develop a common list that will be translated into English in the English class with the help of the teacher and/or the web, dictionary.

Teacher's notes:

Teacher will supervise the teams working and will give them suggestions to improve their work. The teacher will ensure logistic (computers and software). Teacher must survey the students work and correct them.

18. Task: Translate the posters titles and content into English			**Session:** 1 h
COMPETENCES	Communicating in the mother tongue Communicating in a foreign language Digital	**INTELLIGENCES**	Verbal linguistic
GOALS	Improve communication skills (oral and writing skills)		

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Task description:

After writing the posters in the native language, you will translate them into English in teams. In order to do so, you will make use of the vocabulary list you have been working on beforehand. You can use dictionaries to make the translations. You can divide the contents and each of you will translate a sequence. At the end, you will put together the texts and compiles it.

Assessment tools (rubrics …):

This task will be assessed:

- Each team will assess the posters/part of the posters translated by another team, assisted by an English teacher, who will correct you. You will use the vocabulary list to correct the texts. Finally, the posters will be in a correct form, ready to be exposed.

Teacher's notes:

Teacher will supervise the teams working and will give them suggestions to improve their work. The teacher will ensure logistic (computers and software). Teacher must survey the students work and correct them.

FINAL TASKS

19. Task: Organisation of the exhibition - Tour of the gallery			**Session:** 30 min
COMPETENCES	Learning to learn Sense of initiative and entrepreneurship Social and civic	**INTELLIGENCES**	Interpersonal
GOALS	Learning to work in teams and control teamwork		

Task description:

Once you have finished the posters layout and the pictures to be exposed, you will give to those who are responsible to verify and correct it. If is necessary, you will modify so make sure the layout is well written and structured.

Once the layouts are done, you will revise the posters in order to avoid possible mistakes.

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After that, you must organize the exhibition, talking with institutions representatives and make a placement scheme of the posters and drawings.

Teacher's notes:

Teacher will supervise the teams working and will give them suggestions to improve their work. The teacher will ensure logistic (computers and software). Teacher must survey the students work and correct them.

20. Task: Posters dissemination			**Session:** 3 h
COMPETENCES	Sense of initiative and entrepreneurship Social and civic Communicating in the mother tongue Mathematical, scientific and technological	**INTELLIGENCES**	Interpersonal Verbal-linguistic
GOALS	Improve communication skills (oral and writing skills)		

Task description:

You will need to prepare in class by hand and orally what you will say when you will disseminate the posters. You will also rehearse in class.

You must identify the appropriate places where we could disseminate the posters:

- Places which have helped as with the printing financing
- Local market
- Nearby local markets
- Local shops
- Radio
- Tv
- Schools partners
- Another schools

After identifying the places, you will work in teams to complete the task. All teams need to take part in the activity.

21. Task: Prepare the small piece of theatre	**Session:** 3 h

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COMPETENCES	Communicating in the mother tongue Cultural awareness and expression	**INTELLIGENCES**	Interpersonal Bodily-kinesthetic
GOALS	Learning to work in teams and control teamwork		

Task description:

You can create characters and situations using key words throughout your activity: urbanization, natural ecosystem and urban-industrial ecosystem, pollutants, water, people etc.

Make a short scenario illustrating the need to protect the environment by rational water use, avoiding pollution and using biodiversity conservation methods, and the impact that people have on biodiversity as a result of urbanization.

Interpret the roles created to present the project to all guests through a short play.

22. Task: Final team planning assessment			**Session:** 1 h
COMPETENCES	Social and civic	**INTELLIGENCES**	Interpersonal
GOALS	Learning to work in teams and control teamwork		

Task description:

You will assess the objectives and responsibilities established in the team planning before to reflect upon the things you have done well and the issues that must be improved.

Teacher's notes:

See annexes - 3T Team Planning and T1-T3- "Belbin-for-students"

Websites to explore:

http://www.belbin.com/media/1336/belbin-for-students.pdf

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ANNEXES

9T-13T I SEE- I THINK - I WONDER

9T-13T-VT_SeeThinkWonder – PDF

Annexe 1_Zone Table

Annexe 2_Measurement of air temperature

Annexe 3_Measurement by gradual rainfall of the amount of precipitation water

Annexe_4_water-cycle-nature

Annexe_5, 6, 7,8

Annexe 9_Water measurement

T1-T3-Belbin-for-students

T4-Johari window

T15-brainstorming_10rules

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