



LICEO SCIENTIFICO STATALE

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## DAYLIGHT DISPELS NIGHT

Liceo Sensale

Class 5B

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### Abstract

We are a group of students from Nocera Inferiore, a small city in the south of Italy. It is crossed by the river Solofrana, a tributary of the river Sarno, one of the most polluted rivers in Europe. Our objective is to protect the environment by reducing both pollution and death rate which are major problems in our city.

Our project intends to reduce flood risks by providing some possible solutions to the problems caused by the culverts constructed in some parts of our river and to improve the health conditions of the people who live nearby.

To this purpose Pedaste methodology will be followed to plan the activities to be done. A trip to the city Archive office will be organized in order to read the papers concerning the river culverts which were built some years ago. Data about the changes due to their construction will be collected.

After that those data will be analyzed in order to choose an area where the river “daylighting” can be carried out. The aim is to restore the stream to its natural course and enlarge its bed.

In addition to that, possible changes to the road system will be taken into consideration and changes to the urban plan will be suggested.

Finally, an event, such as a conference will be organized in order to inform the people of the city about this project and attract experts and scientists who are interested in assessing its feasibility and make it relevant.

**Keywords:** Pedaste methodology, floods, pollution, culverts, daylighting, urban plan.

### Introduction

Recent reports from the European Environment Agency about the current state of rivers is quite appalling: in fact, they say only 43% of European rivers are ‘healthy’.

For centuries rivers have been essential to human life. Ancient populations settled by water streams because they provided them with fertile lands and trade opportunities. Unfortunately, the almost sacred bond between rivers and people started to deteriorate once man began to significantly change river courses in order to increase the size of arable land or to employ their water for factories and mills.

Industries have greatly contributed to water pollution, as rivers have been used as landfills where factory waste has been illegally discharged for decades. In fact, this is one of the reasons why the Sarno river has become one of the most polluted in Europe. Sadly, this has considerably affected people's health as there has been a constant increase in the incidence of cancer and mortality rate.

Another major problem which concerns modern cities is river culverting. Rivers were first entombed during the Napoleonic era because they emanated foul smells and caused epidemics,

since they were used as open sewers. Later culverting was used as a way to have more building surface. In our city for example, entombment has allowed the municipality to build new parking places. However, whenever there are heavy rains, which are getting worse and worse because of climate change, there is flooding because culverts do not provide enough space for the rain to flow.

## Goal

The project **Daylight dispels night** aims to uncover a part of the river Alveo Comune Nocerino in order to improve people's quality of life. In fact, it intends to redevelop a historical neighbourhood by creating a cycle path which makes it easier to access the public playground and the open space nearby and by cleaning the river which sometimes has an awful smell.

## Water regulations

The EU water framework directive adopted in 2000 is the most important piece of European regulations concerning river restoration. In order to reduce water pollution, they suggest a different management of river basins to contribute to the redevelopment of European rivers, lakes and streams.

Regarding floods, the key directives focus on the prevention and protection of citizens in accordance with the geographical characteristics of the area.

The Habitats Directive encourages river restoration throughout Europe. Therefore, its purpose is to protect wild plants and animals (Habitats) which differentiate the flora and fauna of European rivers.

## Damages caused by culverting and benefits of river restoration

Culverted rivers are watercourses which have been transformed into underground channels over the decades. In particular, in the years 60s and 90s of the twentieth century rivers were covered to allow the construction of new buildings. In Italy about 12 thousand kilometres of watercourses have been covered so far. In our city some parts of the tributaries of the Sarno river, the Cavaiola and the Solofrana, which form the Alveo Comune Nocerino river, have been culverted, too



Figure 1. the Alveo Comune Nocerino river culverted in Domenico Rea street



Figure 2. the Alveo Comune Nocerino river culverted in Domenico Rea street

## Damages

One should never forget that culverted rivers are alive and that they continue to flow underground in a narrower bed. Consequently, they cannot withstand sudden rainfall and reclaim their true course. This inevitably causes floods and consequent death and devastation.

Unfortunately, flooding and inundations risks affect many Italian cities. Heavy rainfall, which are increasingly more frequent because of climate change, can cause extreme weather events which cannot be adequately coped with particularly when above rivers and streams there are houses, offices, streets. In fact, they may be submerged by water if the space that engineering has allocated underground is no longer enough to let it flow freely. As a result, violent rainfall and

continuous waterproofing of the land have turned our rivers into time bombs. In an interview with a journalist from "La Stampa" Martina Bussetti, a researcher at Ispra said: "Italy can be compared to a patient with serious circulatory problems, to whom a stent has been applied to allow the blood to flow better through narrower arteries. The only thing which can be done is to keep the situation under control".

Despite this, there is an increase in wild overbuilding and land consumption which are the main causes of natural events that often end in tragedy. In 2015-2016 an average of 30 hectares of land were consumed every day. The risk is that floods and inundations, that have hit our country, will probably occur more often and with greater intensity if we do not take care of the health of our planet and learn to respect nature.

## **Benefits**

Our project aims to make people aware of the dangers that threaten rivers and nature. We are well aware that the problem is wide and difficult to tackle but may be a project about the restoration of rivers, or even of a small part of a stream, could start making a difference.

In fact, rivers and lakes of European cities are getting cleaner thanks to improvements in wastewater treatment and restoration projects which have brought many streams and bodies of water back to life. For instance, the report 'Rivers and lakes in European cities: past and future challenges' of the European Environment Agency (EEA) has assessed the strategies and measures taken by the administrations of urban centres to improve the state of local rivers and lakes. It has also suggested that what has been done should be a useful example of how urban planning and design can create socially and environmentally resilient cities.

The EEA points out that rivers and lakes have played a key role in the development of European cities and countries, and highlights that thanks to improvements in wastewater treatment and a reduction of industrial activities over the past three decades, urban rivers and lakes have become again important elements in setting the standards for a better and more sustainable quality of life. They have acquired a more positive image, providing spaces for recreation and offering an aesthetically pleasing environment as part of city regeneration projects. Well-functioning and healthy waterways also mitigate the impacts of climate change in cities, which have been more and more afflicted by very high temperatures.

By uncovering a part of the Alveo Comune Nocerino river our project means to improve the state of our town, in particular of the area that has been chosen, to create a healthier environment and reduce the negative ecological impact of industrial areas, which cause considerable air pollution.

## **A possible solution**

One of the problems concerning Nocera Inferiore is traffic congestion, particularly during rush hours or when it rains. In order to reduce traffic in the 1990s the municipality built a road, via Domenico Rea, which connected the city centre to the highway and the motorway. Unfortunately, this also meant that some parts of the river which flows through the city were covered.



Figure 3. Domenico Rea street

We have designed a proposal to be submitted to the municipality of Nocera Inferiore to change the road system in the area mentioned above by constructing a new road, which will reduce traffic

congestion and improve urban mobility. Moreover, as our project aims to uncover the river and create a recreational area, it will also help better air and life quality in town.

### Step 1

To this purpose we needed the papers of the project concerning the construction of Domenico Rea street and the culverting of the river in that area and to consult the Local Authority Planning Department.

Unfortunately, our work was developed during Covid-19 outbreak. Thus, because of lockdown first and quarantine measures later it was impossible for us as a class to go to the Town Hall archive office. As only one person was allowed to go, our science teacher Mr Gioiella got an appointment and managed to photocopy parts of the original project. Obviously, consultation with the Local Authority Planning Department was not allowed, either.

Photos of the project were sent to us by our teacher and they were studied during online classes.



Figure 4. a part of the original project

### Step 2

After speaking to our Art teacher, a Google –map of the area was downloaded, highlighted, enlarged and modified by a group of students.



Figure 5. the area as it looks now

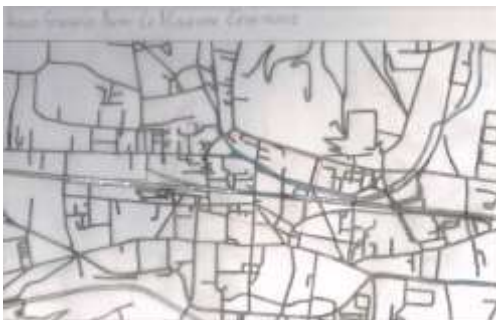


Figure 6. modifications to the street plan

Then, an elevated road which goes from the bridge, which connects via Napoli to via Gabola and the motorway, to the flyover Domenico Mancusi was designed. The new flyover could have four two-way lanes so that traffic on the main road ss18 will be reduced and the car flow across the city improved.

This new flyover is meant to replace the old road and make it possible to uncover the stretch of river inside the red rectangle which can be seen on the map (fig.6)



Figure 7. The area after constructing the new elevated road

### Step 3

As it has already been stated, the new road will allow the Alveo Comune Nocerino to be uncovered. Consequently, Domenico Rea street, on the left side of the stream, will become narrower so it could become a pedestrian walkway flanked by a cycle path leading to the playground area on the right side of this street. In this way there would be a cycle path in the city for the first time, which may encourage people to cycle rather than use their car and thus reduce smog. Furthermore, the playground may be turned into a recreational place for both adults and children.

At the moment the area is a small amusement park for children with a bandstand used for concerts. If the municipality rented a part of the land to citizens willing to do gardening and grow crops, part of the area might be turned into an urban garden where people could spend their free time in contact with nature, relax and help make their city greener, healthier and more beautiful.

### Step 4



Figure 8. The roads which are separated by the river could be connected by a bridge and a small road could be built to allow access to the houses and flats which flank the present road

Volunteers aided by experts could be employed to clean the river from rubbish and waste. Finally, anti-smog trees, like littleleaf linden (*tilia cordata*) and flowers like daisies or verbena, useful to attract butterflies, could be planted, while benches could be placed along the path by the stream for people to sit and enjoy the fresh air in the summer for example.



Figure 9. littleleaf linden



Figure 10. verbena flowers

## Conclusion

Even though it was not possible to perform the activities in the same way we did at school while implementing the learning units created by our teachers, we tried to apply the five phases of Pedaste model: Orientation, Conceptualization, Investigation, Conclusion, Discussion.

We worked on the various stages of the project in small groups. During the investigation phase a few students went to Rea street and took photos. Then, the materials were shared and discussed during remote lessons in the morning and meetings in the afternoon. Some of the tasks were carried out individually first and then online meetings were organized to put things together and set up debate sessions before writing down conclusions.

It was not easy to work from home without having the opportunity to collaborate and share in a real classroom, as we had to discuss ideas and suggestions in a virtual space. Nonetheless, covid-19 emergency measures obliged us to find other ways, tools and strategies to engage in the activities together.

We realize that our project is highly demanding, ambitious and costly, even though costs have not been taken into consideration and it is impossible to say how much money is needed to accomplish what has been planned. We also know that our work is far from being perfect and that experts would certainly suggest changes and improvements. Because of covid-19 measures it was impossible to organize a final event in our school to discuss the feasibility of our proposal with knowledgeable people or raise awareness about such an important issue. However, we hope that other young people will follow and continue working on our idea so that our dream of a better and healthier city, able to see and enjoy its river, will finally come true.

**Il Dirigente Scolastico**

***Elvira D'Ambrosio***

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