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LICEO "N. SENSALE" Nocera Inferiore Italy

Piloting experience

During the month of March the Science teachers of classes 3B (24 students) and 3F (24 students) from Liceo Sensale carried out the activities related to the implementation of the following modules:

- Influence of soil texture and structure
- The symbiosis between the river Sarno and its people
- Ancient artifacts of the Sarno river
- Eutrophication
- River integration to the urban space

The phases of orientation, conceptualization and investigation concerning the modules were carried out in the classroom over the number of hours planned. Then the students went on field trips in order to closely observe the landscape and the water courses. They carried out chemical analyses in the field and measurements of the environmental parameters. They also discussed the characteristics of the places. First field trip

48 students

4 hours

On Friday March 22nd we went on a trip to the area around one of the tributaries of the Sarno, the Solofrana. Its headwater is in Solofra, a small town with leather tanning factories, which in the past were the main source of the pollution of the river Sarno. In fact, until a few years ago in order to avoid paying for having their waste water purified by treatment plants, factory owners had it discharged into the river. This illegally spilled wastewater was rich in hexavalent chromium which went directly into the river. Today this illegal practice is thwarted by the decision to charge for the clean water going into the factories rather than for the wastewater produced.

Nowadays the polluted waters are conveyed to a treatment plant located a few kilometers away in Costa di Mercato San Severino by the means of underground pipes. However, the plant is too small to meet their needs. Consequently, the Solofrana water is clean up to the treatment plant, but after that it becomes brown having received the water flowing through the pipes from Solofra factories which cannot be treated properly. Actually, the colour is not a sign of pollution. In fact, the water is chemically and bacteriologically within the parameters, and the foam which can be seen is due to the substances used in purification, which include caustic soda.



Why then is the Sarno polluted? And why is there open sewage and industrial waste along the river? Why don't the authorities in charge of safeguarding the territory take notice of it and punish those who are responsible for the degradation of this area?

We are told that pollution today is mainly faecal, as highlighted by the high concentrations of E. Coli, due to wastewater coming from all of the towns and villages located along the river, which do not have a sewerage system and which therefore, discharge it into the Sarno and its tributaries. In addition, despite the recent measures aimed at preventing illegal practices, tanning industries are still spilling polluted water into the Solofrana, especially during periods of heavy rainfall. What is more, economic issues make it difficult to meet wastewater treatment standards.

The investigation activity in the field started in Montoro, a town within the Sarno area crossed by streams which later flow downstream into the Sarno. Led by Ms Ida Soriente and by the technician Filippo Alvino, both working at Consorzio di Bonifica of Nocera Inferiore, the students saw some storage tanks managed by the Consorzio, which have been built to prevent the overflowing of this stream in winter. Here the students measured wind, analyzed the Solofrana water, observed the typical vegetation of an area rich in water.





Then we went to Mercato San Severino, where the Solofrana river has been culverted in order to build a road cutting through the town as well as a car park. The students noticed the degradation of the banks and they discussed what may happen in case of abundant rains. In fact, it is well known that this area is at risk of flooding.

Not far from the culverted area, the Solofrana stream receives the Calvagnola, also called Rio Secco. It carries water from the mountains to the north east of the valley, whose name derives from Calvanico, a charming mountain town at the foot of Mount San Michele. The Calvagnola flows through Fisciano, where the University of Salerno is located and then through Mercato San Severino where it flows into the Solofrana. Its bed is dry for most of the year, but when it rains heavily it causes flooding. We followed the course of the Solofrana up to the wastewater treatment plant in Costa in front of San Pasquale's church.





Here the students carried out other water analyses. Later, in the lab the students took other measurements. In addition to the concentration of nitrates, nitrites and phosphates they measured the concentration of dissolved oxygen in various experimental situations. In particular, the measurement of this parameter was carried out in the tanks in which the water had been sampled with spontaneous plants, with and without fertilizers, thus, creating a model that allowed them to study the causes of eutrophication.

A group of students documented all the activities and took photos. All the photos taken were immediately geolocated.

They interviewed two people. One of them, a frequent visitor to the area with the storage tanks, as he goes running there, explained to us that when it rains heavily the tanning factories still illegally spill their discharge into the river, as it is shown by the color, the smell and the appearance of the water after rain. A middle-aged lady who rushed to praise our interest in the river told us she has been a member of several associations for the protection of the Sarno for years, but unfortunately no initiative taken to reduce the degradation of this river has had any positive outcome. She also told us that as a child she used to bathe in these waters which are now brown.





Second field trip

On Friday March 29th we went on the second field trip to the Sarno area. The students were divided into two groups. A group reached the place agreed on in the investigation phase to carry out soil sampling to be studied later in the laboratory. A second group went to the Sarno headwaters: first to Santa Marina, then to Rio Palazzo and finally to Foce. In these places they observed the territory, took water samples and analyzed the dissolved oxygen of the waters, which were then further investigated in the laboratory. The students interviewed uncle Peppe, a farmer whose farm is crossed by the Rio Santa Marina. He is the custodian of the environment and takes care of the place by guiding groups of students to this enchanting stretch of river, a pristine and suggestive glimpse of a complex and diversified reality. After having taken the soil samples the first group went to the water mills located in the area. They took photos and observed interesting architectural details they will later discuss in the classroom while doing other activities. They took notes of the conversations with local people and will later analyze and discuss them.













Then the second group visited the Sarno museum guided by its director Dr. Serena De Caro. Through the exhibits preserved in the museum they retraced the fascinating history of the Sarno valley settlements. The area was sought after by various populations, who settled there from ancient times because of its abundance of water, a navigable river and its soil made extremely fertile by the pyroclastic deposits of the Vesuvius and the Phlegraean Fields. In the classroom the students will work on the notes they took and will expand their knowledge of the history of our territory. In the laboratory the first group of students carried out all of the analyses of the water taken to demonstrate the causes of eutrophication.

