

Final Project Report

Identification, Maintenance and Protection of Ecologically Valuable Stone Quarry Biotopes within the Framework of a Hands-On Project Training

Location:	Nussloch-Leimen stone quarry
Project supervisor:	Dr. Thomas Barth
Personnel:	Director of Studies Lothar Stoll, Tabea Wagner, Monika Schmidt
Classes:	Geography educational stage optional course, science and technology classes 8c, 8b, Biology 9b, 10c, Leibniz Gymnasium, Östringen

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1. Introduction

For several years we have been visiting the stone quarry of HD-Zement, our cooperation partner with the Industry and School Cooperation program (Kooperation Industrie und Schule (KIS)), with our students within the framework of the science and technology lessons. Now in the spring of 2012, we received a flyer from Ms. Michel, introducing an international project. After a brief look, we found that this project - Quarry live award - fits into our school curriculum and the canon projects we are currently implementing in the fields of sustainability, landscape and nature conservation¹. We planned three phases. The preparations taking place during classes at school are not taken into account. For the first phase outside of the school, we planned working visits with the students to the quarry to identify three habitats worthy of protection. In the second phase in May/June, the students were to deal with the implementation of practical maintenance and conservation measures in the identified habitats, and in the third phase, the graphical preparation of information posters. Since we are first and foremost teachers, despite our connection with science, we selected an educational concept that specifically puts the focus on the students' activities. Experiencing, witnessing, touching, grasping, and understanding first hand, on site, where the conflicts arise, where solutions are to be implemented, and not from behind a desk.

2. Educational Concept

Our project is based on the educational concept of hands-on project training, putting the focus on the students' contributions in all of the work steps, from planning over implementation to the recording of the results. Furthermore, through these out-of-school activities, we seek to promote the students' social, professional, methodical and personal skills. This learning intensity is difficult to achieve in the classroom. The students should recognize that people not only destroy nature through their actions, but also can reclaim and preserve this diversity through conscious actions. Thus, there are definitely options for finding constructive solutions to conflicts between re-

¹ Apple project (since 2006), oak forest rejuvenation project (since 2009), amphibian spawning pond (since 1985 with interruptions). More information is available on our homepage: <http://www.leibniz-gymnasium-oestringen.de/>

source exploitation and environmental protection. And not only in textbooks, but outside, in the real world.

3. Brief Description of the Implemented Actions

Due to the adverse weather conditions in this year 2012, and particularly the absence of orchids, we had to slightly modify our project.

3.1. In-Class Preparation

The curriculum of the 8th grade science and technology class at the Leibniz Gymnasium consists of four subject areas, including, among others, the topic of resource exploitation. This facilitates our approach to the project and enables us to explore the material in depth with these students, without neglecting the course of instruction and without having to compromise the implementation of the project. During the science and technology classes, the students were thoroughly prepared for the visit to the stone quarry. This involved the consideration of geological, econo-geographical and ecological aspects on the subject of resource exploitation, and the quarry in particular. Thus, the program included the formation of shell limestone and the sinking of the Upper Rhine Rift, as well as the necessity of producing cement, its production process and aspects of renaturation, recultivation and the classification of habitats, especially of stone quarry biotopes.

Large parts of the class were actively structured by the students themselves, where they independently collected and processed information from the Internet and printed media, and prepared a slide presentation with Powerpoint for their classmates. These presentations had to be structured such that the other students were able to note the most important information in their exercise books². These notes made it possible to recall the information learned within the scope of a regular test and to elaborate on it again.

The other participating classes could not be involved in the project with the same intensity. Thus, the two ninth grade classes dealt with the wild bee hotel, and the optional geography course took on the identification of the flowering plants and the re-

² For example, definitions (renaturation, recultivation), characteristics of invasive plants and vegetation worth protecting, or features of special stone quarry biotopes such as calcareous neglected grasslands.

moval of blackberries and clematis. However, during classes, the geographers in the optional course addressed the topic critically. Conflicting uses between securing the supply of raw material and environmental protection were discussed elaborately and often also controversially, quickly transforming the classroom into a public political debate.

3.2. First Visit to the Stone Quarry on Thursday, 19.04.2012

After an introduction at the cement plant in Leimen with plant manager Dr. Schneider, we visited the stone quarry together with Melanie Meier (geo-ranger), Tina Gölzer (person responsible for the renaturation and recultivation of stone quarries at HDCement), Lothar Stoll, Thomas Barth, and our two student teachers Ms. Tabea Wagner and Ms. Monika Schmidt, and surveyed the potential treatment areas. After assessing the situation, we decided upon two areas, since the third area I had planned to include is located outside of the premises of the quarry. Finally, we set the dates for the field excursions and organised the schedule.

3.3. Second Visit to the Stone Quarry on Wednesday, 09.05.2012

On this day, the science and technology classes 8b and 8c, Lothar Stoll, Thomas Barth, Tina Gölzer and Melanie Meier as well as Tabea Wagner and Monika Schmidt participated in the visit. First, as has been the case the past four years at this time of year, we witnessed a 20,000 t detonation. Then we walked over to the other end of the quarry. On the way over, we saved two yellow-bellied toads and the students gained field experience with renaturated and recultivated quarry areas, learning interesting facts about the native animal and plant species from the experts. Around 11:45, after a few introductory comments, we immediately started to work on our selected habitat. The students removed the invasive species they could recognise, especially Canadian goldenrod (*Solidago canadensis*) and robinia (*Robinia pseudoacacia*). It took two hours to finish this task. Because it had rained the night before and the soil was nice and soft, this morning it was often possible to remove the Canadian goldenrod from the soil with the better part of its underground rhizomes. The smaller robinia were sawed down³, and on the bigger plants, we performed a girdling of the

³ Another cutting was performed after sprouting of the stumps during the fourth visit on 27.06. 2012, and will be continued in 2013 with the new science and technology classes.

bark. Therefore there will be less shoots in the spring of 2013, when they will be cut by the students.

In addition to physical training, the students experienced the necessity of habitat destruction in order to introduce or support a desired rearrangement, and thus protect the habitat of native threatened plant and animal species according to Art. 40⁴ of the Federal Nature Conservation Act against so-called neophytes or invasive species.

The entire excursion was documented by the students in a detailed report, and the results were also included in their end of year report. In most cases, the scope was of at least four pages of text without figures, produced with Word or similar software. This was a considerable achievement, as the texts were all based upon notes and impressions that were collected and recorded in writing by the students during the visit. This means: One hundred percent personal contribution without "*copy and paste*".

3.4. Third Visit to the Stone Quarry on 21.05.2012

The students of the optional geography course, Thomas Barth, Tabea Wagner, Monika Schmidt and Melanie Meier came along on this visit. There were still no orchids to be seen, but despite the lack of these exotic species, we still enjoyed the colourful carpet of many flowering plants, and surveyed the habitat using a measuring tape and compass. Then we got down to work and identified the flowering plants with the aid of a field guide⁵. Here is our list of species, compiled by Vivian Zahs:

Habitat 1 (near stromatolite)

Hedge bedstraw (*Galium mollugo*)

Oregano (*Origanum vulgare*)

Tufted vetch (*Vicia cracca*)

Yarrow (*Achillea millefolium*)

Field clover (*Trifolium campestre*)

Habitat 2 (heavy metals)

Yarrow (*Achillea millefolium*)

⁴ § 40 Non-native, locally absent and invasive species: (1) Suitable measures must be implemented to protect ecosystems, habitats and species against non-native or invasive animal and plant species. (2) Species that are suspected of being invasive must be monitored.

⁵ The field guides used are listed in the references.

Gamander speedwell (*Veronica chamaedrys*)
White mullein (*Verbascum lychnitis*)
Kidney vetch (*Anthyllis vulneraria*)
Cypress spurge (*Euphorbia cyprassias*)
Dog rose (*Rosa canina*)
Hedge bedstraw (*Galium mollugo*)
Broadleaf plantain (*Plantago major*)
Common sorrel (*Rumex acetosa*)
Common cow wheat (*Melampyrum pratense*)
Nottingham catchfly (*Silene nutans*)
Red clover (*Trifolium pratense*)
Bird's-foot trefoil (*Lotus corniculatus*)
Old man's beard (*Clematis vitalba*)
Strawberry (*Fragaria vesca*)
Common dogwood (*Cornus sanguinea*)
St. John's wort (*Hypericum perforatum*)
Yellow woundwort (*Stachys recta*)
Ox-eye daisy (*Leucanthemum vulgare*)

Of course, there were also a number of grasses, but the students were supposed to perform the identification by themselves, so for this reason we excluded vegetation that was difficult to identify.

A comparison with typical plant communities on calcareous low-nutrient meadows⁶ reinforced our intention to provide maintenance. However, by this point we had already given up hope of finding any orchids. We were only able to find several *Epipactis* specimens in the upper area, however they were not flowering and therefore the precise species could not be determined. This was a bit of a shame, because at the beginning of the project, I had assumed that we would find remarkable orchids⁷ at least at one of the sites with a "near-natural calcareous dry grassland" and its shrub succession stage (*Festuco-Brometea*).

⁶ Baden-Württemberg State Institute for the Environment, Surveying and Nature Conservation (2009: 176f)

⁷ *ibidem*

3.5. Visit by Dr. Tränkle at the School and at the Stone Quarry on 27.06.

Our schedule for this day was quite full, both at school and at the quarry. For this reason, the entire familiar team was present. In addition, the students from a ninth and a tenth grade class joined us, under the supervision of Tabea Wagner and Monika Schmidt. These students had prepared information posters on the ecological benefits of wild bees and wild bee hotels during the previous lessons in class. These were presented by groups in front of the other participating students, and evaluated by Ms. Michel and Dr. Tränkle. The two best posters are to be sent to HDCement to create information boards for the quarry.

After this action, we drove to the quarry and immediately started with the activities planned for this day. One group was dedicated to maintenance measures on the area that we had already worked on previously on 09.05.2012. In doing so, the students could clearly see the necessity for repeated, successive maintenance measures. The goldenrods whose rhizomes could not be completely removed during the first visit (despite favourable weather conditions) had already reached a height of approx. 30-40 cm, and there were lots of shoots growing out of the robinia stumps.

A second group dealt with the **burying/drilling** and perforating the two "indestructible wild bee hotels", consisting of oak logs with a length of approx. 1.60 m. When drilling the holes, care was taken that the holes were always drilled at a slightly upwards slant, so that no rain water can get in.

The last group worked on removing the blackberries and clematis, and had the hardest job of all.

After the areas were rid of the undesirable species, we started heading back, already looking forward to our visit next year.

4. References

Aichele, D. (1984): Was blüht denn da? Wildwachsende Blütenpflanzen Mitteleuropas. Kosmos. Stuttgart.

Flitter, R. et al. (2000): Pareys Blumenbuch. Blütenpflanzen Deutschlands und Nordwesteuropas. 3. Auflage. Berlin

Hildebrandt, L.H. (2001): Seltene Pflanzen und Tiere im Bergwerksgebiet. In: Kurpfälzer Winzerfestanzeiger, S. 50 – 54.

Jäger, E.J. Hrsg (2000): Rothmaler 3. Exkursionsflora von Deutschland. Gefäßpflanzen: Atlasband. 11. Auflage. Heidelberg.

Kretzschmar, H. (2008): Die Orchideen Deutschlands und angrenzender Länder. Finden und bestimmen. Freiburg.

Landesanstalt für Umwelt, Messungen und Naturschutz Baden-Württemberg - (2009): Arten, Biotope, Landschaften. Karlsruhe. 312 S.

www.lfu.bayern.de/umweltwissen/doc/uw_41_neophyten_neulinge_pflanzenwelt.pdf

www.lfu.bayern.de/umweltwissen/doc/uw_42_neophyten_pflanzenportraits.pdf