

## GOAL Educational Resource

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<b>TITLE OF THE CASE</b>	Water: a geoethical perspective on one of humanities most valuable resource
<b>SHORT CASE DESCRIPTION</b>	The water supply for the Austrian capital Vienna is used as case-study and starting point to discuss geoethical implications on several aspects involved with the use of the renewable resource water. Geoethical conflicts and dilemmas are addressed that arise from the utilization pressure on the resources water and land use.
<b>KEYWORDS</b>	Water supply, geoethical aspects, holistic thinking, water management, natural resources
<b>PRIOR KNOWLEDGE</b>	Water management, water supply, basics of sanitary engineering
<b>AIM</b>	Promotion of geoethic values and principles related to the human interaction with the water cycle through the reflection about water as a mayor resource of life.
<b>OBJECTIVES</b>	<ul style="list-style-type: none"> <li>• To analyse geoethical issues and dilemmas connected with water supply on two different spatial scales (local and global).</li> <li>• To understand the need to preserve natural systems and its dynamics when designing interventions on the environment.</li> <li>• To defend the involvement of all stakeholders in the decision making process.</li> <li>• To contrast the objectives of different sectors with interest in water use.</li> <li>• To support Geoethical values to preserve a functional environment as the fundamental basis for renewable resources as drinking water.</li> <li>• To value public awareness of geoscientific work.</li> </ul>
<b>CASE</b>	<p>A group of students goes on a field trip along the two water mains of the Vienna Water Works in Austria. At their first stop at the museum in Kaiserbrunn the students learn about the history of the Vienna water mains:</p> <p><i>The provision of spring water for Austria's capital dates back to imperial times. Vienna's First Spring Water Main was established in 1873 initialised by the emperor of Austria Franz Joseph I., who gave the first spring "Kaiserbrunn" as a present to the city of Vienna to bring a long lasting solution to the cities ongoing problems with drinking water quality that resulted in disease and epidemics. The Second Spring Water Main was opened in 1910. Since that time the whole population of Vienna (about 1.8 Mio) is supplied with spring water of excellent quality. The Water runs into the city only by the force of gravity and by implementation of drinking water hydropower plants it additionally produces green electronic energy in a quantity equivalent to supply a city of about 50.000 inhabitants.</i></p>



Figure 1: The “Kaiserbrunn”-Spring given to the people of Vienna by the emperor Kaiser Franz Joseph I.

The guide in the museum, who is also an employee of Vienna Water Works, explains some challenges that he and his colleagues are facing at their daily work.

- 1) For the biggest share, Vienna Water Works is in possession of the land in the catchment area of the springs. Three typical land uses are conducted in this area. Forestry is the historic economic backbone of the region. Therefore the employees of Vienna Water Works nowadays are also concerned with forestry to establish and maintain the land cover as a filter and important barrier against contamination. The forestry strategy follows the target of maximising the protective nature of the land cover for the water.
- 2) The catchment area is also subject to tourism since it's a popular hiking area. Consequently the Vienna Water Works established a comprehensive strategy to deal with wastewater of mountain huts in the catchment area to minimise the risk of pollution from this source.
- 3) Mountain pasture is an old tradition in the region and the rights to conduct it are culturally important. Since the underground residence time of water in the karstic limestone vary strongly between the scales of days up to years, the excrements from the livestock of mountain pasture as well as from the wild animals in the forests pose a risk of pollution to the drinking water in the springs under certain meteorological and hydrological conditions. This risk is addressed on two levels. First, particularly vulnerable areas like dolinas are protected via low earth walls that keep surface runoff from entering and by fences that keep out wild animals. Secondly water quality is monitored constantly at each spring separately, so in case of a contamination they can be redirected to the river.

The second site visited by the students is the “Kläfferquelle”. The biggest spring in the eastern alps and also a geopark site where visitors can learn about the history of the capturing of the spring and also see

the impressive tunnel and the surface openings of the spring where about 1.000 l/s of water exit the Hochschab-Massif.

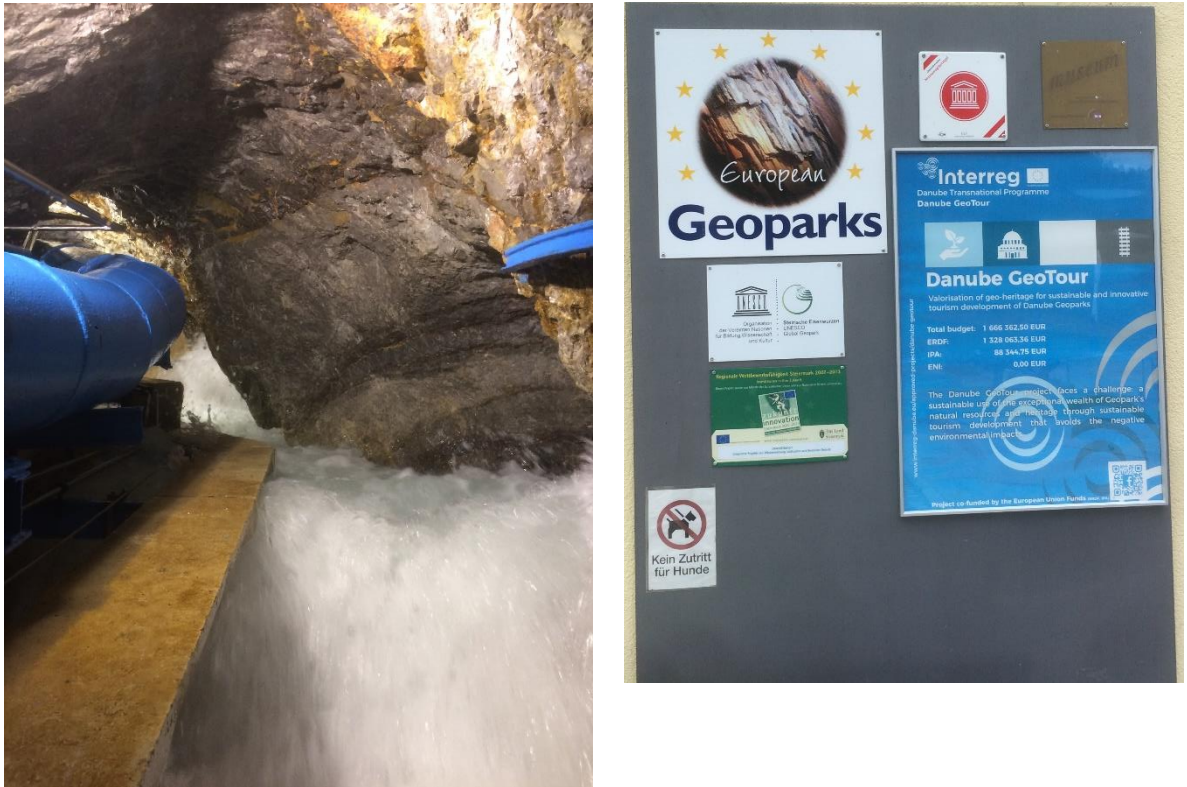


Figure 2: The “Kläfferquelle” at Wildalpen. View of the spring in the mountain (left). Sign for geopark at the entrance (right)

On the way back to Vienna, one of the students shares a link to an online video that gives an overview on the global water consumption and the concept of water food print with his/her colleges.

In the evening a lively discussion about the management of the catchment area by the Vienna Water Works in comparison to water supply facilities in other places started during dinner: Within the group the relevant questions arised.

## QUESTIONS

1. Which geoethical issues and dilemmas arise from different interests in land use in this (and other) catchment area(s) of springs?
2. What would happen if the land would not be in possession of the Vienna Water Works and the landowner would decide to change the forestry strategy? (for example, towards maximisation for wood production or implementing agriculture)
3. How geoethical values can be met by the operation and management of the catchment area of the springs?
4. Which geoethical values are met by the Water Footprint Network?
5. Which SDGs (Sustainable Development Goals) have a strong impact on water supply management and may also pose a (partly) conflict of interests to SDG-6 (Ensure availability and sustainable management of water and sanitation for all)?
6. Which geoethical issues and dilemmas are related with the achievement of the different SDGs and their linkage?



7. How can Earth Scientists be involved in the process of achieving the SDGs related to water management?
8. Explain how geoethical values support geoscientists in their role in the process of achieving the SDGs.

## PROCEDURE

**Split students in random small groups of 4 or 5 and ask them to follow the bellow procedures:**

1. As an introduction to the water supply of Vienna, watch the video "Viennas Water short" (<https://www.wien.gv.at/video/403/Viennas-Water-short>) and the Interview with Lukas Plan (Geologist at Dep. of Geology and Paleontology, Natural History Museum Vienna, Austria) "GOAL: KLÄFFERQUELLE - SOME FACTS ABOUT THE BIG KARSTIC SPRING" (<https://youtu.be/qFwfniq5J78>).
2. Answer questions 1 and 2 after watching the video pill "GOAL: Geoethics issues and geoethical dilemmas" at <https://www.youtube.com/watch?v=1KBFAqMMnpo>

further reading for more detail:

"Marone, & Peppoloni (2017)" <https://www.annalsofgeophysics.eu/index.php/annals/article/view/7445>

**Plenary session were the answers of all groups are collected and discussed.**

3. Answer individually question 3) after reading the article "Peppoloni, & Di Capua (2016)" (<https://goal-erasmus.eu/wp-content/uploads/2019/02/GEOETHICS-ETHICAL-SOCIAL-AND-CULTURAL-VALUES-IN-GEOSCIENCES-RESEARCH-AND-PRACTICE.pdf>);

further reading for more detail:

"Bobrowsky et al (2017)" [https://goal-erasmus.eu/wp-content/uploads/2018/10/Emerging\\_Field\\_Geoethics.pdf](https://goal-erasmus.eu/wp-content/uploads/2018/10/Emerging_Field_Geoethics.pdf).

4. Watch the the video "Where is water?" (<http://thewaterrooms.org/where-is-water/>) and check the hompage of the Water Footprint Network (<https://waterfootprint.org/en/>):
  - Each student estimates her/his actual and virtual water consumption of the day seperatly (starting from breakfast, showering, consumption of goods, etc.) by writing down her/his consumption and water uses.
  - Answer question 4 in the groups already established.

**Collect and discuss the answers to questions 4 in a plenary session.**

5. Read the Agenda 2030 for Sustainable Development (<https://www.un.org/sustainabledevelopment/development-agenda/>):
  - Each group should deal with at least 3 Goals. Each of the 17 Goals should be covered by at least one group. The groups work on answering questions 5 and 6. Futher reading could be UN-Water-Development-Reports ( [https://www.unwater.org/publication\\_categories/world-water-development-report/](https://www.unwater.org/publication_categories/world-water-development-report/)).

**Plenary session where the answers of all groups are collected and discussed.**

6. Go back into the groups and answer questions 7 and 8.  
**Plenary session where the answers of all groups are collected and discussed potentiating the appropriation of new geoethical values and principles towards a Sustainable Development.**

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