

# MYSTERY – ECOLOGY

<b>Title:</b>	<b>Lapwing in a vegetable field</b>					
<b>Topic:</b>	Biodiversity and ecology under the influence of humans					
<b>Age:</b>	10 – 13					
<b>Country of 1<sup>st</sup> Implementation</b>	Bavaria, Germany					
<b>Type of school:</b>	Secondary school, 6th grade					
<b>Teaching time:</b>	90 min					
<b>Working method:</b>	Mystery Method (Inquiry based)					
<b>Methods:</b>	Group work, student-centred, discussion in plenum					
<b>Teaching aids:</b>	Information Cards (padlet)					
<b>School / Informal:</b>	School					
<b>Co-operation:</b>	<input checked="" type="checkbox"/>	Class	<input type="checkbox"/>	Cross-class		
	<input type="checkbox"/>	School	<input type="checkbox"/>	Inter-school		
	<input type="checkbox"/>	Museum	<input type="checkbox"/>	Extracurricular	<input type="checkbox"/>	Learning centre

## SHORT DESCRIPTION OF THE LESSON: "WHY ARE THE LAPWINGS DISAPPEARING?"

*6<sup>th</sup> grade secondary school: Mystery "Why are the lapwings disappearing?"*

Sixth-year students are introduced to an intriguing "mystery game," a research-based learning activity designed for small groups of 2-4 participants. The game begins with a compelling research question that challenges students to explore the reasons behind the decline in the lapwing population, covering biological, ecological, sociological, and economic factors.

To aid in their investigation, students are provided with information cards. These cards offer crucial insights into the lapwing's situation without directly giving away the answer, encouraging students to think critically and piece together the information themselves. To cater to diverse reading preferences and enhance comprehension, the cards are deliberately brief and supplemented with graphics, maps, and images.

During a plenary session, each group shares their proposed solutions, sparking a collaborative discussion on the most persuasive findings and the evidence supporting them. The teacher plays a key role in guiding this discussion, ensuring that it remains focused and productive, and leading students towards the correct conclusion if necessary.

## PROJECT DESCRIPTION

The project employs process-oriented skills and open teaching methods to cultivate abilities essential for a sustainable society, including knowledge acquisition, collaboration, and critical thinking. It defines sustainable citizenship as the commitment to social and environmental responsibility, highlighting the importance of education, ethical consumption, and civic participation. The method of research-discovery teaching is employed to enhance self-efficacy and environmental awareness, aiming to foster a conservationist attitude among students. This approach also facilitates an understanding of complex interrelationships, enabling students to develop sustainable thinking and behaviours.

A sixth-year secondary school program on 'Ecology under the influence of humans' focuses on the lapwing to illustrate human impacts on nature. It adopts a research-based learning strategy, encouraging self-directed, independent study, and cooperative learning alongside plenary discussions. This approach fosters a student-centred learning environment, catering to diverse abilities and promoting individual skill development. Teachers, acting as tutors, offer personalised support to bridge learning gaps and nurture each student's talents and interests, enhancing motivation for self-led learning.

The choice of the lapwing, critically endangered in Bavaria due to habitat changes, highlights urgent environmental issues, making the learning experience relevant and engaging.

## TAILORING EDUCATIONAL CONTENT

Tailoring educational content to reflect local ecosystems significantly enhances the relevance and impact of environmental studies for students. This localized approach not only connects students more deeply with their immediate environment but also highlights the broader issue of habitat loss across different regions:

- In France, the **grey partridge** (*Perdix perdix*) faces declining populations due to habitat loss from agricultural intensification and monoculture practices.
- Ireland's **moor ptarmigan** (*Lagopus lagopus scotica*) is under threat from the destruction and drainage of wetlands, coupled with the transformation of moorlands into agricultural lands.
- In Portugal, the survival of the **marsh warbler** (*Acrocephalus paludicola*) is at risk due to the drainage of wetlands for agriculture and alterations to river courses.
- The **little ringed plover** (*Charadrius dubius*) in Greece, experiences similar threats from the destruction of riverbanks and wetlands, exacerbated by dam construction and intensive agricultural activities.

## WORKING METHODS AND COMPETENCE EXPECTATIONS

according to Bavarian Curriculum Plus

### WORKING METHODS

#### **Learning area 1:** Process-related competencies

- 1.1 Gaining knowledge
- 1.2 Communicate
- 1.3 Evaluate

#### **Learning area 4:** an ecosystem close to home

### EXPECTED COMPETENCIES

The students ...

- describe long-term and seasonal changes in an ecosystem in order to assess the changed living conditions of the biotic community.
- describe the ecosystem as the interaction of habitat and biocoenoses and thus recognise that multi-layered networked abiotic factors form the basis of life for the biocoenosis.
- create descriptions on the basis of exemplary [...] animal observations. In this way, they characterise adaptations and at the same time show how living organisms are associated in an ecosystem.
- describe adaptations of insects to life in the ecosystem, their development and, if applicable, their behaviour. In this way, they gain an insight into the beauty and diversity of this group of animals, reduce reservations and instead develop a protective attitude towards them.
- develop predator-prey relationships. In this way, they develop an idea of the close interrelationships within a biocoenosis and the position of humans as part of ecosystems.
- establish connections between human intervention in nature and the resulting changes in abiotic factors for an ecosystem close to their home. They develop or implement protective measures from the associated effects on the biocoenosis and reflect on their own behaviour.

### CONTENTS OF THE COMPETENCES:

- Overview of the habitat: description of the location and surroundings of the habitat; differentiation: Wilderness versus cultivated landscape; history and future of the ecosystem
- Biotic and abiotic environmental factors: Biotope: abiotic factors at a glance, interaction, seasonal changes where applicable; biocenosis: characteristic animal and plant species, adaptations, ecological niche, indicator organisms;

## DESCRIPTION OF THE MYSTERY METHOD

The MYSTERY method (Leat, 1998) is an innovative pedagogical approach that aims to promote learning through curiosity, enquiry, and discovery. Students can use it to develop critical thinking, problem-solving skills, and teamwork in a variety of educational contexts.

The MYSTERY method provides a dynamic and interactive framework for learning that encourages students to actively explore, question and discover. By promoting critical thinking, problem solving and teamwork, this method prepares students to tackle complex problems in an ever-changing world.

By investigating "mysteries" - carefully constructed scenarios or problems that need to be solved - students learn along the way. This method is based on the idea that students can achieve deeper understanding and lasting learning by actively engaging with a topic that sparks their curiosity and makes them think.

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### HOW DOES A MYSTERY WORK?

1. **choosing a mystery:** The teacher chooses or creates a mystery, i.e. a question that is relevant, challenging and stimulating for the students. A mystery could be an unsolved problem, an interesting phenomenon or a provocative question that allows for different perspectives and solutions.
2. **confrontation with the mystery:** through a story, a picture, a video or a combination of materials that represent the scenario.
3. **investigation and discussion:** information is collected in groups, hypotheses are made, evidence is analysed and discussed. The teacher acts as a facilitator, guiding the process as much as possible but not giving direct answers.
4. **solving the mystery:** Students present their conclusions or solutions to the mystery, supported by the evidence they have collected and their reasoning. Incorrect solutions could also emerge, which are then checked together for accuracy.

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### MATERIALS:

- a. Interesting and challenging **mysteries** that are adapted to the curriculum and students' interests.
- b. Materials and **resources** to support students in their investigation (e.g. prepared information cards, link collections, padlet).
- c. **Time** for investigation, presentation of results and discussion: depending on complexity, approx. 1 hour for investigation and 30 minutes for discussion.

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### STUDENTS COMPETENCIES

- **Critical thinking** and **problem-solving skills:** Critically evaluate information, think logically and find creative solutions to problems.
- **Teamwork:** Collaboration and communication within the group.
- **Self-directed learning:** Students take **responsibility** for their own learning process.
- **Engagement** and **motivation:** Students' curiosity and interest are aroused by the mystery and challenge of the mystery.

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## TEACHER'S COMPETENCIES

- **Creativity and questioning** to find a mystery: Teachers need to be able to develop or select relevant and engaging mysteries.
- **Facilitation** skills as a tutor: Teachers should be able to effectively guide the learning process without giving direct answers, encourage critical thinking and discussion, and be open to the possibility of "wrong solutions".
- **Flexibility and open-mind**: Teachers must be prepared to allow students to take control of their own learning process and adapt the lesson to suit their needs and interests.
- **Observation skills**: Self-study periods give teachers the rare opportunity to observe students as they work and interact socially so that they can offer individualised support or additional challenges as needed, both in this unit and in later lessons.