Lesson Plan

Target Audience

Vet Trainers

Goal (50-60 words)

The goal of this Learning Plan is to introduce the topic of environmental impact of the production of paper and to educate trainees about paper waste. It also aims to present to the trainees the global problem of paper overconsumption. It will facilitate conducting a lesson on environmental risks from paper waste.

Objectives (1-3 Objectives)

Upon completing this lesson plan, the trainees will be able to:

- Understand current practices and technologies for paper production and give examples of the environmental risks from paper production
- Describe the environmental risk effects from paper waste on biodiversity, water use, energy use and climate change

Optional
Theoretical Background (200-400 words)

An alarming fact is that more than **300 000 000 tons** of paper have been produced in the world by September 2024**.**

We know that paper production causes deforestation, uses enormous amounts of energy and water, and contributes to air pollution and waste problems. 1

Indeed, the sector has a significant impact on the environment, and the industrial process to produce paper from virgin fibres, which are mostly sourced from trees, is one of the biggest producers of both air and water pollution.

It is a fact that pulp and paper mills contribute to air, water and land pollution and discarded paper and paperboard make up roughly 26% of solid municipal waste in landfill sites (Wikipedia)

- No doubt **deforestation** is one of the main environmental problems we're facing in these times. It concerns thousands of plant and animal species. **42%** of all global wood harvest is used **to make paper**. And despite those facts still **93%** of paper comes **from trees**. It is estimated that about 17 trees are needed to produce one tonne of white paper.

- Moreover, the voluminous amount of paper waste that ends up in landfills presents a two-fold challenge: it occupies **valuable land** and, as it decomposes, produces methane, a potent **greenhouse gas.** Paper production accounts for **12% of global greenhouse gas emissions** from the industrial sector

- The pulp and paper industry is the 4th largest industrial **consumer of energy** in the world. Paper production is the third-largest user of fossil fuels worldwide. The pulp and paper industry **uses more water** to produce a ton of product than any other industry

- Primary concerns include the use of chlorine-based bleaches and resultant toxic emissions to air, water, and soil. With global annual growth forecast at 2.5%, the industry, and its negative impacts, could double by 2025. (Reach for Unbleached Foundation)

- Another way that paper waste **damages the environment is through the inks** and other chemicals used in its production. These toxic substances are released into the environment and eventually, through soil, water and air, have an impact on human health.

- White paper can take up to five years to decompose in nature. In turn, as this waste accumulates, it can cause **degradation of the soil and habitats**. The disappearance of forests also has serious consequences on biodiversity because their ecosystems are home to a wide range of species of flora and fauna.

Considering all facts we can conclude that reducing paper waste is of vital importance for the planet

and it should become a major priority for all of us who use paper for a wide number of purposes every day.

Lesson Plan Details	
Lesson Plan title	Lesson Plan 1: Paper production and its environmental impact
21st Century Skills	Choose the skills that will be developed in the lesson: ● Collaboration ● Communication ● Researching ● Identifying important data ● Critical Thinking ● Problem-solving ● Decision making
Duration	Total duration: 130 minutes. Activity 1: Introduction to the environmental risks from paper production and paper waste and work with scenario "The Paper Mill Challenge"- 35 minutes Activity 2: Biodiversity Investigation (incl. outdoor activity) – 55 min Activity 3: "Paper, without trees, really?" aimed at exploring and presenting sustainable alternatives to traditional paper - 40 min
Classroom setting	● In groups – for activity 1, 2 and 3
Required material/resources	Activity 1: ● Case scenario handout ● Whiteboard and markers ● Computers/tablets (for online implementation) ● Internet connection Activity 2: ● Notebooks and pencils for notetaking ● Phones or camera for taking photos

	● Field guides for identifying trees and wildlife (optional) Activity 3: ● Computers/tablets (for online implementation) ● Internet connection
Prerequisites	● General knowledge about the environmental risks of today's economy, knowledge about the use of paper in everyday life in business and at home. ● Awareness about the crucial role of trees for the living beings, the air, the animals' habitats in forests and the risks of deforestation.
Final Assessment	*Quiz* What is one of the environmental impacts of the paper industry? a) Expansion of natural habitats b) Deforestation **(correct)** c) Increase in marine biodiversity d) Reduction in greenhouse gas emissions Which factor is a consequence of the paper industry's water usage? a) Increase in water availability b) Reduction in soil erosion c) Enhanced aquatic ecosystems d) Water pollution **(correct)** How much paper does the world produce each year? a) 1 tonne/year b) 20 tonnes/year c) 406 mln tonnes/year **(correct)** d) 0,5 tonnes/year Most paper is made from? a) animal fibres b) wood cellulose **(correct)** c) straw d) rags
Additional resources	Paper Waste Facts (theworldcounts.com) The Paper Recycling Process https://www.youtube.com/watch?v=jAqVxsEgWIM (1.44 min)

	Paper Waste Management: Key Considerations for Businesses https://wastecontrolinc.com/2024/02/28/paper-waste-management/
References	● Faidon Papadimoulis and Jack Lynch, Pulp & paper (IEA 2023) https://www.iea.org/energy-system/industry/paper ● Global paper consumption 2021-2032 | Statista https://sustainablebrands.com/read/corporate-member-update/paper-recycling-as-a-means-of-protecting-world-forests ● Paper Waste: Why It Matters & How to Reduce It (December 2023) https://www.reelpaper.com/blogs/reel-talk/paper-waste-why-it-matters-how-to-reduce-it

Lesson Plan for Activities & Scenarios #1 (include 1-3 activities & 1-2 scenarios)

Activity 1 - Scenario "The Paper Mill challenge"

This activity consists of four steps.

Step 1: After introducing the environmental risks from paper production and paper waste, present the following mini scenario to your trainees (10 min):

In a small town surrounded by lush forests, a paper mill has been operating for decades. The mill produces a significant amount of paper, which is in high demand. However, the production process has led to deforestation, habitat destruction, and pollution of nearby water sources. As a result, local wildlife, including several endangered species, is struggling to survive. The community is now faced with a challenge: how to balance the need for paper production with the preservation of biodiversity.

Challenge:
You are the manager of the paper mill, and the community expects from you to propose solutions for mitigation of the negative impact of paper production on local biodiversity. You must consider the

ecological, economic, and social implications of your choice.

Step 2: *Choices (10 min):*

1. I will increase recycling efforts. I will focus on increasing the recycling of paper products. Together with the Mayor of the town we will launch a campaign to encourage the community to recycle more and invest in technology to process recycled paper.

2. I will try to decrease the production capacity. I choose to reduce the production capacity slightly to meet the concerns of the community, already cutting down less trees and reducing water consumption.

3. I will implement sustainable forestry practices. The paper mill will collaborate with environmental organisations to adopt sustainable forestry practices. This includes replanting trees, maintaining biodiversity in forest management, and ensuring that logging does not exceed growth rates.

Step 3: Feedback (10 min):

1. Feedback 1: Increase recycling efforts
While increasing recycling efforts is a positive step, it may not fully address the root cause of biodiversity loss. Recycling can reduce the demand for new paper, but it does not eliminate the environmental impact of the production process itself. It's a good interim solution, but it should be part of a broader strategy that includes sustainable practices.

2. Feedback 2: Decrease production capacity
Decreasing production without considering long-term environmental impacts will lead again to further habitat destruction and pollution. It may provide short-term economic benefits, but the long-term consequences for local wildlife and the ecosystem could be severe. This approach is not sustainable in time.

3. Feedback 3: Implement sustainable forestry practices
This is an excellent choice! By implementing sustainable practices, the paper mill can continue to operate while ensuring that the forest ecosystem remains healthy. This approach not only protects biodiversity but also enhances the mill's reputation and can attract environmentally conscious consumers.

Step 4: Conclusion (5 min):

Trainees should discuss the implications of each choice and consider how their decisions can impact both the economy and the environment. The VET trainer can guide the discussion towards understanding the importance of sustainable practices in preserving biodiversity while meeting human needs.

Activity 2 – Biodiversity Investigation

This activity aims to engage students in understanding the impact of paper production and understand the importance of trees for biodiversity. It consists of five steps.

Step 1 Introduction and preparation (10 min)

- Briefly discuss the concept of biodiversity and the importance of trees in ecosystems.
- Explain the activity's objectives and safety guidelines for outdoor exploration.

Step 2: Outdoor Exploration and observation (20 min)

- Take students to the school yard or a nearby park.
- Divide the trainees into two groups.
- Instruct each group to observe different types of trees and their surroundings. Encourage them to take notes on the various tree species they encounter and any visible signs of wildlife (e.g., nests, holes, or cocoons).
- Students should also observe and note any birds they see or hear in the vicinity.

Step 3: Discussion on Biodiversity (10 min)

- Go back to the classroom and have each group present their findings to the class.
- Discuss the types of insects and birds they discovered and their roles in the ecosystem. Highlight the importance of trees in providing habitat, food, and shelter for various species, emphasizing how this contributes to overall biodiversity.

Step 4: Connection to paper production and conclusion (15 min)

- Discuss the relationship between trees, forests, and paper production.
- Elaborate on how trees are harvested for paper and the importance of sustainable practices to protect biodiversity.
- Encourage students to think critically about the balance between resource use and conservation, and brainstorm ways to promote sustainability in their communities.

Activity 3 - Paper, without trees, really?

(Alternative solutions that do not harm the environment)

This activity consists of three steps.

Step 1: Introduction and preparation (5 min)

- Based on the previous findings about the negative environmental impact of paper production, discuss the importance of finding sustainable alternatives to traditional paper.

Step 2: Research phase (20 min)

- Divide participants into small groups.
- Assign each group a specific type of alternative paper to research (e.g., paper made from bamboo, hemp, recycled materials, agricultural waste, stone paper etc.).
- Provide guidelines on what information to gather: environmental benefits, potential uses and good practice examples (example: Lindt's packaging using green grass paper).

Step 3: Group Discussion (15 minutes)

- Have each group share their findings with the rest of the participants via a short PPT presentation (max 8 slides).
- Encourage questions and discussions about the pros and cons of each alternative.