

Individual Portfolio in Sustainable Development

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2024 - 2025

OVERVIEW LEARNING GOALS AND ACTIVITIES

Learning goal 1

Learning goals 1: Analyze the ecological and social impacts of climate change and land use changes on Arctic ecosystems. Focus on the northward expansion of species (borealization), the warming of permafrost and the melting of sea ice. Explore how these ecological changes affect indigenous Arctic communities, such as the Sámi and Inuit, and how Arctic policies are shaped to include and address their interests.

Motivation:

Nowhere on Earth are the effects of climate change and biodiversity loss from land use changes more pronounced than in the Arctic, where temperatures are rising nearly four times faster than the global average. The northward shift of vegetation zones, along with the melting of sea ice and permafrost, is dramatically altering the structure and functioning of these already fragile ecosystems.

These processes have not only ecological consequences but also profound impacts on Indigenous communities, whose traditional knowledge and land-use practices are deeply connected with the Arctic ecosystems. These communities are now facing enormous disruptions to their way of life and their cultural heritage. It is therefore crucial to reframe Arctic policies by including indigenous people, their knowledge, rights and their adaptation needs.

I am interested in the ecosystems of the Arctic, especially after going on an expedition to Svalbard and spending multiple months in northern Scandinavia. I would love to gain a deeper understanding of these habitats, as I find them fascinating and might pursue future projects in the region. That is why I am eager to explore how ecological shifts are impacting the Arctic's biodiversity and ecosystem dynamics. As an ecologist working on projects in the Arctic, it is crucial to also include the local communities, who have often been excluded from international policies in the past, despite being severely affected by climate change.

Learning goal 2

Learning goal 2:

Evaluate the ecological role and social impact of the return of the grey wolf (*Canus lupus*) in Flanders (Belgium) by analyzing its contribution to ecosystem restoration and the challenges it poses to local livestock farmers.

Motivation:

Large predators are critical for maintaining balance within ecosystems and enhancing biodiversity. However, human impacts such as habitat loss and overhunting have led to the reduction and, in some cases, the disappearance of these predators, resulting in distorted ecosystem dynamics. This is particularly relevant in regions like Belgium where historical predator populations have been diminished. The return of the grey wolf to Flanders is an important event for biodiversity and ecosystem restoration. As an apex predator, the wolf plays a vital role in the maintenance of healthy wildlife populations and the promotion of trophic regulation. However, the return of the wolf also creates new tensions between wildlife and local people, particularly livestock-holding farmers. These tensions show the complex intersection between conservation goals and rural livelihoods. By participating in two field days with the Wolf Fencing Team Belgium, I was able to gain insight into the practical and emotional responses to wolf presence in northern Belgium. This learning goal aims to understand apex predator return not only as an ecological issue but also as a social complex situation. Therefore, I am convinced that as a future sustainable development practitioner, it is essential to explore how biodiversity can coincide with social complexities.

Learning goal 1 - Learning activity 1

Learning activity 1: Webinars (ARCUS & EU-PolarNet) of the ecological changes in the Arctic due to climate change and a webinar (United Nations UAE) of the social impact of climate change on Arctic indigenous communities.

Date/time/place:

- ARCUS: Gerald "JJ" Frost: The "Greening" of the Arctic - <https://www.arcus.org/research-seminar-series/2020-05>
- EU PolarNet: Permafrost Research: current activity and future needs <https://eu-polarnet.eu/eu-polarnet-2-webinar-permafrost-research-current-activity-and-future-needs/>
- United Nations UAE: Climate change and the Arctic - <https://unitedarabemirates.un.org/en/232075-climate-change-and-arctic>

Nature of involvement: observer

Motivation:

Through this webinar, I aim to better understand the challenges currently facing Arctic ecosystems and the indigenous peoples living there. The main ecological areas of focus are Arctic greening, permafrost thaw, and sea ice melting. I hope to gain a better insight of how these processes are interconnected and how they affect local people communities in the Arctic. In the webinars, climate scientists, environmental lawyers, policy makers, anthropologists and members from Indigenous communities contribute and elaborate on the topic, providing a holistic understanding of the complex relationships in the Arctic.

Collaboration with other students to organize the learning activity: no

Title product:

The scientific poster provides an overview of three significant ecological consequences of climate change in the Arctic, along with their social impacts on indigenous Arctic communities, specifically the Inuit and Sámi people. For each process a map has been created to visualize where these changes occur within the Arctic, as well as the areas inhabited by the Inuit and Sámi to clearly show how these changes affect their living environments.

The first map illustrates changes in Arctic Sea ice extent during September 2024, compared to the median Arctic Sea ice extent from 1981 to 2010, using data from the National Snow and Ice Data Center (NSIDC). The second map visualizes the northward shift of dense vegetation, such as (boreal) trees and larger shrubs, a phenomenon known as 'Arctic greening', due to rising temperatures, which alters the tundra biome. This map was created using NDVI data from the MODIS satellite, provided by NASA's Earth Observing System Data and Information System (EOSDIS) was used. The third map depicts changes in permafrost extent in the Arctic from 2000 to 2020, showing percentage of area covered by permafrost. Data from Centre for Environmental Data Analysis (CEDA) was used. The areas inhabited by Sámi and Inuit Indigenous communities are highlighted on the maps to illustrate how they are geographically directly affected by these ecological changes. The scientific poster also shows the social issues faced by these communities, complemented with qualitative quotes from community members gathered during the webinars. Finally, some policy recommendations are provided on how to move forward.

This product can be valuable for environmental organizations, policymakers, researchers and NGOs focused on the consequences of climate change in the Arctic, as well as Arctic policy development.

Did you publish this product? not yet

Collaboration with other students in the development of the product: no

Learning goal 1 - Learning activity 2

Learning activity 2: Online courses by the University of Alberta (Canada): 1) Introduction to the Arctic: Climate, 2) Arctic Peoples and Cultures

Date/time/place:

Date of completion: 03/01/2025: Introduction to the Arctic: Climate -

<https://www.coursera.org/learn/arctic-introduction-climate>

Date of completion: 04/01/2025: Arctic Peoples and Cultures -

<https://www.coursera.org/learn/arctic-peoples-and-cultures>

Nature of involvement: student (course participant)

Motivation (including link with learning objectives): The online courses, *Introduction to the Arctic* and *Arctic Peoples and Cultures*, provided by the University of Alberta (Canada), in collaboration with the University of Tromsø and the University of the Arctic, have allowed me to deepen my understanding of the complex interplay between ecological and social dimensions of climate change in the Arctic.

The content of these courses offers a multidisciplinary perspective which is essential for understanding how ecosystem dynamics are evolving and intersecting with the rights, traditions and adaptation needs of Arctic indigenous peoples. These courses have further strengthened my motivation to integrate indigenous knowledge and perspectives into policy frameworks as these people, who have lived in the most northern and remote ecosystems for centuries, hold valuable insights that are critical for addressing the challenges posed by climate change in the Arctic.

Collaboration with other students to organize the learning activity: no

Title product:

For my second product, I have chosen to create a physical game named *Adventure to the Arctic Iceberg*, designed for children aged 8-12. With this game, I hope to raise awareness about the rapid ecological and social changes occurring in the Arctic due to climate change. My primary motivation for creating this game is the recognition that many children, especially in more temperate regions, like Belgium, may not be fully aware of the rapid environmental transformations happening in the Arctic. The game aims to highlight the concept of global interconnectedness of climate issues by emphasizing how actions in different regions (e.g. temperate regions) such as increasing greenhouse gas emissions can have far-reaching consequences on Arctic ecosystems.

Through this game, children can learn how environmental and social factors are related to each other and how this requires collective international action. The game aligns with my first learning goal: "Analyze the ecological and social impacts of climate change and land use changes on Arctic ecosystem and how Arctic policies are shaped to include indigenous Arctic communities." I chose a physical game because it allows for interactive learning which, I believe, is an effective way to engage young children in complex topics. By raising awareness at young age, I hope to provide children with a basic understanding of the Arctic's vulnerability and the urgent need to protect its ecosystems.

The game (incl. manual) will be developed both in English and Dutch and can be valuable for teachers, environmental organizations and NGOs aiming to involve children in the urgent matter of Arctic conservation and protection. As an example of how the game can be used, I plan to introduce it to an elementary school near Leuven, particularly in Haacht. One of the teachers will use it during a World Orientation class (literally translated from the Dutch subject "Wereldoriëntatie", (WO)) which is a common subject taught in elementary schools in Belgium. During this class, the game I developed will serve as an educational tool to raise awareness about the ecological and social changes in Arctic regions.

Did you publish this product? The boardgame was shared with an elementary school near Leuven (Haacht) for educational purposes.

Collaboration with other students in the development of the product: no

Learning goal 2 - Learning activities 1 & 2

Learning activity: Field participation with the Wolf Fencing Team Belgium to assist the installation of wolf-proof fences to protect livestock from wolf attacks in risk zones. This activity took place over two separate full days at different locations and is therefore counted as two learning activities.

Date/time/place:

- 10/04/2025, 09:30-17:30, Heistraat 29, 2990 Wuustwezel
- 22/04/2025, 09:30-17:00, Spreeuwstraat 6, 2920, Kalmthout

Nature of involvement: Active volunteer participant in all stages of the fence construction. Tasks included the placing and tensioning electric wires, boring in insulators, installing concrete profiles to prevent digging and helping to connect and test power source.

Motivation:

Participating in two field days with the Wolf Fencing Team Belgium has allowed me to engage directly with the practical challenges that arise when apex predators like the grey wolf return to human-dominated landscapes, such as Flanders. This experience contributes to my learning goal by offering a better understanding of how farmers respond to wolf presence and how the coexistence is supported through concrete measures like fencing.

Beyond the technical work, the activities have also helped me better understand the social tensions linked to conservation efforts, particularly the concerns of local livestock holders in risk zones. Being able to see how policy, field support and local livelihoods come together gave me a more detailed view of what coexistence looks like in practice.

These activities showed that it is important to look beyond the mere ecological importance of bringing back an important ecosystem species and also focus on the social impact this has to rural livelihoods and thus consider both approaches in sustainable development practices.

Collaboration with other students to organize the learning activity: no

Title product:

For my product, I created a short documentary and trailer on wolf-proof fencing and local farmers' perspectives in response to the return of the grey wolf in Flanders, Belgium.

The short documentary highlights the ecological importance of the wolf's return but focuses in particular on the social implications, especially for livestock holders in officially designated wolf risk zones. It is based on footage collected during two fieldwork days with the Wolf Fencing Team Belgium, where volunteers and farmers collaborated to install wolf-proof fencing as a measure against livestock attacks by the wolf. The short movie includes footage of the key construction tasks, interviews with affected farmers, and maps showing the locations of our activities in relation to government-defined wolf risk zones.

In addition to the short movie, I created a separate trailer to highlight the activities of the Wolf Fencing Team Belgium. This video shows footage of the fieldwork and landscapes, without the interviews, and aims to focus on the Wolf Fencing Team Belgium's actions.

These products aim to support my learning goal of evaluating the ecological and social impact of the grey wolf's return in Flanders and shows the intersection between ecological importance and rural livelihoods. It may be of interest to conservation NGOs, environmental policymakers, students and researchers in sustainability and particularly in human-wildlife conflict, but also to citizens seeking to better understand this socio-ecological issue.

Did you publish this product? Yes, the trailer was published on the Wolf Fencing Team Belgium-Vlaanderen Facebook page: <https://www.facebook.com/reel/9558017907650700>

Collaboration with other students in the development of the product: José Antonio Borbolla joined me on my second fieldwork day to assist with filming and drone footage of the activity.

PROCESSES AND PRODUCTS

Process portfolio of learning activity 1

For this learning activity I reviewed three webinars on socio-ecological changes in the Arctic: The United Nations UAE's session related to COP28, ARCUS's "The 'Greening' of the Arctic," and the EU PolarNet's "Permafrost Research: Current Activity and Future Needs." I actively listened to these webinars by synthesizing and taking notes focusing on key points raised by the experts and indigenous speakers aiming to better understand the consequences of climate change in the Arctic. In the ARCUS webinar, I engaged with the technical discussion on Arctic greening, particularly the high variability in greening across regions. This webinar I intentionally selected as a general understanding of NDVI data was required before starting the processing and analysis of the MODIS NDVI data by NASA Earth Observing System and Information System. In contrast, the United Nations webinar pushed me to focus on social consequences, while the EU PolarNet session deepened my understanding of permafrost thaw, a topic that I had minimal prior knowledge of. While primarily being an observer, I engaged actively by formulating questions and insights that were relevant for the development of my scientific poster. For instance, I noted recurring themes such as the urgent need for localized policy approaches and connected this with the ecological changing patterns of borealisation and its impact on indigenous communities. This activity aligns with my first learning goal as multiple experts in the field shared their knowledge on processes such as Arctic greening, permafrost thawing and sea ice melting together with its social consequences for indigenous Arctic communities. Consequently, these webinars advanced my knowledge in multiple ways.

During the webinar on Arctic greening by Gerald Frost I learned more about the challenges and possibilities of using technologies such as remote sensing to analyze environmental changes in the Arctic. I also came to understand that Arctic greening is not just a monotonous event but shows significant variation across different areas of the Arctic with certain hotspots of greening, such as in Alaska, while in contrast, some areas of browning, such as in the Canadian Arctic. During his talk he mentioned several social impacts related to Arctic greening such as the loss of traditional lifestyles for Inuit and Sámi communities that rely on tundra ecosystems for herding and hunting. However, I learned from the webinar that we need to adopt a nuanced perspective, as the consequences of this phenomenon are not simply black and white. As such, the expansion of shrub species can enhance food security for moose, but we must be cautious when looking at the implications on the entire ecosystem.

The United Nations UAE's webinar related to COP28 provided me a more detailed understanding of how climate change in general affects people living in the Arctic. Issues such as cascading effects from increased sunlight intensity and ocean acidification were discussed as well as the consequences of melting of sea ice in the Arctic. A particularly interesting part of this webinar was the talk by the Sámi representative of Norway. She emphasized the importance of reindeer to the Sámi culture and their economic activities, as changing vegetation and plant community pose significant risks to their health and survival. She also discussed the necessary actions to address climate change and the social debate about who is largely responsible for climate change and who bears the burden.

In the webinar EU PolarNet's "Permafrost Research: Current Activity and Future Needs", I gained a better understanding of the importance of permafrost in the Northern hemisphere, a topic I previously knew little about. I learned how vital permafrost is for the working of our global ecosystem and the abrupt changes that can result from its thawing. I also became more aware of the social consequences and hazards associated with thawing permafrost, which was an aspect that I had not fully considered before.

Something that I found particularly interesting after listening the webinars and developing my learning product was the use of remote sensing technologies such as satellites to assess environmental changes in the Arctic. This is a skill I want to further improve, as I hope to work with spatial data from remote sensing in my future career. The webinars also helped me to understand the limitations of these methods and search for alternative ways to monitor and assess changes in the Arctic region. However, they did not provide me insights in how to analyze satellite data, such as NDVI and permafrost models. As a result, I had to search for additional information on how process and analyze these types of data. My prior knowledge of data analysis helped me work with the data, but through this process, I gained a better understanding of how to use this data. I believe this skill will help me to work with similar types of data in the future.

After the webinar I realized how important it is to recognize that most local communities where not the main contributors to climate change but are disproportionately affected by it, especially in the Arctic which is one the fastest changing regions due to climate change. Therefore, it is particularly important to engage with indigenous peoples such as Inuit and Sámi and include them in internation climate policies which is a crucial aspect that has not been emphasized enough to date. Despite the talk by the Sámi representative of Norway, I felt the absence of perspectives from other indigenous representatives. With over 4 million people inhabiting the Arctic and six Indigenous Peoples' Organizations, a boarder range of voices would have enriched the discussion (Arctic Council, 2024). To include a broader perspective on the impacts experienced by indigenous peoples in the Arctic, I searched additional sources in the literature, which I referenced in my scientific poster. I also missed the voices of young people in the webinars. As they represent the future, their role in the changing Arctic is crucial. This is an aspect I hope to explore further through my second learning activity.

The Changing Arctic: Climate Impacts and Indigenous Communities

Examining the Socio-Ecological Impacts of Greening, Permafrost Thaw, and Sea Ice Loss

Climate change in the Arctic

Nowhere on Earth are the effects of climate change and biodiversity loss from land use changes more pronounced than in the Arctic, where temperatures are rising nearly four times faster than the global average (Hirawake et al., 2021; Rantanen et al., 2022). The northward shift of vegetation zones, along with the melting of sea ice and permafrost, is dramatically altering the structure and functioning of these already fragile ecosystems (Dörr et al., 2024; Jin et al., 2021; Orlov & Volvenko, 2024). These processes have not only ecological consequences but also profound impacts on Indigenous communities, whose traditional knowledge and land-use practices are deeply connected with the Arctic ecosystems (Stephen, 2018).



Indigenous Peoples' organizations (Arctic Council, 2024)

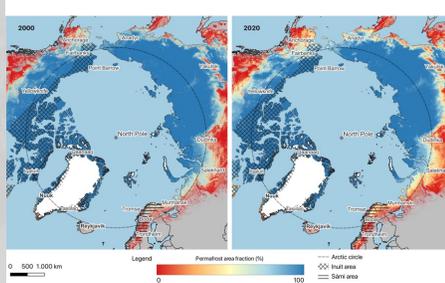
Ecological changes in the Arctic as a consequence of climate change

Mapping Arctic greening using NDVI data – July 2024



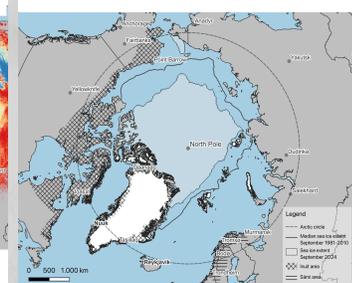
Source: MODIS NDVI, NASA Earth Observing System Data and Information System (EOSDIS)

Arctic Permafrost Extent : Area Fraction by Percentage



Source: Centre for Environmental Data Analysis (CEDA)

Changes in Arctic Sea Ice Extent



Source: National Snow and Ice Data Center (NSIDC)

Impact on Sámi and Inuit communities

- ❖ Cultural sites at risk due to landscape changes
- ❖ Vegetation changes disrupt traditional ecological knowledge
- ❖ Shrub expansion shifts wildlife dynamics, affecting hunting resources
- ❖ Changing vegetation alters access to traditional plant foods (Frost, 2020; Husson et al., 2024)

- ❖ Infrastructure damage threatens community safety and cultural heritage
- ❖ Reduced water quality, impacting ecosystem health
- ❖ Health risks increase due to exposure to contaminants
- ❖ Mobility and supply routes are disrupted, affecting local economies (EU-PolarNet, 2023)

- ❖ Loss of hunting grounds endangers food security and culture
- ❖ More maritime traffic disrupts hunting and habitats
- ❖ Coastal erosion and extreme weather damage infrastructure and harvests
- ❖ Precipitation changes threaten Sami herding by limiting reindeer grazing (Cosiern, 2024; United Nations, 2023)

The Sámi and Inuit communities in the Arctic face severe impacts from ecological changes driven by climate change. Consequently, it is crucial to prioritize their inclusion in climate policies and decision-making. Their traditional knowledge and livelihoods are essential for understanding the unique challenges posed by climate change in the Arctic and must be actively engaged in shaping effective responses to these rapid changes (Kerkelä, 2022; United Nations, 2023; EU-PolarNet, 2023).



Image created by Gemini AI, OpenAI (2024)

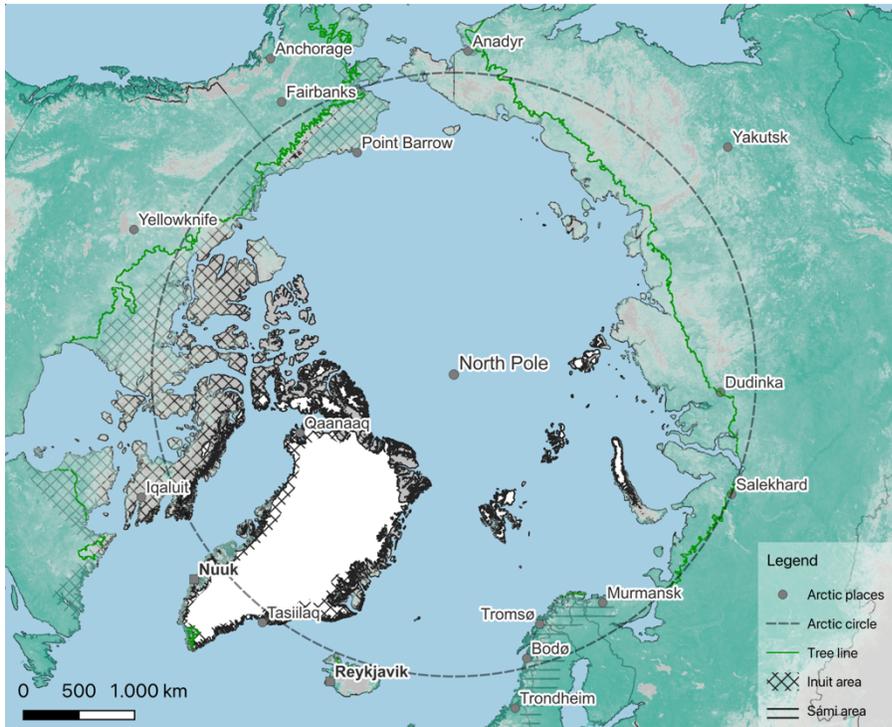


References

Individual maps

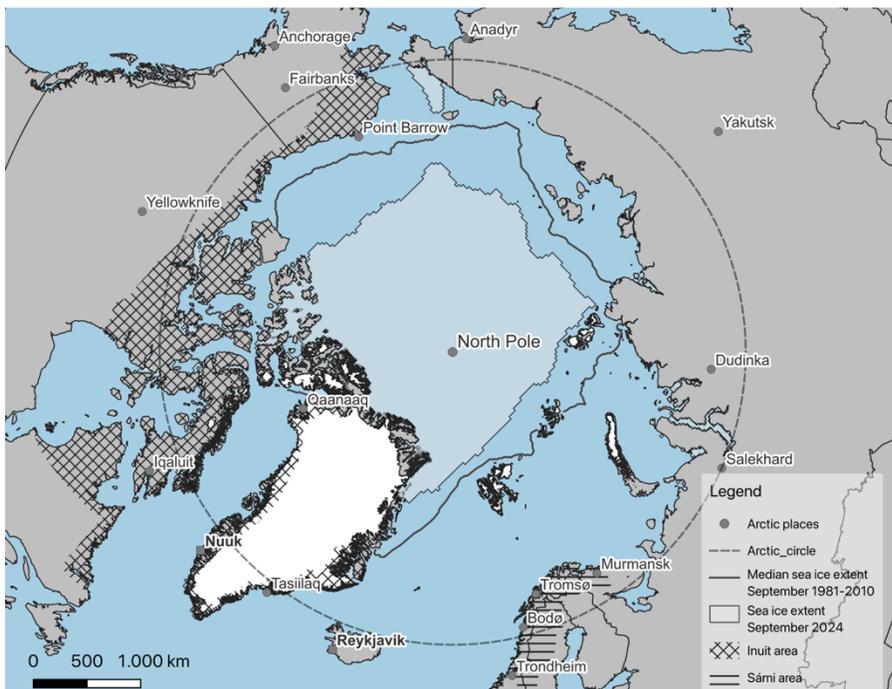
Mapping Arctic greening using NDVI data - July 2024

Source: MODIS NDVI, NASA Earth Observing System Data and Information System (EOSDIS)



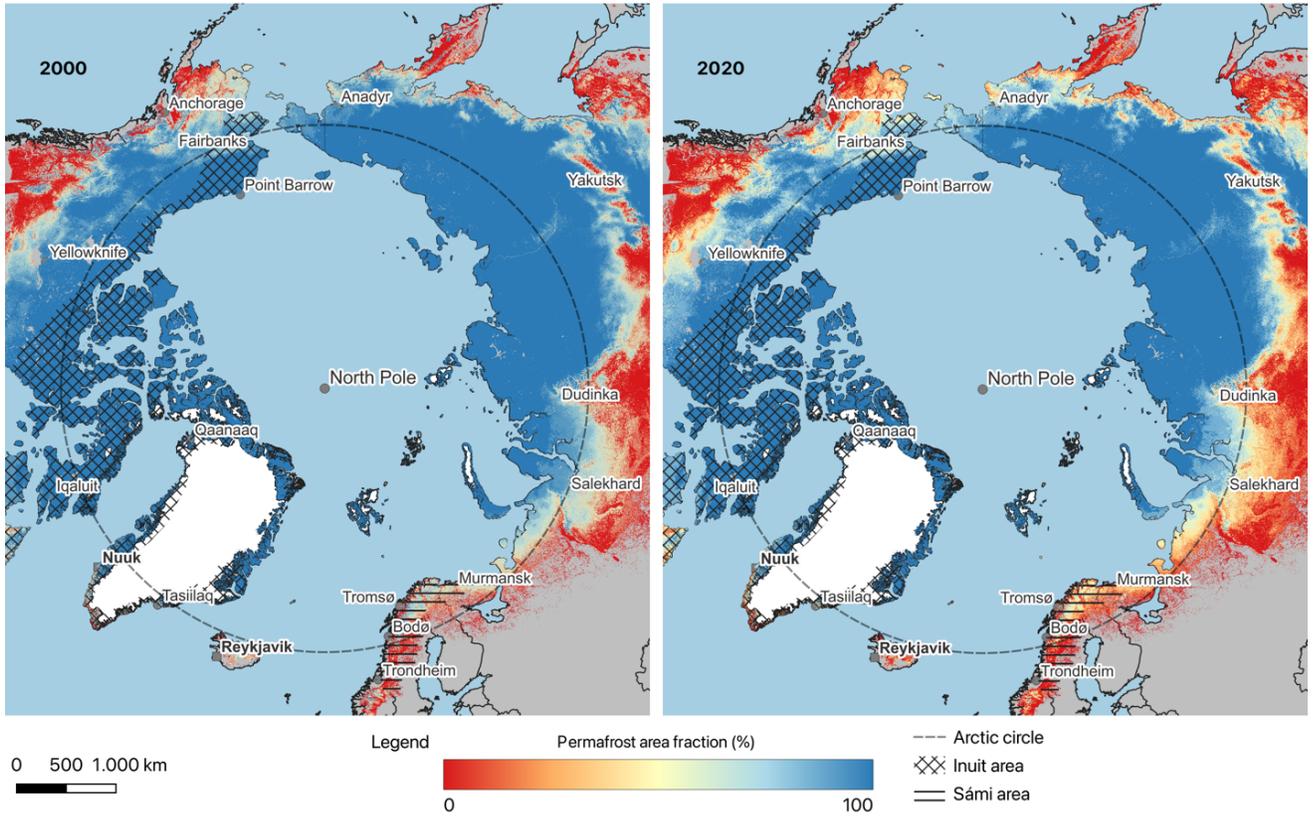
Changes in Arctic sea ice extent

Source: National Snow and Ice Data Center (NSIDC)



Permafrost Extent in the Arctic: Area Fraction by Percentage

Source: Centre for Environmental Data Analysis (CEDA)



Process portfolio of learning activity 2

For this learning activity, I participated two online courses that were provided by the University of Alberta (Canada) in collaboration with the University of Tromsø and the University of the Arctic. The course *Introduction to the Arctic: Climate* provides insights into the regional geography of the Arctic, as well as the cryosphere and atmosphere of the region. It explores the interaction of the Arctic ecosystem with the rest of the world, highlighting the implications of climate change on this fragile environment and illustrating the rapid pace of transformation in the region. This course addresses key ecological impacts of climate change, including permafrost thawing, melting of the sea ice and their connections to the atmosphere and oceanic processes. The course *Arctic Peoples and Cultures* focusses the lives of people living in the Arctic, examining how they live and adapt to life in these remote ecosystems. It also explores how climate change affects their daily lives and local traditions, while emphasizing the importance and the need to include indigenous Arctic peoples in policymaking frameworks. This course thus provides a focus on the social dimension of my first learning goal. While both courses provided valuable insights to understand Arctic dynamics, I chose to focus primarily on the course *Arctic Peoples and Cultures* for this learning activity because for my first learning activity I largely concentrated on the ecological dimension.

The course provided a clear starting point by discussing the history of indigenous Arctic communities, their cultural discrimination and efforts to erase their languages and traditions. Various powerful points were raised by indigenous speakers highlighting that for these cultures to survive, they must adapt to the interests of young people to remain relevant in the future.

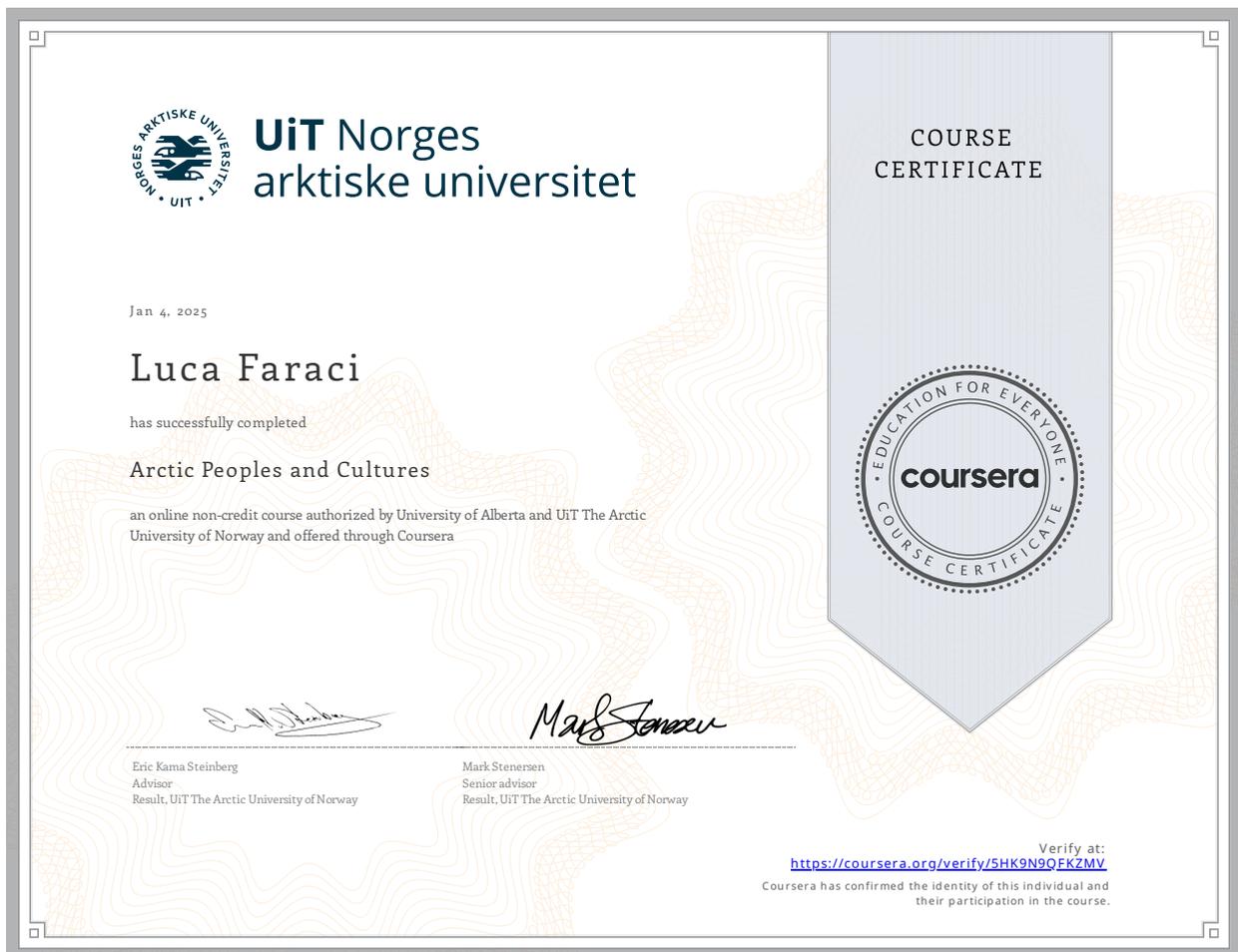
Another key discussion revolved around the challenges indigenous communities are facing due to climate change. These include sea ice decline, changes in fish migration, and the growing presence of large international companies in the Arctic. I learned that it is important to not only look at what kind of development is desired but also how this might clash with traditional lifestyles. The extraction of oil in the Arctic, for example, threatens the core of many communities that rely on fishing. Pollution further complicated this, as it not only harms the environment but also people and animals that depend on it. In Greenland, Arctic Canada and the Faroe Islands, pollution has become a serious issue altering how people relate to species that were once central to their cultural identity and traditional food practices.

However, while at the international level, many solutions have been implemented to address these challenges, they often overlook indigenous knowledge. The course touched upon this issue by a discussion about the role of climate change and globalisation within the Arctic. As globalisation increases, misunderstandings occur when traditional knowledge systems clash with modern science practices which potentially results in the imposition of external values on indigenous cultures. This shows the broader tension between traditional ways of life and modern regulations that often fail to recognize the knowledge that local people in the Arctic hold. Another discussion which aligns with this, that I found particularly, interesting is the value of Indigenous knowledge versus science-based knowledge. While science-based knowledge is often based on quantitative data that focuses on isolating variables to answer specific questions, Indigenous knowledge is often qualitative and embraces complexity and multiple variables to understand the environment. However, this difference creates challenges when trying to combine the two knowledge systems. Despite these challenges, there is a growing recognition of the need for equitable partnerships between scientists and indigenous communities which requires open communication and mutual respect. While complexities of integrating traditional knowledge into scientific research in the

Arctic are significant, the co-production of knowledge can lead to more effective and inclusive solutions to Arctic issues.

My personal key takeaway from the course *Arctic Peoples and Cultures* is the importance of trust and time in building these partnerships. However, this process may take time and overcoming the challenges will require a shift in both the scientific community and policymakers approaches to include indigenous knowledge and giving a greater recognition to Arctic communities in building a strong partnership.

To demonstrate my engagement with this course, I decided to complete its requirements and earn a certificate of completion (see below). I believe this certificate holds significant value as it aligns with my intention to potentially work on projects in contexts similar to the Arctic. Therefore, it could be an additional advantage to show on my CV that I hold a certificate which incorporates a social dimension from a northern university. As I aim to work as an ecologist, it is important to highlight my knowledge of the challenges indigenous people face, who are most affected by ecological changes. Being aware of this interplay and the importance of the people living in the Arctic adds depth to my expertise.



I provided the game manual in both English and Dutch. Below, I have included some pictures of the creation process and the final product. I plan to introduce it to an elementary school near Leuven (Haacht).

GAME MANUAL - *Adventure to the Arctic Iceberg*

Goal of the Game

Journey through the Arctic, answer questions, and overcome obstacles to reach the top of the Arctic iceberg first. Along the way, players will learn about Arctic ecosystems, climate change, solutions, and Indigenous cultures and peoples.

Materials Needed

1. **Game Board:** Showing a path to the top of the iceberg.
 2. **Question Cards:** Divided into four categories:
 - Arctic Animals
 - Climate Change
 - Indigenous Peoples
 - Solutions
 3. **Obstacle Cards:** With challenges or penalties.
 4. **Game Pieces:** One per player or team.
 5. **Die:** To determine movement.
 6. **Game Manager:** A person (for example, the teacher) who will ask the questions and manage the flow of the game
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Setup

1. Place the game board on the table and sort the question cards by category. Shuffle the question and obstacle cards, then place the pile for each category on the marked square (on the game board) that matches the category's color.
 2. Each player chooses a game piece and places it at the starting point (space 1).
 3. Decide who goes first by rolling the die; the highest roll starts.
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Rules of Play

1. **Taking Turns:**
 - Roll the die and move your piece forward the number of spaces.
 - If you land on a "Question" space, draw a question card from the matching category and answer it.
 - **Correct Answer:** Stay on the space.
 - **Incorrect Answer:** Move back 1 space.
 - If you land on an "Obstacle" space (dark grey), draw an obstacle card and complete the challenge.
 2. **Obstacles:**
 - If you fail the challenge, follow the penalty (e.g., skip a turn or move back spaces).
 3. **Winning:**

The first player to reach the top of the iceberg wins the game.
-

SPELHANDLEIDING – *Avontuur naar de Arctische ijskap*

Doel van het spel

Reis door het Arctische gebied, beantwoord vragen, en overwin obstakels om als eerste de top van de ijsberg te bereiken. Onderweg leer je meer over het Arctische ecosysteem, klimaatverandering, oplossingen, en de cultuur van inheemse culturen en volkeren.

Benodigdheden

1. **Spelbord:** Met een route naar de top van de ijsberg.
 2. **Vragenkaarten:** Onderverdeeld in vier categorieën:
 - Arctische dieren
 - Klimaatverandering
 - Inheemse volkeren
 - Oplossingen
 3. **Obstakelkaarten:** Met uitdagingen of straffen.
 4. **Pionnen:** Eén per speler of team.
 5. **Dobbelsteen:** Om stappen vooruit te bepalen.
 6. **Spelbegeleider:** Een persoon (bijvoorbeeld de meester) die de vragen stelt en het spel beheert.
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Spelvoorbereiding

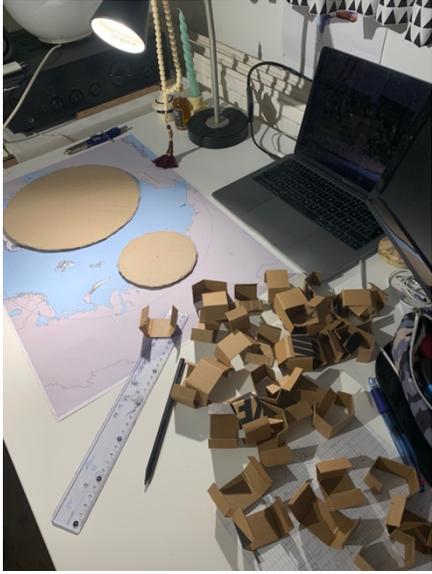
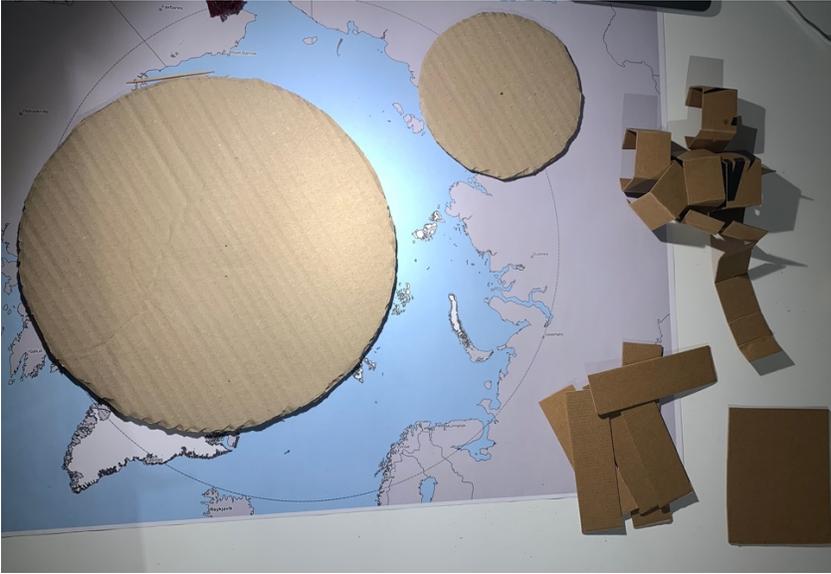
1. Leg het spelbord op tafel en sorteer de vraagkaarten op categorie. Schud de vraag- en obstakelkaarten en leg de stapel voor elke categorie op het gemarkeerde vak (op het spelbord) dat overeenkomt met de kleur van de categorie.
 2. Kies een pion en plaats deze op start (vakje 1).
 3. Bepaal wie begint door te dobbelen; de hoogste worp mag starten.
-

Spelregels

1. **Beurten nemen:**
 - Gooi de dobbelsteen en beweeg je pion het aantal ogen vooruit.
 - Als je op een "Vraag"-vakje landt, trek je een vraagkaart van de overeenkomstige categorie en beantwoord je de vraag.
 - **Juist antwoord:** Blijf staan.
 - **Fout antwoord:** Ga 1 vakje terug.
 - Als je op een "Obstakel"-vakje (donkergrijs) landt, trek je een obstakelkaart en voer je de uitdaging uit.
 2. **Obstakels:**
 - Als je de uitdaging niet kunt voltooien, volg je de straf (bijv. sla een beurt over of ga terug).
 3. **Winnaar:**

De speler die als eerste de top van de ijsberg bereikt, wint het spel.
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CREATION PROCESS - *Adventure to the Arctic Iceberg*



FINAL PRODUCT - Adventure to the Arctic Iceberg



Process portfolio of learning activities 1 & 2 (goal 2)

As someone with a background in ecology, I mostly viewed the return of apex predators like the grey wolf just as a positive sign for biodiversity. However, this activity showed me that the social side of conservation also plays an important role, especially when these species return to areas with a high population density.

During the two days of fieldwork with the Wolf Fencing Team Belgium, I helped install wolf-proof fencing on two farms in the Noorderkempen region, which is an area that is now recognized as a wolf risk zone. Compared to other areas like Limburg, where wolves have returned to larger and more connected natural areas such as Bosland, Pijnven, and the military domains near Hechtel-Eksel (in total between 20,000 and 40,000 ha), the situation in the Noorderkempen is different, as the forested areas are much smaller and more fragmented. This area is largely agricultural with relatively small forest patches such as Groot Schietveld (1,570 ha), Marum (315 ha) and Uilenbos (8 ha) (Lokaal bestuur Wuustwezel, 2025; Nationaal Park Bosland, n.d.). The female wolf Emma, who is currently the only confirmed wolf in the Noorderkempen region, occupies this fragmented landscape, which lacks scale and prey abundance, especially compared to Limburg. In this environment, the chances of livestock predation have increased, especially when fencing is absent or inadequate. While wolves generally prey on wild animals such as deer, wild boar and hares, in this context, unprotected livestock becomes easy target (ANB, 2025).

During the fieldwork, I realized how important it is that the return of the wolf goes hand-in-hand with both habitat readiness and community support. I also became more aware of how much effort is needed to build proper fencing, and how challenging the situation is for local farmers. During the interviews with the affected farmers, I noticed the emotional impact of losing animals and that talking about this issue was delicate. It was important to approach the conversation carefully and avoid coming across as a 'pro-wolf' which was important to build trust. It was also interesting to learn more about how the Flemish government supports farmers through partial subsidies for wolf-proof fencing in designated wolf risk zones. The existence of a Wolf Plan shows the government's attempt to balance biodiversity conservation with practical support for farmers and rural communities. However, I believe these policies will only be effective if trust and communication exist on both sides.

I am convinced that this activity helped me develop technical skills, such as placing a wolf-proof fence, but also improved my communication and teamwork skills. Most of all, I learned to look at conservation issues from different perspectives. It helped me better understand the intersection of the ecological importance of the return of the grey wolf while at the same time also realizing the social complexities it brings for the local people. In general, this experience showed me that it is crucial to not only protect ecosystems but also to create space and connect habitats, together with providing practical solutions for the local people that live there. I appreciate the opportunity to join the Belgian Wolf Fencing Team and would like to thank them for the experience.

Product portfolio of learning activities 1 & 2 (goal 2)

I created a trailer (1) and a short documentary (2) based on my two days of fieldwork with the Wolf Fencing Team Belgium, along with a selection of final photos from the activities (3). You can double-click on the image (if Word file) or use the link provided below to open the media file. I, recommend downloading the mp4-file to retain high-definition quality.

1. Trailer Wolf Fencing Team Belgium



<https://drive.google.com/file/d/1vECGtxty7zzJWlimVjpYDdLQ48Ju2Wpp/view?usp=sharing>

2. Short documentary Wolf Fencing Team Belgium

Wolf Fencing Team Belgium

https://drive.google.com/file/d/1KqVqHnUNgPU0_0uAX1xj9B3Evw11NE-c/view?usp=sharing

3. Images of the field work





CONCLUDING CRITICAL SELF-EVALUATION ON ENTIRE PORTFOLIO PROCESS

In this final reflection I will present my personal reflection and perspective on the learning process of the portfolio, discussing the main achievements and challenges, and a critical self-evaluation on my professional development.

When setting my learning goals, I focused mainly on ecological topics, as this matches with my background and interests as a future ecologist. However, I am glad that I also decided to include the social dimension, as this added a lot of value to my learning process. By attending the webinar series, I deepened my understanding of the ecological changes taking place in the Arctic, which I summarized in a scientific poster and various maps. This helped me engage more critically with the environmental shifts that are affecting the region. But it was through the course on Arctic peoples and cultures that I truly realized how often the knowledge and perspectives of indigenous communities are overlooked, even though they are directly affected by these changes and have long-standing knowledge of the region. Personally, this combination of activities helped me to see that understanding the ecosystems alone is not enough. Working in such regions also requires understanding the people who live there and their relationship with the land as they have survived for many centuries and developed strategies to adapt to these remote and harsh environments. This reflection became even more relevant when considering current developments in Arctic places such as Greenland, where geopolitical and economic interests are increasing, often without involving local communities in decision-making. These activities made me more aware of the risks of top-down approaches and strengthened my belief that science and policy must work with local voices, especially in regions as vulnerable as the Arctic.

Similarly, for my second learning goal, I focused on the return of the grey wolf in Flanders. This is often seen as something positive for biodiversity. However, like many others, and especially before participating in the activities, I had not given much thought to the local challenges that can arise, particularly for livestock-holding farmers. While various governmental measures (see video) have already been put in place, I still thought that it would be important to speak directly with farmers to hear their personal experiences and concerns. Hearing their stories was very insightful. It allowed me to understand how deeply such ecological changes can affect the people living in the region. What stood out to me was how sensitive the issue is in the northern part of the province of Antwerp, where a fragmented landscape, intensive agriculture and limited forest connectivity make coexistence challenging, particularly when compared to the situation in the province of Limburg (northeastern Belgium), where conditions are more favorable. This made me realize that the return of the wolf is much more than just the importance of ecological restoration but also raises important social questions. Also in this case, it made me realize how closely ecological and social dimensions are connected and how important it is to prepare both the landscapes and communities for coexistence between humans and wildlife.

Based on the activities and reflections, I believe I was able to achieve both learning goals. They helped me to understand the connection between ecological and social dynamics in two very different contexts. However, I also encountered some challenges during the portfolio process. One particularly difficult was interviewing the farmers who had been affected by wolf attacks. It was important to approach these conversations carefully and avoid coming across as pro-wolf, so I made sure to take a neutral position to build trust and create space for an open conversation. Working with large datasets when developing the Arctic maps was often challenging in terms of data analysis. Another challenge was to design the Arctic

board game based on the courses that I participated. It required creativity and I had to make sure that the content was appropriate and engaging for primary school children, which was not always easy.

Despite, these challenges, I also gained multiple skills during the process. Technically, I improved in handling spatial and climate data using R, Python and QGIS. I also developed media skills by producing a trailer and a short documentary using the software CapCut. Additionally, I learned to communicate in sensitive interviews, collaborate during fieldwork and be creative in making a complex material accessible to younger audiences through the board game. What was personally also very valuable to me, especially as I am currently looking for job opportunities, was obtaining a certificate from the University of Alberta (Canada), provided in collaboration with the University of Tromsø and the University of the Arctic. This shows my interest in, and understanding of, the Arctic region and could be an additional asset to highlight on my CV.

Overall, this portfolio gave me the opportunity to gain theoretical knowledge and apply this in real-world contexts. Through both of my learning goals, I was able to engage with ecological and social dimensions of sustainability in very different contexts. I gained a broader understanding of how environmental change affects ecosystems and communities in the Arctic region and develop a better insight into human-wildlife conflicts, particularly related to the return of the grey wolf in Flanders. I believe this course is a good opportunity to explore personal interests that are not always covered during classes, while also applying them in practical or professional settings.

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