Introduction & Rationale

For this assignment, I have decided to create a human-centered data story about climate change in Antarctica. The story is told from the viewpoint of Pepper the Penguin. Penguins are among the most recognizable symbols of Antarctica. Their unique and appealing appearance draws public attention, making them the ideal narrator for my story about a global issue. Antarctica contains around 90% of the world's ice [1], so any changes here will impact not just Antarctic life, but also wildlife and humans globally due to rising sea levels. By telling the story from Pepper's perspective, the data becomes more emotionally engaging, creating a connection between climate change and its effects on people.

Method & Visualization Techniques

I have combined hand-drawn storyboard sketches with various data visualizations, including a pie chart, line charts, a bar chart, and a world map. These charts are sourced from credible datasets (referenced at the end). I further split my sketches panel-wise and added corresponding text to convert them into a scrolly-telling format, so the detailed contexts appear gradually as readers scroll. Each panel is reinforced with Pepper's narrative, supported by the appropriate visualizations. For example, a pie chart shows species dependence on sea ice, a bar chart shows greenhouse gas emission by sector, and line charts show CO_2 rise and krill population trends. The colour palette of my storyboard is black and white, reflecting Antarctica's constant ice cover and limited natural colour. The simplicity in the visuals provides a way for the audience to follow both the story and the data without being overwhelmed.

Audience

For my story, the target audience is general readers, especially students and young adults with limited data literacy. Pepper's story provides emotional context, and the charts are straightforward and labelled. As climate change is a global issue, my use of storytelling and visuals makes sure that my readers comprehend the effects of Antarctic ice loss on the environment and on people. Since the melting of Antarctic ice is a result of widespread human activity and has implications for humanity's future, I want to make the data understandable while encouraging contemplation and possible action. Therefore, I believe general public awareness should be increased regarding this issue, and that is exactly what I have attempted to do through my story.

Iteration 1A – Initial Notes

In the first part of the first iteration, I just jotted down all the points I wanted to include on a piece of paper, along with notes on the data I planned to visualize. This included Antarctic Sea ice extent, species dependence on ice, reasons for ice melting, krill population trends, global sea level rise, effects of sea level rise and also how we can minimize this. At this stage, I did some research regarding available datasets and included them in my notes as well. But there were no sketches or narrative framing—just raw ideas and potential charts. I was still contemplating the main character or narrator of my story at this stage – will it be a human or some Antarctic animal or may be a small snowflake! Basically, this served as a blueprint for organizing my narrative and determining the most important scientific information that would support each panel.
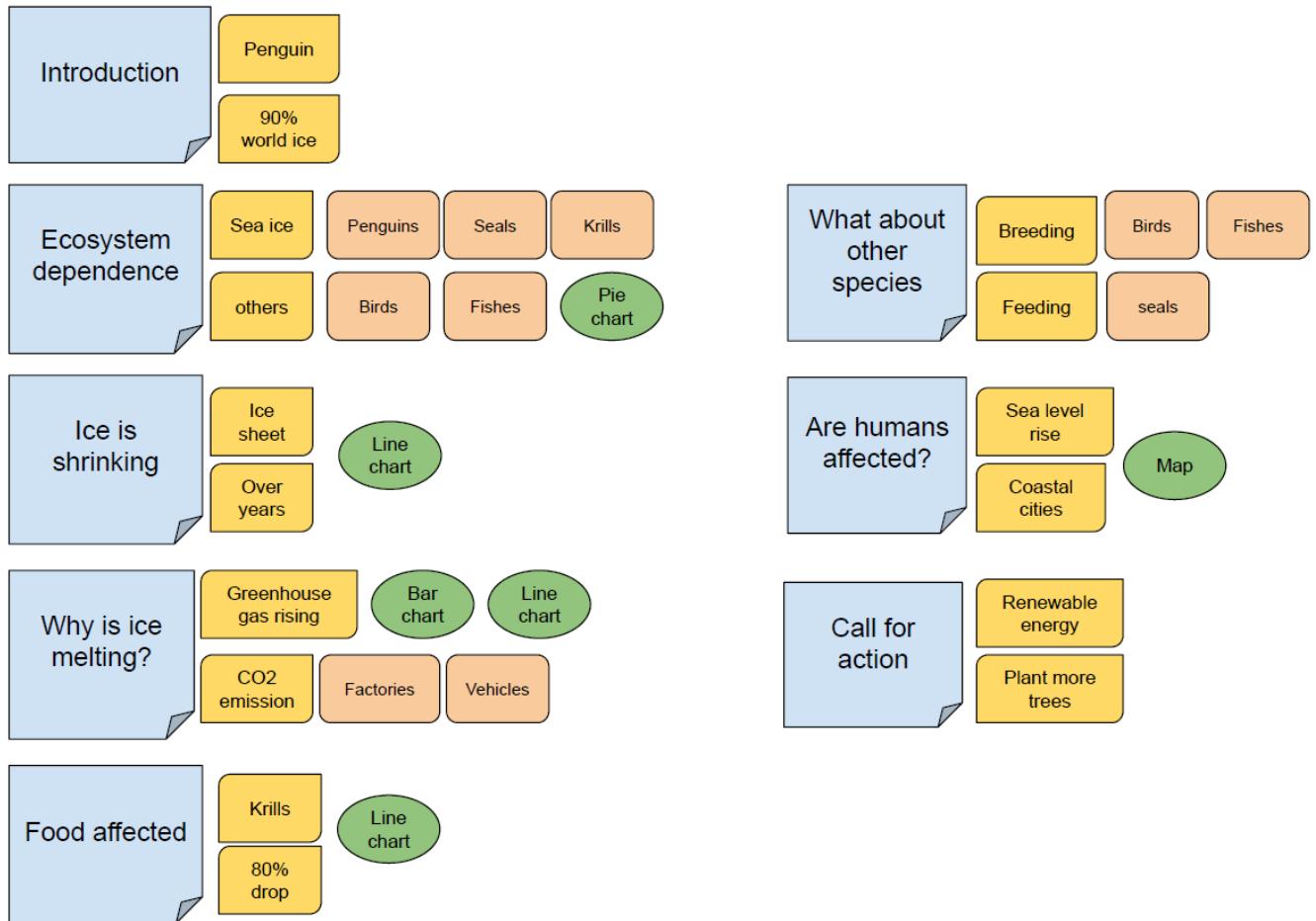
Penguin's story of climate change

1) Antarctica → 90% of world's ice.

3) Ice of Antarctica is shrinking → (? chart) Ice melting

    i) Ice sheet in 1985 → 18.7 million km^2

    ii) 2003 → 18.3 million km^2

    iii) 2018 → 17.9 mil km^2

    iv) 2023 → 16.89 mil km^2

2) max of Antarctic wildlife lives in the sea → (? chart)

    i) Depends on sea ice → 70%

    ii) Depends on other ecosystem → 30%

4) Why is ice melting? → Greenhouse gas rising. Factory, car, airplanes CO_2 rising.

    → Per capita greenhouse gas emission by sector, world, 2022
     Electricity & heat - 2080 kg .... aviation - 142 kg (? chart)
     Transport - 1010 kg ... Agriculture - 758 kg etc.

5) Krill population decreasing → Food chain is impacting (? chart)
    Food   (80% drop since 1970)

6) Other species impact

7) Sea level rising

    → which areas majorly? → Coastal cities

    → How much sea level may rise? → 58 meters (global mean
   sea level) → if all ice melts.

8) How to minimize?

    → Renewable energy

    → Plant trees

Iteration 1B – Gathering Thoughts (Google Drawing)
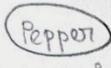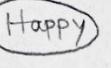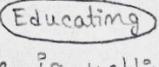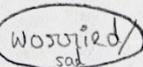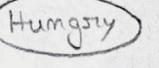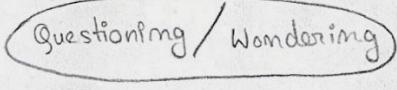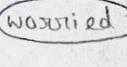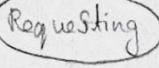
During the final part of the Iteration 1, in order to gather my thoughts and to really start building the story, I used the software, Google Drawing. There I first added the sticky notes in blue and wrote down the themes I wanted to add in my story panels. After that, I started adding more details in yellow & pink notes against each theme, which helped me decide pretty easily that a penguin would be my story's narrator. Finally, I went through all the data I had gathered so far and finalized in which panels I wanted to add exactly which type of data visualization charts. For example, I wanted to add a line chart depicting the decreasing number of krill population in the fifth panel.

Iteration 2A – Penguin Integration and Sketch Plan

In the part A of the second iteration, I adapted the initial notes into a penguin-centric narrative. I decided the name of my narrator and Pepper the Penguin was born. Now instead of directly going into drawing, I started making a sketch plan on a paper. I wrote down brief ideas about each panel and especially highlighted the state of Pepper's mood in each panel. For example, Panel 2 would have Pepper educating readers regarding Antarctica's ecosystem dependence through a pie chart, Panel 3 would show Pepper worried at a line chart of ice decline and Panel 4 would explain why ice is melting with corresponding visuals and charts. I also added probable dialogue and visuals to create emotional engagement, linking each dataset to Pepper's story.
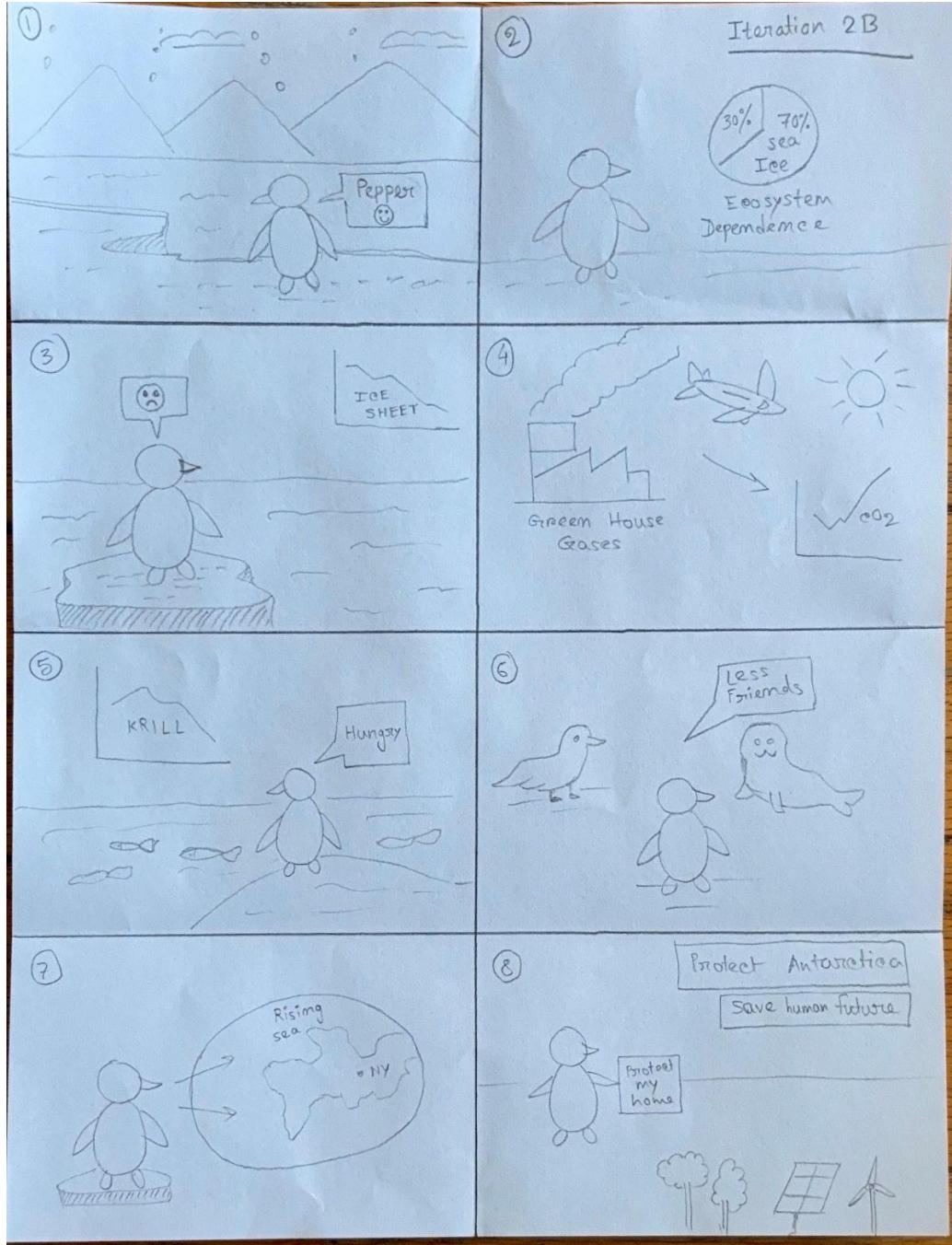
Iteration 2A

(Pepper)

1) A penguin standing on ice. Looking at the ocean, ice, environment of Antarctica. 90% world's ice text. (Happy)

2) Pepper showing a pie chart. 70% sea ice, 30% other eco systems. (Educating)

3) Pepper is standing on a small portion of ice as ice is melting. Pepper is looking at a decreasing line chart of shrinking ice over the years. (Worried/sad)

4) Smoke rising from factories, plane in the sky, CO_2 rising over the years line chart.

5) Pepper looking at a decreasing krill line chart. (Hungry)

6) Pepper with his friends → a seal, birds. Pepper wondering why did all his friends do not come to play with him anymore? (Questioning / Wondering)

7) Pepper looking at a world map showing people that if antarctica ice melts, the sea level will rise too which is a risk. (Worried)

8) Pepper holding a board to request everyone to protect his home. A solar panel & widmill, A few little trees below. (Requesting)

## Iteration 2B – Storyboard Sketch Draft
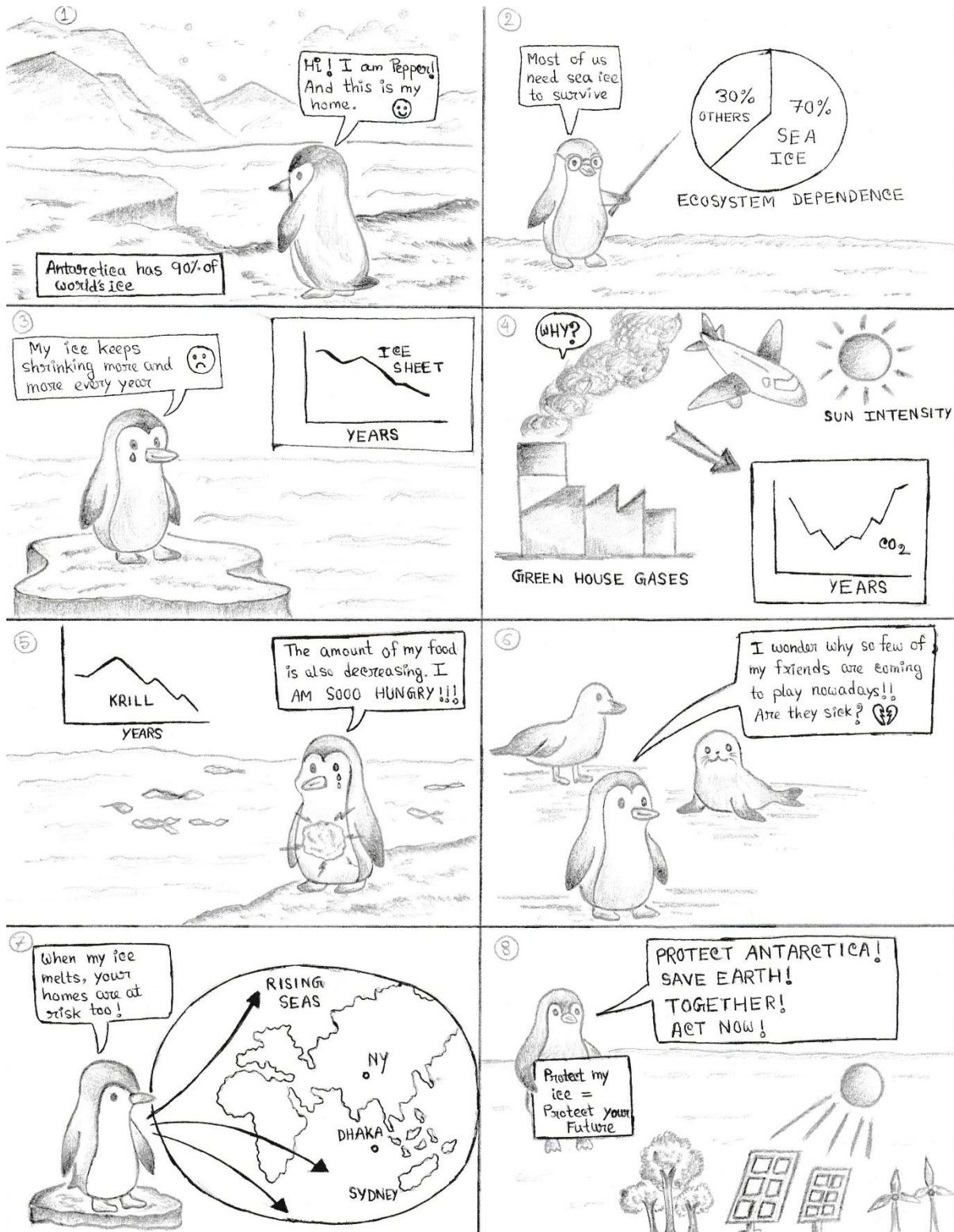
In the final part of the second iteration, I took the most important decision that is to create the final story board by pencil sketching on a paper. The reason is whenever I hear the word "creativity", the first thing that comes to my mind is pencil sketch by hand on a blank canvas. Also, even though I tried a couple of times but the way I wanted to portray my story and Pepper's emotions, AI-generated or Google-searched images were not suitable and were too time-consuming. Hence, I took the decision of creating the storyboard through my drawing itself. As I already jotted down the

basic sketch plan during iteration 2A, in this stage, I finally started with my sketch draft. I divided my paper into 8 panels and started with the panel-wise basic sketching. The sketching did not include any dialogue. They were mainly focused on the whole environment, Pepper's activities, emotions and charts wherever required. I would say, this step transformed raw data into a cohesive storyboard concept.

Iteration 3 – Final Drawn Storyboard

The third iteration represents the fully realized storyboard, where all eight panels have been illustrated and include the relevant data visualizations. I designed each panel on white paper, focusing on balancing the story, Pepper's emotions, and the clarity of the data. Also, as mentioned earlier, the colour theme of my storyboard is black and white. So instead of adding any bright colours, I pencil shaded the elements to highlight every little detail as clearly as possible.
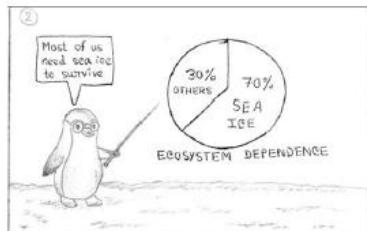
Iteration 4 – The Final Storyboard with Captions (Google Drawing)

In the previous iteration, I drew my detailed story on a blank paper and divided the panels by drawing lines. So, to convert it into an actual storyboard, I scanned my drawing and snipped each panel to split them. Then I inserted each of those panel images into a Google Drawing board followed by including text boxes with corresponding captions for each panel. As the sketches in the panels consist of only visuals, Pepper's speech and data charts, these captions will greatly help the
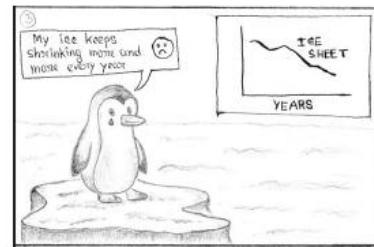
readers to understand the contexts of each panel more clearly.
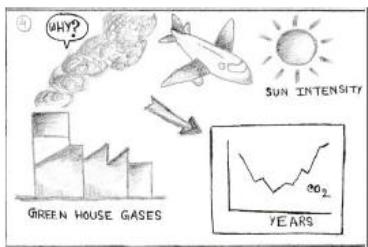
Antarctica holds approximately 90% of the world's ice. This ice regulates Earth's climate and provides habitat for penguins like Pepper.

Around 70% of Antarctic life depends on sea ice ecosystems. Penguins, seals, and krill are highly vulnerable to changes.

Antarctica's sea ice has reached record-low levels in recent years. Over the decades, it keeps declining.
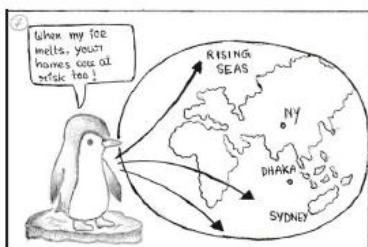
Greenhouse gases trap heat in the atmosphere, which increases the global temperatures. Human activities such as factories and aviation drive CO_2 emissions.

Krill population has declined by up to 80% around the Antarctic Peninsula since the 1970s. Less ice means less food for the penguins.

Melting ice also affects other species - seals, seabirds, and fish populations, disrupting the entire Antarctic ecosystems.
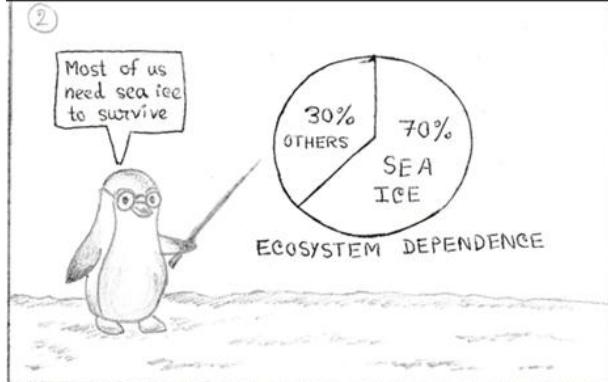
If Antarctic ice continues melting, sea level rise will threaten coastal cities worldwide. If all Antarctic ice melts, it will raise global mean sea level by 58 meters.

Protecting polar ecosystems by reducing carbon emissions, switching to renewable energy, and planting more trees can slow ice melt and protect both wildlife and human communities.

Iteration 5 – Scrolly-telling Storyboard
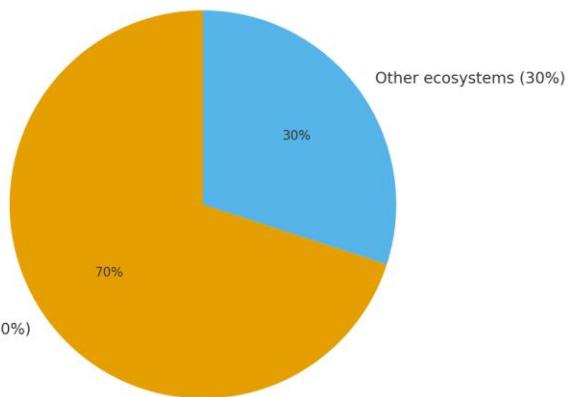
In the final iteration, I have enhanced my story to give the readers a better scrolly-telling experience which includes not only the panel descriptions but also detailed and enlarged data charts. This iteration integrates emotional storytelling with cited data. It also focuses on a polished visual style, panel order, and narrative flow.
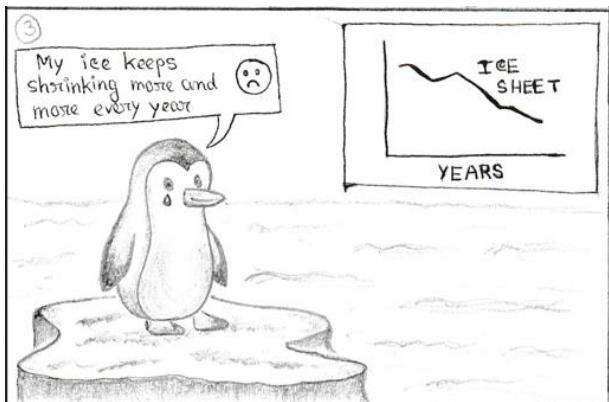
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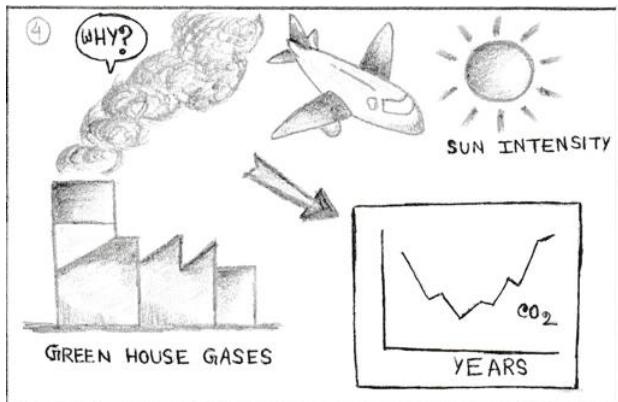
1. **Introduction** – A happy Pepper is standing on Antarctic ice and greeting the audience by introducing himself. The sketch shows his small size in contrast to a wide, icy landscape, highlighting the beautiful landscape. Caption: "Hi! I am Pepper! And this is my home."

2. **Ecosystem Dependence** – A pie chart shows that approximately 70% of Antarctic species depend on sea ice [2]. Pepper is pointing at the chart and trying to educate the readers regarding the sea ice dependence, emphasizing his own survival. Caption: "Most of us need sea ice to survive."

[Note: The pie chart is illustrative, and I chose 70% as a legible, round fraction to represent the "majority depend on sea ice" factor.]
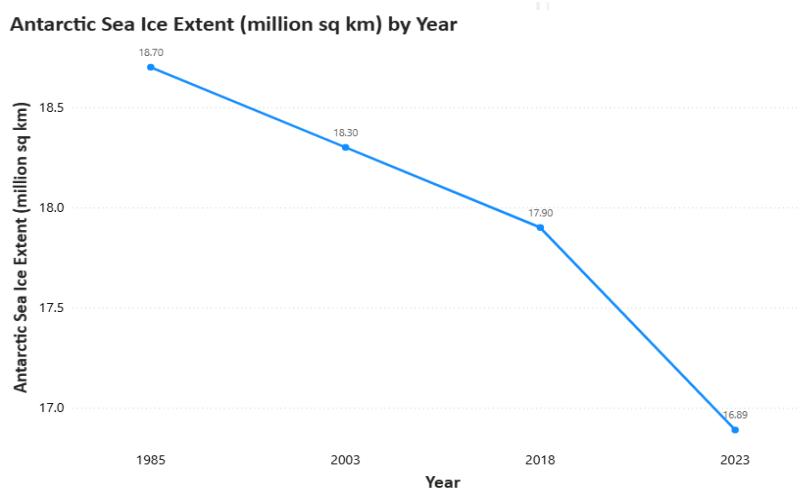

Antarctica's sea ice has reached record-low levels in recent years. Over the decades, it keeps declining.
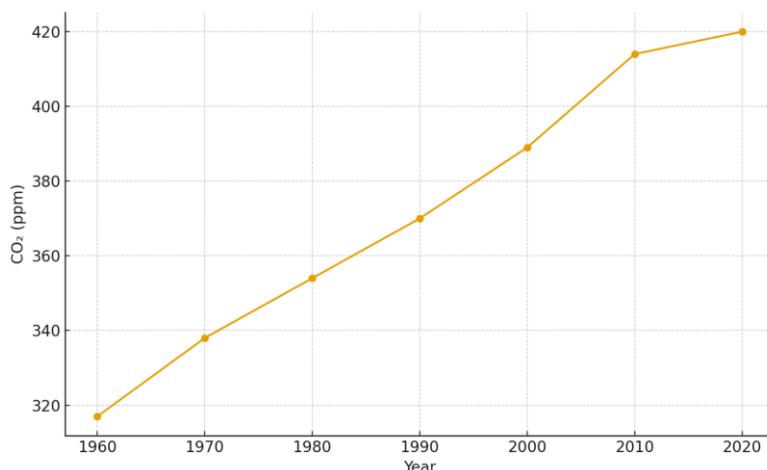

Greenhouse gases trap heat in the atmosphere, which increases the global temperatures. Human activities such as factories and aviation cause CO_2 emissions.
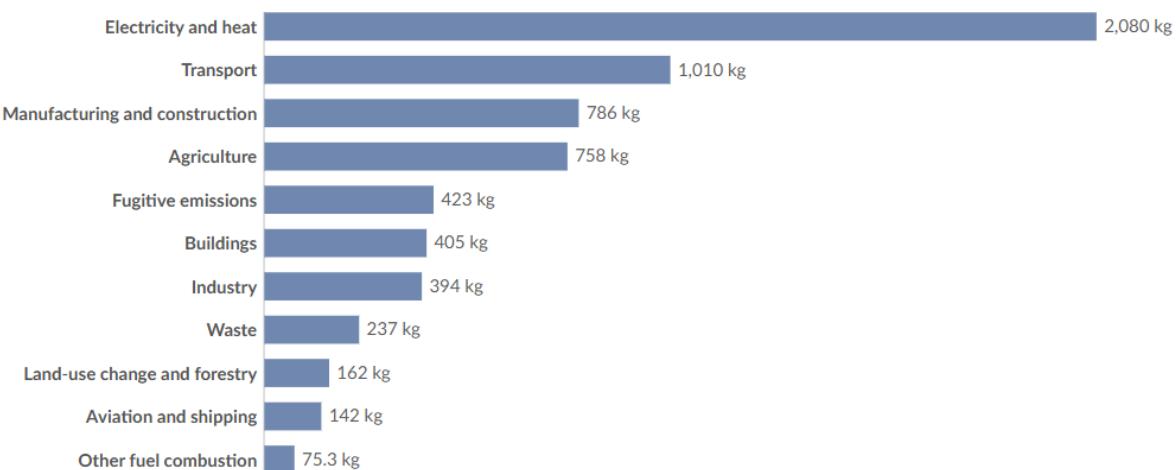
3. **Ice Shrinking** – A line chart displays Antarctic Sea ice extent across decades: 1980s, 2000s and 2023 [3]. Pepper looks worried at the line, visually emphasizing the decline. Caption: "My ice keeps shrinking more and more every year."

Antarctic Sea Ice Extent (million sq km) by Year

4. **Why Is Ice Melting?** – A line chart of atmospheric CO_2 over years is included [4]. Factories and a plane are sketched to illustrate human causes. These are directly connecting ice loss to human activities.
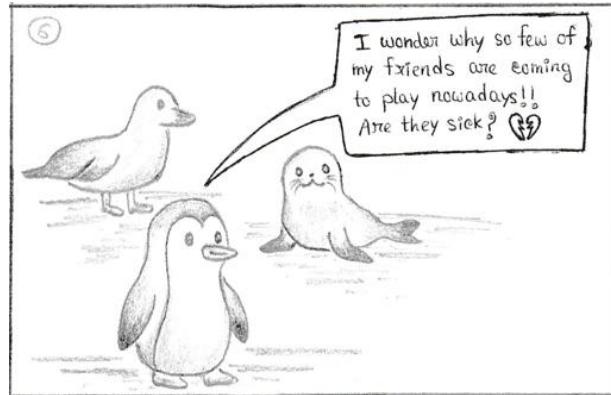

Also attaching a bar chart depicting worldwide per capita Greenhouse gas emission by sector as of 2022 [5]. The chart includes the maximum of 2080 kg greenhouse gas is emitted through electricity & heat whereas, aviation & shipping emits the least amount.
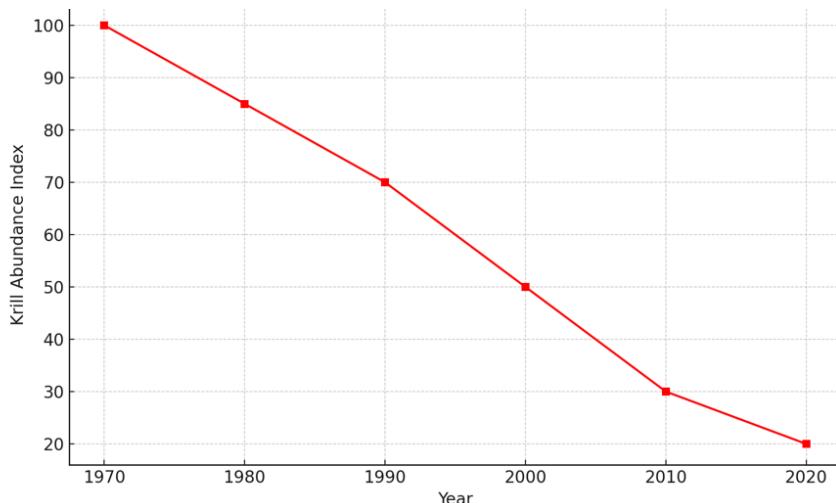
Krill population has declined by up to 80% around the Antarctic Peninsula since the 1970s. Less ice means less food for the penguins.
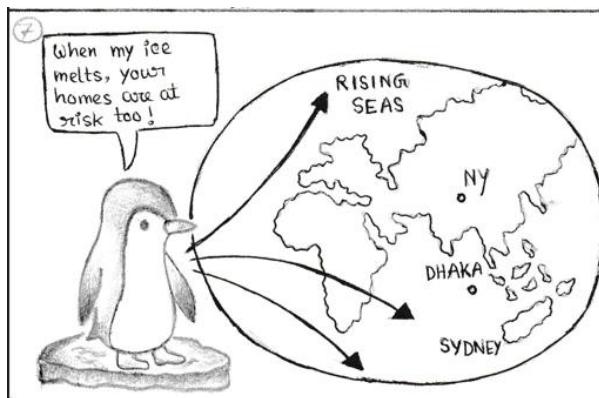
Melting ice also affects other species - seals, seabirds, and fish populations, disrupting the entire Antarctic ecosystems.

5. **Food Affected** – A line chart depicts krill population decline since the 1970s [6]. Pepper, clearly hungry, is looking into the water at fewer krill. Caption: "The amount of my food is also decreasing. I AM SOOO HUNGRY!!!"

6. **Other Species Impact** – Sketches of seals and seabirds show habitat fragmentation. The climate change is affecting the feeding and breeding habits of these animals. The broken icebergs, on which Pepper and his few friends are standing indicate the ecological ripple effect. Pepper is sad that the number of Antarctic animals is decreasing steadily due to climate change. Caption: "I wonder why so few of my friends are coming to play nowadays!! Are they sick?"
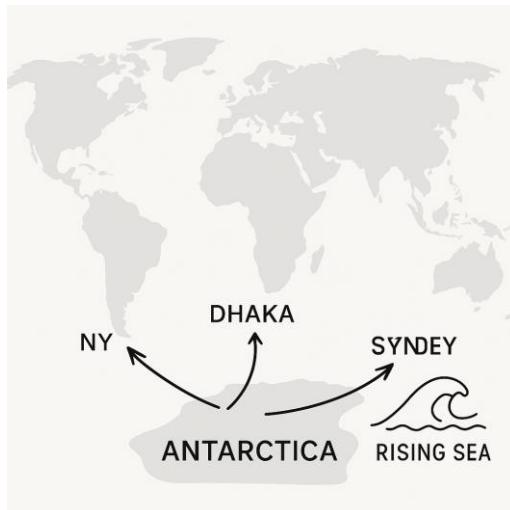
If Antarctic ice continues melting, sea level rise will threaten coastal cities worldwide. If all Antarctic ice melts, it will raise global mean sea level by 58 meters.

Protecting polar ecosystems by reducing carbon emissions, switching to renewable energy, and planting more trees can slow ice melt and protect both wildlife and human communities.

7. **Human Connection** – An infographic map links Antarctic melt to global coastal cities at risk like New York, Dhaka and Sydney [7]. The arrows illustrate the rising sea levels [8]. Pepper gestures toward the cities, emphasizing human vulnerability. Caption: "When my ice melts, your homes are at risk too!"

8. **Call for Action** – Pepper is holding a sign "Protect my ice = Protect your future." He is desperately asking humans to collectively act as soon as possible in order to save the Earth by saving Antarctica. Small trees and renewable energy symbols in the background (wind turbines, solar panels) provide a hopeful, solution-oriented ending. Caption: "Protect Antarctica! Save Earth! Together! Act Now!"

Conclusion

This storyboard highlights how data storytelling can humanize a complex climate issue. Across the iterations, I have refined the balance of narrative and visuals with the help of pencil-paper sketches and software (Google Drawing) - initial data notes, penguin-centric sketches and fully drawn panels with charts. The figures include habitat pie chart, ice shrink, CO_2 and krill line charts, greenhouse gas emission bar chart and a sea level rise map. Step by step, the storyboard depicts how human actions are the cause for Antarctic ice to melt which in turn affects not only the fauna of Antarctica, but also the future of humanity and Earth in general. Thus, the final storyboard emphasizes that protecting Antarctic ice is crucial not only for penguins but also for human communities, making the story both emotionally resonant and factually grounded.

References

1 https://www.aurora-expeditions.com/blog/10-fun-facts-about-antarctica

2 https://www.antarcticscienceplatform.org.nz/updates/sea-ice-and-ecosystems

3 https://ourworldindata.org/grapher/antarctica-sea-ice-extent?tab=table&time=earliest..2025

4 https://gml.noaa.gov/ccgg/trends/global.html

5 https://ourworldindata.org/emissions-by-sector

6 https://news.agu.org/press-release/climate-change-could-cause-major-decline-in-antarctic-krill-habitat-by-2100

7 https://www.ipcc.ch/report/ar6/wg1/

8 https://sealevel.nasa.gov/news/266/how-ice-shelf-loss-drives-sea-level-rise