The ozone layer is an invisible shield that exists 15—35km above the earth’s surface, protecting us from harmful ultraviolet, or UV, radiation, and in doing so safeguarding all life on earth.

But in the 1980s, scientists discovered a huge and harmful hole in the ozone layer. The hole was caused by chemicals and gases known as ozone-depleting substances. At the time, these were found in almost everything – from aerosol cans to fridges, from computer equipment to the soles of your shoes!

Across the world, scientists, policy makers and governments worked together, taking urgent steps to control and phase out these ozone-depleting substances. Together they developed the Vienna Convention, and then the Montreal Protocol which became one of the most successful environmental treaties of all time, universally endorsed by 197 nations of the world and the European Union.

And it worked! Thanks to the Montreal Protocol, the hole in the ozone layer is healing, with ozone expected to return to 1980s levels by the 2060s.

But the story is not over. In fact, it might never be over. We have to make sure we keep monitoring the gases that enter our atmosphere and the impact that they have on the ozone layer.

The next generation of young people face many challenges. But the story of the ozone layer and how the world joined together to protect it, is a story of hope. A story that proves that it can be done. That when we act together, and are guided by science, we can solve major global crises.
Dear Teachers

In January 2022, the Ozone Secretariat of the United Nations Environment Programme launched a follow-up to the highly successful Reset Earth animated series and mobile game. This time round, the focus is on a new character, Apollo, and her adventure in the metaverse! She’s created a world in which people can learn about ozone layer protection and the environmental challenges our planet is facing.

To accompany Apollo’s Edition of Reset Earth, a teaching toolkit has been developed filled with ideas, activities, games, and discussions that will empower you to engage your students on the issues of ozone layer protection and environmental challenges. Using Apollo’s vlogs as a foundation, 3 unique lessons have been developed. An accompanying teacher toolkit to help navigate through the content has also been created, including a corresponding student workbook. These printable documents can be adapted and made your own to share with your students.

The lessons are diverse and varied. While we have tried to create content that appeal to learners across a broad range of age profiles, teachers are encouraged to use what will work best for their students, or adapt and make it their own. Whether the lessons run over three days, three weeks or three months; only one idea is used, or all of them, it is up to you, the teacher, to decide. Most of all, we at the Ozone Secretariat hope that through the animations, games, discussions, and activities, you can help us bring the story of the ozone layer to life, and inspire the next generation of young people to continue to protect the ozone layer and the global environment. If you’ve used any of our teacher resources, please send feedback, photos or any related learner artwork to stephanie.haysmith@un.org.

Lesson plans and workbooks are based on fictional animations and not entirely on scientific fact. For facts and accurate timelines, please visit https://ozone.unep.org/.
CONTENTS

Understanding the ozone layer
Get to know Apollo and Remi as they explain the environmental challenges we face and how protecting the ozone layer can save life on earth and underwater. Their goal is to inspire action from a generation of creative problem-solvers.

> **Introduction activity:** Mind map on the ozone layer
> **Video & discussion:** Watch Apollo’s video and discuss key learnings
> **Game:** Play Reset Earth Impact Simulator game and discuss key learnings
> **Primer:** Do some research online and compile facts about the ozone layer
> **Discussion:** Open discussion about how our decisions can make a difference
> **Worksheet:** Answer the questions in written form and evaluate
> **Activity:** Choose a good news story to discuss with a partner
> **Worksheet:** Complete the ‘characteristics of a hero’ worksheet
> **Conclusion:** Write down what you think are important points to share with your community
THE BIG IDEA

Ozone layer depletion leads to changes over time that directly impact world health and safety. Uncertainty and lack of information can drive fear about the future but can help drive change through a sense of urgency and need for protection. A variety of character traits can empower and hinder heroes in their mission for change.

CRITICAL QUESTIONS

> Does depletion of the ozone layer increase ground-level ultraviolet, or UV, radiation?
> Does depletion of the ozone layer impact global climate change?

I CAN / I WILL OUTCOME STATEMENT FOR STUDENTS

> I will interpret data to estimate community and seasonal changes due to ozone depletion and protection over time, predicting future outcomes across the globe if ozone depletion continues.
> I will assess the effectiveness of knowledge sharing on environmental issues across multiple mediums and will justify the importance of highlighting messages of hope and success in knowledge sharing.
> I can identify characteristics of change makers, and how these characteristics can help and hinder environmental advocates.
RESOURCES

Below you will find a list of the resource references. Because of the global audience, possible language barriers, and the age profile being quite broad (ranging from 13 to 18) we have included a range of resources as listed below. Please apply and utilise the references that best accommodate your learners, taking both age and learning ability into consideration.

The videos available as part of ‘Apollo’s Ozone Playlist’ are particularly useful to all ages and showcase a diverse range in skill level and comprehension. The playlist is graded according to skill levels: Level 1 - easy to understand, Level 2 - intermediate and Level 3 - containing more complex science.

Below is the full list of resources, you will also find specific resources referenced as part of the lesson plans. Please feel free to utilise those you feel are appropriate for your learners and their age.

- Apollo’s Ozone Playlist
- Lesson 1-3 Worksheet (colour)
- Lesson 1-3 Worksheet (print friendly)
- UNEP Ozone & You
- UNEP Q&A
- UNEP Country Profiles
- NOAA 20 Questions: Q14
- UNEP What you can do
- UNEP Montreal Protocol
- UNEP The Vienna Convention
- UNEP Ozone Timeline
- UNEP Ozone treaties and SDGs
- UNEP Sustainable Development Goals
- UNEP World Ozone Day
LESSON 1 GUIDE

The below suggested times of activities are a helpful guide for this lesson. Actual time can differ based on needs and interests of students, resources, and available time.

INTRO

LESSON TIME:
0—5 MINS

GLOBAL COMPETENCY:
N/A

LESSON DESCRIPTION:
Pre-Lesson Survey.

Personal mind map on ozone layer:
Write OZONE in the middle of a piece of paper, and with 1 colour, write down all of the things that you can think of when you hear that word.

MIND MAP EXAMPLE
For ideas on mind maps have a look here

LEARNER OBJECTIVES:

Science
S1 - Explain ozone layer formation and characteristics.
S2 - Recognise the important role of the ozone layer in protecting all life on earth and underwater from UV radiation.
S3 - Identify how the ozone layer and climate are connected, but not causal.
S4 - Acknowledge ozone layer recovery and seasonal changes.
S5 - Understand natural impacts on the ozone layer such as volcanoes and the sun.

Impact
H1 - Identify the pollution that affects the ozone layer - ODSs (ozone-depleting substances such as CFCs and the halons).
H2 - Recognise that pollution from the previous generation persists and will impact future generations as well as all life on earth and underwater.
H3 - Appreciate that this challenge requires international regulations and cooperation.
H4 - Appreciate that individual personal behaviours and consumer choices have an impact on the ozone layer.
H5 - Recognise the impact of the ozone layer on all life on earth and underwater.

Long-term Progress
L1 - Identify the consequences of continued ozone layer depletion.
L2 - Acknowledge the role of global regulations and the ozone treaties.
L3 - Acknowledge that continued progress on ozone layer requires a broad base of awareness and support.
L4 - Understand continued progress relies on Assessment Panels.
L5 - Acknowledge ozone layer recovery is a source of hope for other global environmental challenges.
VIDEO

LESSON TIME:
40—45 MINS

GLOBAL COMPETENCY:
N/A

LESSON DESCRIPTION:
Watch Apollo’s video as she and her robot companion, Remi, explain key concepts and areas of focus regarding the ozone layer and climate change.

LEARNER OBJECTIVES:

Knowledge

Science
S2 - Recognise the important role of the ozone layer in protecting all life on earth and underwater from UV radiation.

Impact
H5 - Recognise the impact of the ozone layer on all life on earth and underwater.

Long-term Progress
L1 - Identify the consequences of continued ozone layer depletion.
RESET EARTH SIMULATION GAME

LESSON TIME:
20—30 MINS

GLOBAL COMPETENCY:
N/A

LESSON DESCRIPTION:
Play the new Reset Earth Impact Simulator game and find out how your actions can influence the fight against climate change.

GO TO
Reset Earth Impact Simulator game

LEARNER OBJECTIVES:

Combined

Science
S3 - Identify how the ozone layer and climate are connected, but not causal.

Impact
H5 - Recognise the impact of the ozone layer on all life on earth and underwater.

Long-term Progress
L2 - Acknowledge the role of global regulations and the ozone treaties.
LESSON TIME: 5—15 MINS

GLOBAL COMPETENCY: N/A

LESSON DESCRIPTION: Have your students spend 10 minutes researching ozone on Google and YouTube or from a reference book with facts about the ozone, to compile a top 5 ozone facts list.

LEARNER OBJECTIVES:

Knowledge

Science
S2 - Recognise the important role of the ozone layer in protecting all life on earth and underwater from UV radiation.

Impact
H5 - Recognise the impact of the ozone layer on all life on earth and underwater.

Long-term Progress
L1 - Identify the consequences of continued ozone layer depletion.

EXTENSION DISCUSSION: Create a blog or YouTube playlist where your students can upload links or videos for their top 5 ozone facts. If internet access is an issue, they can design a flyer instead.
DISCUSSION

LESSON TIME:
15—20 MINS

GLOBAL COMPETENCY:
N/A

LESSON DESCRIPTION:
Open Discussion with class, ask guiding questions (eg. what are your thoughts after your research, how did it make you feel, what are the key takeaways) - group discussion with chart paper to jot down/draw ideas, then share with the class.

Ask students to also brainstorm what they envision the potential impacts on their own communities, as well as all other life on earth and underwater. This should be based on what they have learned about ozone (its protective properties and depletion).

LEARNER OBJECTIVES:
Combined

Science
S3 - Identify how the ozone layer and climate are connected, but not causal.
S4 - Acknowledge ozone layer recovery and seasonal changes.
S5 - Understand natural impacts on the ozone layer such as volcanoes and the sun.

CLASS ACTIVITY

QUESTIONS TO ASK:
> Note 3 things you saw
> 3 things you felt
> 3 things you learnt
WORKSHEET - PROJECTION ACTIVITY

LESSON TIME:
20—35 MINS

GLOBAL COMPETENCY:
N/A

LESSON DESCRIPTION:
Ozone plays a key role in protecting and maintaining our climate, environment and life on earth and underwater.

PLEASE NOTE:
This activity does not require the students to make calculated predictions. It is a thought exercise where they can analyse trends (looking at the graphs and patterns and trends they see after the Montreal Protocol – if any) and make and defend logical determinations about what their community might look like and why. There is no singular correct answer; as long as the students can justify their reasoning and defend it (especially as they may differ across the class), when they have completed the exercise. Teachers can add in a ‘discussion’ section to the lesson where students compare their predictions with others in the class and explain why they chose the representation that they made.

Activity: What do you think your neighbourhood would look like if ozone-depletion continues? Review your Country Profile on the UNEP website, and using the information on ozone-depleting substances (ODSs) and HCFC/HFC production & consumption, project what your community would have looked like in the 1980s, 2020s and 2100s with and without the implementation of restrictions on ODS and HFC production and consumption.

Activity (extension): Your country and community may be very different from other places on the planet. Review the Country Profile for two other countries that you feel differ greatly to yours, and complete the same projection for 1980s, 2020s and 2100s with and without regulations of ODSs/HFCs. What are some factors that may contribute to some differences (i.e. temperature, wealth, resources, latitude)?

LEARNER OBJECTIVES:

Action

Impact
H3 - Appreciate that this challenge requires international regulations and cooperation.
H5 - Recognise the impact of the ozone layer on all life on earth and underwater.

EXTENSION DISCUSSION:
Ask your students how seasonality may influence their projections. What role does ozone play on our seasons?
Imagine you were living in a world without any regulations; what if the production of ozone-depleting substances continued, and ozone depletion progressed at rapid rates. How would this make you feel? Do you feel like you have a great enough understanding of the science, regulations and policy surrounding ozone protection and depletion? Does this uncertainty or lack of understanding change how you feel?

While our knowledge may be limited, we are lucky to have access to a variety of ways to educate ourselves and others on issues impacting our daily lives.

What is an environmental issue that you feel like you have a great understanding of? Where did you learn or find most of this information?

How do you prefer to learn new facts, lessons, or ideas? Consider multiple mediums of information sharing, including textbooks, school, Youtube or social media, videos, documentaries, posters, etc.

Is there an environmental issue that you know is impacting your daily life or future, but you feel like you don’t have any answers or solutions on what to do? Do you feel lost, anxious, or fearful of your future?

What is an environmental issue that you feel like you have a great understanding of? Where did you learn or find most of this information?

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Hint: Research other environmental activists and how they have used social platforms effectively.
ACTIVITY: LIFE ON EARTH CAN PREVAIL!

LESSON TIME:
45—55 MINS

GLOBAL COMPETENCY:
N/A

LESSON DESCRIPTION:
In order to inspire hope, choose a ‘good news story’ to discuss with a partner. Choose a great environmental challenge that has been faced in human history. One with a positive outcome, either from people working together, implementing regulations or changes, or better educating citizens on the impact and potential solutions that can be taken.

> Identify the issue, and key actions that were taken to turn this into a good news story.
> What can we learn from stories like this?

LEARNER OBJECTIVES:

Action

Long-term Progress
L5 - Acknowledge ozone layer recovery is a source of hope for other global environmental challenges.

LESSON EXTENSION
Ask students to identify which social media platforms are best to share a ‘good news story’. Then explain why and how to use them.
LESSON TIME: 55—60 MINS

GLOBAL COMPETENCY: N/A

LESSON DESCRIPTION:
Creating change isn’t easy, and as learned from the good news stories, there are endless ways behaviour change can be implemented. The key to all of these scenarios is the role that humans have played; and how many different types of people have contributed. It takes a variety of people, from different backgrounds, lifestyles, and personalities to create the perfect storm of environmental change.

On the worksheet template, circle all of the traits that you think Apollo has.

<table>
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<th>Adventurous</th>
<th>Afraid</th>
<th>Brave</th>
<th>Caring</th>
<th>Cautious</th>
</tr>
</thead>
<tbody>
<tr>
<td>Confident</td>
<td>Energetic</td>
<td>Fair</td>
<td>Feisty</td>
<td>Funny</td>
</tr>
<tr>
<td>Generous</td>
<td>Humble</td>
<td>Inquisitive</td>
<td>Intelligent</td>
<td>Knowledgeable</td>
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<tr>
<td>Loyal</td>
<td>Mature</td>
<td>Mean</td>
<td>Outgoing</td>
<td>Resourceful</td>
</tr>
<tr>
<td>Selfish</td>
<td>Sensitive</td>
<td>Serious</td>
<td>Talented</td>
<td>Timid</td>
</tr>
</tbody>
</table>

DISCUSSION POINTS:
> How do they think these characteristics will help her in the journey to save the ozone?
> What characteristics drive her to want to make a difference?
> Does she have any characteristics that may limit her?

LESSON EXTENSION:
In a different colour, highlight the characteristics that the students have which do they think will help them be an ozone hero? Which ones may limit them?

> We know that it takes a team to create change. Identify the characteristics that would best compliment your own strengths and weaknesses to create the ultimate ozone hero team. Is there somebody in your class that demonstrates these traits?
CONCLUSION - LINK LESSON 2

LESSON TIME:
55—60 MINS

GLOBAL COMPETENCY:
N/A

LESSON DESCRIPTION:
Jot down (or draw) your ideas on which facts or types of facts would be compelling to your peers, your parents and your grandparents. 

What would your community want to hear?

LEARNER OBJECTIVES:
Reflection

Long-term Progress
L1 - Identify the consequences of continued ozone layer depletion.

LESSON RESOURCES
Click on the links below to download the lesson resources:
> Apollo’s Ozone Playlist
> Lesson 1 Worksheet (colour)
> Lesson 1 Worksheet (print friendly)
> UNEP Ozone & You
> UNEP Q&A
> UNEP Country Profiles
> NOAA 20 Questions: Q14

PREPARATION
> Access to Apollo’s video
> Lesson 1 Worksheet
> Materials to draw on worksheet

LESSON EXTENSION
Ask students to create a social media post or physical poster based on one of their interesting facts about the ozone.

This poster can be placed in the school to create awareness and the social media post could be posted on the school’s social media platform. Include #ResetEarth when sharing.