



 **INNOVATIVE
APPROACHES TO
COMBAT PLASTIC
POLLUTION**

CURRICULUM RESOURCE GUIDE

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How To Use This Guide



Visual Media



Audio / Podcast



Charts and Graphs



Lesson Plans

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Outlining Standards

COLLEGE, CAREER, & CIVIC LIFE C₃ FRAMEWORK FOR SOCIAL STUDIES STATE STANDARDS

The C₃ Framework is organized into the four Dimensions, which support a robust social studies program rooted in inquiry.

The four Dimensions are as follows:

- (1) Developing questions and planning inquiries;
- (2) Applying disciplinary concepts and tools;
- (3) Evaluating sources and using evidence;
- (4) Communicating conclusions and taking informed action

DIMENSION 1: DEVELOPING QUESTIONS AND PLANNING INQUIRIES	DIMENSION 2: APPLYING DISCIPLINARY TOOLS AND CONCEPTS	DIMENSION 3: EVALUATING SOURCES AND USING EVIDENCE	DIMENSION 4: COMMUNICATING CONCLUSIONS AND TAKING INFORMED ACTS
Developing Questions and Planning Inquiries	<ul style="list-style-type: none"> • Civics • Economics • Geography • History 	<ul style="list-style-type: none"> • Gathering and Evaluating Sources • Developing Claims and Using Evidence 	<ul style="list-style-type: none"> • Communicating and Critiquing Conclusions • Taking Informed Action

Dimension 2 has four disciplinary subsections: (1) **Civics**; (2) **Economics**; (3) **Geography**; (4) **History**. Each disciplinary subsection has three to four additional categories, which provide an organizing mechanism for the foundational content and skills within each discipline.

C₃ Framework Organization

CIVICS	ECONOMICS	GEOGRAPHY	HISTORY
Civic and Political Institutions	Economic Decision Making	Geographic Representations: Special Views of the World	Change, Continuity, and Context
Participation and Deliberation: Applying Civic Virtues and Democratic Principles	Exchange and Markets	Human-Environment Interaction: Place, Religions, and Culture	Perspective
Processes, Rules, and Laws	The National Economy	Human Populations: Spatial Patterns and Movements	Historical Sources and Evidence
	The Global Economy	Global Interconnections: Changing Spatial Patterns	Causation and Argumentation

Outlining Standards

A Note on Learning Standards Presented in this Guide

Three sets of standards have been linked to each of the learning objectives in this packet. The **Washington State K-12 Social Studies Learning Standards** and the accompanying Grade Level Requirements are the social studies standards for WA State.

The **College, Career, & Civic Life C₃ Framework for Social Studies State Standards** are the standards published by the National Council for the Social Studies. Guiding the packet as a whole is the Framework for Global Learning created by the Asia Society and the Council of Chief State School Officers titled *Educating for Global Competence: Preparing Our Youth to Engage the World* (2011).

Cross-objective standards are listed at the beginning of the packet, and content-specific standards can be found after each learning objective.

The standards provided have been selected for relevance, but are not exclusive: many other standards, such as Common Core, may be applicable to the resources and learning objectives identified in this packet. The intention for this packet's organization is to provide educators with an idea of resources available and possible uses for resources. Users should feel free to create their own learning objectives and to select resources according to the specific needs of their classrooms.

WASHINGTON STATE K-12 SOCIAL STUDIES LEARNING STANDARDS

There are five EALRs in Social Studies, one for each of the discipline areas: civics, economics, geography, and history, and a fifth for social studies skills.

(1) Social Studies EALR 1: CIVICS

The student understands and applies knowledge of government, law, politics, and the nation's fundamental documents to make decisions about local, national, and international issues and to demonstrate thoughtful, participatory citizenship.

(2) Social Studies EALR 2: ECONOMICS

The student applies understanding of economic concepts and systems to analyze decision-making and the interactions between individuals, households, businesses, governments, and societies.

(3) Social Studies EALR 3: GEOGRAPHY

The student uses a spatial perspective to make reasoned decisions by applying the concepts of location, region, and movement and demonstrating knowledge of how geographic features and human cultures impact environments.

(4) Social Studies EALR 4: HISTORY

The student understands and applies knowledge of historical thinking, chronology, eras, turning points, major ideas, individuals, and themes on local, Washington State, tribal, United States, and world history in order to evaluate how history shapes the present and future.

(5) Social Studies EALR 5: SOCIAL STUDIES SKILLS

The student understands and applies reasoning skills to conduct research, deliberate, and form and evaluate positions through the processes of reading, writing, and communicating.

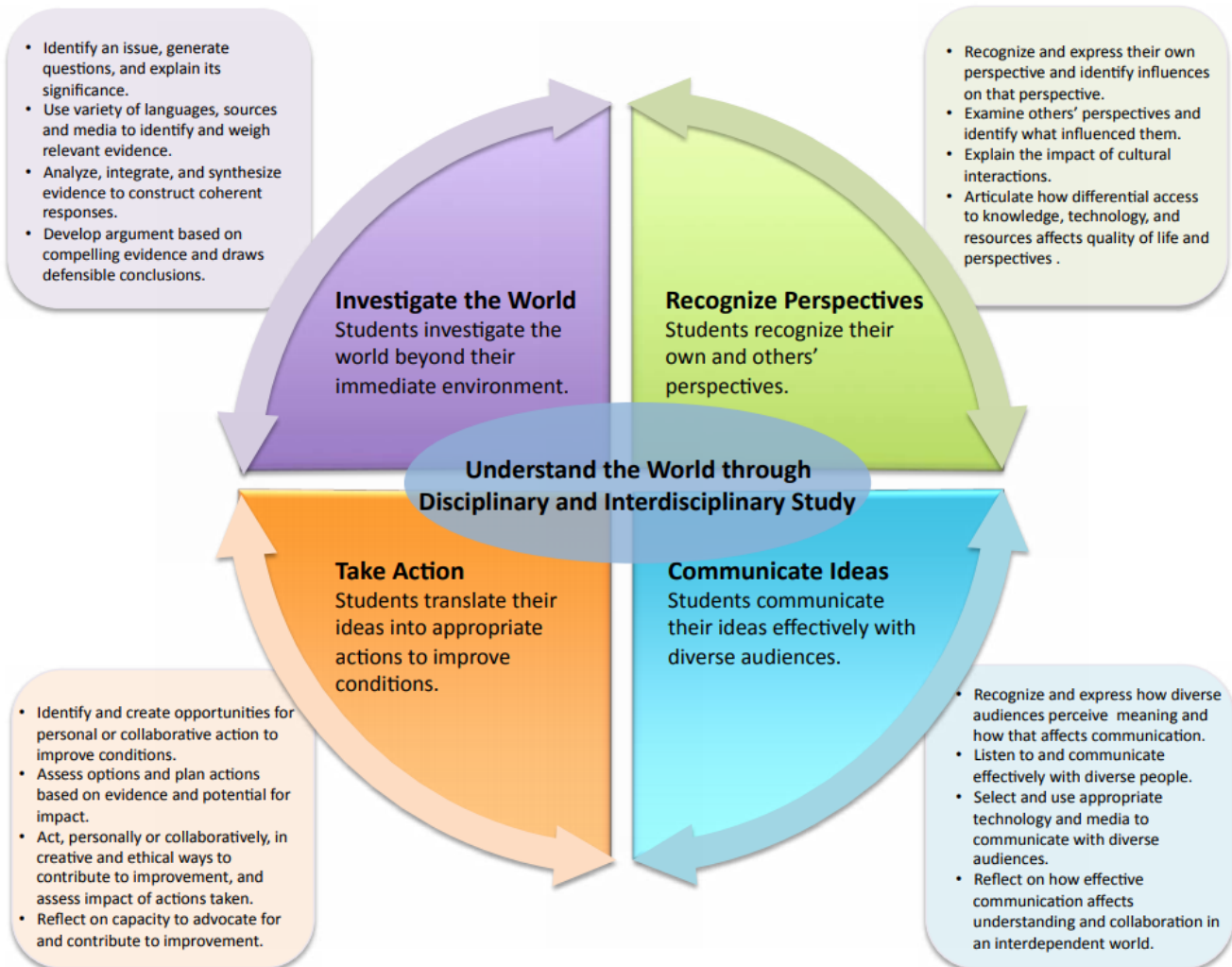
Educating For Global Competence

Frameworks taken from *Educating for Global Competence: Preparing Our Youth to Engage the World* (Asia Society and the Council of Chief State School Officers 2011).

“Global competence is the capacity and disposition to understand and act on issues of global significance” (Chapter 2).

Globally competent students are able to perform the following four competences:

1. **Investigate the world** beyond their immediate environment, framing significant problems and conducting well-crafted and age-appropriate research.
2. **Recognize perspectives** others’ and their own, articulating and explaining such perspectives thoughtfully and respectfully.
3. **Communicate ideas** effectively with diverse audiences, bridging geographic, linguistic, ideological, and cultural barriers.
4. **Take action** to improve conditions, viewing themselves as players in the world and participating reflectively.



Introduction to Session Moderator



Ryan Hauck is a teacher at Glacier Peak High School in Snohomish, WA. As a teacher of comparative politics and international studies, he is often applauded for bringing the world into his classroom by engaging students around the importance of living in an increasingly interconnected, interdependent world. One of Ryan's global projects has been his work in the Niger Delta region of Nigeria, building not only a sister school relationship between his high school and a remote village school in Oporoza, but also a village library. Recently, Ryan participated in a U.S. State Department fellowship to Senegal as part of the Teachers for Global Classroom Program and as a fellow with the Goethe Institut's Transatlantic Outreach Program to Germany. Ryan Completed his master's degree in Globalization and Educational Change from Lehigh's Comparative & International Education Department. As part of this program, Ryan worked with a cohort of classmates and teachers on a professional development project in Cambodia to enhance teacher training and student learning. As a Washington State Council for the Social Studies Board Member, Ryan extends his passion for global studies to other teachers, students, and communities. Ryan brings his own real-life experiences into the classroom so that his students begin to understand the value of cross-cultural understanding and humanitarian action.



Introduction to Session Speakers



Mr. Simon Pierre BERNARD

CEO and Co-Founder, Plastic Odyssey

As CEO and Co-Founder of the non-profit Plastic Odyssey, **Mr. Simon Pierre Bernard** leads his team in a mission to highlight the importance of preserving the ocean ecosystem, promote local waste treatment initiatives, develop the recycling economy to create jobs, and raise awareness among local citizens. Co-founded by Mr. Bernard in 2016, Plastic Odyssey tackles ocean pollution by promoting plastic recycling solutions adapted to countries from the Global South. Since October 2022, its 40-meter laboratory vessel has been traveling across Africa, South-

east Asia, and South America to promote its solutions and develop a global network of entrepreneurs. The Plastic Odyssey Vessel promotes local waste treatment initiatives and runs awareness campaigns for citizens on its many stops. In addition, it promotes accessible technologies that can transform waste into locally useful resources, trains entrepreneurs, and develops the recycling economy to create jobs. Plastic Odyssey also studies initiatives to reduce its own use of plastic, documents them, and freely shares this data so others can be inspired to lower plastic consumption. In partnership with the French Ministry of Education, Plastic Odyssey also raises awareness about marine pollution in French schools through videoconferences, reaching 2,000 students during each stop-over throughout the year. Mr. Bernard has been featured in Forbes' 30 under 30 list.

Ms. Eva Beatrice Simone RUMEAU

Business Development Manager, Écotable

Ms. Eva Beatrice Simone Rumeau works as the Business Development Manager at Écotable, a French start-up focused on making the food industry more sustainable. Écotable provides a range of content on sustainability, including educational materials, an eco-friendly certification for restaurants, and a network of sustainable food suppliers. Ms. Rumeau's work puts her at the intersection of plastics and the food service industry, a key plastics-using sector. As head of Écotable's business development, Ms. Rumeau works to build partnerships with major companies, restaurants, and institutions, including collective catering services and tourism offices. Through these partnerships, she aims to accelerate ecological transitions within companies, including efforts to combat plastics in restaurant and food service operations.



Introduction to Session Speakers



Ms. Lila Jodelle Pauline Maria DURIX

Head, Zero Single Use Plastics Ambition, Direction of Climate and Ecological Transition, City of Paris

Ms. Lila Durix leads the City of Paris government's major project eliminating the consumption of single-use plastics. Recently, she oversaw the effort to eliminate consumption of single-use plastics in the 2024 Olympic and Paralympic games. Her office's achievements toward this goal include a partnership with Coca-Cola that has saved over 1 million single-use plastic bottles. Ms. Durix also worked on the September 2024 zero plastic requirements for all of Paris' city races, projected to save 20 tons of plastic per year. Additionally, she and her office have encouraged 1,000 shopkeepers to join the "Here, I Choose Water from Paris," campaign, which focuses on expanding free access to tap water, with an estimated reduction in plastic use of one million 1-L bottles of water. Within the city government itself, efforts on the gradual elimination of non-reusable plastics have achieved an estimated reduction of 41 tons of plastic in 2023. Previously, Ms. Durix worked as Corporate Social Responsibility Manager for Danone France where she coordinated packaging for Danone products. From 2019 to 2021, she ensured the recyclability of all packaging for 2025 and fostered projects to initiate the first reusable containers for yogurt and baby food in 2020 and 2021.

Mr. Hugo Lucien Pierre Yves VIEL

Campaign Strategist, Oil Change International

Mr. Hugo Viel is a climate justice activist currently working as a campaign strategist for Oil Change International. Previously, he was a campaigner at 350.org from 2022 to 2024. His book "Climate: Too Late to Take Action?" has been cited as representative of the new generation's perspectives on climate, and he is frequently called on to embody the youth voice in the media. Having studied at Paris' ECE engineering school and the Sorbonne, Mr. Viel has a strong academic background in energy and the environment. He previously volunteered as Secretary General at "CliMates," a nonprofit which organizes workshops, training courses, and simulations to empower individuals to act. He also served as a representative at COP 24 and COP 25 and has experience in the political field working with deputies of the National Assembly in the campaign for a Real Climate Law. Additionally, he served as Parliamentary Collaborator in the office of National Assembly Deputy Matthieu Orphelin. In this role, Mr. Viel worked on communication strategy, civil society relations, and legislative proposals. As an activist, Mr. Viel has organized several nationwide climate protests, including the first worldwide strike for the climate on March 15, 2019.



Key Terms

[Plastic Pollution](#): accumulation in the environment of synthetic plastic products to the point that they create problems for wildlife and their habitats as well as for human populations.

[Single-Use Plastic Products](#): include plastic and polystyrene food and beverage containers, bottles, straws, cups, cutlery and disposable plastic bags that are designed for or intended to be used once and discarded.

[Microplastics](#): small pieces of plastic, less than 5 mm (0.2 inch) in length, that occur in the environment as a consequence of plastic pollution. Microplastics are present in a variety of products, from cosmetics to synthetic clothing to plastic bags and bottles. Many of these products readily enter the environment in wastes.

[Nanoplastics](#): are synthetic polymers with dimensions ranging from 1 nm to 1 μm . They are directly released to the environment or secondarily derived from plastic disintegration in the environment.

[Anti-Waste Law](#): France adopted its comprehensive Anti-waste Law in 2020. The law aims to eliminate waste and pollution from the design stage and transform the system of production, distribution, and consumption from a linear to a circular economic model. It encourages businesses across various sectors, municipalities, and citizens to eliminate waste and adopt more circular practices.

[Plastic Packaging Bans](#): are an effective tool to reduce the consumption of plastic bags and limit plastic bag pollution in our environment.

[Zero Waste](#): The conservation of all resources by means of responsible production, consumption, reuse, and recovery of products, packaging, and materials without burning and with no discharges to land, water, or air that threaten the environment or human health.

[Throwaway Culture](#): is the practice of throwing something out after a single use. It can also include things that end up in landfills after a few days or weeks of usage.

[Climate Change](#): periodic modification of Earth's climate brought about as a result of changes in the atmosphere as well as interactions between the atmosphere and various other geologic, chemical, biological, and geographic factors within the Earth system.

[Climate Crisis](#): is the decisive tipping point of climate change, seen as the "point of no return" where the future of life on earth is in peril.

[Sanitary Landfill](#): method of controlled disposal of municipal solid waste (refuse) on land.

Key Terms

[Secure Landfill](#): Hazardous wastes must be deposited in so-called secure landfills, which provide at least 3 metres (10 feet) of separation between the bottom of the landfill and the underlying bedrock or groundwater table. A secure hazardous-waste landfill must have two impermeable liners and leachate collection systems. The double leachate collection system consists of a network of perforated pipes placed above each liner. The upper system prevents the accumulation of leachate trapped in the fill, and the lower serves as a backup. Collected leachate is pumped to a treatment plant. In order to reduce the amount of leachate in the fill and minimize the potential for environmental damage, an impermeable cap or cover is placed over a finished landfill.

[Circular Plastic Economy](#): is a system that aims to sustainably produce, use, and manage plastics, keeping them out of landfills and the environment.

[Informal Waste Sector](#): is a collection of individuals and businesses that collect and sell recyclable materials and waste. It's a vital part of the global recycling system, but workers in this sector are often marginalized and face unsafe working conditions.

[Waste Pickers](#): are people who collect, sort, and sell recyclable or reusable materials that others have discarded. They can work in a variety of settings, including on streets, in dumpsites, and at private waste bins. Waste pickers are essential to the world's recycling systems, and their work has a positive impact on the environment, public health, and local economies.

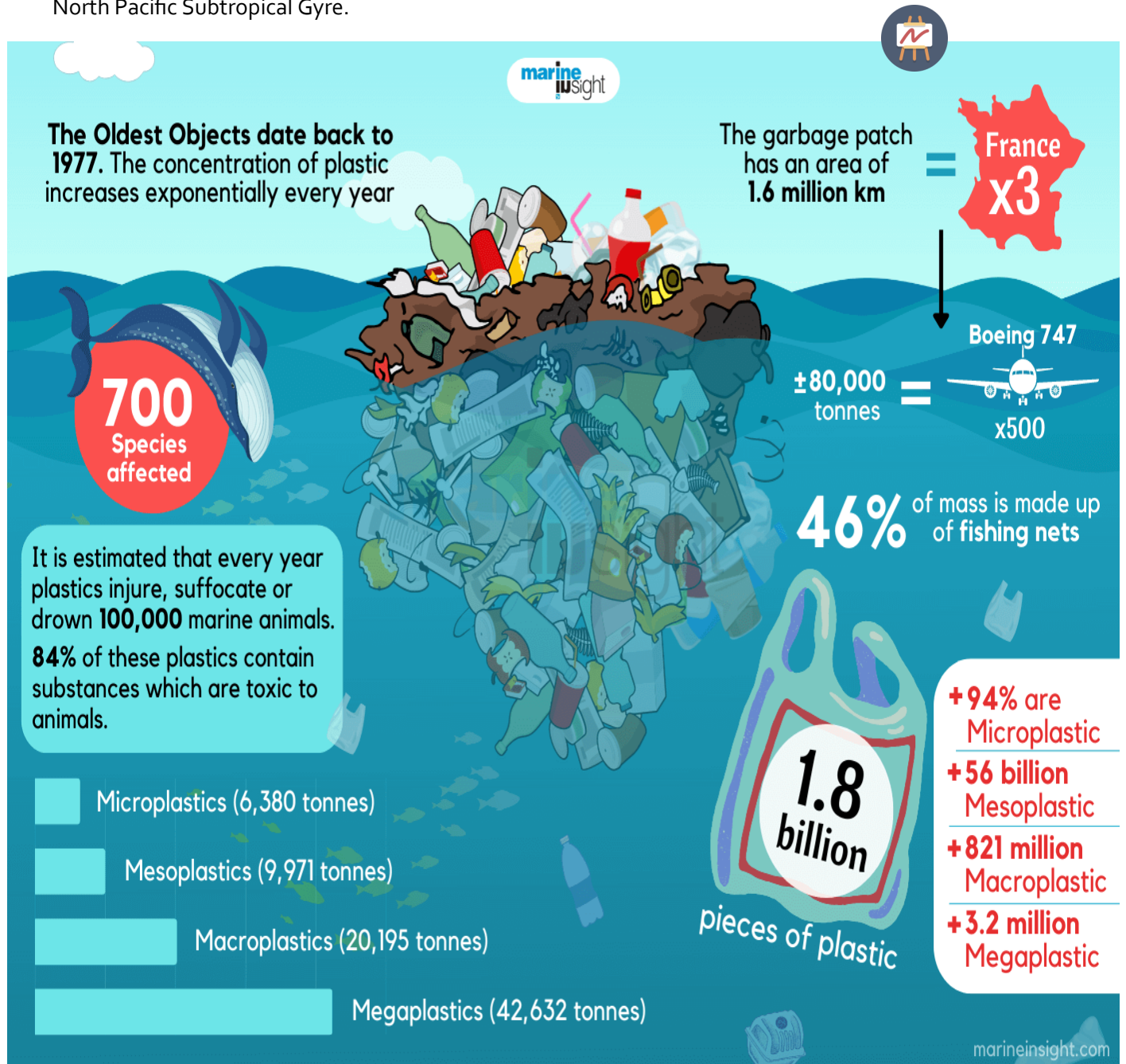
[Global Plastics Treaty](#): a new set of legally binding and equitable global agreements that define the tangible steps and timelines necessary to change how we produce and consume high-risk plastic.

[Recycling](#): recovery and reprocessing of waste materials for use in new products. The basic phases in recycling are the collection of waste materials, their processing or manufacture into new products, and the purchase of those products, which may then themselves be recycled.

[Marine Debris](#): is defined as any persistent solid material that is manufactured or processed and directly or indirectly, intentionally or unintentionally, disposed of or abandoned into the marine environment or the Great Lakes. Anything human-made and solid can become marine debris once lost or littered in these aquatic environments. Our trash has been found in every corner of our ocean, from the most remote shorelines, to ice in the Arctic, and even the deepest parts of the sea floor.

Key Terms

Great Pacific Garbage Patch: is a collection of marine debris in the North Pacific Ocean. Also known as the Pacific trash vortex, the garbage patch is actually two distinct collections of debris bound by the massive North Pacific Subtropical Gyre.



Did You Know?

Five gyres, large rotating currents, in the Pacific Ocean gather plastic into concentrated patches.

<https://www.babraham.ac.uk/blog/big-plastic-count#:~:text=Five%20gyres%2C%20large%20rotating%20currents,times%20the%20size%20of%20France>

Learning Objectives

Learning Objective 1: Students will be able to identify and explain the impact of plastic pollution on communities.

Learning Objective 2: Students will be able to identify and evaluate strategies (or policies) for addressing plastic pollution in local, national, and global contexts.

Learning Objective 3: Students will be able to explain the role of local, national, and/or international organizations in addressing plastic pollution.

Learning Objective 4: Students will be able to identify and explain how they can make a difference in combating plastic pollution individually and collectively.

Learning Objective 5: Students will be able analyze and explain how plastic pollution contributes to other societal challenges such as poverty, climate change, or global health.

Learning Objective 6: Students will be able to identify and explain the impact of plastic pollution on our ecosystem.

Learning Objective 7: Students will be able to use critical and creative thinking to design an innovative solution to address plastic pollution.



What Is Plastic Pollution?



[Plastics Activities & Lessons](#)

"A variety of lesson plans on plastic pollution based on age groups. Each plan consists of storytelling, arts and crafts, presentations, and small-group activities."



[Plastics Education Toolkit](#)

"This toolkit provides a menu of resources which educators are invited to adapt based on their unique student and classroom needs. You'll find a collection of high-quality resources developed by other organizations and original resources created by Plastic-Free MKE educators. We welcome your feedback to help us continually improve our curriculum and content."

[Plastic Pollution - United States Department of State](#)

"Plastic pollution is a global problem that affects our natural world and its biodiversity. It impacts our environment, health, food security, and economies. An estimated 11 million metric tons of plastic enters the ocean each year. Often stemming from poor waste mismanagement, plastic pollution is a major environmental issue because most plastics do not biodegrade and instead break down into microplastics. Microplastics are estimated to persist in the environment for centuries, or even longer."

What Is Plastic Pollution?

[About Plastic Products and Plastic Pollution | U.S. Environmental Protection Agency](#)

"Plastic products are generally versatile, durable and lightweight. Plastic products are prominent in the construction, transportation, and packaging industries. Plastic innovations contributed to many life-saving products that revolutionized the health care industry."



[Plastic Pollution and You: An Interdisciplinary Curriculum to Explore Our Role in Plastic Pollution](#)

"The Plastic Pollution and You curriculum is designed to supplement existing educational materials on plastic pollution and marine debris that connect students to these issues in their watershed. We offer these materials as extension activities that incorporate the social, economic, and public policy context of one of the most pressing environmental issues our society faces - plastic pollution and marine debris."

[The World's Plastic Pollution Crisis, Explained | National Geographic](#) (February 21st, 2024)

"Plastic pollution has become one of the most pressing environmental issues, as rapidly increasing production of disposable plastic products overwhelms the world's ability to deal with them. Plastic pollution is most visible in developing Asian and African nations, where garbage collection systems are often inefficient or nonexistent. But the developed world, especially in countries with low recycling rates, also has trouble properly collecting discarded plastics. Plastic trash has become so ubiquitous it has prompted efforts to write a global treaty negotiated by the United Nations."

[Everything You Need to Know About the Great Pacific Garbage Patch](#) (May 10th, 2023)

"The Great Pacific Garbage Patch (GPGP) has been making headlines for years, as it accumulates more waste and sets new records. Now, it has grown so large that it now supports an entire ecosystem of invasive species. "



[Is Recycling Worth It Anymore? The Truth Is Complicated | NPR](#) (April 21st, 2021)

"America produces more waste per capita than any other country in the world. And recycling, which was once considered the solution to that problem, isn't really working anymore. Recycling works, but it's not magic. As America continues to lead the world in per capita waste production, it's becoming more and more clear that everybody-- manufacturer and consumers-- "over-believe" in recycling."



[Plastics 101 | National Geographic](#) (May 18th, 2018)

"Once a completely natural product, much of today's plastic is man-made and largely dependent upon fossil fuels. From polymers to nurdles, learn how plastic is created and what we can do to slow the lasting repercussions this material will have on both our planet and our lives."



Global Impacts of Plastic Pollution



[Plastisphere: A Podcast on Plastic Pollution in the Environment](#)

"Plastics have become the basis for our modern lives, but they also pollute the planet. Will we be able to develop a healthy relationship with these materials we've created? Follow Anja on a journey into the world of synthetic polymers, their impacts on nature and ourselves, and the global quest to tackle plastic pollution. Each episode explores the issues from a different angle, featuring a diverse set of voices and viewpoints."

[Impacts of Plastic Pollution | U.S. Environmental Protection Agency](#)

"Plastic pollution has become ubiquitous in natural and built environments, raising concerns about potential harm to humans and nature alike. Once in the environment, research shows that plastic pollution is persistent and may take between 100 to 1,000 years or more to decompose, depending on environmental conditions."



Global Impacts of Plastic Pollution: Human Health



[Plastic and Human Health: What We Do and Do Not Know with the Minderoo Foundation](#) (May 21st, 2024)

"In this revealing episode of "Plastic Podcast," host Clark Marchese delves deep into the alarming gaps in our understanding of plastics and human health. Joined by Dr. Sarah Dunlop, Dr. Bhedita Seewoo, and Dr. Louise Goodes from the University of Western Australia, the discussion centers around their extensive research documented in the Plastics Human Health Map. This comprehensive project aggregates all known research linking plastics and their associated chemicals to human health outcomes, highlighting vast uncharted territories in scientific knowledge. The episode explores the daunting realities of microplastics and chemical exposures, the societal and environmental justice issues surrounding plastic pollution, and the urgent need for global policy changes. Listen in for an in-depth conversation that not only uncovers the hidden dangers of plastic but also emphasizes the critical need for further research to safeguard future generations."



[EP 202 - The Impact of Plastics and Plastic Pollution on Human Health](#) (January 25th, 2024)

"Plastic pollution extends beyond humans, affecting marine life and ecosystems. Microplastics from everyday products and hormone-disrupting chemicals like BPA exacerbate the problem. Addressing plastic pollution demands collective action, heightened awareness, and innovative solutions to protect the environment and human well-being. It's a call for individuals, communities, and policymakers to reassess their relationship with plastic for a sustainable future. Join Host Bernice Butler and Anja Brandon and Samantha Romanick as they unpack and explore how Plastics and Plastic Pollution impacts our human health."

[The Global Plastics Treaty: An Endocrinologist's Assessment](#) (November 14th, 2023)

"Plastics are everywhere. They are in many goods that we use every day. However, they are also a source of pollution. In 2022, at the resumed fifth session of the United Nations Environment Assembly, a historic resolution was adopted with the aim of convening an Intergovernmental Negotiating Committee to develop an international legally binding instrument on plastic pollution, including in the marine environment, with the intention to focus on the entire life cycle of plastics. Plastics, in essence, are composed of chemicals. According to a recent report from the secretariat of the Basel, Rotterdam, and Stockholm conventions, around 13 000 chemicals are associated with plastics and plastic pollution. Many of these chemicals are endocrine-disrupting chemicals and, according to reports by members of the Endocrine Society and others, exposure to some of these chemicals causes enormous costs due to the development of preventable diseases. The global plastics treaty brings the opportunity for harmonized, international regulation of chemicals with endocrine disrupting properties present in plastic products."

Global Impacts of Plastic Pollution: Human Health



[How Dangerous Are Microplastics? | DW Documentary](#) (November 1st, 2022)

"Microplastics have only recently become an issue outside the scientific world. A pioneering researcher in this field, Christian Laforsch is primarily interested in the long-term hazards they pose - something that could assume critical importance for us in the future. Microplastics can be found everywhere: in snow up in the mountains, in our rivers - and in the air that we breathe. They comprise particles so minute that they can only be seen under a microscope. Professor Christian Laforsch and his team from the University of Bayreuth have devised their own customized instruments to track down microplastics in water, the air and farmland soil. They also want to find out how dangerous they are for humans and our environment. Seema Agarwal is a chemist who knows the problem all too well from her native India. She's working on the development of organic-based plastics that are 100% biodegradable. At the same time, she's trying to reach out to the chemical industry - because in her eyes, the obvious and ultimate goal is to prevent microplastics being created in the first place."

[Harmful Effects of Plastic on Human Health](#)

"From our home habitats to the sources of our most valuable, life-sustaining natural resources, plastic now spreads to every corner of the earth. And it's starting to make us sick. It's strange to look at a bottle of soda and change our thinking from "How should I recycle this?" to "How does this plastic bottle contribute to problems around the world?", but we must. Earth's soil, water, biodiversity and even the air in our lungs depends upon it."

[Why Ocean Pollution is a Clear Danger to Human Health](#) (February 1st, 2021)

"Ocean pollution is widespread, worsening, and poses a clear and present danger to human health and wellbeing. But the extent of this danger has not been widely comprehended – until now. Our recent study provides the first comprehensive assessment of the impacts of ocean pollution on human health."



THE OCEAN POLLUTION-BERG

PLASTIC WASTE IS JUST THE TIP OF A LARGER PROBLEM

Pollution of the oceans is widespread, worsening, and in most countries poorly controlled. Human activities result in a complex mixture of substances entering the aquatic environment.

More than 80% arises from land-based sources

It reaches the oceans through rivers, runoff, atmospheric deposition and direct discharges. Ocean pollution has multiple negative impacts on ecosystems and human health, particularly in vulnerable populations

1 PLASTIC WASTE THE TIP OF THE POLLUTION-BERG

Plastic is a rapidly increasing and highly visible component of ocean pollution. An estimated 10 million metric tons enter the seas each year. Plastic pollution threatens marine mammals, fish and seabirds. It breaks down into microplastic and nanoplastic particles containing multiple manufactured chemicals that can enter marine systems, including species consumed by humans.

2 OIL SPILLS AN AQUATIC KILLER

Oil spills have occurred with increasing frequency in recent years as the result of growing global demand for petroleum. These spills have resulted in direct release of millions of tons of crude oil and other petroleum products into the oceans. Petroleum-based pollutants reduce photosynthesis in marine microorganisms that generate oxygen. They also disrupt food sources, destroy fragile habitats such as estuaries and coral reefs, and foul beaches.

2

3 MERCURY QUICKSILVER BULLETS

Mercury is released from two main sources - coal combustion and small-scale gold mining. Exposures of infants in utero when pregnant mothers eat contaminated seafood can cause IQ loss and serious developmental disorders. In adults, mercury increases risks for dementia and cardiovascular disease.

3

4 MANUFACTURED CHEMICALS A HEADY COCKTAIL

Manufactured chemicals - phthalates, bisphenol A, flame retardants, perfluorinated chemicals and pharmaceutical waste, can disrupt endocrine signaling, reduce male fertility, damage the nervous system, and increase risk of cancer. They can also damage coral reefs.

4

5 PESTICIDES COLLATERAL DAMAGE

pesticides are specifically designed to have biological effects, and thus even low-dose exposures can affect living organisms, including humans. Pesticides contribute to global declines in fish stocks, and can also reduce human fertility.

5

6 NUTRIENTS FEEDING FRENZY

Industrial releases, runoff from animal feedlots and human sewage increase frequency and severity of harmful algal blooms (HABs), bacterial pollution and anti-microbial resistance.

6

THE WAY FORWARD

World leaders who take bold, evidence-based action to stop pollution at source will be critical to preventing ocean pollution and safeguarding human health. Measures such as these could help with the six problems:

- 1 Better management of plastic waste
- 2 Wide-scale transition to renewable fuels
- 3 Banning mercury use
- 4 Chemical control policies
- 5 Bans on persistent organic pollutants (POPs)
- 6 Better treatment of sewage
- ALL Transition to a circular economy

FOR MORE INFORMATION, SEE THE FULL PAPER AT:
<http://bit.ly/pollutionberg>



BOSTON COLLEGE



CENTRE SCIENTIFIQUE DE MONACO



DESIGNED IN 2020 BY WILL STAHL-TIMMINS

Global Impacts of Plastic Pollution: The Environment



[Be the Wave: Plastic Pollution Lesson Plan](#)

"This Lesson aims to develop understanding of plastic pollution and the impact it can have on the marine environment and the wildlife it supports."



[A Plastic Ocean: Coca-Cola's Hidden Secrets](#) (December 9th, 2023)

"A staggering ten tons of plastic is churned out each second, with 10% of this ending up in our oceans. Dire predictions warn that by 2050, the seas will harbor more plastic than fish. Confronted by this global crisis, numerous businesses, including the Coca-Cola Company, pledge to embrace recycling, despite selling a whopping 4000 plastic bottles every second worldwide. Can we trust these multinational commitments, and is recycling truly the panacea? Our investigation into these corporate assurances reveals that their promises are as saccharine-laden as their products."



[\(PLASTIK\) – A Wake Up Call to End Plastic Pollution](#) (June 3rd, 2022)

"'(PLASTIK)' is the first short film made in Asia that uses creative storytelling and live action drama to raise awareness and catalyse action to end plastic pollution in the region. The film aims to visually narrate, particularly in a South-East Asian context, the social implications of plastic pollution; increase empathy for the crisis; and activate emotions that will drive behavioural change amongst youth in the region to say no to single-use plastic."

[The Detrimental Impacts of Plastic Pollution on Animals](#) (May 4th, 2022)

"In just over 70 years, our dependence on the albeit efficient and cheap material that is plastic has skyrocketed to unsustainable levels. Yet as the global production and consumption of this material continues to soar, we are not disposing and recycling plastics at the same rate. Global plastic pollution jumped from two million tonnes in 1950 to 348 million tonnes in 2017 and is projected to double by 2040. What's left behind is incredibly harmful to all wildlife animals and to humans. Here's how plastic pollution impacts animals."



[How Does Plastic Get into the Ocean? \(Grades 6-12\)](#)

"Follow this progression to help your child learn more about plastic pollution and to encourage them to take action to reduce single-use plastics."

[A Plague of Plastics](#) (June 1st, 2019)

"From the Arctic to Antarctica, ocean debris is killing marine wildlife—but we still have the power to stop plastic pollution."

*From the Arctic to
Antarctica, ocean
debris is killing
marine wildlife—
but we still have
the power to stop
plastic pollution.*

The albatross carcass, and one
of its chicks, were found
with plastic trash on Midway
Island, where scientists estimate
80 percent of the birds have
some plastic in their stomachs.

a Plague of Plastics

Global Impacts of Plastic Pollution: The Economy

[Microplastics Pollution: Economic Loss and Actions Needed](#) (April 26th, 2023)

"Microplastics originate from plastic bottles of water and soft drink, plastic bags, tire wear, plastic agricultural mulches and 3D printing. These small fragments of wastes being 1 µm to 5 mm pollute the environment and threaten human health and ecosystem services including crops and others, leading to economic losses. It is predicted that by 2030, plastic productions will be leading environmental pollution in terms of carbon footprint and toxic chemicals, making U.S. the world's largest plastic waste generator. Based on reports from the United Nations Environment Assembly (UNEA) and the United Nations Environmental Program (UNEP), plastics in the environment annually burden the global economy by \$19 billion, causing concerns for long-term ecological sustainability and the Global Goals. It is reported that about 8.3 billion tons of plastic waste have been created, leading to 4.9 billion tons discarded through landfilling globally, causing a yearly financial loss of more than \$13 billion."



[Meet 8 Young Founders Turning Trash into Cash | World Wide Waste | Business Insider](#) (December 28th, 2022)

"Young inventors and entrepreneurs across the world are coming up with new ways to deal with waste. These businesses are paving the way for a new generation of creative solutions to our trash problem."

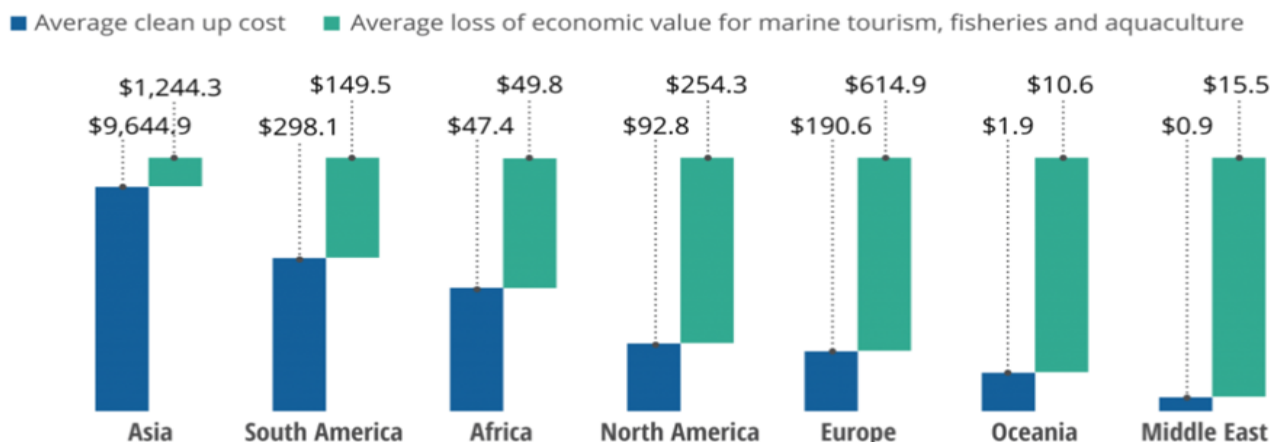


[How People Profit Off India's Garbage | World Wide Waste | Business Insider](#) (July 27th, 2022)

"India has more people and produces more garbage than nearly every other country in the world. Many make a living off that waste, from ragpickers to entrepreneurs. Join us as we look at how they turn trash into shoes, tiles, teddy bears, and more."

FIGURE 1

An overview of the cost components in 2018 by region, values in USD million



Source: Deloitte analysis based on The Price Tag of Plastic Pollution.⁷

Plastic Pollution in Washington State

[Most Plastic Foam Containers Banned in Washington Starting June 1](#) (May 30th, 2024)

“Your to-go box and other food service items will be changing starting this summer. Beginning June 1, restaurants, businesses, organizations, or other institutions will no longer be able to provide expanded polystyrene foam coolers, cups, trays, bowls, or clamshell containers to customers, the Washington State Department of Ecology said.”

[Washington Becomes the Latest State to Tackle Plastic Pollution](#) (May 11th, 2023)

“Washington recently joined several other states in seeking to address plastic pollution through restrictions on specific types of products when Governor Jay Inslee signed HB 1085, which takes a multipronged approach to reducing plastic pollution, addressing plastic water bottles, then overwater structures, then guest toiletries. The provisions of the new law will come into force according to a staggered schedule, with the earliest taking effect on January 1, 2024 and the last taking effect three years later. Because of its unique approaches, the most significant effects will likely be felt not by product manufacturers, but rather in the real estate, construction, and hospitality sectors.”

[Reducing Plastics in Washington: New State Laws Will Help U.S. Plastic Pact's Roadmap to 2025 Goals](#) (June 21st, 2021)

“Plastic pollution is everywhere and poses a threat to human health, wildlife, and the environment. During production, use, incineration, or its slow disintegration to particles visible only with a microscope, harmful chemicals are released or leach out of plastics and into the surroundings. They can include dioxins, phthalates, vinyl chloride, ethylene dichloride, lead, cadmium, and other toxics.”

[Plastics | Department of Ecology, State of Washington](#)

“Plastic pollution is a problem deeply interwoven into our economy. The once-hailed “miracle material” that has revolutionized manufacturing is increasingly shedding, spreading, and remaining, in our water, soil, and air. Areas left unscathed are virtually nonexistent. Plastic has found its way into the depths of the Mariana Trench and heights of Mount Everest. Commercials may depict pristine beaches and trails, but the actual shores and outdoors are clogged with cheap junk that will long outlive the next seven generations. Washington alone disposed of 330,990 tons of plastic packaging in 2017. As the state’s regulator of waste and its pollution, we approach plastics issues on a number of fronts, to promote our mission to reduce waste and promote material reuse.”

[Zero Waste Washington](#)

“Achieving Zero Waste plays a significant role in reducing greenhouse gas emissions. It saves natural resources. Less waste means less plastic pollution and fewer toxic chemicals in our environment.”

Plastic Pollution in Washington State

[Partnering with Native Communities to Take on Marine Debris](#) (November 12th, 2020)

"In celebration of National Native American Heritage Month, the NOAA Office of Response and Restoration's Marine Debris Program and Assessment and Restoration Division are highlighting examples of collaboration with native communities, nations, and peoples."



[The Plastic Problem - A PBS NewsHour Documentary](#) (November 27th, 2019)

"By 2050 there will be more plastic than fish in the oceans. It's an environmental crisis that's been in the making for nearly 70 years. Plastic pollution is now considered one of the largest environmental threats facing humans and animals globally. In "The Plastic Problem: PBS NewsHour Presents", Amna Nawaz and her PBS NewsHour colleagues look at this now ubiquitous material and how it's impacting the world, why it's become so prevalent, what's being done to mitigate its use, and what potential alternatives or solutions are out there. This hour-long program travels from Boston to Seattle, Costa Rica to Easter Island to bring the global scale of the problem to light."

Connecting the Local to Global: How France is Combatting Plastic Pollution

[Plastic Odyssey: The Global Network Serving Plastic Emergency](#)

“Plastic Odyssey is a global project to reduce plastic pollution in the ocean by creating a worldwide network of local recycling initiatives. The project is supported by various actors who all share the desire to build a world in which plastic waste does not end up in the Ocean.”



[Écotable](#)

“Écotable was born from the desire to help restaurant owners in their ecological journey. The SSE company has created a range of tools to help them: an environmental impact measurement platform, a directory of virtuous suppliers and educational tools. In order to promote restaurants that are committed to the environment, Écotable has created the first sustainable restaurant label in France. The company has built a network and a community around the same mission: to make the restaurant industry more sustainable.”

[Trash and Recycling in France](#) (September 16th, 2024)

“We deal with trash every day, but how much do you really know about recycling and waste collection in France? Read on to find out more.”

[Understanding France’s Ban on Plastic Packaging for Fruits and Vegetables](#) (August 15th, 2023)

“The landmark prohibition results from collaborative efforts and public consultations aiming to crack down on plastic pollution.”



[UN Talks on a Treaty to End Global Plastic Pollution Open in Paris | France 24 English](#) (May 30th, 2023)

“A United Nations committee met in Paris Monday to work on what is intended to be a landmark treaty to bring an end to global plastic pollution, but there is little agreement yet on what the outcome should be.”

Connecting the Local to Global: How France is Combatting Plastic Pollution



[Plastic Pollution is a 'Time Bomb' Warns France's President Macron](#) (May 29th, 2023)

"French President Emmanuel Macron warns that global plastic pollution is a 'time bomb' as delegates begin five days of talks in Paris aimed at reaching an international treaty to end plastic waste."

[FR Early Warning Assessment Related to the 2025 Targets for Municipal Waste and Packaging Waste](#) (June 2022)

"This assessment has been prepared by the ETC/WMGE and the successive ETC/CE under guidance of the European Environment Agency and with inputs from a consortium led by Rambøll Group under contract with the European Commission. It builds to a large extent on the answers provided by the Ministry for the Ecological Transition/CGDD/SDES (Commissariat général au développement durable (CGDD) / Service des données et études statistiques (SDES)) in March 2021 to a questionnaire to a questionnaire developed by the EEA and ETC/WMGE. The EEA and ETC/CE would like to thank the French authorities for the information provided and for the kind review of drafts of this assessment in 2021 and May 2022."



[5 Facts About Plastic Pollution in the Mediterranean French Coast](#) (August 23rd, 2019)

"With its legendary beaches, its dream climate and outstanding nature, the French Riviera is one of the most glamorous coasts of the Mediterranean. But even this heaven has become a plastic hell. Let's get to know some key facts about plastic pollution in France."

Innovative Approaches to Combat Plastic Pollution



[How Cheap the Cleanup of the Great Pacific Garbage Patch Truly Is](#) (September 7th, 2024)

"Yesterday, The Ocean Cleanup vessels returned to San Francisco with tons of trash onboard and exciting news on what it will concretely take to clean up the Great Pacific Garbage Patch. The real-world performance of System 03 during the past 12 months has demonstrated that the Great Pacific Garbage Patch can be cleaned in 10 years' time at a cost of 7.5 billion dollars. In the meantime, to accelerate the cleanup, we are developing methods to use GPS trackers and directly measure plastic concentrations with drones: hotspot hunting. We now have the technology to clean up the Great Pacific Garbage Patch; the only thing standing between the world and clean oceans is money. So we call upon the world—the governments, the companies, and the individuals—to make this cleanup happen."



[The Problem with Plastic and How We Can Solve It | BBC Ideas](#) (May 18th, 2024)

"Plastic is one of the most incredible materials in the modern world - but the way we use it damages the environment. What's the solution?"

[A Circular Economy for a Healthy People and Planet](#) (April 30th, 2024)

"Our economies have for too long been built on the relentless extraction, use and wasting of resources, which destroys nature, warms the climate, pollutes ecosystems, feeds inequalities and throws away resources that still have huge value to economies. So, reducing the resource intensity of key economic sectors and adopting circular models is central to achieving the Sustainable Development Goals. To hitting the targets set by global agreements on climate, biodiversity, chemicals and pollution. To delivering equity, justice and a healthy planet for all."



[Cleaning Up the Great Pacific Garbage Patch \(With A Gigantic Net\) | A Brief History of the Future](#) (April 15th, 2024)

"Boyan Slat, the founder of The Ocean Cleanup, highlights that instead of waiting for someone else to solve problems, we should actively engage in finding solutions to the issues that bother us."

Innovative Approaches to Combat Plastic Pollution



[Plastic Waste May FINALLY Have a Solution!](#) (March 26th, 2024)

"Plastic has become synonymous with modern human life. We use it in almost everything single product we touch and use, each and every day. And there has been SO much innovation and R&D spent on making plastic better. But what about at the end of life? How do we deal with the huge amounts of plastics being produced around the world? I wanted to figure out the scale of this problem, and why its such a challenge. I can't believe how much I learned by partnering with Aduro Clean Technologies, so let's see if we can figure out Plastic Waste Recycling, together!"



[Combatting Plastic Pollution: A New Nature-Inspired Solution](#) (March 13th, 2024)

"Plastic pollution extends beyond what meets the eye, with microplastics posing a significant threat to both the environment and human health. These tiny particles result from the breakdown of larger plastics, and are omnipresent in various products, including cosmetics, and accumulate in our waterways and bodies. However, there's hope in the form of cellulose, an eco-friendly alternative derived from plants and bacteria. Scientists at Cellugy are pioneering the use of bacteria found in fermentation to produce cellulose at scale for cosmetics and personal care products. This natural substance not only offers a safe alternative to plastic-based ingredients but also boasts the ability to trap water, oil droplets, vitamins, and pigments, providing effective skincare solutions while reducing our reliance on harmful plastics. Embracing sustainable alternatives like cellulose is crucial in combating plastic pollution and safeguarding our planet for future generations."

[5 Innovative Ways We Are Tackling Plastic Waste](#) (December 8th, 2023)

"While plastic has become a vital part of modern life, plastic pollution is a threat to the planet and our health. These innovations are helping to recycle more plastic, reduce microplastics in water and cut emissions. Building a circular economy to reduce plastic waste is a key focus of the World Economic Forum's Global Plastic Action Partnership."



[Most Ocean Plastic Flows from Rivers. Can Giant Trash Barriers Stop It? | World Wide Waste](#) (May 1st, 2023)

"The Ocean Cleanup started removing plastic from the ocean a decade ago. But most of that plastic comes from rivers, so it started building solar-powered river cleaners to catch garbage before it goes out to sea."

Innovative Approaches to Combat Plastic Pollution



[What Can Be Done About The Plastic Crisis? \(Part 2\) | Drowning in Plastic | Earth Stories](#) (January 13th, 2023)

"The world is waking up to one of the biggest threats to our planet. Nearly all the plastic that has ever been made still exists and most of it is now floating in our seas and oceans. Leading scientists are frantically trying to understand the problem. Other natural disasters have had decades of intensive research; but research into the effect of plastics on marine life began in earnest just five years ago. The race is on to understand the scale of the problem and find a solution before the life in our oceans is irreparably damaged forever."



[What Can Be Done About the Plastic Crisis? \(Part 1\) | Drowning in Plastic | Earth Stories](#) (December 31st, 2022)

"The world is waking up to one of the biggest threats to our planet. Nearly all the plastic that has ever been made still exists and most of it is now floating in our seas and oceans. Leading scientists are frantically trying to understand the problem. Other natural disasters have had decades of intensive research; but research into the effect of plastics on marine life began in earnest just five years ago. The race is on to understand the scale of the problem and find a solution before the life in our oceans is irreparably damaged forever."

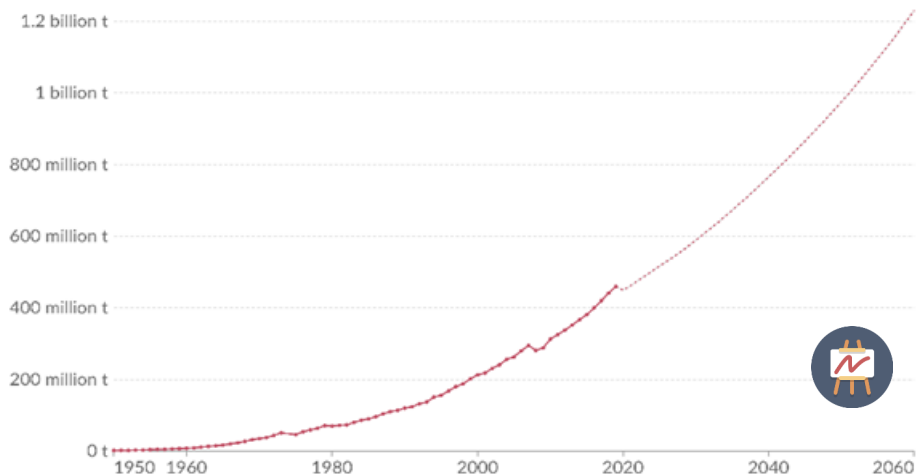


[How to Clean Up the World's Most Polluted Rivers](#) (August 3rd, 2022)

"It's estimated that every year, millions of tons of plastic enter the ocean through rivers, and as global waste generation increases, the problem is poised to worsen. But a host of companies from Baltimore, Maryland to Bengaluru, India are working on the issue, developing novel methods to capture trash from rivers before it reaches the ocean."

Global plastic production with projections, 1950 to 2060

Annual production of polymer resin and fibers. Projections are based on the "business-as-usual" scenario which assumes that current policies remain unchanged in the foreseeable future.



Data source: Geyer et al. (2017); OECD (2022)

OurWorldInData.org/plastic-pollution | CC BY



TAKE ACTION: Combat Plastic Pollution in Your Own Lives

[From Students to Activities: Lesson Plans on Plastic Pollution and Our Zero Waste Future \(6-12 Years of Age\)](#)

"Discuss how plastic pollution happens and how it can be avoided. Use simple yet informative videos to spark curiosity about plastic pollution."



[Innovative Approaches to Combat Plastic Pollution – Virtual Event](#) (September 19th, 2024)

"Dive into a dynamic 90-minute session with Global Classroom as we tackle the urgent issue of plastic pollution. This **FREE** virtual event features innovative strategies from French experts visiting Seattle as part of the U.S. Department of State's premier professional exchange program, the International Visitor Leadership Program (IVLP), centering groundbreaking approaches to combatting plastic waste globally. Learn about innovative technologies and solutions driving a circular economy, explore ambitious city-wide policies aimed at eliminating single-use plastics, and discover sustainable practices within the hospitality industry. Additionally, hear about the role of climate activism and grassroots movements in addressing plastic pollution and promoting systemic change. This session will provide a comprehensive overview of ongoing efforts and future directions in combating one of today's most pressing environmental challenges."



[Lesson 1: SDG #13: Climate Action](#) (June 2023)

"In this lesson, students learn about United Nations Sustainable Development Goal #13: Climate Action. They will examine the causes and consequences of climate change and explore possible courses of action to address the issue. Students will engage in activities to reflect on previous knowledge, develop new learning, and encourage creative and critical thinking."



[Lesson 11: SDG#14: Life Below Water](#) (June 2024)

"In this lesson, students explore United Nations Sustainable Development Goal #14: Life Below Water. Through individual and collaborative activities, they will learn the importance of conserving and sustainably using oceans, seas, and marine resources. In small groups, students will assess how proactive policies, and collective action can address ocean challenges. They can choose to evaluate issues like plastic waste, warming oceans, acidification, or damaged ecosystems."



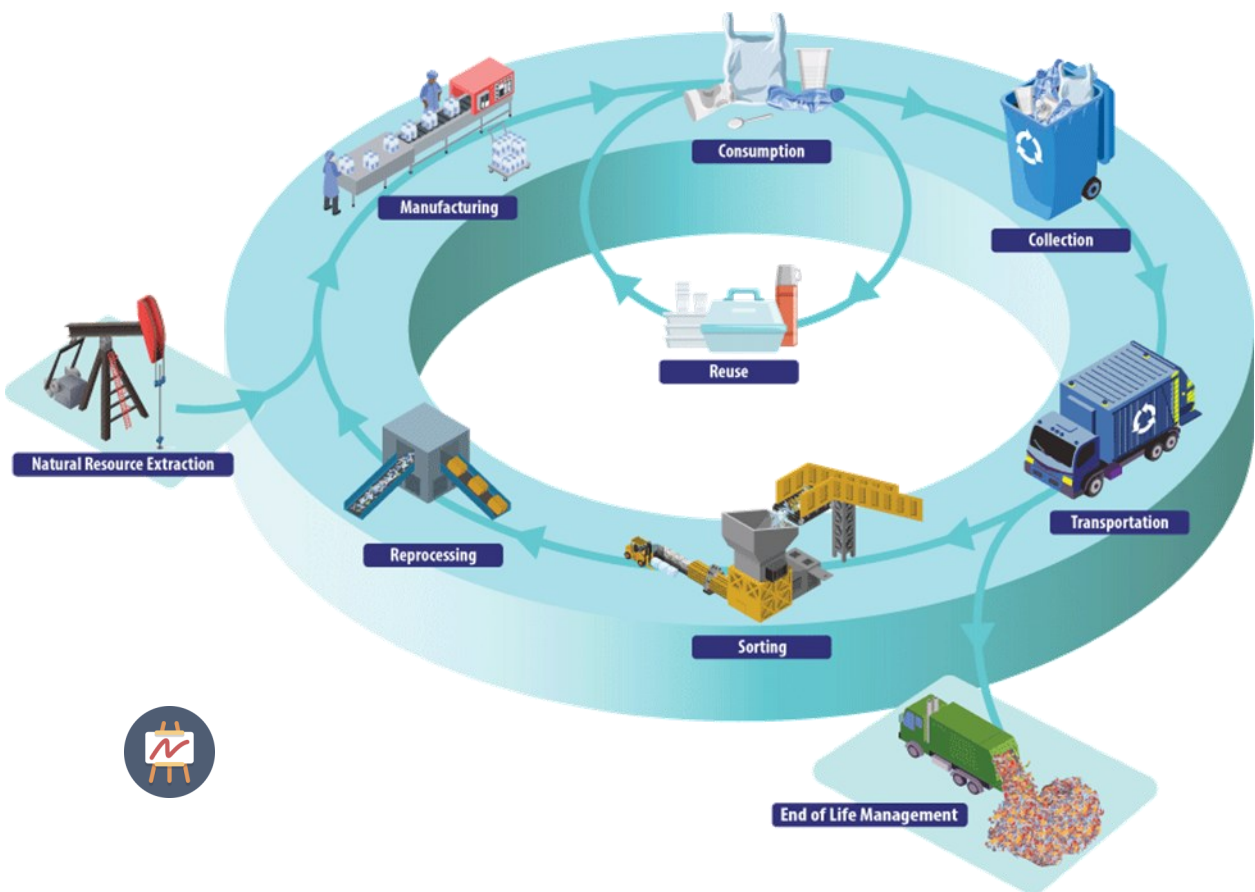
[Lesson 12: SDG #15: Life on Land](#) (June 2024)

"In this lesson, students will comprehensively understand SDG #15: Life on Land, including its key targets and significance. They will learn the importance of sustainable practices to protect and restore biodiversity, exploring how economic activities like agribusiness drive deforestation and its broader impacts."

TAKE ACTION: Combat Plastic Pollution in Your Own Lives

[Plastic Material Recovery | King County](#)

"King County has a Zero Waste of Resources by 2030 goal referenced in King County Code (KCC 10.14.020), the Strategic Climate Action Plan, and 2019 Comprehensive Solid Waste Management Plan. In 2019, plastics comprised of more than 14% of what was disposed at Cedar Hills Regional Landfill. This represents a significant wasted resource that could be prevented upstream or recovered and transformed into a new product."



[SwopItUp Podcast](#)

"Youth talking eco-truth, from fast fashion and consumerism to plastic pollution and solutions to the climate crisis. Listen for tips on being environmentally friendly!"

[Seattle Aquarium: Plastic Pollution: A Global Threat](#)

"Everyone can make individual choices right now to reduce our reliance on plastics and keep them from ending up in the ocean."

Photo Bibliography

Cover Image

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Introduction to Session Moderator

<https://powerknot.com/2023/02/20/how-ships-are-fueling-the-global-plastic-pollution-crisis/>

Key Terms

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Learning Objectives

<https://earth.org/plastic-pollution-animals/>

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