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Human Nature Projects Ontario Newsletter



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OCEAN ACIDIFICATION THREATEN SHELLFISH LIFE

INTRODUCTION

According to estimations, the ocean takes up roughly the same amount of CO₂ annually as all of the world's forests (Jet Propulsion Laboratory, 2022). Scientists and biologists are worried about how much CO₂ the ocean takes in. As CO₂ dissolves in the oceans, the seawater's chemistry changes. It becomes more acidic and has lowered its pH by up to 30% over the previous 200 years (Fitzer, 2019). Crabs, clams, and other shellfish have a hard time growing their shells to the necessary strength because they absorb CO₂. The global supply of shellfish is facing significant challenges due to the increasing acidity of the oceans (Fitzer, 2019). These organisms need their shells as protective habitats, as the acidity of water can kill them (Jet Propulsion Laboratory, 2022).



Figure 1. Shellfish Impacts in Various pH Level (NOAA Fisheries, 2019).

WHAT HAPPENS TO SHELLFISH?

Shellfish include organisms like mussels, oysters, and corals that create calcium carbonate shells and skeletons (Fitzer, 2019). They form their protective shell structures and filter calcium and carbonate from the water to produce hard minerals like calcium carbonate. Researchers from Milford Lab collected samples from two systems of experimentation to investigate the effects of increasing acidity in the water on shellfish (NOAA Fisheries, 2019). In the first experiment, "seed" oysters that were seven months old were the subjects. Scientists at Milford examined respiration, growth, and feeding in two groups of oysters—one fed and the other unfed—over the course of ten weeks in November and December 2018 at three distinct pH levels. The study discovered that oysters from the low-pH treatment had shell weights that were much lower than those of oysters kept at the standard pH level of the water (NOAA Fisheries, 2019). The Olympia oyster and the Pacific oyster were the subjects of research by additional researchers from the University of Washington School of Aquatic and Fishery Sciences (DiNicola, 2020). Researcher Laura Spencer found that when subjected to acidity and warmth throughout the winter, Olympia oyster adults were found to be relatively resilient. This resilience can help the future oysters by enhancing their chances of survival. In another study, adult Pacific oysters were similarly exposed to lab circumstances that were acidic; however, they did not survive as well in their experimental conditions as Olympia oysters did (DiNicola, 2020).

OCEAN ACIDIFICATION THREATEN SHELLFISH LIFE

EFFECTS OF OCEAN ACIDITY ON SHELLFISH CAUSES CHAIN REACTION

The lack of a protective shell can affect growth of the shellfish along with the overall survival of the organism. The weakened shells make the shellfish more susceptible to predation and enable them to thrive in their habitats. The consequences extend beyond the individual organism, affecting entire ecosystems and the human communities that depend on them.

Firstly, there will be an increase of dead zones. Shellfish are filter-feeding organisms and without these, nutrients will start to accumulate. This event is known as Eutrophication. Eutrophication occurs when there is a rapid entry of nutrients, usually due to fertilizer runoff or waste. In the absence of shellfish, bacteria and algae will consume the nutrients, as well as the oxygen leaving the rest of the organisms with no oxygen. A no oxygen area is called the dead zone, where many aquatic organisms will die.

Moreover, the food web will collapse. Many organisms in the marine ecosystems depend on each other for food. Shellfish are a key in this food web. As the shellfish population decreases, species such as Atlantic cod, salmon, pollock and coastal waterbirds will lose their main food source and eventually cause a decline in these populations as well.

Furthermore, the economy will suffer. Acidification reducing the size and abundance of shellfish results in fishermen experiencing decreases in harvest and at the same time, consumers facing changes in prices.

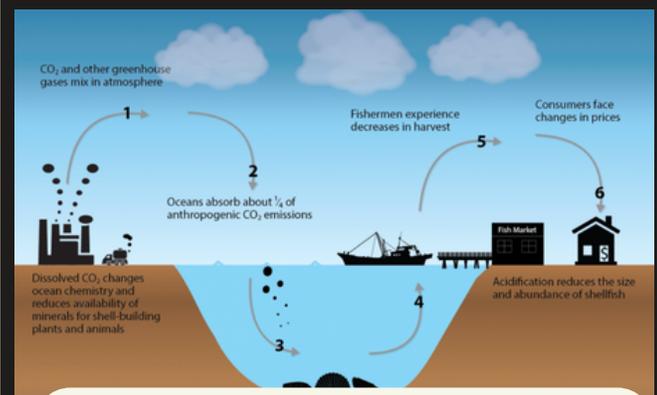
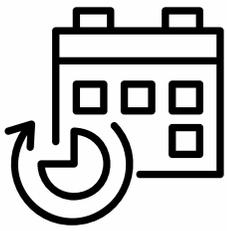


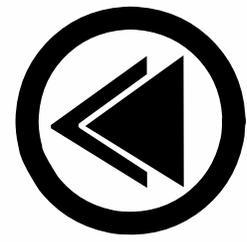
Figure 2. Ocean Acidification Impact Pathway for Shellfish (EPA, 2015).

ADDRESSING THE ISSUE + NEXT STEPS

Next steps include addressing the issue. Advocating and addressing the effects acidification has on aquatic creatures and humans is essential. Day to day actions can be taken to reduce overall climate change issues which will also reduce ocean acidification. Simple actions such as taking the transit, carpooling, and reducing waste can all help with this situation.



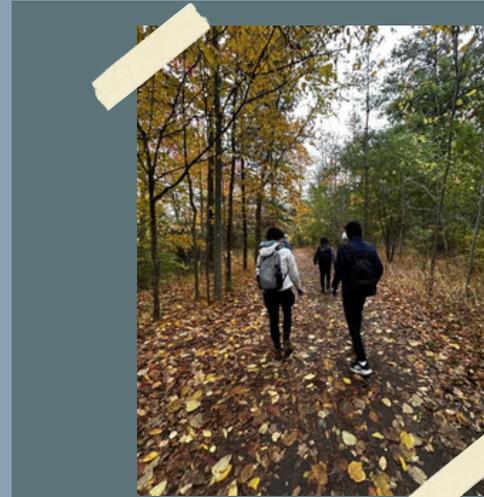
EVENT RECAP!!



TREE PLANTING EVENT

A massive thanks to the 40+ incredible individuals who rolled up their sleeves for our recent Tree Planting Event! Together, we planted an impressive 100 trees of six different species—a solid step toward a greener tomorrow.

Special thanks to our partners at Credit Valley Conservation (CVC) for their invaluable support in bringing this vision to life. Your collaboration made all the difference.



COMMUNITY CLEANUP

Thanks to the awesome crew of 20+ who pitched in for our Community Cleanup Event, we were able to tackle three whole trails, and ridding them of all garbage!

Special thanks to our sponsors for the donations, and to our pals at Eco Spark for helping us with this event—we appreciate the teamwork!

OCEAN ACIDIFICATION THREATENS CORAL REEFS

INTRODUCTION

In the fight against climate change, the population is forced to focus on the ecosystems and environments that are most affected. While forestry is a primary focus, the largest problem at stake are the oceans, as they host a habitat for millions of species, including coral reefs. Coral reefs however are facing mass deterioration, as ocean acidification continues to infect water bodies and every species living in them. In this article, we will briefly investigate what ocean acidification is and how it is affecting the development and growth of coral reefs and aquatic life as a whole.



Figure 1. A coral reef in the Great Barrier Reef (Olivia Lai, 2023).

WHAT IS OCEAN ACIDIFICATION?

Julia Jacobo from ABC News credits the process of ocean acidification to excessive levels of CO₂ (carbon dioxide) being stored in the oceans. An article explaining ocean acidification states that ocean acidification is “caused primarily by an uptick in carbon dioxide absorption from the atmosphere.” In simpler terms, excess carbon dioxide requires itself to be stored somewhere (Julia Jacobo, 2023). Since the oceans cover 71% of the Earth’s surface, water serves as a primary deposit for CO₂. Despite the mass and area the oceans uphold, ocean acidification is responsible for destroying the natural cycle of species, specifically aquatic plants. For example, Olivia Lai from Earth.org reported on a 2 degree Celsius increase in water temperature in Mexico (Olivia Lai, 2023). In her study, they found that “Mexico observed severe disturbances on coral photosynthesis and calcification. In contrast, the experimental simulation of the expected OA conditions by 2100 caused moderate changes in coral performance” (Olivia Lai, 2023). Whether the impact of ocean acidification is either extreme or moderate, there is still a significant amount of changes happening to coral reefs and aquatic plant life.

OCEAN ACIDIFICATION THREATENS CORAL REEFS

IMPACTS OF DECLINING POPULATION

Coral reefs are “known as the rainforest of the sea and the foundation of the ocean, and they are dying almost everywhere they are found” (Julia Jacobo, 2023). Commonly mistaken for plants, coral reefs are aquatic animals that encourage biodiversity within species of fish, delay storms and provide a livelihood for over one billion people (Olivia Lai, 2023). While coral reefs cannot absorb carbon dioxide and therefore cannot participate in carbon mitigation, they are an adaptable species, as some evolve to have harder shells and increased heat tolerance to avoid complete bleaching (Olivia Lai, 2023). Despite coral reefs adaptations to ocean acidification, this does not reduce their environmental importance. Reefs are “essential to both marine and land dwelling species, as about 25% of all marine life depends on coral reefs (Julia Jacobo, 2023). Scientist Danny DeMartini states that select fish populations and reefs have dropped up by 50% in the last 10 years (Julia Jacobo, 2023).



Figure 2. Kuleana Coral Reefs is working on restoring Hawaii’s coral reefs (Julia Jacobo, 2023).

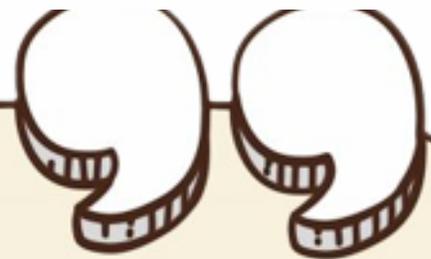
PREVENTION

Recently, the IAEA has established the Ocean Acidification International Coordination Centre (Vladimir Tarakanov, 2022). The Centre aims to unite researchers and organizations in defeating the overarching problem of ocean acidification. The OA-ICC commits to the following requirements in enhancing ocean acidification research and finding new ways for prevention:

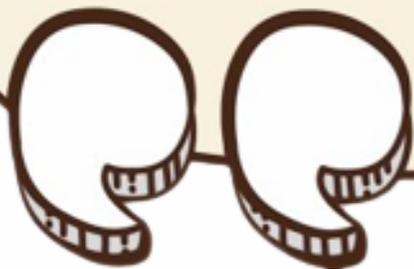
- Organizes training courses around the world; provides access to data; and manages a dedicated, open-access website that offers a steady stream of scientific reports, media coverage, policy briefs and other materials on ocean acidification.
- Promotes the development of data portals, standardized methodologies and best practices.
- Raises awareness among relevant stakeholders and informs them about the role nuclear and isotopic techniques can play in assessing ocean acidification’s impacts.
- Supports the Global Ocean Acidification Observing Network (GOA-ON) — a community providing information on ocean acidification monitoring facilities and access to real-time data.
- (Vladimir Tarakanov, 2022)

Thanks to the IAEA, research for ocean acidification continues to grow and eventually, there may be a definitive solution to the problem as a whole.

EXECUTIVE OF THE MONTH



Hello everyone, I'm Puneet Khaira! Here's a bit about me and my time here at HNP!



1. What do you enjoy most about being on the HNP team?
My favorite part of HNP is working with all the people! Since I first joined the team, in February, everyone has been consistently kind and fun to collaborate with 😊



2. Tell us more about the recent task you've been working on.

Ridah (she's awesome!!) and I are in the early stages of planning the BC branch for HNP! I'm so excited to see how everything unfolds!

3. Tell us more about the significant role you play in being a part of the executive team.

Since I'm the Secretary, I try to help out with tasks wherever possible, by sending out weekly recap emails, managing departmental meeting attendances, and answering any of the executive's questions!

4. What is something you learned while being a part of the HNP team?

I learned how incredible teamwork can be! Any task that once seemed difficult is always carried out spectacularly because of how talented everyone on the HNP team is ❤️

5. What is your most memorable experience with HNP?

This is such a difficult question to answer, but I would have to say the Youth Environmental Advocacy Fellowship! It was amazing to see just how much the participants of the fellowship enjoyed the week-long experience!

6. How does it feel to be a member of the HNP team?

Being a part of this team has truly been a life-changing experience! I'm so thankful that a best friend recommended me to apply for a position at HNP. Knowing that I'm working with such supportive individuals to mitigate climate change makes this experience extremely rewarding!



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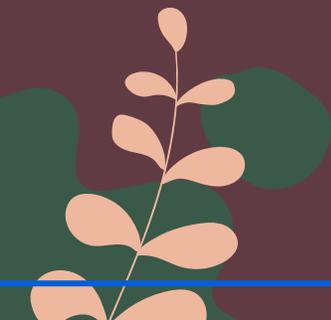
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