

# *ECO*<sub>2</sub>

HM's Premier Environmental Journal

Volume I Issue 1  
February 2019

## Letter From the Editor

Dear Readers,

This is the first issue of ECO<sub>2</sub>, Horace Mann's premier environmental magazine! ECO<sub>2</sub> is pronounced "Eco," but spelled with the formula of carbon dioxide, a greenhouse gas. This publication will provide the HM community with in-depth articles on climate, energy, and the environment—topics underrepresented in the media today. Articles examine events through a scientific, political, or social lens, with news stories incorporating interviews as well.

I would like to give a huge thank you to everyone that contributed to this issue, whether it was submitting art or writing an article. I would like to thank our editorial board especially, for all of the time and energy that they've dedicated to this issue. And finally, I would like to thank our incredible advisor Dr. Reesbeck, who has made all of this possible. It has been such an honor to work with so many amazing people throughout this process and I am looking forward to the rest of the year!

We hope that this issue sparks some interesting discussions, from the controversy of nuclear energy to the effects of ecotourism to the sustainability initiatives at HM. One recurring theme you'll see throughout is the underlying connection between environmental and social issues, which is becoming increasingly important as climate change progresses. Thanks for reading and enjoy the issue!

Silvia Wang  
Editor-in-Chief



## Editorial Board

Silvia Wang  
*Editor-in-Chief*

Andre Dang  
Margot Rosenblatt  
*Executive Editors*

Bradley May  
Madison Li  
Silvia Wang  
*Layout Editors*

Edward Ahn  
*Senior Editor*

Madison Li  
Kiara Royer  
Euwan Kim  
Mayanka Dhingra  
*Junior Editors*

Dr. Reesbeck  
*Faculty Advisor*

### Fair Use Notice

This publication contains or may contain copyrighted material, the use of which has not always been specifically authorized by the copyright owner. We are making such material available in our efforts to advance understanding of environmental issues in our school community. We believe this constitutes a "fair use" of any such copyrighted material as provided for in section 107 of the US Copyright Law. In accordance with Title 17 U.S.C. Section 107, this publication is distributed without profit for research and educational purposes. If you wish to use copyrighted material from this publication for purposes of your own that go beyond "fair use", you must obtain permission from the copyright owner.



# Table of Contents

## Current Events

<b>Do Ecotourists Save Rainforests?</b>	<b>04</b>
Euwan Kim	
<b>Air Pollution in New York City</b>	<b>06</b>
Silvia Wang	
<b>Ten Marks of Progress and Hope</b>	<b>09</b>
Margot Rosenblatt	

## Science

<b>Nuclear Energy</b>	<b>10</b>
Berk Balkir	
<b>Coral Bleaching</b>	<b>12</b>
Mayanka Dhingra	
<b>Each Moo Comes at a Price</b>	<b>14</b>
Arden Chen	

## HM Sustainability

<b>FLIK Promotes Sustainability</b>	<b>18</b>
Kiara Royer	
<b>Student-Initiated Projects: Take Back The Tap</b>	<b>19</b>
Madison Li	
<b>Climate Change Education</b>	<b>20</b>
Amanda Katiraei	



# DO ECOTOURISTS SAVE RAINFORESTS?

EUWAN KIM

Costa Rica rainforest, photographed by Hannah Long

THE NUMBER OF FOREIGN

ECO-TOURISTS VISITING

NATIONAL PARKS INCREASED

BY 330%

BETWEEN 1985 AND 1991

If you've ever been on a tour to the Amazon jungle, the rainforests of Costa Rica, or the mountains of South Asia, you've probably been an ecotourist. Ecotourism provides tours in natural areas that sustain the wellbeing of locals and the environment while educating guests and the community about the region. If you've bought souvenirs crafted by locals, went shopping in small-scale markets, or paid for a tour led by a local, you've probably been a sustainable ecotourist.

In general, ecotourism raises greater awareness about conservationist communities and their benefits to communities' economies can extend to the environments they are trying to protect. More specifically, increase in tax revenue and capital leads to a large money flow. In Costa Rica, dubbed as the brainchild of ecotourism, the number of foreign eco-tourists visiting national parks increased by 330% between 1985 and 1991, and park entrance fees in developing countries increased to between approximately \$2 billion and \$12 billion every year. Ecotourists' spent between approximately \$93 billion and \$233 billion annually in developing countries on indirect expenditures of their visits, including hotel rooms, rental cars, and food.<sup>6</sup>

Ecotourism or environmental protection groups should not use their industry to appropriate control over the natural environments of a particular region from that region's local community.<sup>5</sup> They should be working with the locals instead of occupying a superiority or savior complex, especially considering

ECO<sub>2</sub>



## THE MAJORITY OF ECOTOURISM SITES ARE IN DEVELOPING NATIONS



Ecotourists in Costa Rica

how the majority of ecotourism sites are in developing nations.<sup>1</sup> Organizations can do this by educating their customers on the region's other industries, social issues, and possibly even promoting investment opportunities for tourists interested in entrepreneurial ventures. With a more varied industry, foreign capital would be more attracted to investing in the nation's economic development.<sup>6</sup> Supporting the community supports the environment. Additionally, the ecotourism organizations should use their funds to educate the locals on sustainability and development to ensure that their priority is to preserve the environment rather than reap the benefits of industrialization.<sup>2</sup>

The progress in the tourism industry has accelerated tremendously over the last two decades.<sup>8</sup> In the early 2000s, the United Nations recognized Costa Rica's interests in ecotourism and declared 2002 the International Year of Ecotourism. They released a list of important objectives national governments and ecotourism organizations should accomplish during that year, including the "promoting tourism within the framework of sustainable development so as to meet the needs of present tourists and host countries... while protecting and enhancing opportunities for the future, managing resources to fulfill economic,



wikipedia.org

social and aesthetic needs, and maintaining cultural integrity, essential ecological processes, biological diversity and life-support systems."<sup>4</sup> It is clear that the United Nations realized the economic but also environmental benefits of ecotourism, and it declared 2017 as the International Year of Sustainable Tourism for Development.<sup>4</sup>

The nations participating in 2017's goal to increase and assess the effects of sustainable tourism by 2030 will see the benefits of ecotourism within the next few decades. As long as the ecotourism industry keeps its eyes on the environmental priority, its development should be strongly encouraged.

# Air Pollution in New York City

Silvia Wang

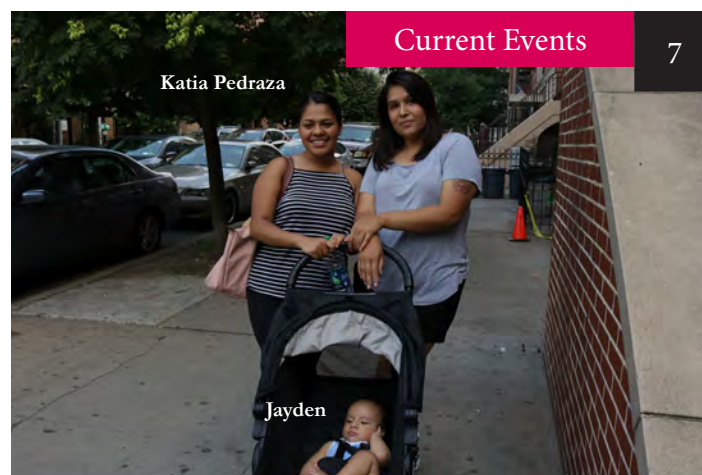
*“East-Harlem children wind up hospitalized for asthma at **more than three times** the city rate.”*



As gray smog drifts through the streets of East Harlem alongside busy roads and noisy construction projects, many families are walking outside, completely exposed to the surrounding pollution. Katia Pedraza, a resident of the neighborhood, recounted her daughter's sudden reaction to the toxins in the air. "When we were walking, blood started gushing excessively from her nose," she said. The constant exposure to polluted air over time could have weakened the blood vessels in her nose, triggering the nosebleed.<sup>6</sup> As a resident of the area, Pedraza takes extra precautions by using an app on her phone to monitor air quality index. When the value exceeds 100, she prioritizes the health of her children above all else. "There are certain days when my daughter wants to go outside, we can't go outside," she said. When asked about access to healthcare, she responded, "I honestly go in whenever to see my doctor. That has to come out of my pocket."

### ***"Air pollution may be linked to cognitive decline: dementia, mental health, anxiety, and other conditions."***

Environmental problems, economic disparities, unequal access to healthcare, and historical context shape the patterns of air pollution in New York City. WeACT, an environmental justice organization located in Harlem, reports that "East-Harlem children wind up hospitalized for asthma at more than three times the city rate" and that "African American, Asian American, and Latino communities have some of the highest rates of asthma." New York City has had a history of heavy air pollution. In 1966, widespread smog killed over a hundred people and many others suffered adverse health effects. Harmful particles in the air can damage lung tissue and lead to life-threatening conditions. While air quality has improved in the past few decades, WeACT states, "not all neighborhoods are experiencing that improvement equally."<sup>5</sup> Air pollution disproportionately affects low-income communities and communities of color. Industrial facilities, toxic power plants, and construction projects release pollutants into the air, causing serious health



problems for people living in the area.

Dr. Perry E. Sheffield is a pediatrician with the Mount Sinai Pediatric Environmental Health Specialty Unit. She explained that there are six principal air pollutants that the EPA has set National Ambient Air Quality Standards on: particulate matter, sulfur dioxide, nitrogen oxides, carbon monoxide, lead, and ozone. These pollutants are considered particularly harmful to public health and the environment. Sheffield emphasized the importance of the size of particulate matter. The smaller the particles, the farther they travel into the body and the more dangerous they are. For instance, PM 2.5 are particles in the air that are 2.5 microns ( $2.5 \times 10^{-6}$  meters) wide or less. The human body can catch large pieces of dust, like pollen. However, microscopic particles can travel into the lungs and bloodstream. "They can also cross the nasal passage into the brain," Dr. Sheffield explained.

In a report titled "Air Pollution and the Health of New Yorkers: The Impacts of Fine Particles and Ozone," the NYC Department of Health and Mental Hygiene estimated that every year, "PM 2.5 pollution in New York City causes more than 3,000 deaths, 2,000 hospital admissions for lung and heart conditions, and approximately 6,000 emergency department visits for asthma in children and adults."<sup>2</sup> Air quality affects nearly every system in the body, but primarily the lungs and the cardiovascular system, including the heart and blood vessels. The newest areas of research examine the effects of air pollution on the brain, showing that it can hinder cognitive development, especially in babies or young children. Air pollution may be linked to cognitive decline: dementia, mental health, anxiety, and other conditions.<sup>2</sup> "I've seen

children die from asthma,” Sheffield said. “And those children disproportionately are children of color and come from low income communities. That’s not just. No child should die of asthma. We can do much better than that as a healthcare community.”

Dr. Gregory Rowangould, a professor at the University of New Mexico who has researched the impacts of transportation on air quality, explained that the Clean Air Act mainly focused on regional air pollution issues, which affect everyone, but more recently the focus has shifted to localized air pollution. This raises the question of who lives near sources of pollution.

“Populations that live closer to more heavily used roadways and highways tend to be of lower income and they tend to be minority communities so there’s this big equity and environmental justice issue surrounding localized air pollution,” Rowangould explained, noting that this trend is present in almost every state and city that he’s studied. In New York, garbage trucks emit fine particulate matter that pollute neighborhoods in the South Bronx, North Brooklyn, and Southeast Queens. The City Council states that those areas hold stations that process 80 percent of the city’s waste.<sup>1</sup> To reduce the air pollution emitted by cars, Rowangould pointed to congestion charging in London. This model charged everyone with a personal car, generating funds to improve public transport services.

The environmental risks of air pollution lead to high rates of asthma hospitalizations and heart disease, experienced most heavily by low-income



communities and communities of color. Sources of pollution like sanitation facilities, construction projects, and transportation continuously threaten the well-being of vulnerable families in New York City. A report called “Unequal Air and Care” by WeACT asserts, “The disproportionate number of toxic and polluting industrial facilities located in disadvantaged communities is a true environmental justice issue.”<sup>4</sup>

---

**“The environmental risks of air pollution lead to high rates of asthma hospitalizations and heart disease, experienced *most heavily* by low-income communities and communities of color.”**





# Ten Marks of Progress and Hope

Margot Rosenblatt

1. A rare tree kangaroo was just photographed for the first time in New Guinea. Scientists had thought they were extinct for 90 years.<sup>5</sup>
2. Jadav Payeng, “The Forest Man of India,” planted tens of thousands of trees over the course of nearly 40 years on an island in the Brahmaputra river. He has transformed the island from a wasteland into a forest.<sup>3</sup>
3. One Colorado town is using human waste to power their vehicles. The new process is also a more eco-friendly way to process sewage.<sup>6</sup>
4. China hit their Paris Climate Accord carbon goal 12 years ahead of schedule, meaning that they’ve begun to stabilize their emissions.<sup>7</sup>
5. Researchers at UC Davis have invented a better feed for livestock that will curb methane emissions.<sup>10</sup>
6. The “Bluestar” bus has been launched in the UK. It’s the first bus to clean the air as it drives!<sup>9</sup>
7. The world’s first major ocean cleanup system has been launched from San Francisco and is on its way to the Pacific Garbage Patch.<sup>4</sup>
8. Solar panels have reached efficiencies of 41.4%, way past the “theoretical limits” of just a few years ago.<sup>1</sup>
9. Antarctic bedrock is rising rapidly as a result of less weight from ice. It could slow down the catastrophic melting of ice! However, this is absolutely not a solution.<sup>2</sup>
10. Stoners are mobilizing to clean up litter where they smoke worldwide. It’s called the #StonerCleanupInitiative.<sup>8</sup>

# Nuclear Energy

Berk Balkir

**N**uclear energy. While many of us have heard of this term in some boring chemistry textbook sometime in our lives, few actually learn about the details associated with this term. Nuclear energy is defined as energy created by splitting the atom of a substance.<sup>7</sup> The process of harnessing this energy as electricity is conducted in a nuclear power plant, like the Indian Point Nuclear Energy Facility in Westchester.<sup>4</sup> In the process of creating electricity, nuclear fission must occur. Nuclear fission is when a large nucleus splits into smaller species—most power plants use uranium atoms. This gives off a lot of energy and creates a chain reaction that generates heat. This

**“A nuclear power plant produces little to no fossil fuel emissions”**

newly produced heat warms a cooling agent, usually water, to generate steam. Afterwards, the steam turns turbines that are rotated by a flowing current within the power plant. Finally, the turning of the turbines excites generators, which ultimately produce the required energy.<sup>7</sup>

Many scientists are torn over whether the pros of nuclear energy outweigh its cons, but nuclear energy could be the most sustainable and most reliable form of energy because of its effect on the environment, the amount of electricity it produces, and its benefit on the economy.<sup>6</sup> A nuclear power plant produces little to no fossil fuel emissions, and fossil fuels contribute to the melting of the polar ice caps. Since no harmful substance is burned

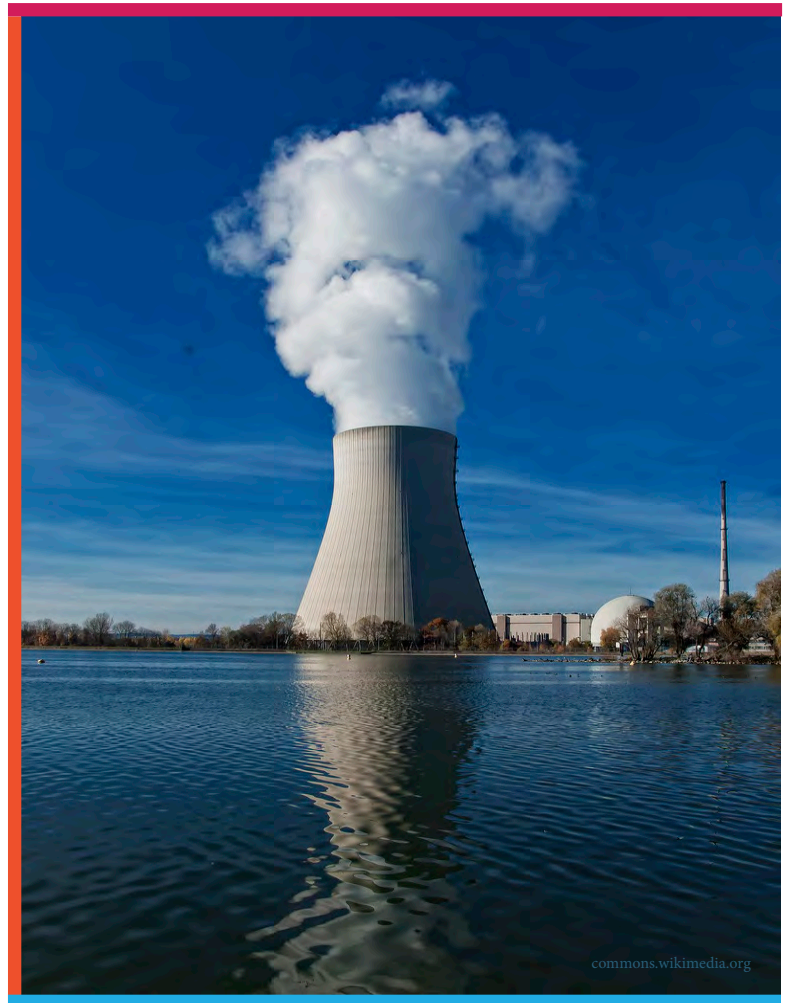
when making the electricity, there is no leftover dangerous smoke emitted into the atmosphere.<sup>6</sup> Additionally, nuclear power plants do not pollute the local environment with chemical residues like coal power plants do. Since they emit less toxins into the air, they can be erected near residential areas. Nuclear power plants also differ from coal power plants in the amount of energy they can produce. Although every power plant differs in size, nuclear power plants can produce an extraordinary amount of energy within a short time frame.<sup>6</sup> For example, the smallest nuclear power plant in the United States, the R. E. Ginna Nuclear Power Plant, can produce 582 watts of electricity in only one hour. Meanwhile, the Palo Verde Nuclear Power Plant, the largest nuclear plant in the US, can produce 3,937 watts per hour.<sup>2</sup> The Palo Alto nuclear power plant has the capacity to power the homes and businesses of around four million people!<sup>4</sup> Another benefit of nuclear plants that is often overlooked is its impact on the local economy. While the insertion of a nuclear plant into a community may not generate as many jobs as other industries, nuclear power plants still create anywhere from 400 to 700 jobs. But unlike most industries, they are not low level, low-income jobs.<sup>4</sup> In fact, the average worker in a nuclear power plant earns \$72,000 a year, which is more than the amount a worker in another industry would earn.<sup>5</sup>

While the positive effects of nuclear energy are immense, there are still many setbacks to the concept. For example, although there are no visible pollutants of a nuclear power plant, its radioactive effects have the potential to hurt the environment and people.<sup>6</sup> Radiation from the plant has proven to cause cancer and alter DNA sequences amongst humans that live near the energy plant for a long

period of time. Additionally, radiation affects the wildlife that lives in close proximity to the electricity source because long-term exposure to radiation has shown to shrivel the leaves of trees and cause many plants to die.<sup>6</sup> Another

## Radiation from the [nuclear] plant has proven to cause cancer and alter DNA sequences amongst humans

risk of this energy method is the damage it can cause in case of failure. A notable example is the Chernobyl disaster of 1986. The disaster occurred as a result of a failed and flawed test on the energy efficiency of the Chernobyl power plant in Ukraine. During the catastrophe, cold water began mixing with hot fuel, and increased the pressure in the reactors.<sup>1</sup> Ultimately, the reactors blew up and killed many people.<sup>1</sup> The explosion also had a long-term effect on the health of the population as evidenced by many inhabitants in the area developing various types of cancers as a result of the radiation.<sup>1</sup> A similar event occurred in 2011, when a nuclear power plant blew up near Fukushima, Japan. The incident occurred after a 15 meter high tsunami knocked out the water coolant systems of the plant.<sup>4</sup> This caused the core to start melting and released immense amounts of radioactivity. The incident caused over 17,000 deaths and the surrounding areas, with a radius of twenty kilometers, were abandoned.<sup>4</sup> These two incidents are only some of the infamous accidents that have occurred throughout the history of nuclear energy production, but many lesser known incidents have also occurred.<sup>8</sup> Consequently these disasters relating to nuclear energy and the side-effects of radiation force many to think twice about consistently installing nuclear power plants and using it as a main source of energy.







commons.wikimedia.org

# CORAL BLEACHING

*How will this phenomenon damage our current and future marine ecosystems?*

**By Mayanka Dhingra**

Climate change poses a very real threat to all parts of our world, from droughts and wildfires to wildlife under the sea.<sup>6</sup> It is drastically altering the world as we know it. Our oceans and their corals reefs are not exempt from the perils of climate change, and many unfortunate changes are happening.

Indeed, more coral reefs are dying off today than ever before due to mass climate-related bleaching.<sup>7</sup> Coral bleaching, a phenomenon largely unheard of until as recently as the 1980s, is the process by which coral lose their natural colors and dissipate into white exoskeletons of their former selves. Their natural colors result from microscopic organisms known as zooxanthellae algae that are embedded in the soft tissue of the reefs. As part of this symbiotic relationship, zooxanthellae algae undergo photosynthesis and provide the coral with photosynthate, which accounts for ninety percent of their nutrition. At the same time, they supply the algae with the

nitrogen, carbon dioxide waste, and phosphorus necessary to develop.<sup>1</sup> Just like with any system, it is possible for the relationship to lose its balance at times. Typically in this case, increased water temperatures inhibit coral from producing carbon dioxide and ammonia since they carry out their photosynthetic processes at a more frequent rate. Instead of producing essential photosynthetic sugars, they release harmful toxins into coral tissue.

**Conditions such as overexposure to sunlight and changes in ocean currents can result in partial or total death of coral colonies.**

Corals are naturally able to correct this imbalance by rejecting the algae out of their tissue, regulating the toxins being released into their bodies. Consequently, all that remains of the coral is a stark white

exoskeleton —this process is known as bleaching. While this process alone is normal, under certain climate contingent conditions corals can expel the excess algae. This leads not only to widespread bleaching, but also to coral death from being unable to photosynthesize.<sup>7</sup>

The symptoms of climate change on our oceans have directly caused a rise in unfavorable conditions for coral reefs. Bleaching is triggered by high water temperature and exposure to too much sunlight, both of which corals reefs are known to be highly sensitive to. These two symptoms of climate change on oceans are not the exclusive factors that induce bleaching. The list also includes changes in salinity, currents, water turbulence, sedimentation, greater exposure to ultraviolet radiation, and build up of carbon dioxide and methane gases.<sup>3</sup> These conditions and the stress they impose on corals can result in partial or total death of coral colonies.<sup>3</sup> At the same time, zooxanthellae algae

are equally impacted by coral death. They are left without a source of nitrogen, phosphorus, or carbon waste, all of which sustain them.

Moreover, coral reefs are vital to ocean life as a whole. Coral reefs are a fundamental part of the survival and procreation of many large fish in the ocean that contribute to the larger food chain, each in their own way. For example, there is a multitude of species that rely on the coral as a food source, not to mention the many fish that depend on coral reefs as places for them to lay eggs and host larvae without fear of predation.<sup>1</sup> Both larvae and fish that hide in the corals from their predators are in increasing danger from attacks by larger predators, such as sharks.<sup>5</sup> The symbiotic nature of ocean ecology would be disrupted by the absence of coral reef habitats, resulting in widespread population loss of ocean wildlife.<sup>2</sup>

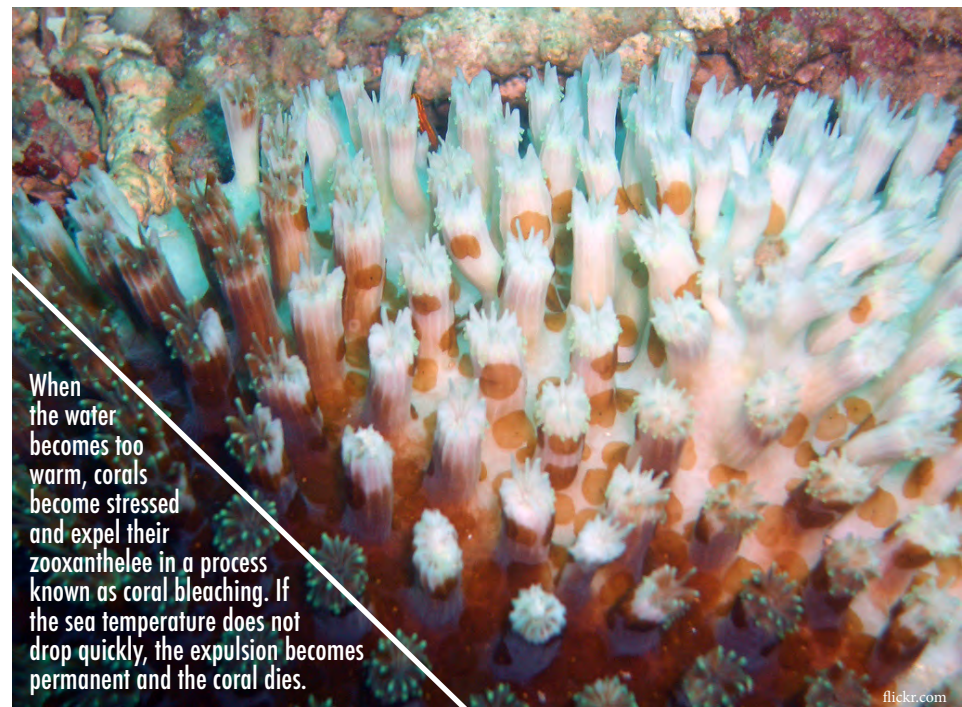
The loss of coral will not just have detrimental effects on our oceans, but will also have grave impacts on the livelihoods of people all around the world. For one, tourism is expected to suffer in places where vibrant coral reefs, which support over a quarter of all marine biodiversity, are the primary attractions. For example, the Great Barrier Reef alone is home to 600 variations of coral, over 100 species of jellyfish, 3000 types of mollusks, 500 species of worms, 1625 types of fish, 133 varieties of sharks and rays, and more than 30 species of whales and dolphins.<sup>2</sup> This in turn is expected to have economic impacts on such places, since coral reef associated tourism is reported to generate \$9.6 billion dollars annually in revenue from snorkels

and divers.<sup>1</sup> In Australia the reef contributes around \$6.4 billion to the Australian economy every year.<sup>2</sup> These places are also predicated to face increasingly devastating aftermath of storms, which are only expected to grow more powerful, as coral serve as critical buffers against severe weather and barriers shielding coastline communities.<sup>1</sup>

Coral reefs are also the habitat of species of high medicinal value and thereby are potential hubs of cures to health related concerns. In fact, drugs aimed at counteracting chronic pain, like Ziconotide, were originally created based on a toxin produced by the conus magus, an inhabitant of coral reefs.<sup>1</sup>

There is an original documentary by Netflix inspired by the issue called *Chasing Coral*, which traces coral life across thirty different countries in an effort to capture the natural beauty of coral and raise awareness of the dire state of our oceans' reefs. "One of the biggest issues with the ocean is that it's completely out of sight and out of mind... but our

planet is unique in the universe because we have an ocean that is the source of life," said Richard Vever, an avid diver and underwater photographer, who is featured in the documentary. The issue has become so severe that, according to *The Daily Good*, upward of 90% of Australia's Great Barrier Reef has suffered from bleaching and of the 911 individual reefs that comprise GBR, a mere 68 of them had totally avoided bleaching.<sup>1</sup> Furthermore, research has projected that by 2050 close to 90% of the world's vibrant corals will have disappeared.<sup>5</sup> The Great Barrier reef is not the only reef facing this problem. Coral bleaching has plagued reefs around the globe in places including the Caribbean, South Florida and the Keys, Hawaii, the Maldives, Sri Lanka, Seychelles, making the issue one that will have globally resounding impacts if we do not take measures to protect our reefs soon.







## Each Moo Comes at a Price

Arden Chen

When asked about the causes of global warming, most people consider carbon dioxide emissions from cars or chemicals from factories. However, as pressing as these issues are, they should not be the greatest of our concerns. In fact, a much larger problem is being created by another uncanny contributor to global warming: cows. These bovines harm the environment in many different ways, making them potentially more threatening than cars.<sup>4</sup>

to get beef on your plate, each step of which contributes to global warming and harms the Earth in a multitude of ways.<sup>3</sup> Cows and other ruminant animals produce methane, among other greenhouse gases, which contributes directly to global warming. Cows also require a lot of maintenance, while being a relatively inefficient food source. This creates many other sources of pollution as well. All livestock contribute to these problems, not only cattle.

All ruminant animals produce a lot of methane and nitrous oxide.<sup>7</sup> These are

---

*“ On average, around **25** kilograms of feed are required to produce just **1** kilogram of beef on your plate—horrendously inefficient. ”*

The chemicals produced by each cow negatively affects the planet, but the harmful effects of cows are not limited to their chemical production. Humans have developed a sophisticated process

both extremely potent greenhouse gases—methane has a Global Warming Potential (GWP) of about 23, while nitrous oxide has a GWP of almost 300. GWP is a scale used by the Environmental Protection



Agency to measure the potency of greenhouse gases, and, specifically, these numbers represent the amount of energy they can absorb, relative to CO<sub>2</sub>. This means methane is 23 times as potent as carbon dioxide, while nitrous oxide is 300. The more energy is absorbed, the more heat is insulated in the atmosphere and the less heat is released, which is a force behind global warming. Cattle are ruminant animals, meaning they have a gastric system comprised of four chambers. The rumen is the chamber where dozens of microorganisms preside to ferment the ingested items. Through this process, methane is

for livestock. An additional 33% of all croplands are used to grow crops dedicated to feed that livestock.<sup>6</sup> In total, this corresponds to almost 80% of all agricultural land use in the world<sup>10</sup> (not counting the area needed for transportation to carry all of this meat around the world)—and this number is growing each year as demand for meat increases.<sup>3</sup> This increase causes further deforestation of rainforests, indirectly increasing carbon emissions.

Each year, about 13 billion hectares of forested land are converted into farmland, and this causes problems linked to water quality, biodiversity, soil fertility

*“Dicke proposes a solution that is innovative, though slightly disturbing to most—replacing our meat with insects.”*

produced as a byproduct through a process called enteric fermentation, and this methane is usually belched out or released as flatulence. Nitrous oxide is also produced, although at a lower rate. Nitrous oxide is still very threatening, as it has a high (260–300) GWP. Nitrous oxide is produced through the process of nitrification at the top of manure piles. It is also produced as a byproduct through agricultural soil management—a larger agricultural issue, where farmers treat the soil with toxic chemicals to prevent it from losing productivity over time. This treatment is a much more prominent source of nitrous oxide, used in the feed for cattle. Although cattle are not the only source of these gases, they are a very prominent one: In the US, over 90% of methane emissions are from cattle. Soil management represents almost all nitrous oxide emissions, with manure releasing approximately 6%.<sup>5</sup>

An entire 26% of all non-ice cap land in the world is used up by grazing

and climate change.<sup>6</sup> Additionally, due to the increasing density in which animals are being packed, 20% of the world's grasslands are being degraded, intensifying those agricultural issues.<sup>6</sup> This land usage is one main reason why this food is very inefficient. Agriculture is also detrimental to the world in a variety of other ways—it is the driving force behind many of the factors of climate change.<sup>6</sup>

Next, that 33% of croplands is, again, solely used to feed livestock, not humans. On average, around 25 kilograms of feed are required to produce just 1 kilogram of beef on your plate—horrendously inefficient. These crops also then run into the issue of fertilizer and insecticides, which is a major issue of its own, indirectly affecting human health through crop quality and runoff. Later, gasoline is needed for all of the tractors, harvesters, and trucks used to transport them to slaughterhouses, butchers, or supermarkets. This may not seem

like much, but all of these steps are taken for the sole purpose of producing meat. Each step in the production chain harms the environment in its own way.<sup>4</sup>

So, has the human race doomed itself by agriculture and animal husbandry, two developments that, ironically, jump-started the rise of human civilization itself? Many people are currently researching solutions and changes to be installed. Dr. Marcel Dicke at the Wageningen University in the Netherlands has put forth one very radical but practical solution. Since meat is a central source of protein, it is impossible to simply ignore it in our diet, and in his TED talk at TEDGlobal 2010, Dicke proposes a solution that is innovative, though slightly disturbing to most—replacing our meat with insects.

In Wageningen, insects have already been a regular part of human food. Pancakes with mealworms for breakfast, quiches with mealworms for lunch, topped with chocolate with locusts for dessert—it's all a part of their culture already. To the outside world, this sounds simply revolting, until Dicke mentions a crazy fact: about 30% of people on this planet consume insects on a regular basis, and that everyone—including you—has eaten insects at some point. All processed foods have small portions of insects in them, and all of us have eaten these foods: tomato ketchup, chocolate, and noodles, to name a few.<sup>1</sup>

Despite the initial queasiness at the thought of consuming critters, Dicke says that insects are the perfect solution to this imminent agricultural dilemma. The human population is growing at an insane pace—we are projected to become nine billion strong by 2050, and we are not stopping anytime soon.<sup>3</sup> Meat is simply not going to work, due to all the issues listed above: the planet physically does not have enough space to support all of these people with the inefficiencies of meat. While meat needs 25 kilograms of feed to produce 1 kilogram of food on your plate, insects need only about 2.2

kilograms of feed to produce the same amount of food.<sup>1</sup> On top of that, insects are on par with meat with the nutrients they pack—in terms of fat, protein, calories, vitamins, insects and meat are not too different.<sup>9</sup>

Marcel Dicke believes that insects are the best solution to the problem caused by traditional meat, and Wageningen is leading the global charge. After the initial “City of Insects Festival” in 2006 in Wageningen, cities all over the world have held insect festivals to promote the consumption of insects. Dicke acknowledges the general consensus that insects are disgusting to people, but as he puts it, so was raw fish in the United States, and today sushi is consumed on a regular basis. Insects are certainly a terrifying option to us, but what else can we do? Cows are slowly killing the planet with their global warming contributions and land usage, and we do not have much time left to find a viable solution.

---

*“Cows are slowly killing the planet with their global warming contributions and land usage, and we do not have much time left to find a viable solution.”*







*By Maya Dubno*





## FLIK Promotes Sustainability

Kiara Royer

Both students at the school and FLIK Independent School Dining have spurred individual yet complementing plans to further the school's sustainability initiatives involving the Cohen Dining Commons (CDC).

The school has partnered with FLIK to implement numerous environmentally-conscious practices in the CDC. According to the school website, FLIK has incorporated the Sustainable Eating and Environmental Dining program at the school as an essential part of its vision to make the school more environmentally friendly.<sup>2</sup>

The school's Food Service Program is certified by the Green Restaurant Association. According to its website, the association is an international nonprofit organization that is a leading voice in the food industry and encourages "restaurants to green their operations using transparent, science-based certification standards." The Association awards the school with two stars out of a possible four stars, a rating based on criteria such as recycling, composting, disposables, as well as education and transparency, among others.<sup>3</sup>

The school has also been a part of The Monterey Bay Aquarium's Sustainable Oceans Seafood Watch program since 2006. According to its website, the program is "designed to raise consumer awareness about the importance of buying seafood from sustainable sources", and all of the seafood purchased by FLIK is in accordance with the Aquarium's watch guidelines for sustainability.<sup>1</sup>

"Anytime you're eliminating plastic you're benefiting not only the school but the planet as well," Senior Director of Dining Services Brenda Cohn said.

"In terms of recent food service, there's a whole

spectrum that goes on with sustainability," Cohn said. "We have reusable plates as well as plates that are completely biodegradable because there is no wax and petroleum in them. We also provide reusable and disposable utensils, and the disposable ones are made of cornstarch, so those are biodegradable."

The CDC servery will be renovated next summer, and come next fall, there will be no more bottled beverages for sale.

While both the CDC and the café will continue to offer bottled drinks such as grab-and-go beverages and Starbucks cans and glass bottles, the number of plastic vessels will be kept to a minimum so that the school can focus on promoting the use of water fountains, Cohn said.

Regardless, although the FLIK staff asks everyone passing through the servery whether they would like a reusable or disposable plate, during busy hours this becomes a problem as the staff wants to serve everyone quickly and sometimes does not get the chance to ask and will simply use single-use plates, she said.

Ideally in the future, Cohn would like to see those sitting in the CDC to use reusable plates and utensils and to be aware of all the sustainable practices occurring in the dining commons, she said.

"It's all about awareness, because we can set up bins with signs that say paper here or plastic here, but if people are not aware, then it won't get practiced," Cohn said.

"The more our students and our community are aware of sustainable practices and how it benefits all of us, the faster we'll grow in that direction."

# Student-Initiated Sustainability Projects: “Take Back the Tap”

Madison Li

Take Back the Tap, a waste-conscious initiative led by Natalie Sweet (10), continues to thrive for a second year in the CDC in efforts to raise awareness of plastic usage within the school community and spread environmentally-friendly practices.



“Take Back the Tap is for students to be aware of the amount of plastic bottles that are used by the school every day and to reduce the amount of bottles used,” Sweet said.

Another goal of the project is to encourage students to bring reusable water bottles that they can fill with the water provided by the program. Cohn said that Natalie Sweet came to her asking to partner with FLIK on the project, which offers coolers of naturally flavored water on Fridays in the CDC.

Sweet decided to start the initiative at the school after attending an environmental conference for students and hearing about the conservation efforts in other schools. “I realized that Horace Mann was extremely behind in terms of environmental protection. I noticed that especially regarding bottled water usage,

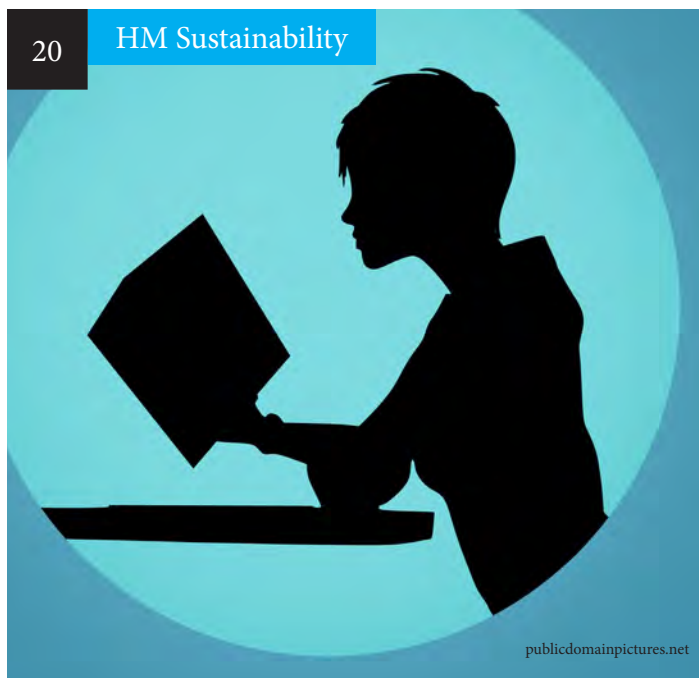
most schools had banned the sale of bottled water while Horace Mann was still selling upwards of 200,000 bottles per year,” she said.

The initiative is based on similar projects at institutions such as the University of Chicago and Cornell University. However, the school represents the first high school to start a Take Back the Tap proposal, and the school’s plan is unique for its strategy of implementing flavored water coolers, Sweet said.

To improve the idea during this school year, Sweet has been asking students for feedback. “I’m trying to create more incentives to participate by taking suggestions from people,” she said. These suggestions, which students can send to Sweet by email, have included requests for sales of reusable water bottles at the school, putting up more posters, having flavored water coolers more often, and speaking about Take Back the Tap at assemblies.

“I think it is important for our school to be more eco-friendly because in a time where protecting the environment is crucial, HM needs to do its part. I also think that HM needs to set an example for other schools, and for the students itself. Since high school is such a formative time for students, my hope is that if HM prioritizes environmental protection, HM students will prioritize environmental protection later on in life themselves,” she said.

*I realized that Horace Mann was extremely behind in terms of environmental protection.*



## Climate Change Education

Amanda Katiraei

Climate change is a prevalent issue facing our world today and Horace Mann could do more to address it through education. While the school is promoting sustainability by eliminating plastic straws and implementing initiatives like Take Back the Tap on Fridays, they could also create a program or elective dedicated specifically to teaching every student about the environmental problems threatening the Earth today, their widespread effects, and what we can do to help.

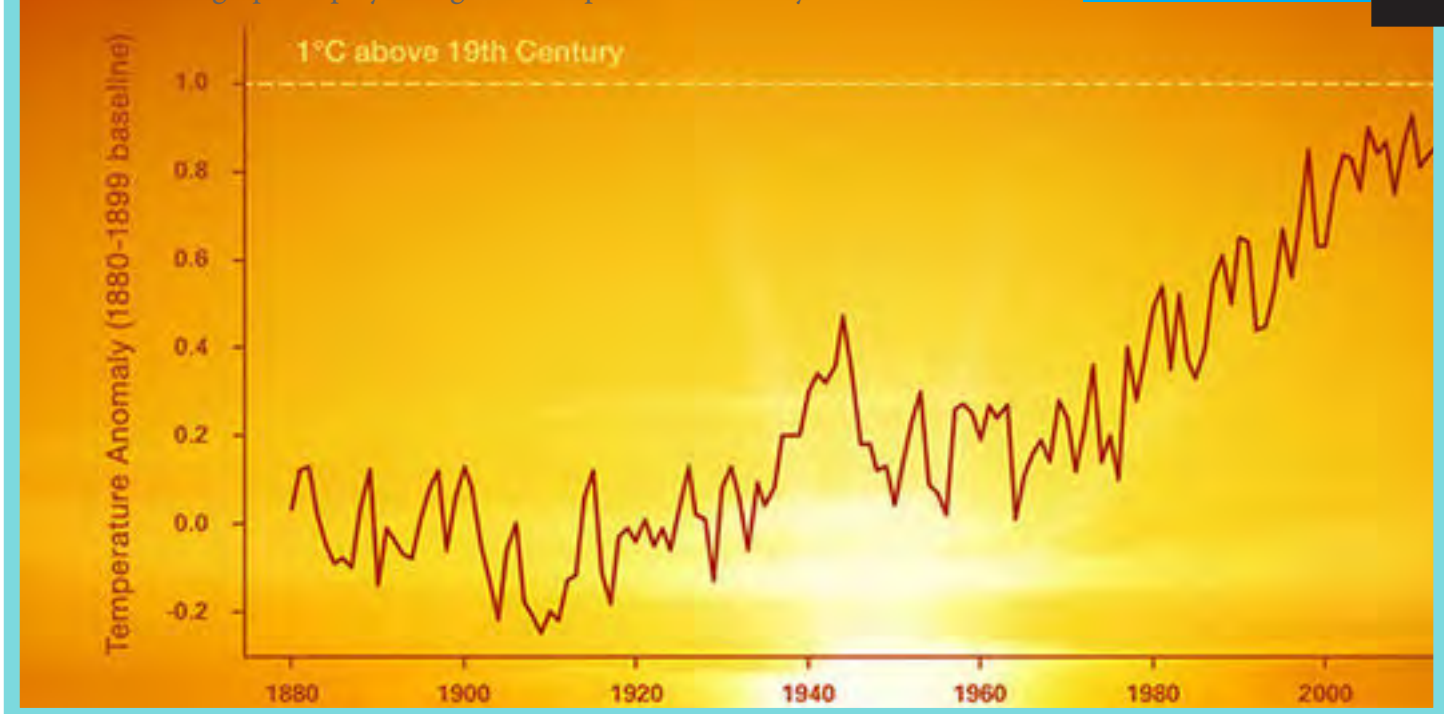
Having a climate change assembly once a year along with Green HM's efforts to spread climate awareness is beneficial, but having a mandatory course for students would be much more effective in improving the community's understanding of the issue and its importance. Recently, in one of my classes, my teacher spent the first few minutes of class telling us what she read on the news earlier that day: pollution in the oceans and in the air has grown so severe that it poses serious risks to public health, and could lead to a decline in the human population.<sup>2</sup> I was petrified by this thought and began to research current climate issues, astonished to realize how many of them I never knew existed.

For example, a few issues today are:<sup>2</sup>

- The melting of polar ice caps
- Habitat loss for many species
- Rising temperatures
- Rising sea levels putting coastal communities at risk
- Stronger and more frequent hurricanes
- Increased number of droughts and heat waves

With the temperatures rising, polar ice-caps are melting. The polar icecaps are so important because the Arctic sea ice keeps the polar regions cold, providing a habitat to species such as penguins and polar bears. These ice caps play an essential role in maintaining a moderate global climate because they can reflect up to 95% of solar radiation back into the atmosphere.<sup>3</sup> With the rapid depletion of ice caps, less sun energy is reflected, causing the earth to absorb more heat. This has led to melting ice in Arctic regions, increasing ocean





temperatures, and an 8-inch rise in sea levels since 1800. By 2100 it is projected to rise another 1 to 4 feet, causing storms, high tides, and flooding in areas such as Manhattan and Miami.<sup>3</sup> It shocked me how little I knew about the planet and how quickly these issues would be impacting us directly. A mandatory course dedicated to teaching current environmental issues may be difficult to include, but it would be a significant step forward to tackling climate change.

*“By 2100 [sea levels are] projected to rise another 1 to 4 feet, causing storms, high tides, and flooding in areas such as Manhattan and Miami.”*

At Yale, the *Climate Change Communication Project* illustrated statistics in 2010 on teenagers’ knowledge of climate issues:

- 54% of teens believed that climate change was happening
- 46% of teens understood that the emission of cars and trucks contribute to global warming
- 18% of teens had heard of ocean acidification
- 7% of teens knew how much carbon dioxide was in the atmosphere

These statistics prove that teenagers across America were not well informed on issues of climate change and that in 2010, almost half of all teenagers did not even believe that climate change existed.<sup>1</sup> In the past few years, public understanding and awareness of climate change has improved, but research published in 2018 in *Science* reported that only 30% of middle school and 45% of high school science teachers in the U.S. recognize the scientific consensus on climate change and 30% of all educators on climate incorrectly teach that global warming is naturally caused.<sup>4</sup>

According to the College Board AP Environmental Science course description, its goal of AP Environmental Science “is to provide students with the scientific principles, concepts, and methodologies required to understand the interrelationships of the natural world, to identify and analyze environmental problems both natural and human-made, to evaluate the relative risks associated with these problems, and to examine alternative solutions for resolving or preventing them.”

*“...in 2010, almost half of all teenagers did not even believe that climate change existed.”*

A mandatory course on climate change would allow students to better understand and identify ways to mitigate its effects, encouraging faster and more effective adaptation to climate-related trends.

ECO<sub>2</sub>

# REFERENCES

## Do Ecotourists Save Rainforests?

- (1) Campbell, Lisa. "Ecotourism in rural developing communities." ScienceDirect, Elsevier B.V., July 1999, [www.sciencedirect.com/science/article/abs/pii/S0160738399000055](http://www.sciencedirect.com/science/article/abs/pii/S0160738399000055). Accessed 11 Dec. 2018.
- (2) Weiner, Eric. "Ecotourism: Can It Protect the Planet?" The New York Times, 19 May 1991, [www.nytimes.com/1991/05/19/travel/ecotourism-can-it-protect-the-planet.html](http://www.nytimes.com/1991/05/19/travel/ecotourism-can-it-protect-the-planet.html). Accessed 11 Dec. 2018.
- (3) "What is Ecotourism?" The International Ecotourism Society, [www.ecotourism.org/what-is-ecotourism](http://www.ecotourism.org/what-is-ecotourism). Accessed 11 Dec. 2018.
- (4) "Economic and Social Council." United Nations, United Nations Department of Economic and Social Affairs, 30 July 1998, [www.un.org/documents/ecosoc/res/1998/eres1998-40.htm](http://www.un.org/documents/ecosoc/res/1998/eres1998-40.htm). Accessed 11 Dec. 2018.
- (5) Kent Ecotourism, environmental preservation and conflicts over natural resources\*, Michael. "Ecotourism, environmental preservation and conflicts over natural resources." Horizontes Antropológicos, vol. 9, no. 20, Oct. 2003. SciELO, [dx.doi.org/10.1590/S0104-71832003000200010](http://dx.doi.org/10.1590/S0104-71832003000200010). Accessed 11 Dec. 2018.
- (6) Nash, Jonathon. "Eco-Tourism: Encouraging Conservation or Adding to Exploitation?" PRB, Population Reference Bureau, 1 Apr. 2001, [www.prb.org/ecotourismencouragingconservationoraddingtoexploitation/](http://www.prb.org/ecotourismencouragingconservationoraddingtoexploitation/). Accessed 11 Dec. 2018.
- (7) Norman, Greg. "Cuba's ecotourism: Fruit of a green revolution." Deutsche Welle, 12 June 2016, [www.dw.com/en/cubas-ecotourism-fruit-of-a-green-revolution/a-36640748](http://www.dw.com/en/cubas-ecotourism-fruit-of-a-green-revolution/a-36640748). Accessed 11 Dec. 2018.
- (8) Rader, Douglas. "Ecotourism in Cuba: A model for sustainable economic development." Environmental Defense Fund, 3 Mar. 2015, [www.edf.org/blog/2015/03/03/ecotourism-cuba-model-sustainable-economic-development](http://www.edf.org/blog/2015/03/03/ecotourism-cuba-model-sustainable-economic-development). Accessed 26 Nov. 2018.

## Air Pollution in New York City

- (1) Crean, Sarah. "The Bronx is Breathing." New York Environment Report. Last modified February 20, 2015. Accessed November 19, 2018. <https://www.nyenvironmentreport.com/the-bronx-is-breathing/>.
- (2) Kheirbek, Iyad. Air Pollution and the Health of New Yorkers: The Impact of Fine Particles and Ozone. Edited by Lise Millay Stevens. Accessed November 14, 2018. <https://www1.nyc.gov/assets/doh/downloads/pdf/eode/eode-air-quality-impact.pdf>.
- (3) "1966 New York City Smog." In Wikipedia. Accessed November 12, 2018. [https://ipfs.io/ipfs/QmXoypijW3WknFijnKLwHCnL72vedxjQkDDP1mXWo6uco/wiki/1966\\_New\\_York\\_City\\_smog.html](https://ipfs.io/ipfs/QmXoypijW3WknFijnKLwHCnL72vedxjQkDDP1mXWo6uco/wiki/1966_New_York_City_smog.html).
- (4) Steele, Tenya. Unequal Air and Care: Federal Impact on Pediatric Asthma Disparities in 4 U.S. Cities. WE ACT for Environmental Justice, 2017. Last modified 2017. Accessed November 20, 2018. [https://www.weact.org/wp-content/uploads/2017/08/Unequal-Air-and-Care\\_DigitalCopy.pdf](https://www.weact.org/wp-content/uploads/2017/08/Unequal-Air-and-Care_DigitalCopy.pdf).
- (5) WE ACT for Environmental Justice. "Clean Air." WE ACT for Environmental Justice. Accessed November 24, 2018. <https://www.weact.org/whatwedo/areasofwork/cleanair/>.
- (6) Nakagoshi, Kaity. 9 Things to Beware of About Breathing Bad Air. 20 October 2014. 14 December 2018 <<http://www.connerton.com/9-things-beware-breathing-bad-air/>>.

## Ten Marks of Progress and Hope

- (1) Cruz, J. I. (2018, November 26). When I was a freshman in college, "theoretical limits" to solar panel efficiency capped us at 30% Four years later, new advancements are shattering our expectations. This is why I remain a climate change optimist. Scientists-- both in the public and private sectors-- have been working for decades on saving this planet. When will we match their ingenuity with an equivalent amount of political will? <https://cleantechnica.com/2018/11/26/concentrated-photovoltaics-achieve-solar-conversion-efficiency-record-of-41-4/?fbclid=IwAR2b-F0GoG6Lod0RHK6Mwa4uwyq16QTKMVJEY6K1-fjNmazzrppKyNGyZWA>
- (2) Gabbatiss, J. (2018, June 21). Antarctica's rapidly rising bedrock could slow down catastrophic melting of ice sheet. Retrieved December 3, 2018, from Independent website: <https://www.independent.co.uk/environment/antarctica-ice-melting-sea-level-rise-west-sheet-climate-change-global-warming-a8409871.html>.

level-rise-west-sheet-climate-change-global-warming-a8409871.html.

- (3) McCarthy, J. (2017, December 26). A Lifetime Of Planting Trees On A Remote River Island: Meet India's Forest Man. Retrieved December 3, 2018, from NPR website: <https://www.npr.org/sections/parallels/2017/12/26/572421590/hed-take-his-own-life-before-killing-a-tree-meet-india-s-forest-man>.
- (4) The Ocean Cleanup Soon to Begin Removing Plastic Pollution from the Great Pacific Garbage Patch. (2018, September 8). Retrieved December 3, 2018, from The Ocean Cleanup website: <https://www.theoceancleanup.com/press/the-worlds-first-ocean-cleanup-system-launched-from-san-francisco/>.
- (5) Pickrell, J. (2018, September 25). Rare Tree Kangaroo Reappears After Vanishing for 90 Years. Retrieved December 3, 2018, <https://www.nationalgeographic.com/animals/2018/09/rare-wondiwoi-tree-kangaroo-discovered-mammals-animals/>.
- (6) Sevchenko, M. (2016, January 16). Power to the poop: one Colorado city is using human waste to run its vehicles. Retrieved December 3, 2018, <https://www.theguardian.com/environment/2016/jan/16/colorado-grand-junction-persigo-wastewater-treatment-plant-human-waste-renewable-energy>.
- (7) Smith, M. K. (2018, August 21). China, World's Biggest Polluter, Hits Carbon Goals—12 Years Early: Study. Retrieved December 3, 2018, from Daily Beast website: <https://www.thedailybeast.com/china-worlds-biggest-polluter-hits-carbon-goals-12-years-early>.
- (8) The Stoner Cleanup Initiative. (n.d.). Retrieved from <http://thestonercleanupinitiative.com/> Taylor, M. (2018, September 27).
- (9) UK's first air-filtering bus launches in Southampton. Retrieved December 3, 2018, from The Guardian website: <https://www.theguardian.com/environment/2018/sep/27/uks-first-air-filtering-bus-launches-in-southampton>
- (10) Whittle, P. (2018, September 30). Gassy cows are bad for the planet; could seaweed diet help? Retrieved December 3, 2018, from Daily Beast website: <https://www.thedailybeast.com/researchers-new-diet-to-stop-cow-farts-will-fight-climate-change>.
- (11) Wouters, F. (2007, January 20). File:Dendrolagus goodfellow eating.jpg. Retrieved December 3, 2018, from Wikimedia Commons website: [https://commons.wikimedia.org/wiki/File:Dendrolagus\\_goodfellow\\_eating.jpg](https://commons.wikimedia.org/wiki/File:Dendrolagus_goodfellow_eating.jpg).

## Nuclear Energy

- (1) "Chernobyl Accident 1986." World-nuclear.org. Accessed October 29, 2018. <http://www.world-nuclear.org/information-library/safety-and-security/safety-of-plants/chernobyl-accident.aspx>.
- (2) "How Much Electricity Does a Nuclear Power Plant Generate?" eia.gov. Accessed October 28, 2018. <https://www.eia.gov/tools/faqs/faq.php?id=104&t=3>.
- (3) "Nuclear Energy." arizonaexperience.org. Accessed October 28, 2018. <http://www.arizonaexperience.org/innovate/nuclear-energy>.
- (4) "Nuclear Energy." nuclearenergy.net. Accessed October 25, 2018. <https://nuclear-energy.net/>.
- (5) payscale.com. Accessed October 28, 2018. <https://www.payscale.com/research.aspx?category=&str=coal+plant+worker&CountryName=United+States&SourceId=>
- (6) Rinkesh. "Nuclear Energy Pros and Cons." conserveenergyfuture.com. Accessed October 25, 2018. <https://www.conserve-energy-future.com/pros-and-cons-of-nuclear-energy.php>.
- (7) Rutledge, Kim. "Nuclear Energy." nationalgeographic.com. Accessed October 25, 2018. <https://www.nationalgeographic.org/encyclopedia/nuclear-energy/>.
- (8) Supinsky, Sergei. Taringa! Photograph. Accessed October 30, 2018. <https://www.taringa.net/posts/imagenes/10318667/Asi-viven-ahora-en-Chernobyl.html>.

## Coral Bleaching

- (1) Goldman, Jason G. "What Is "Coral Bleaching" and Just How Bad Is It?" The Daily Good, April 29, 2016. <https://www.good.is/articles/science-of-coral-bleaching>.
- (2) Gu, Kat. "The Great Barrier Reef: What You Need to Know about Coral Bleaching." Better World International, July 12, 2016. <https://www.betterworldinternational.org/planet/great-barrier-reef/>.
- (3) Hauter, Stan, and Debbie Hauter. "Coral Bleaching: What is Coral Bleaching and Why Does it Occur?" The Spruce Pets. <https://www.thesprucepets.com/coral-bleaching>.



# REFERENCES

bleaching-2924018.

(4) NASA. "Coral Bleaching." Climate Kids. <https://climatekids.nasa.gov/coral-bleaching/>.

(5) Ortiz, Erik. "Scope of Great Barrier Reef's Massive Coral Bleaching Alarms Scientists." NBC News. <https://www.nbcnews.com/news/world/scope-great-barrier-reef-s-massive-coral-bleaching-alarms-scientists-n867521>.

(6) Pariona, Amber. "How Serious Is the Problem of Coral Bleaching?" World Atlas. <https://www.worldatlas.com/articles/how-serious-is-the-problem-of-coral-bleaching.html>.

(7) Ronson, Jacqueline. "What Is Coral Bleaching? How Some Reefs Glow before They Die." Inverse. Last modified July 14, 2017. <https://www.inverse.com/article/34218-what-is-coral-bleaching-chasing-coral-great-barrier-reef-dead>.

## Each Moo Comes at a Price

(1) Faz, Guy. "The Food We Eat". TED Radio Hour, 2018, [https://open.spotify.com/episode/591f0fcp21g7a0AFnQ7rTu?si=\\_mkd87F8QjKWzkbnR0pzrg](https://open.spotify.com/episode/591f0fcp21g7a0AFnQ7rTu?si=_mkd87F8QjKWzkbnR0pzrg). Accessed 31 Oct 2018 [45:00]

(2) Steinfeld, Henning, et al. Livestock's Long Shadow: Environmental Issues and Options. Food and Agriculture Organization of the United Nations, 2006, [www.fao.org/docrep/010/a0701e/a0701e.pdf](http://www.fao.org/docrep/010/a0701e/a0701e.pdf). Accessed 1 Nov. 2018.

(3) Dicke, Marcel. "Why Not Eat Insects?" TEDGlobal 2010, 15 July 2010, Oxford Playhouse, Oxford University. Lecture.

(4) Hayes, Denis, and Gail Boyer Hayes. "Eating a Burger or Driving a Car: Which Harms Planet More?" Interview by Simon Worrall. National Geographic, 11 Mar. 2015, [news.nationalgeographic.com/2015/03/150311-cow-agriculture-cattle-dairy-beef-health-food-ngbooktalk/](http://news.nationalgeographic.com/2015/03/150311-cow-agriculture-cattle-dairy-beef-health-food-ngbooktalk/). Accessed 31 Oct. 2018.

(5) Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2016. United States Environmental Protection Agency, 12 Apr. 2018. EPA, [www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2016](http://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2016). Accessed 1 Nov. 2018.

(6) Livestock and Landscapes. Food and Agriculture Organization of the United Nations, 2012, [www.fao.org/docrep/018/ar591e/ar591e.pdf](http://www.fao.org/docrep/018/ar591e/ar591e.pdf). Accessed 1 Nov. 2018.

(7) Smil, Vaclav. "Eating Meat: Evolution, Patterns, and Consequences." Population and Development Review, vol. 28, no. 4, 2002, pp. 599-639.

(8) Steinfeld, Henning, et al. Livestock's Long Shadow: Environmental Issues and Options. Food and Agriculture Organization of the United Nations, 2006, [www.fao.org/docrep/010/a0701e/a0701e.pdf](http://www.fao.org/docrep/010/a0701e/a0701e.pdf). Accessed 1 Nov. 2018.

(9) Van Huis, Arnold, et al. Edible Insects: Future Prospects for Food and Feed Security. Research report no. 171, Wageningen University and Research, [www.fao.org/docrep/018/i3253e/i3253e.pdf](http://www.fao.org/docrep/018/i3253e/i3253e.pdf). Accessed 5 Nov. 2018.

(10) Ritchie, H. (2017, October 3). How much of the world's land would we need in order to feed the global population with the average diet of a given country? Retrieved January 4, 2019, from <https://ourworldindata.org/agricultural-land-by-global-diets>

## FLIK Promotes Sustainability

(1) "Seafood Watch." Monterey Bay Aquarium, 2019, [www.montereybayaquarium.org/conservation-and-science/our-programs/seafood-watch](http://www.montereybayaquarium.org/conservation-and-science/our-programs/seafood-watch). Accessed 11 Jan. 2019.

(2) "Food & Drink: Implementation and Updates." Horace Mann School, 2010, [www.horacemann.org/page.cfm?p=1163](http://www.horacemann.org/page.cfm?p=1163). Accessed 11 Jan. 2019

(3) "Find Certified Green Restaurants." Green Restaurant Association, [www.dinegreen.com/find-restaurants](http://www.dinegreen.com/find-restaurants).

## Climate Change Education

(1) "American Teens' Knowledge of Climate Change." Yale Program on Climate Change Communication. Last modified April 18, 2011. Accessed December 5, 2018. <http://climatecommunication.yale.edu/publications/american-teens-knowledge-of-climate-change/>.

(2) "How Climate Is Changing." NASA: Global Climate Change. Accessed December 5, 2018. <https://climate.nasa.gov/effects/>.

(3) "How Does Sea Ice Affect Global Climate?" National Ocean Service. Accessed December 5, 2018. <https://oceanservice.noaa.gov/facts/sea-ice-climate.html>.

(4) Cheskis, Abigail. "Americans Support Teaching Children about Global

Warming." Yale Program on Climate Change Communication, 11 Apr. 2018, [climatecommunication.yale.edu/publications/americans-support-teaching-children-global-warming/](http://climatecommunication.yale.edu/publications/americans-support-teaching-children-global-warming/). Accessed 4 Feb. 2019.

## IMAGES

### Cover

<https://www.maxpixel.net/Sermilik-Sea-Greenland-Arctic-Fjord-Ice-Iceberg-3926926>

### Do Ecotourists Save Rainforests?

Costa Rica Rainforest Photo by Hannah Long  
Ecotourists in Costa Rica Photo by Hannah Long  
[https://en.wikipedia.org/wiki/Moraine\\_Lake](https://en.wikipedia.org/wiki/Moraine_Lake)

### Air Pollution in New York City

Factory Image by Bradley May  
Photo by Silvia Wang  
[https://en.wikipedia.org/wiki/1966\\_New\\_York\\_City\\_smog](https://en.wikipedia.org/wiki/1966_New_York_City_smog)

### Ten Marks of Progress and Hope

<https://www.flickr.com/photos/giftsoftheuniverse/31230072265>

### Nuclear Energy

[https://commons.wikimedia.org/wiki/File:Nuclear\\_power\\_plant\\_Isar\\_2.jpg](https://commons.wikimedia.org/wiki/File:Nuclear_power_plant_Isar_2.jpg)

### Coral Bleaching

[https://commons.wikimedia.org/wiki/Category:Coral\\_bleaching#/media/File:Bent\\_Sea\\_Rod\\_Bleaching\\_\(15011207807\).jpg](https://commons.wikimedia.org/wiki/Category:Coral_bleaching#/media/File:Bent_Sea_Rod_Bleaching_(15011207807).jpg)  
[https://commons.wikimedia.org/wiki/Category:Coral\\_bleaching#/media/File:Bleached\\_Coral.png](https://commons.wikimedia.org/wiki/Category:Coral_bleaching#/media/File:Bleached_Coral.png)

### Each Moo Comes at a Price

<https://pixnio.com/fauna-animals/cows-and-calves/pasture-cow-agriculture-animal-bull-cattle-rural-silhouette-summer-sun>

### Page 17

Art by Maya Dubno

### FLIK Promotes Sustainability

Photos by Silvia Wang

### Student Initiated Sustainability Projects

Photos by Silvia Wang

### Climate Change Education

<https://publicdomainpictures.net/en/view-image.php?image=265552&picture=education-studying-university>  
Iceberg Image by Bradley May  
<https://www.jpl.nasa.gov/edu/teach/activity/graphing-global-temperature-trends/>

### Back Page

Art by Maya Dubno



*By Maya Dubno*

Interested in climate, energy, or the  
environment? To join ECO<sub>2</sub>, email  
[silvia\\_wang@horacemann.org](mailto:silvia_wang@horacemann.org)