

# NHSMUN50

National High School Model United Nations



CMS

BACKGROUND GUIDE



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**Nicole Pilliod**  
**Anya Prasad**  
**Joseph Rojek**  
**Amira Samih**  
**Zaheer Sooliman**  
**Terry Wang**  
**Ellie White**

Dear Delegates,

Welcome to NHSMUN 2024! I hope you are just as excited as we are to make this NHSMUN the best one yet during its 50th year! My name is Sesa Doshi, and I am going to be your director this year for the Convention on the Conservation of Migratory Species (CMS) during Session I. The topics that we are going to discuss this year surround how the world is changing and how monumental groups of animals are being affected. For the past several months, Ayla and I have been working diligently to create this background guide. These topics are not only interesting with the inclusion of cute animals, but are multi-faceted and complex. We cannot wait to see what every single one of you in CMS contributes to the global cause!

I am currently studying in my fourth year at the University of Western Ontario in London, Ontario, Canada. I study environmental sciences and am currently applying to go to medical school! Outside of school, I like to volunteer at my local hospital. I also work in an Oral Pathology Laboratory part-time, which is really interesting since I get to see all kinds of biopsies from the inside of people's mouths. I've become very familiar with mouth and teeth related anatomy if that somehow interests any of you. In terms of hobbies, I love hanging out with my friends, painting, reading, playing computer games, and watching cheesy romantic comedies.

This is going to be my third year on NHSMUN Staff but my 8th year doing Model UN overall. I started my MUN journey in the 9th grade and carried on doing it in University as well. I don't compete anymore on the MUN circuit. Instead, I staff conferences and do behind-the-scenes work. In addition to NHSMUN, I am also Secretary-General of the team at my University! Model UN has been such a large part of my life, even after high school and I look forward to sharing my passion with you.

Model UN is rooted in understanding and research, so we encourage you to use all the hard work you put in before the conference in learning about the topics, country policy, and more to bring informed and innovative solutions to the discussion. It can be intimidating to explore new ideas and topics while having to create complex solutions to complex problems. However, we know that all of you are more than capable of doing so, and we cannot wait to see what you come up with!

Since NHSMUN is the largest MUN conference in the world, it is an enormous educational opportunity and also a great opportunity to make new friends from all over the globe. Make sure to be kind, diplomatic, and confident in your ideas, as we know that every single one of you is a valuable addition to the committee. Lastly, just be true to yourself and as we always say...MUN is FUN!

I'll see all of you in New York,

Sesa Doshi  
Director of CMS, Session I  
[nhsmun.cms@imuna.org](mailto:nhsmun.cms@imuna.org)



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**Joseph Rojek**  
**Amira Samih**  
**Zaheer Sooliman**  
**Terry Wang**  
**Ellie White**

Dear Delegates,

It is my great pleasure to welcome you to NHSMUN 2024! My name is Ayla Perosky, and I am serving as Session II Director of the Convention on Migratory Species. This is my third year on staff, but it will be my sixth time attending NHSMUN. Last year, I served as the director of the United Nations Relief and Works Agency for Palestine Refugees (UNRWA). I cannot wait to watch each of you succeed at this year's conference with this background guide as a resource for your preparation.

My Model UN journey began at E. O. Smith High School in Mansfield, Connecticut. I joined as a freshman and was passionately involved throughout high school. Model UN has fundamentally changed my career path and given me a variety of tools to use in the real world. NHSMUN was the first real conference I attended as a delegate. I had no idea what I was doing and did not know how to properly make a speech. Over time, and even over the three short days of committee sessions, I grew into a stronger speaker, a better listener, and a more invested global citizen. I highly encourage you to take advantage of everything this conference and its staff have to offer.

I am a third-year student at the University of Connecticut, majoring in allied health sciences. I am simultaneously working towards my master's degree in public health at the University of Connecticut School of Public Health. I plan to study health in conflict zones after I was inspired from serving at NHSMUN as director of the UNRWA. This year, I live on my university's student farm in a historic farmhouse with other student farmers. We grow produce for the dining halls and local community. When I am not at school or on the farm, I love hiking, paddleboarding, and listening to music.

This year's topics are "Preserving the Great Migration in the Serengeti" and "The Conservation of Pacific Shark Species." Both topics cover migratory species who cross wide spans of land and sea, even countries, to complete their natural paths. Conservation of these species has the capacity to unify bordering countries to take action to protect endangered wildlife. For both Pacific shark species and animals in the Great Migration, human barriers prove a significant challenge. For the Great Migration, man-made structures such as farms, fences and roads can interrupt migratory pathways and can make a migration disappear altogether. For Pacific shark species, human intrusion for hunting and trade is a significant threat to shark populations. Environmental tourism is increasing worldwide and has increased human presence in protected habitats. It is crucial that the delegates of the CMS collaborate to create comprehensive, creative solutions to protect migratory species and ensure the world does not lose its most iconic natural phenomena.

Should you have any questions about this background guide, NHSMUN, or just want to say hello, feel free to reach out to me. I look forward to seeing you in March!

Sincerely,

Ayla Perosky  
Director of CMS, Session II  
[nhsmun.cms@imuna.org](mailto:nhsmun.cms@imuna.org)



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## A Note on the NHSMUN Difference

Esteemed Faculty and Delegates,

Welcome to NHSMUN 2024! We are Dennis Zhang and Christian Hernandez, and we are this year's Secretary-General and Director-General. Thank you for choosing to attend NHSMUN, the world's largest and most diverse Model United Nations conference for secondary school students. This year is particularly special as NHSMUN celebrates its **50th Anniversary**, and we are thrilled to welcome you to our hometown, New York City, this March for this landmark year!

As a space for collaboration, consensus, and compromise, NHSMUN strives to transform today's brightest thinkers, speakers, and collaborators into tomorrow's leaders. Our organization provides a uniquely tailored experience for all through innovative and accessible programming. We believe that an emphasis on education through simulation is paramount to the Model UN experience, and this idea permeates throughout numerous aspects of the conference:

**Realism and accuracy:** Although a perfect simulation of the UN is never possible, we believe that one of the core educational responsibilities of MUN conferences is to educate students about how the UN System works. Each NHSMUN committee is a simulation of a real deliberative body so that delegates can research what their country has said in the committee. Our topics are chosen from the issues currently on the agenda of that committee (except historical committees, which take topics from the appropriate time period). We also strive to invite real UN, NGO, and field experts into each committee through our committee speakers program. Moreover, we arrange meetings between students and the actual UN Permanent Mission of the country they are representing. Our delegates have the incredible opportunity to conduct first-hand research, asking thought-provoking questions to current UN representatives and experts in their respective fields of study. These exclusive resources are only available due to IMUNA's formal association with the United Nations Department of Global Communications and consultative status with the Economic and Social Council. No other conference goes so far to deeply immerse students into the UN System.

**Educational emphasis, even for awards:** At the heart of NHSMUN lies education and compromise. Part of what makes NHSMUN so special is its diverse delegate base. As such, when NHSMUN distributes awards, we strongly de-emphasize their importance in comparison to the educational value of Model UN as an activity. NHSMUN seeks to reward students who excel in the arts of compromise and diplomacy. More importantly, we seek to develop an environment in which delegates can employ their critical thought processes and share ideas with their counterparts from around the world. Given our delegates' plurality of perspectives and experiences, we center our programming around the values of diplomacy and teamwork. In particular, our daises look for and promote constructive leadership that strives towards consensus, as real ambassadors do in the United Nations.

**Debate founded on strong knowledge and accessibility:** With knowledgeable staff members and delegates from over 70 countries, NHSMUN can facilitate an enriching experience reliant on substantively rigorous debate. To ensure this high quality of debate, our staff members produce detailed, accessible, and comprehensive topic guides (like the one below) to prepare delegates for the nuances inherent in each global issue. This process takes over six months, during which the Directors who lead our committees develop their topics with the valuable input of expert contributors. Because these topics are always changing and evolving, NHSMUN also produces update papers intended to bridge the gap of time between when the background guides are published and when committee starts in March. As such, this guide is designed to be a launching point from which delegates should delve further into their topics. The detailed knowledge that our Directors provide in this background guide through diligent research aims to increase critical thinking within delegates at NHSMUN.

**Extremely engaged staff:** At NHSMUN, our staffers care deeply about delegates' experiences and what they take away from

their time at NHSMUN. Before the conference, our Directors and Assistant Directors are trained rigorously through hours of workshops and exercises both virtual and in-person to provide the best conference experience possible. At the conference, delegates will have the opportunity to meet their dais members prior to the first committee session, where they may engage one-on-one to discuss their committees and topics. Our Directors and Assistant Directors are trained and empowered to be experts on their topics and they are always available to rapidly answer any questions delegates may have prior to the conference. Our Directors and Assistant Directors read every position paper submitted to NHSMUN and provide thoughtful comments on those submitted by the feedback deadline. Our staff aims not only to tailor the committee experience to delegates' reflections and research but also to facilitate an environment where all delegates' thoughts can be heard.

**Empowering participation:** The UN relies on the voices of all of its member states to create resolutions most likely to make a meaningful impact on the world. That is our philosophy at NHSMUN too. We believe that to properly delve into an issue and produce fruitful debate, it is crucial to focus the entire energy and attention of the room on the topic at hand. Our Rules of Procedure and our staff focus on making every voice in the committee heard, regardless of each delegate's country assignment or skill level. Additionally, unlike many other conferences, we also emphasize delegate participation after the conference. MUN delegates are well researched and aware of the UN's priorities, and they can serve as the vanguard for action on the Sustainable Development Goals (SDGs). Therefore, we are proud to connect students with other action-oriented organizations to encourage further work on the topics.

**Focused committee time:** We feel strongly that face-to-face interpersonal connections during debate are critical to producing superior committee experiences and allow for the free flow of ideas. Ensuring policies based on equality and inclusion is one way in which NHSMUN guarantees that every delegate has an equal opportunity to succeed in committee. In order to allow communication and collaboration to be maximized during committee, we have a very dedicated administrative team who work throughout the conference to type up, format, and print draft resolutions and working papers.

As always, we welcome any questions or concerns about the substantive program at NHSMUN 2024 and would be happy to discuss NHSMUN pedagogy with faculty or delegates.

Delegates, it is our sincerest hope that your time at NHSMUN will be thought-provoking and stimulating. NHSMUN is an incredible time to learn, grow, and embrace new opportunities. We look forward to seeing you work both as students and global citizens at the conference.

Best,

Dennis Zhang  
Secretary-General

Christian Hernandez  
Director-General

## A Note on Research and Preparation

Delegate research and preparation is a critical element of attending NHSMUN and enjoying the debate experience. We have provided this Background Guide to introduce the topics that will be discussed in your committee. We encourage and expect each of you to critically explore the selected topics and be able to identify and analyze their intricacies upon arrival to NHSMUN in March.

The task of preparing for the conference can be challenging, but to assist delegates, we have updated our [Beginner Delegate Guide](#) and [Advanced Delegate Guide](#). In particular, these guides contain more detailed instructions on how to prepare a position paper and excellent sources that delegates can use for research. Use these resources to your advantage. They can help transform a sometimes overwhelming task into what it should be: an engaging, interesting, and rewarding experience.

To accurately represent a country, delegates must be able to articulate its policies. Accordingly, NHSMUN requires each delegation (the one or two delegates representing a country in a committee) to write a position paper for each topic on the committee's agenda. In delegations with two students, we strongly encourage each student to research each topic to ensure that they are prepared to debate no matter which topic is selected first. More information about how to write and format position papers can be found in the NHSMUN Research Guide. To summarize, position papers should be structured into three sections:

**I: Topic Background** – This section should describe the history of the topic as it would be described by the delegate's country. Delegates do not need to give an exhaustive account of the topic, but rather focus on the details that are most important to the delegation's policy and proposed solutions.

**II: Country Policy** – This section should discuss the delegation's policy regarding the topic. Each paper should state the policy in plain terms and include the relevant statements, statistics, and research that support the effectiveness of the policy. Comparisons with other global issues are also appropriate here.

**III. Proposed Solutions** – This section should detail the delegation's proposed solutions to address the topic. Descriptions of each solution should be thorough. Each idea should clearly connect to the specific problem it aims to solve and identify potential obstacles to implementation and how they can be avoided. The solution should be a natural extension of the country's policy.

Each topic's position paper should be **no more than 10 pages** long double-spaced with standard margins and font size. **We recommend 3–5 pages per topic as a suitable length.** The paper must be written from the perspective of your assigned country and should articulate the policies you will espouse at the conference.

Each delegation is responsible for sending a copy of its papers to their committee Directors via [myDais](#) on or before **February 23, 2024**. If a delegate wishes to receive detailed feedback from the committee's dais, a position must be submitted on or before **February 2, 2024**. The papers received by this earlier deadline will be reviewed by the dais of each committee and returned prior to your arrival at the conference.

Complete instructions for how to submit position papers will be sent to faculty advisers via email. If delegations are unable to submit their position papers on time, please contact us at [info@imuna.org](mailto:info@imuna.org).

**Delegations that do not submit position papers will be ineligible for awards.**

## Committee History

The Convention on the Conservation of Migratory Species of Wild Animals was established in 1983 in Bonn, Germany.<sup>1</sup> It came about in response to the growing need for international cooperation in conserving migratory animals and their habitats. CMS recognizes migratory species as animal species that are “facing a very high risk of extinction in the wild in the near future,” meaning that they are classified as threatened or endangered by the International Union for the Conservation of Nature (IUCN). CMS is the stage for the development of agreements, many of which concern multiple groups of migratory species, including dolphins, whales, sharks, geese, cranes, ducks, turtles, elephants, bats, butterflies, etc. These species are crucial for many of the ecosystems that support life on Earth. They provide food for other animals, act as pollinators, and even indicate to us where environmental changes are happening around the globe.

Initially, the CMS was primarily focused on the protection of terrestrial and avian migratory species, like deer, gazelle, gorillas, bats, and many different species of birds. Over the years, its mandate has evolved to include aquatic migratory animals as well, such as sharks, dolphins, whales, manatees, and sturgeons. The convention provides a platform for member states to ensure the sustainable use and conservation of these species and their habitats.<sup>2</sup> As of March 2022, CMS has 133 member states.<sup>3</sup> These countries have all recognized the need to protect migratory species and have agreed to collaborate. They are organized into range states and party states, with range states. Although CMS is sometimes referred to as a UN committee, it is actually not formally part of the UN, it still works closely with various UN agencies.

Because migratory species do not abide by the same political borders that humans have drawn around the world, CMS is often required to collaborate with foreign organizations and other UN agencies. CMS has had contact with Barcelona’s *Convention for the Protection of the Mediterranean Sea against Pollution* and Cartagena’s *Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region*. These two organizations are seen as international CMS counterparts, and during conferences involving all three organizations, objectives are strengthened, and improvements are made to current plans in order to enhance their collective efficiency. CMS also is in frequent communication with BirdLife International and the International Union for the Conservation of Nature, both of which are affiliated with but not part of the UN.<sup>4</sup> In addition to partnerships, CMS has also been the primary voice in discussions, agreements, and understandings with foreign organizations.

A memorandum of agreement was signed between Wetlands International and CMS in 1997, which allowed for collaboration between CMS and Wetlands International offices in Africa, Europe, the Middle East, and Asia.

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1 “Progress Report on Relevant Activities Undertaken within the Framework of CMS for the United Nations Process on Oceans and the Law of the Sea,” Convention on the Conservation of Migratory Species of Wild Animals, accessed September 23, 2023, [https://www.un.org/depts/los/general\\_assembly/contributions\\_2019/CMS.pdf](https://www.un.org/depts/los/general_assembly/contributions_2019/CMS.pdf).

2 Convention on the Conservation of Migratory Species of Wild Animals “Progress Report.”

3 Sellheim, Nikolas, and Jochen Schumacher. 2022. “Increasing the Effectiveness of the Bonn Convention on the Conservation of Migratory Species.” *Environmental Policy and Law* 52 (5-6): 367-383. <https://www.tandfonline.com/doi/full/10.1080/13880292.2022.2153461>. Accessed September 22, 2023

4 Collaboration with Other Organizations, “Convention on the Conservation of Migratory Species of Wild Animals (CMS)”, accessed September 23, 2023, [https://www.cms.int/sites/default/files/document/stc23DOC7\\_Collaboration\\_organiz\\_0.PDF](https://www.cms.int/sites/default/files/document/stc23DOC7_Collaboration_organiz_0.PDF)





CMS

NHSMUN 2024

**TOPIC A:**  
**PRESERVING THE GREAT MIGRATION IN THE SERENGETI**

Photo Credit: T. R. Shankar Raman

## Introduction

The Great Migration is the largest herd movement of animals on the planet.<sup>1</sup> The circular migration occurs between Tanzania and Kenya. In February, wildebeest in Tanzania's Ngorongoro conservation area deliver nearly 400,000 new calves.<sup>2</sup> By May, the herds move westward to the center of Serengeti National Park. With the abundance of new calves, predators like cheetahs and hyenas follow close behind the herds. In the Serengeti, zebras, gazelles, and other animals join the growing migration. The herd continues northwest and reaches the Mara River in July. The Mara River crossing represents the herd's crossing into Kenya. It results in thousands of wildebeest deaths from drowning and crocodile attacks.<sup>3</sup> The Mara River crossing brings hundreds of thousands of tourists to Kenya and Tanzania annually. Once the herds cross into Kenya, they remain between the border of the Serengeti and Mara until making the return to Tanzania in October. Through the migration cycle, the herds face a variety of barriers and dangers. Understanding how these barriers affect animal instincts can help organizations like the CMS work to better preserve and protect global migrations.

The main barrier animals face on the Great Migration pathway is humans. In both Tanzania and Kenya, wild ecosystems are surrounded by large, growing human populations. These growing communities bring with them increased construction and agricultural activity. Because of this, there is less space available for the animals to complete the migration. Human barriers like fences, roads, and settlements have blocked pathways throughout Tanzania and Kenya. In Kenya alone, 20 percent of the ecosystem is restricted by fencing.<sup>4</sup> These restrictions have severely harmed the migration.

For low-income communities, agriculture is an important source of food and money. However, agricultural development can threaten migratory pathways, endangering both humans and animals. When faced with poor crop yields, farmers in these communities are likely to expand their fields into protected areas.<sup>5</sup> This is damaging to the migrations. Further, agricultural development can create unwanted interactions between wild animals and livestock. Predators following the migratory herds can enter human properties and cause harm to livestock or people. Many locals who live in the area

surrounding the Great Migration believe conservation efforts lead to poverty.<sup>6</sup> This is a result of poor compensation for land loss, crop damages, and displacement caused by these efforts.

Emerging effects of climate change pose a serious threat to migratory animals in the Serengeti-Mara. Unpredictable weather, long dry seasons, and unusual temperatures have created new dangers for the wildlife.<sup>7</sup> Rainy seasons and other seasonal changes help animals determine when to move north or south. When rains do not come, and droughts occur, the Serengeti-Mara becomes nearly uninhabitable. Some animals can only go a few days without water, making movement during droughts difficult.<sup>8</sup> Further, wild animals searching for food may enter farmlands and contribute to crop destruction. Worse, wild animals may bring diseases or hungry predators that kill farmers' livestock and cause serious financial losses.<sup>9</sup> Alternatively, heavy rains can cause flooding that renders bodies of water impassable. During droughts, floods, and other adverse weather, migratory pathways are at risk.

In 2023, the Great Migration faces new and heightened threats.

1 "The Great Migration," Serengeti National Park, accessed June 23, 2023, <https://www.serengeti.com/great-migration-africa.php>.

2 "The Great Wildebeest Migration," Asilia Africa, accessed June 23, 2023, <https://www.asiliaafrica.com/great-wildebeest-migration/>.

3 "The Great Migration."

4 Bedelian, "Saving the Great Migrations."

5 Jafari Kideghesho, "Serengeti Shall Not Die: Transforming an Ambition into a Reality," *Tropical Conservation Science* 3 (September 2010): 228-247, <https://doi.org/10.1177/194008291000300301>.

6 Kideghesho, "Serengeti Shall Not Die."

7 Nita Bhalla, "In Kenya, Climate Change Shrinks Maasai Mara Wildebeest Migration," *Context*, November 3, 2022, <https://www.context.news/climate-risks/in-kenya-climate-change-shrinks-maasai-mara-wildebeest-migration>.

8 Bhalla, "In Kenya, Climate Change Shrinks."

9 Kideghesho, "Serengeti Shall Not Die."

The pandemic brought a great deal of attention to the illegal hunting and the growing wild meat, or “bushmeat” trade. In Kenya and Tanzania, the pandemic saw an exponential increase in bushmeat consumption and poaching.<sup>10</sup> Currently, the incentives and social norms mean that poaching and bushmeat consumption are normalized ways to make money and get protein. The prices of imported meats have become so expensive that for some, bushmeat is the only option.<sup>11</sup> As ungulates (including wildebeests) are the majority of poached and traded animals, this increase is an existential threat to the Great Migration.<sup>12</sup>

The post-pandemic era has also seen a rapid return to pre-pandemic tourism levels. While the economic boost has been very beneficial to Kenya and Tanzania, the crowds have been detrimental to the migrations within. There was an 83 percent increase in tourism revenue over the 2022–2023 season in Kenya alone.<sup>13</sup> Increased tourists mean safari and camp businesses surrounding the Serengeti-Mara must grow rapidly. This has led to an increase in poorly trained safari leaders and land use for tourist accommodations. Poor training and demanding tourists have resulted in tourist vehicles entering restricted areas and getting close to animals. These close interactions can result in animal attacks and harm migratory animals.<sup>14</sup> If migrating animals know where tour vehicles tend to be, they may avoid those areas and lose historic migratory pathways. More jobs in the tourism industry and economic gains are good for locals and governments. However, the rapid return of tour vehicles to the Serengeti-Mara stands to seriously affect migratory animals and their pathways.

Conservation, protection, and research of the Great Migration is critical. Threats that risk total migration loss are coming from many angles. Growing human populations present the

greatest risks to these areas. Fences, roads, and settlements have already contributed to migration loss in East-Central Africa. In addition to addressing human effects, the CMS must also grapple with the ongoing effects of climate change. Unpredictable weather has already affected migratory pathways. Understanding the different players in the Great Migration and their historic migratory pathways is key to developing agreements that will protect the migration. It is also essential to support and promote research in order to develop solutions. The Great Migration is the world’s largest and most iconic migration. Its ecological and cultural value is enormous. In order to secure its future, the CMS must work together to develop solutions that protect this migration and others like it around the world.

## History and Description of the Issue

### The Serengeti-Mara Ecosystem

The Great Migration is often referred to as one of the greatest examples of the circle of life because of the interactions that occur between different species of animals and plants.<sup>15</sup> The Great Migration is a year-long, 800-kilometer circular movement between the Maasai Mara Reserve in Kenya and Serengeti National Park in Tanzania. Together, these areas are referred to as the Serengeti-Mara ecosystem.<sup>16</sup> An ecosystem is defined by the World Wildlife Foundation as “a community of animals and plants interacting with each other and with their physical environment.”<sup>17</sup> The Great Migration encompasses many of the animal relationships that can be found in the Serengeti-Mara Ecosystem.

The Great Migration is primarily an ungulate migration.<sup>18</sup> Ungulates are hoofed mammals, like cows, antelope, and

10 Pauline Kairu, “Free-for-all bush-meat trade adds pressure to wildlife conservation efforts,” *The East African*, October 23, 2022, <https://www.theafrican.co.ke/tea/science-health/after-poachers-countries-dread-bushmeat-trade-3994352>.

11 Eli Knapp, “Why Poaching Pays: A Summary of Risks and Benefits Illegal Hunters Face in Western Serengeti, Tanzania.” *Tropical Conservation Science* 5 (December 2012): 434-445, <https://doi.org/10.1177/194008291200500403>.

12 Lina Mwamachi, “Reformed Poachers Turned Conservationists in East Africa,” *Infonile*, January 20, 2023, <https://infonile.org/en/2023/01/reformed-poachers-turned-conservationists-in-east-africa/>.

13 “Kenya: 83% Increase in Tourism Revenues in 2022,” *Africanews*, 2022, <https://www.africanews.com/2023/03/22/kenya-83-increase-in-tourism-revenues-in-2022/>.

14 Reinstein, “The Elephant in the Room.”

15 “The Great Migration,” Serengeti National Park, accessed June 23, 2023, <https://www.serengeti.com/great-migration-africa.ph>.

16 Asila Africa, “The Great Wildebeest Migration.”

17 “Ecosystem Services,” World Wildlife Foundation, accessed August 15, 2023, [https://wwf.panda.org/discover/knowledge\\_hub/where\\_we\\_work/baltic/area/ecosystem\\_services/](https://wwf.panda.org/discover/knowledge_hub/where_we_work/baltic/area/ecosystem_services/).

18 “The Great Migration.”



Wildebeest crossing the Mara River  
Credit: Christopher Michel

giraffes.<sup>19</sup> Wildebeests make up the largest part of the herd, with approximately two million making the journey each year. Gazelles and zebras follow behind the wildebeests.<sup>20</sup> Each of the ungulate species that participate in the Great Migration benefit from their relationships with each other. Sometimes called the “lawnmowers of the Mara,” the grass eating habits of wildebeest are beneficial for gazelles and zebras. By cutting down the grass, the zebras and gazelles can more easily see predators.<sup>21</sup> Thompson’s gazelles are sometimes considered “friends” with wildebeests. This is because the wildebeest’s larger size and large numbers can provide additional protections for the vulnerable gazelles.<sup>22</sup> Understanding relationships between these migratory ungulates can give insight into the conservation that is necessary to protect them.

Along the 800km migration, wildebeest, gazelles, and zebras also interact with a variety of predators. These predators,

like lions and hyenas, are also considered a part of the Great Migration.<sup>23</sup> Some lions and hyenas follow behind the moving herds to hunt weak, injured, or young wildebeest. However, other predators like the Serengeti lions, wait for the food to come to them. Serengeti National Park is home to Tanzania’s largest population of conserved lions, with between 3,000–4,000 total.<sup>24</sup> When wildebeest leave the Serengeti in May as the dry season begins, these lions lose their main food source. The wildebeest then return in November when the rains return, providing lions with food when they desperately need it.<sup>25</sup> Serengeti lions are so dependent upon wildebeest for food in November and December that their reproductive seasons are centered around them.<sup>26</sup> Similarly, hyenas depend on migratory herds arriving to certain territories during dry seasons. However, as unpredictable weather has caused extended dry and wet seasons, herd arrivals have become

19 “Global Initiative on Ungulate Migration,” CMS, accessed June 18, 2023, <https://www.cms.int/en/gium>.

20 “The Great Migration.”

21 Bhalla, “In Kenya.”

22 Eva Frederick, “Animal Friendships Change with the Weather in African Savanna,” *Science*, August 6, 2019, <https://www.science.org/content/article/animal-friendships-change-weather-african-savanna>.

23 “Other Animals of the Great Migration,” Great Migration Camps, May 2022, <https://www.greatmigrationcamps.com/other-animals-of-the-great-migration/>.

24 Marc Nkwame, “How Many Lions are Roaming in The Serengeti?” *Tanzania Times*, June 12, 2023, <https://tanzaniatimes.net/news-lions-number-in-serengeti-national-park/>.

25 Courtney Suci, “The Great Migration & Changing Seasons in the Serengeti,” ProQuest, September 13, 2018, <https://about.proquest.com/en/blog/2018/The-Great-Migration--Changing-Seasons-in-the-Serengeti/>.

26 Sarah Marshall, “The Greatest Show on Earth: Tracking the Wildebeest Migration Across Tanzania’s Serengeti,” *National Geographic*, March 16, 2021, <https://www.nationalgeographic.com/travel/article/greatest-show-earth-tracking-wildebeest-migration-across-tanzanias-serengeti>.

difficult to predict. In response, hyenas have changed their den locations and used “social learning” to hunt herds.<sup>27</sup> Social learning means the hyenas take advantage of animal networks of information to find the herds more easily. For example, if they see an animal go looking for food and return with something, the next day they will follow this individual to see where it found its food. This is an adaptation that predators will increasingly need to use as migration and ecosystem changes occur in the future.

Mammals are not the only predators hunting the herds. One of the most iconic events of the Great Migration is the Mara River crossing, in July and August. The Mara River is only 20 meters across and two meters deep, but it is one of the most dangerous points along the migration pathway for wildebeest.<sup>28</sup> The river is home to approximately three thousand Nile crocodiles, who hunt the crossing wildebeest.<sup>29</sup> Thousands of wildebeest cross the river at once, and many are trampled. If a crocodile is unable to make a kill, many injured and dead wildebeest will be left behind along the riverbanks. However, many crocodiles will be successful. After crossing, scavenger birds will swoop in to consume carcasses.<sup>30</sup> While the wildebeest and gazelles are migrating to find food, they represent a critical food source for predators along the way.

The physical environment of the Serengeti-Mara ecosystem also plays an important role in the Great Migration. The migration occurs in the plains, which are an ideal habitat for migratory ungulates. For wildebeest, the plains have abundant water sources and wide-open spaces for herding. In a good season, water sources will not be further than 25km apart.

This means the migrating animals will not go more than one day without water. But during severe droughts, wildebeest can go without water for up to five days.<sup>31</sup> Wildebeest also sleep for multiple hours a day and use the open fields to do so strategically. The herds sleep on the ground in long rows so they can run from predators if needed.<sup>32</sup> For gazelles, the broad span of grass is perfect for moving nearly 24 hours a day. These gazelles sleep standing up for brief periods, and do not need much water.<sup>33</sup> For predators, the plains provide hiding spots and good hunting visibility.<sup>34</sup> The space the grassland provides is therefore highly beneficial to the migrating animals.

The animals of the Great Migration also have a mutually beneficial relationship with their environment. For example, wildebeest trample old grass which allows new grass to grow. Their waste also helps fertilize the soil.<sup>35</sup> Overall, wildebeest contribute to a net carbon reduction in the Serengeti. Like the Amazon rainforest, the Serengeti-Mara is a carbon sink, meaning it is efficient at absorbing carbon dioxide from the atmosphere.<sup>36</sup> Grazing migratory animals can also reduce the risk of wildfires by eating grass and making it shorter.<sup>37</sup>

The migrating wildebeests even provide essential nutrients to the Serengeti and Mara grasslands when they die. It is estimated that 6,250 wildebeest die annually during the migration.<sup>38</sup> Many of these animals die while crossing the Mara River because of trampling injuries and crocodile attacks. Altogether, the Mara River is left with approximately two million pounds of wildebeest carcasses each year.<sup>39</sup> The decaying wildebeest contribute to the river ecosystem in two

27 Ryan Truscott, “Spotted Hyenas Adapt to Climate Change in Famed Tanzanian Park,” *Mongabay*, May 18, 2022, <https://news.mongabay.com/2022/05/spotted-hyenas-adapt-to-climate-change-in-famed-tanzanian-park/>.

28 “Mara River Crossing,” Ermak Vagus, accessed September 3, 2023, <https://ermakvagus.com/Africa/Kenya/Mara%20River%20Crossing/Mara%20River%20Crossing.htm>.

29 Marshall, “The Greatest Show on Earth.”

30 “Maasai Mara: Scavengers – Essential to an ecosystem,” *Justine Carson Photography*, September 6, 2016, <https://www.justinecarson.com/blog/2016/9/maasai-mara-scavengers---essential-to-an-ecosystem>.

31 “Wildebeest Biology,” Gnu Landscapes, accessed August 14, 2023, <https://www2.nrel.colostate.edu/projects/gnu/wildebeest.php>.

32 Gnu Landscapes, “Wildebeest Biology.”

33 “Thomson’s Gazelles,” Animalia, accessed August 14, 2023, <https://animalia.bio/thomsons-gazelle>.

34 “Everything to Know About Serengeti National Park,” Focus East Africa Tours, accessed September 5, 2023, <https://serengetinationalparksafaris.com/everything-to-know-about-serengeti-national-park/>.

35 “Wildebeest Migration,” National Geographic, accessed September 3, 2023, <https://www.nationalgeographic.org/media/wildebeest-migration/>.

36 “How the Blue Wildebeest Restored the Serengeti Ecosystem,” One Earth, accessed August 14, 2023, <https://www.oneearth.org/species-of-the-week-blue-wildebeest/>.

37 One Earth, “How the Blue Wildebeest Restored the Serengeti Ecosystem.”

38 Shaena Montanari, “How 2 Million Pounds of Rotting Flesh Helps the Serengeti,” *National Geographic*, June 19, 2017, <https://www.nationalgeographic.com/animals/article/wildebeest-serengeti-migration-carcasses>.

39 Montanari, “2 Million Pounds of Rotting Flesh.”

ways. First, it releases phosphorus, an essential nutrient for plant and animal growth.<sup>40</sup> Second, it creates a thick biofilm, which is a group of bacteria and other small organisms that form a film together.<sup>41</sup> This biofilm provides nutrient-dense food for fish and smaller organisms in the river.<sup>42</sup> Since bones take nearly seven years to break down, they slowly release more nutrients into the environment over an extended period of time. This provides the animals and plants in the ecosystem with a sustained source of nutrients.<sup>43</sup> Even when they are not migrating, the passing wildebeest represent a crucial component of the ecosystem of the Serengeti and Mara.

Weather and climate are another important factor in the Great Migration. In fact, the migration only occurs because of the constantly changing weather and environment in East Africa. East Africa's plains vary between dry and wet seasons throughout the year. These seasonal changes can result in changes in resources like food and safe breeding grounds.<sup>44</sup> The migration allows the wildebeest and other ungulates more control over their circumstances throughout the year. By moving, they can access more abundant grasses, closer water sources, and safer places to raise calves. The herds begin in the southern Ngorongoro region of the Serengeti in Tanzania. From December to April, thousands of wildebeest and zebras are born during what is known as calving season. The short-grassed Serengeti plains are ideal for baby wildebeest and zebras, or calves, because predators, especially lions, can be detected easily.<sup>45</sup> This is also during the rainy season in the Serengeti, so there is plenty of vegetation for calves to feed on.<sup>46</sup> The first large movement of the herds occurs between May and July. As the weather begins to dry up the southern Serengeti, millions of wildebeest, zebra, and gazelles migrate north up the western corridor of the park.<sup>47</sup> This movement includes the iconic crossing of the Grumeti River, where many animals are killed by crocodiles in the first "natural spectacle"

event of the migration. In July and August, after reaching the northernmost part of the western corridor of the Serengeti, the herds will cross into the Maasai Mara Reserve in Kenya. The Mara is bordered by the famous Mara River, where herds crowd by the thousand to cross the dangerous river. In the Mara, the wildebeest can wait out the dry season in much rainier, wetter conditions. In November and October, as calves have matured and rains have returned to the Serengeti, the wildebeest will return to the Serengeti to breed, give birth, and graze the nutritious short grasses.<sup>48</sup>

When the Great Migration occurs without barriers or unusual weather events, the ecosystem is healthy. When die-offs or migration breakdown occurs, biodiversity is lost, and the ecosystem is unhealthy. Ecosystem health has changed in the Serengeti-Mara over hundreds of years. Because of the important role the Great Migration plays in maintaining a healthy ecosystem across the Serengeti and Mara, threats to the migration threaten the whole ecosystem. Wildebeest populations across Africa have been facing population decline for years. In Kenya alone, there were once four discrete migrations, and since 2021, the only remaining one is the Serengeti-Mara migration. Since 1977, there has been a nearly 60 percent decline in wildebeest who participate in the Great Migration.<sup>49</sup> Migration loss, especially in East Africa, has been a concern for decades. Kenya had two gazelle and wildebeest migrations that moved throughout the land every year. Tanzania had a wildebeest migration that went from Tarangire National Park to the Simanjiro Plains. In a 2013 article, it was reported that nearly 80 percent of these migrating populations had been lost.<sup>50</sup> Lost migrations result in a loss of environmental relationships at every level. When animals stop migrating, predators lose food sources. Environmental nutrients from animal carcasses and waste are lost. These lost relationships also risk habitat loss and environmental damage.

40 Montanari, "2 Million Pounds of Rotting Flesh."

41 "A Brief Introduction to Biofilms," Montana State University, accessed September 3, 2023, <https://www.cs.montana.edu/webworks/projects/stevesbook/contents/chapters/chapter001/section002/green/page001.html>.

42 Montanari, "2 Million Pounds of Rotting Flesh."

43 Montanari, "2 Million Pounds of Rotting Flesh."

44 Claire Bedelian, "Saving the Great Migrations: Declining Wildebeest in East Africa?" *UNEP Global Environmental Alert Service*, December 2013, [https://na.unep.net/geas/getUNEPPageWithArticleIDScript.php?article\\_id=107](https://na.unep.net/geas/getUNEPPageWithArticleIDScript.php?article_id=107).

45 Serengeti National Park, "The Great Migration."

46 Serengeti National Park, "The Great Migration."

47 Serengeti National Park, "The Great Migration."

48 Serengeti National Park, "The Great Migration."

49 Bhalla, "In Kenya."

50 Bedelian, "Saving the Great Migrations."

Migratory losses represent critical losses of diverse species, ecosystem relationships, and animal instincts.<sup>51</sup> These lost migrations resulted from agricultural development, physical barriers, and other forms of infrastructure development that barred migratory pathways.<sup>52</sup>

All of these developments can be tied to increased human population around the migration areas. As human population has increased over the last decade, all three migrations other than the Great Migration were lost.<sup>53</sup> The Great Migration showcases the importance of a healthy ecosystem and conservation efforts. Because the Serengeti-Mara pathways had protection measures, the effects of increased population did not cause a total migration loss.<sup>54</sup> Wildebeest, gazelles, and zebras represent a critical link between animals and their ecosystem health.

## Human Barriers to Migration

A majority of migration losses over the last several decades are due to man-made structures and other forms of development. Roads, barriers, and houses have caused a massive breakdown in migratory pathways, even in protected areas. Realizing this, the CMS formed the Global Initiative for Ungulate Migration (GIUM). The GIUM is an international collaboration of scientists and small agencies to study and conserve ungulate migrations worldwide. One of the primary focuses of the GIUM is to use maps to identify man-made barriers such as roads that are concerning to migration pathways.<sup>55</sup> Roads and settlements can represent positive growth opportunities. Similarly, increased population can represent healthier communities and better living conditions. However, increasing population numbers in the communities surrounding the Serengeti-Mara are directly linked to migration loss.<sup>56</sup> This leads to a conflict between solutions for migratory animals and solutions for human development. It

will be critically important for delegates of the CMS to find solutions that prevent human barriers to migration. Taking into consideration the relationship between humans, animals, and their environment is crucial to preserving the Serengeti-Mara ecosystems.

Roads are important for connecting growing communities. They provide access to resources for rural areas and can improve the quality of life for a whole community. However, roads are a major barrier for migratory animals. These can result in the death of the animals as they attempt to cross the roads. For those that do not cross, their migrations are disrupted. Even the pollution created by traffic is threatening to these ecosystems. In 2010, the Tanzanian government proposed constructing a 53km road through the Serengeti National Park called the “Serengeti Superhighway.” While it would have connected many northern settlements with the rest of East Africa, the traffic would have harmed the Serengeti.<sup>57</sup> In 2011, a study leaked from the government of Tanzania that showed that the Serengeti Superhighway would cause a 35 to 70 percent reduction in migratory populations. In the end, the proposed project did not go through.<sup>58</sup>

Roads pose threats in three main ways. First, paved or blocked off roads represent a significant physical barrier. For movements at the scale of the Great Migration, barriers that bottleneck movement can cause animals to stay in an area for longer periods of time. Bottlenecks are a sudden narrowing or barrier of a pathway that makes mass movement difficult.<sup>59</sup> For a movement as large as the Great Migration, a pathway bottleneck could cause animals to stay for weeks longer than usual. Staying still can result in overgrazing, where herds consume all available grass and cause damage to the environment. In worst-case scenarios, migration could stop altogether. Additionally, increased traffic creates multiple problems for migrating animals. More vehicles increase the

51 Bedelian, “Saving the Great Migrations.”

52 Bedelian, “Saving the Great Migrations.”

53 Bhalla, “In Kenya.”

54 Bedelian, “Saving the Great Migrations.”

55 CMS, “Global Initiative for Ungulate Migration.”

56 Bhalla, “In Kenya.”

57 Jeremy Hance, “Regional Court Kills Controversial Serengeti Highway,” *Mongabay*, June 23, 2014, <https://news.mongabay.com/2014/06/regional-court-kills-controversial-serengeti-highway/>.

58 Jeremy Hance, “Leaked Government Study: Road Will Damage Serengeti Wildlife, Despite President’s Assurances,” *Mongabay*, February 10, 2011, <https://news.mongabay.com/2011/02/leaked-government-study-road-will-damage-serengeti-wildlife-despite-presidents-assurances/>.

59 “Bottleneck,” Merriam-Webster Dictionary, accessed September 3, 2023, <https://www.merriam-webster.com/dictionary/bottleneck>.

risk of animal and human deaths due to driving accidents. A long-term study in the Serengeti National Park found that 104 spotted hyenas were killed from 1989 to 2023 due to vehicle collisions.<sup>60</sup> Increased emissions also contribute to air pollution and changing climate in the long term. For the Serengeti Superhighway, it was estimated that 800 vehicles would use the road per day.<sup>61</sup> Finally, roads often lead to the development of human settlements.<sup>62</sup> For example, the Kenyan Athi River-Namanga road heavily increased settlement traffic and impeded wildebeest movement in Nairobi National Park.<sup>63</sup> Even with land protections, the presence of human settlements near protected areas can lead to habitat encroachment. Habitat encroachment can be defined in a few ways. In the most direct way, habitat encroachment refers to the establishment of settlements or farmland on protected habitats. Roads are a direct form of habitat encroachment. However, the traffic, pollution, and barrier effects that they bring are indirect forms of encroachment. They cause serious effects just by being near a protected habitat.

60 Forschungsverbund Berlin e.V., “Examining the risk of fatal collisions between vehicles and spotted hyenas in the Serengeti,” Phys.org, April 6, 2023, <https://phys.org/news/2023-04-fatal-collisions-vehicles-hyenas-serengeti.html>.

61 Hance, “Leaked Government Study.”

62 Bedelian, “Saving the Great Migrations.”

63 Joseph Ogutu et al, “Changing Wildlife Populations in Nairobi National Park and Adjoining Athi-Kaputiei Plains: Collapse of the Migratory Wildebeest,” *The Open conservation Biology Journal* 7, (2013): 11-26, <https://benthamopen.com/contents/pdf/TOCONSBJ/TOCONSBJ-7-11.pdf>.

64 Tom Wall, “The Battle to Save Lapland: First, They Took the Religion. Now They Want to Build a Railroad,” *The Guardian*, February 23, 2019, <https://www.theguardian.com/world/2019/feb/23/battle-save-lapland-want-to-build-railroad>.

65 Wall, “The Battle to Save Lapland.”

66 Wall, “The Battle to Save Lapland.”

Despite the risk posed to animals, governments want to develop roads and railways through or near areas like the Serengeti. This is because migration is a spectacle that can bring in a lot of money. For example, in Lapland, Finland, thousands of tourists observe reindeer migration every year. In 2017, Lapland and Northern Norway proposed the creation of an “Arctic Rail,” that would connect the two areas.<sup>64</sup> Much like a road system through the Serengeti, this proposed railway would have a massive impact on the reindeer population and migration. The rail would act as a border and could prevent migratory reindeer herds from reaching vital food sources.<sup>65</sup> To date, planning for the railway has stopped for many reasons, with the most significant one being a conflict between Finland’s Indigenous Sámi reindeer herders and the Finnish government.<sup>66</sup> However, the financial and human incentive for governments to develop roads and railways is high, especially in East Africa. It is important that migratory species are prioritized when considering new roads.

While roads may be a sign of growth for human populations,

An elephant crosses the road in the Ngorongoro Conservation Area, Tanzania

Credit: Zenith4237





they can just as easily be a death sentence for world wildlife migrations.

Fences are the clearest physical barrier to migratory pathways. They are considered the most significant cause of historical wildebeest die-offs and migratory losses.<sup>67</sup> As early as the 1920s, growing human populations increased their fences to protect people and croplands. This continued in the following decades. Today, nearly 20 percent of the Kenyan ecosystem alone is restricted by fencing.<sup>68</sup> Apart from the obvious blockage of migratory movements, fences represent a conflict between animal and human needs. Animals need to be able to move freely through their habitats, and humans need animals to stay off of their farms and property. When human settlements grow on the borders of wildlife areas, people are more likely to interact with animals.<sup>69</sup> These increased interactions, such as rogue wildebeest consuming crops, cause people to surround their land with fences. In turn, fences prevent animals from reaching critical food sources and have often led to migration breakdown. According to Dr. Joseph Ogutu, a leading researcher on wildebeest migration across Kenya and Tanzania, fences are used more often when government policies are inadequate.<sup>70</sup> Without animal control policies or payments for wildlife-related land damages, the easiest and cheapest option is fencing. Because there is no incentive to act in harmony with the ecosystem, humans are more likely to build fences to avoid responsibility for wildlife. In Kenya, landowners do not benefit from sharing their land with wild animals, and the government has few structured “animal control” policies.<sup>71</sup> Therefore, fencing property and avoiding contact with wild animals is the best option for many rural landowners. These fences cause animals to take more

dangerous routes through settlements and across roads. In fact, despite breakdowns in animal migrations across Kenya, human-wildlife interactions have increased significantly.<sup>72</sup> This shows that fences meant to protect property and minimize conflict with animals can have the opposite effect.

Some fences are used to prevent disease transmission from wildlife to livestock. However, these have not been effective. In order to better solve this issue, the South African Development Community (SADC) decided to remove these fences.<sup>73</sup> They also promoted grazing practices that minimize contact with wildlife and strategies for safe food processing.<sup>74</sup> One expert said the fence removal led to animals crossing a migratory pathway that had not been used for decades.<sup>75</sup> It is important for local governments to find solutions to human wildlife conflict that do not include fencing. Regardless of existing solutions, fences still pose the largest threat to migrations worldwide. In East Africa alone, it is estimated that at least three of four major migrations have been lost over the last two decades due to habitat and migratory pathway fragmentation by man-made barriers.<sup>76</sup> Experts have known for many years that fences are causing major migratory breakdowns. It is highly important that the committee begins to address fences as their own issue and begin to reopen protected lands in the Serengeti-Mara and around the world.

In Kenya and Tanzania, rapid population growth has resulted in a need for houses and villages. Kenya and Tanzania regularly have annual growth rates of 3.5 percent or greater. Both countries have seen over 550 percent population growth since 1960.<sup>77</sup> These populations have grown just outside of the Serengeti-Mara ecosystems. Development and growth

67 Bhalla, “In Kenya.”

68 Bedelian, “Saving the Great Migrations.”

69 Kideghesho, “Serengeti Shall Not Die.”

70 Joseph Ogutu, “Barriers to Migration: The Negative Impact of Fences on Ungulate Populations in Africa,” *Research Features*, February 24, 2021, <https://researchfeatures.com/barriers-migration-negative-impact-fences-ungulate-populations-africa/>.

71 Ogutu, “Barriers to Migration.”

72 Gordon Ojwang et al, “Wildlife Migratory Corridors and Dispersal Areas: Kenya Rangelands and Coastal Terrestrial Ecosystems,” *Kenya Vision 2030*, 2017, [https://conservationcorridor.org/cpb/Ojwang\\_et\\_al\\_2017.pdf](https://conservationcorridor.org/cpb/Ojwang_et_al_2017.pdf).

73 Steven A Osofsky, “Ancestral Migrations Stopped at Fencelines,” *Cornell Wildlife Health and Policy*, 2019, <https://migrations.cornell.edu/ancestral-migrations-stopped-fencelines>.

74 G. Thomson et al., *Guidelines on Commodity-Based Trade Approaches for Managing Foot and Mouth Disease Risk in Beef in Southern Africa* (Ithaca: Cornell University College of Veterinary Medicine, 2018), <http://www.wcs-ahead.org/kaza/181114-guidelines-for-implementing-cbt-final.pdf>.

75 Osofsky, “Ancestral Migrations Stopped at Fencelines.”

76 Bedelian, “Saving the Great Migrations.”

77 “Population Growth in Kenya,” World Data, accessed August 15, 2023, <https://www.worlddata.info/africa/kenya/populationgrowth.php>;

“Population Growth in Tanzania,” World Data, accessed August 15, 2023, <https://www.worlddata.info/africa/tanzania/populationgrowth.php>.

of settlements is a sign of positive growth for humans, but it is not necessarily positive for animals. Two of the biggest contributions to expansion are poverty and population growth. With more individuals to accommodate, land expansion is only natural. Between 1910 and 1930, there was a 40 percent reduction of the “untouched” Serengeti ecosystem as a result of human activity.<sup>78</sup>

Land development continues to be a concern as the population continues to grow. In the Mara, settlement growth has caused the government to reduce the reserve size by 15 percent over several years.<sup>79</sup> Habitat loss, especially in the Serengeti, means loss of breeding and calving grounds. The calving process is critical to the Great Migration cycle, especially because wildebeest populations are declining. An issue with many of the settlements, particularly in Kenya, is that they are privately owned. Privately-owned land next to protected public lands containing wildlife creates conflict between local people and animals. These conflicts, whether they are animal attacks or crop destruction by wildlife, can cause locals to harbor negative feelings toward conservation efforts. In one report, 80 percent of villagers interviewed in the Western Serengeti felt that wildlife diseases had been a primary cause of livestock losses.<sup>80</sup> Human-animal conflicts can result in hostile responses, such as revenge-killing wild animals for hunting livestock.<sup>81</sup> As populations continue to grow in Kenya and Tanzania, it is important to ensure that new human settlements do not interfere with migratory pathways.

Despite the many natural barriers that the Great Migration faces, it is human barriers that have led to the most destruction over time. Fences, roads, and human settlements are contributing to migration losses not just in the Serengeti-Mara, but worldwide. In the face of population growth

and increased habitat loss, the CMS must work with local communities to find policy alternatives to physical barriers. Connected landscapes are important for humans, but they are even more important for migrating animals. It is important to foster human-animal relationships through education and collaborative policy rather than prevent them entirely.

## Agriculture and Impacts on Migratory Pathways

Agriculture is important across Tanzania and Kenya. In both countries, farming makes up over 30 percent of the country’s income.<sup>82</sup> This demonstrates how important farming is on both a local and national level. Farmland surrounds Serengeti National Park and Maasai Mara Reserve. Between 1973 and 2000, there was a 203 percent increase in farmland in the Mara alone.<sup>83</sup> Farmers are important community food sources and sources of national exports. This means that agriculture is constantly developing in the region. However, farmland development poses a significant threat to migrating species in East Africa. While there was a 276 percent increase in farmland, migrations were reduced by 73 percent.<sup>84</sup>

In the region of the Great Migration, land expansion has caused a 75 percent reduction in wildebeest populations.<sup>85</sup> As farms expand, wildlife is forced to concentrate into smaller areas to avoid human interactions. This can lead to limited food availability for the migrations.<sup>86</sup> Additionally, interactions between farm animals and wildlife are dangerous to both groups. However, many farmers work to increase their agricultural land because of poverty. By increasing their land, they can produce more food and thus earn more income. It is important to ensure that agriculture does not interfere with migratory pathways and harm wildlife in Kenya and Tanzania.

78 Jafari Kideghesho, “Serengeti Shall Not Die: Transforming an Ambition into a Reality,” *Tropical Conservation Science* 3 (September 2010): 228-247, <https://doi.org/10.1177/194008291000300301>.

79 Kideghesho, “Serengeti Shall Not Die.”

80 Kideghesho, “Serengeti Shall Not Die.”

81 Ojwang et al, “Wildlife Migratory Corridors.”

82 “Kenya: Agriculture, Food, and Water Security,” USAID, accessed July 17, 2023, <https://www.usaid.gov/kenya/agriculture-food-and-water-security>; “Tanzania - Commercial Country Guide,” International Trade Administration, accessed July 20, 2023, <https://www.trade.gov/country-commercial-guides/tanzania-agriculture-and-agricultural-processing>.

83 Peter Miururi, “Fears for a Million Livelihoods in Kenya and Tanzania as Mara River Fish Die Out,” *The Guardian*, November 10, 2020, <https://www.theguardian.com/global-development/2020/nov/10/fears-for-a-million-livelihoods-in-kenya-and-tanzania-as-mara-river-fish-die-out>.

84 Joseph Ogutu, “The Great Migration Faces Extinction,” *Horizon Guides*, October 21, 2019, <https://horizonguides.com/journal/the-great-migration-faces-extinction-we-need-to-act-now>.

85 Kideghesho, “Serengeti Shall Not Die.”

86 Ogutu, “Barriers.”



Kenyan farmers leaning on a tractor used to plough fields

Credit: Ed Hawkesworth/DFID, DFID - UK Department for International Development

Livestock farming, which is the raising of farm animals, is a primary source of income in Kenya and Tanzania. Nearly 40 percent of farming households in Tanzania keep some kind of livestock, such as cows, pigs, or horses.<sup>87</sup> In Kenya, livestock contributes to almost half of the agricultural income.<sup>88</sup> However, wild migratory animals can pose a threat to livestock in a few specific ways. First, for ungulates like wildebeest and gazelles, disease transmission is a significant concern for African farmers. Foot-and-mouth disease (FMD), a painful illness experienced by cows, sheep, and wild species, is still rampant across Africa. FMD causes blisters on the mouth, teats, and feet of the animals. Though it may not kill them, it weakens livestock significantly.<sup>89</sup> Animals infected with the disease will produce less milk and meat, causing farmers to quickly lose money. Since the disease spreads quickly, it is often easier for farmers to kill and isolate infected animals before the entire population is infected.<sup>90</sup> To prevent the spread of these diseases, farmers will often build fences.<sup>91</sup>

Livestock farming also requires large areas of land. This land often encroaches on grazing space, pathways, and breeding grounds for migratory species. When farmers allow their animals to freely graze in protected areas, they create unnatural competition for migratory grazing animals. Wildebeest, zebras, and gazelles need large amounts of grass to sustain the migrating herds. Livestock overconsuming these grasses in protected areas prevents migrating animals from getting the food they need. This can lead to wild animals entering croplands and using farmers' crops as a food source.<sup>92</sup> Additionally, livestock farming can increase human-animal conflicts in a dangerous way. When the Great Migration occurs, the wildebeest, gazelles, and zebras are trailed by a variety of predators, including lions and hyenas. If migratory pathways are surrounded by farmland, these predators take advantage of livestock as a food source. This can result in predatory animals being killed by villagers for "revenge", which increases the likelihood of human and animal injury.<sup>93</sup> Disease

87 Ermias Engida, et al, "The Role of Livestock in the Tanzanian Economy: Policy Analysis Using a Dynamic Computable General Equilibrium Model for Tanzania," *International Conference of Agricultural Economists* (2015): 2, <https://ageconsearch.umn.edu/bitstream/212039/2/Legesse-The%20Role%20of%20Livestock%20in%20the%20Tanzanian%20Economy-98.pdf>.

88 "Improving Livestock Markets to Generate Economic Growth and Resilience in East Africa," DAI, accessed August 15, 2023, <https://dai-global-developments.com/articles/improving-livestock-markets-to-generate-economic-growth-and-resilience-in-east-africa/>.

89 "Foot and Mouth Disease," World Organization for Animal Health, accessed July 20, 2023, <https://www.woah.org/en/disease/foot-and-mouth-disease/>.

90 World Organization for Animal Health, "Foot and Mouth Disease."

91 Ogutu, "Barriers."

92 Phuntsho Thinley et al, "High Relative Abundance of Wild Ungulates Near Agricultural Croplands in Livestock-Dominated Landscape in Western Bhutan: Implications for Crop Damage and Protection," *Agriculture, Ecosystems & Environment* 248, (October 2017): 88-95, <https://doi.org/10.1016/j.agee.2017.07.036>.

93 Gordon Ojwang et al, "Wildlife Migratory Corridors."

transmission, crop damage, and human-animal conflicts are all serious effects of livestock farming that surrounds migratory pathways in East Africa.

Farming also requires a large, constant flow of water. Worldwide, farming contributes to nearly 70 percent of freshwater usage. In countries that are especially dependent on farming, this total can reach up to 95 percent.<sup>94</sup> The Mara River is critical for migrating animals because it is the only water source during the dry season migration. The Mara River has been a subject of concern for the past few years as fish and bird extinctions have increased. These extinctions are a result of poor water quality and low water levels caused by agricultural land use. Deforestation, pesticide runoff, and irrigation use has removed or damaged critical habitat for animals in the Mara River.<sup>95</sup> As the Mara is the most important crossing for the entire great migration, it represents a significant water source for crossing animals, especially thirsty wildebeest. For smaller gazelles, the Mara River is the biggest water source the herds will have encountered in weeks. Further, the crossing animals are a significant food source for the river's fish, crocodiles, and waterfowl.<sup>96</sup> It is estimated that with the disappearance or loss of the Mara River, the wildebeest population could decline over 80 percent.<sup>97</sup> Such significant die-offs would lead to fundamental changes in the Serengeti-Mara ecosystem.

To address this issue, the World Wildlife Foundation (WWF) collaborated with Kenya to implement the Water Law in 2002.<sup>98</sup> The Water Law is a series of practices that encouraged local-level management of water resources. Smaller parts of the communities surrounding the Mara River were broken into Water Resource User Associations (WRUAs). WRUAs are voluntary organizations that work with Kenya and the

WWF to more effectively use water resources and better plan land development. Since 2002, 23 WRUAs have been established around the Mara River basin. The WRUAs in the Mara have helped farmers plant drought resistant crops, which use less water. They have also helped create devoted land areas for cattle, and overall reduce water usage. By moving cattle drinking areas away from river sources, runoff and pollution is prevented.<sup>99</sup> However, the Mara River Basin, where the WRUAs operate, has not seen a significant change in water quality. This is because many areas of the river basin do not comply with water laws. It is important to incentivize participation in water programs. Legislation like the Kenya Water Law is a step in the right direction and should be an example for other regions covered by the Great Migration. Farming is an essential part of self-sufficiency in the Serengeti-Mara, and it is important to support farmers while ensuring the safety and longevity of the Great Migration.

When considering solutions to prevent further agricultural expansion, it is important to examine poverty. Between 20 and 50 percent of people in the Mara River Basin live in poverty.<sup>100</sup> In the Serengeti, approximately 75 percent of households live below the poverty line.<sup>101</sup> Poverty contributes significantly to the expansion of farmland in East Africa. Since poverty restricts people's access to machinery and other agricultural tools, the easiest way to deal with poor crop yields is to use more land and plant more crops.<sup>102</sup> When farmland is already close to protected areas, this expansion will likely interfere with migration pathways. However, when farmland expands into protected areas, crops are often damaged by wildlife. This leads to a difficult cycle where farmers will expand their farmland even further, only to have it damaged. It also farmers deeper into poverty and causes negative feelings from

94 "Water in Agriculture," World Bank, accessed June 24, 2023, <https://www.worldbank.org/en/topic/water-in-agriculture>; FAO, *Water for Sustainable Food and Agriculture*, (Rome: Food and Agriculture Organization of the United Nations, 2017), <https://www.fao.org/3/i7959e/i7959e.pdf>.

95 Muiruri, "Fears for Millions."

96 Montanari, Shaena, "How 2 Million Pounds of Rotting Flesh."

97 Muiruri, "Fears for Millions."

98 WWF, *Kenya's Water Resource Users Associations*, (Nairobi: World Wildlife Foundation, June 2017), [https://www.wwf.org.uk/sites/default/files/2017-06/170606\\_Mara\\_WRUAs\\_CS\\_external\\_final\\_0.pdf](https://www.wwf.org.uk/sites/default/files/2017-06/170606_Mara_WRUAs_CS_external_final_0.pdf).

99 WWF, *Kenya's Water Resource Users Associations*.

100 *Vulnerability and Adaptation in the Mara River Basin* (Narok: USAID, 2019) <https://reliefweb.int/report/kenya/vulnerability-and-adaptation-mara-river-basin>.

101 Solomon Walegn et al, "Roads and Livelihood Activity Choices in the Greater Serengeti Ecosystem, Tanzania," *PLoS One* 14, no. 3 (March 2019): 21-30, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6407761/>.

102 Kideghesho, "Serengeti Shall Not Die."

locals towards migrating animals.<sup>103</sup> With many conservation programs like WRUAs being voluntary, it is important for communities to be involved. To prevent agricultural loss, locals should understand the risks of expansion into protected areas. Further, sustainable farming and conservation should be incentivized by local governments and NGOs. It is important to address poverty in the Mara River Basin and the Serengeti to prevent farmland expansion into protected areas.

Conservation efforts have often displaced Indigenous peoples. One of these groups is the Maasai people. The Maasai people migrated to the area that is now considered Serengeti National Park in the 17th century.<sup>104</sup> However, British colonizers established the Serengeti as a game reserve intended to protect lions in 1921 and displaced the Maasai people that lived there.<sup>105</sup> The Maasai people were then forced to move out of their homes to Ngorongoro Crater Conservation Area (NCCA) and Loliondo, a nearby town.<sup>106</sup> Today, Tanzania continues to evict Indigenous peoples from conservation areas for tourism.<sup>107</sup> This has left people without farmland or even homes.<sup>108</sup>

When the government forces people out of conservation areas, they often do not give them adequate financial compensation for their losses.<sup>109</sup> Despite being forced to leave their homes and livelihoods, these people are often faced with poverty and food insecurity. For example, in the 1990s, TANAPA developed a series of programs to financially compensate communities that were impacted by conservation efforts. However, the grants were not enough.<sup>110</sup> To some, this action represented a lack of care for the community and an unfair care for the animals.<sup>111</sup> In cases like these, an increase in illegal activity can be seen by the disadvantaged

community members. However, government policies still have not changed today. This lack of motivation to conserve wildlife has ruined the relationship between communities and their wildlife neighbors. It is important that the CMS focuses on developing solutions that combine the interests of human population growth and preservation of migratory wildlife in East Africa.

The Serengeti and the Mara are both protected from farmland expansion in slightly different ways. The Serengeti ecosystem is twice as large as Serengeti National Park. The park is primarily overseen by the Tanzania National Parks Agency (TANAPA).<sup>112</sup> However, it is also a UNESCO World Heritage Site, which allows stricter protections under international law.<sup>113</sup> The Maasai Mara Reserve is not a UNESCO World Heritage Site, which may lead to more significant farmland intrusion and habitat loss. This is due to the lack of international protections. Though the Mara lacks international legal protection, it is in the process of becoming a World Heritage Site.<sup>114</sup> For now, both lands are under national government protection. Therefore, it is the responsibility of the Kenyan and Tanzanian governments to create policies that address the needs of farmers while protecting migratory animals.

Conservation must take into account the social contexts of the Serengeti-Mara ecosystem. By providing better compensation for communities that are affected by conservation, better relationships can be built between individuals and the ecosystems. This can also help ensure that farmers have legal and safe ways to make a living. By recognizing the importance of local communities, governments can work towards integrating them into conservation planning.

103 Kideghesho, "Serengeti Shall Not Die."

104 "Meet your hosts: the Maasai people," Serengeti National Park, accessed September 5, 2023, <https://www.serengeti.com/maasai-people-serengeti.php>.

105 "Beyond just conservation: a history of Maasai dispossession," Minority Rights Group International, accessed September 5, 2023, <https://minorityrights.org/2023/02/23/beyond-just-conservation-a-history-of-maasai-dispossession/>; "Serengeti National Park," Explore Rwanda Tours, accessed September 5, 2023, <https://www.rwandawildlifefarisafari.com/serengeti-national-park/>.

106 Minority Rights Group International, "Beyond just conservation."

107 Minority Rights Group International, "Beyond just conservation."

108 Kideghesho, "Serengeti Shall Not Die."

109 Kideghesho, "Serengeti Shall Not Die."

110 Kideghesho, "Serengeti Shall Not Die."

111 Kideghesho, "Serengeti Shall Not Die."

112 "Conservation of Serengeti National Park," Serengeti National Park, accessed July 20, 2023, <https://www.serengeti.com/conservation-serengeti.php>.

113 "Serengeti National Park," WHC, accessed June 18, 2023, <https://whc.unesco.org/en/list/156/>.

114 "The African Great Rift Valley," WHC, accessed June 23, 2023, <https://whc.unesco.org/en/tentativelists/5512/>.

## Changing Weather Patterns and Animal Behavior

For years, climate change has been at the forefront of discussions of global issues, and for migratory species, this is no different. Since migratory animals depend on seasonal change to determine when to move and breed, changing temperature is a concern. Seasonal irregularity and extreme weather are some of the primary effects of climate change, and they will have serious consequences for migratory species and their human neighbors. In the Serengeti-Mara, droughts and heavy rains are of the greatest concern.<sup>115</sup> Long, unpredictable dry seasons can lead to water shortages, food loss, and have cascade effects for years to come. Heavy rains can cause irreversible land damage that breaks off migratory pathways and prevents critical migration. The world has seen a rapid rise in global temperature, at nearly 3°C for this past century.<sup>116</sup> Temperature changes cause more instability in worldwide climate and precipitation cycles. This has led to increasingly intense weather events that stand to threaten migrations worldwide. Animal behavior has changed a lot to accommodate the effects of climate change. Understanding

115 Bhalla, “In Kenya.”

116 “UNEP Climate Action Note,” UNEP, accessed August 15, 2023, <https://www.unep.org/explore-topics/climate-action/what-we-do/climate-action-note/whats-happening.html>.

117 Bhalla, “In Kenya.”

118 Wanjohi Kabukuru, “African Migratory Birds Threatened by Hotter, Drier Conditions,” *Associated Press*, August 20, 2022, <https://www.pbs.org/newshour/world/african-migratory-birds-threatened-by-hotter-drier-conditions>.

these behavioral shifts can help the CMS address changes in the Serengeti-Mara as soon as possible.

In 2021 and 2022, the Mara and Serengeti faced the driest seasons recorded since 1981.<sup>117</sup> Excessive dry seasons are dangerous for a variety of reasons. Loss of food and water sources, vulnerability to wildfires, and increased human-wildlife interactions are all serious effects of drought. Extended droughts can cause a cascade effect of issues. For example, if plants are unable to grow due to dry conditions, they will not be able to seed, and the amount of available edible grasses will be diminished significantly.<sup>118</sup> With less crop and grass cover, the soil dries rapidly and its capacity to absorb water is significantly reduced. This contributes to dustier conditions across the ecosystem and creates a cycle of grass loss. Grass and crop loss across the region causes food shortages for migrating animals, livestock, and people. This can increase interactions between migratory wildlife and livestock because both herbivores are seeking the same food sources. This leads to both wildlife and domesticated livestock intruding on each other’s territory. When hungry wildebeest enter farmlands, hungry predators often follow behind.



African wild dogs play fighting to practice their skills for hunting

Credit: Charles J. Sharp

These predators can increase human-animal interactions in a dangerous way, prompting animal attacks or illegal human hunting.<sup>119</sup>

Further, direct interactions between wildebeest and livestock have caused mass die-offs from disease.<sup>120</sup> With droughts already endangering the migratory animals, additional factors like disease could completely destroy a population. Farmlands in East Africa already face many serious effects from climate change, and increased risks of animal attacks are among the more concerning. In addition to environmental damage and resource loss, droughts can be a serious factor in migratory pathway changes or breakdown. Droughts are tied directly to wildebeest deaths and have caused population decrease in all the species that participate in the Great Migration.<sup>121</sup> In 2022, over one thousand animals died from drought-related starvation and dehydration.<sup>122</sup> These deaths occurred despite conservation efforts such as animal feeding programs. The region has been unable to counteract the effects of the relentless drought. Because of this, migratory animals may remain in place or change their pathways to avoid dry areas. However, this results in migration loss, and can have serious consequences for the rest of the ecosystem. Drought is an existential issue for migratory animals. Conservation efforts cannot solve extreme weather conditions, but facing drought as a primary threat to migratory animals may yield better strategies to prepare for and address extreme weather as it happens.

Often associated with droughts, wildfires are a growing concern across the East African region. Fires are a normal weather event in the Serengeti-Mara, occurring September-November of each year. Wildfires can be beneficial to the ecosystem by allowing better vegetation growth and adding nutrients

to the soil. Migratory species also play a significant role in fire control across the region. At the same time, uncontrolled wildfires can break down historic migratory pathways and prevent animals from migrating in a timely manner.<sup>123</sup> Grazing migratory animals provide wildfire control everywhere they eat food. By grazing, animals shorten the grassy plains and prevent fires from spreading during dry seasons.<sup>124</sup> In fact, grazing animals like wildebeest contribute significantly to the Serengeti's ability to absorb carbon dioxide.

In the 1900s, wildebeest populations were decimated by disease. Fewer migrations occurred annually, which meant certain regions were not being grazed as heavily as they were in the past. This led to wildfires that would destroy 80 percent of the vegetation in the ecosystem annually.<sup>125</sup> When wildfires occur too often in the Serengeti-Mara, the region risks becoming a net-producer of carbon dioxide, rather than a natural absorber of it. Wildebeest populations have returned from mass disease die-offs and the Serengeti-Mara is now a net-absorber of carbon dioxide.<sup>126</sup> However, with multiple migrations that have disappeared since the 1900s, and large reductions in wildebeest populations occurring annually, the risk for wildfires is increasing. In 2020, Kenya saw historic wildfires that halted wildebeest migration.<sup>127</sup> Like other weather factors, conservation efforts can only address so much. Wildfires are a rare example where the ecosystems being damaged are the solution to the problem. For Serengeti-Mara wildfires, natural solutions like increased wildebeest populations and stronger vegetation are applicable. This type of conservation is called nature-based conservation, where strengthening ecosystems can help to alleviate the effects of climate change.<sup>128</sup> Maintaining migratory ungulates is not just good for migratory species worldwide, it may be an essential strategy for Kenya and Tanzania to adapt to climate change.

119 Bhalla, "In Kenya."

120 One Earth, "How the Blue Wildebeest Restored the Serengeti Ecosystem."

121 Ojwang et al, "Wildlife Migratory Corridors."

122 Bryan Pietsch, "Relentless Drought Kills Hundreds of Kenya's Zebras, Elephants, Wildebeests," *The Washington Post*, September 6, 2022, <https://www.washingtonpost.com/world/2022/11/06/zebra-elephants-kenya-drought-deaths/>.

123 "How Weather Affects the Serengeti-Mara Migration," Mondisti, accessed August 15, 2023, [https://mondisti.com/the-great-migration-tanzania/#how\\_floods\\_and\\_drought\\_impact\\_the\\_migration](https://mondisti.com/the-great-migration-tanzania/#how_floods_and_drought_impact_the_migration).

124 Bhalla, "In Kenya."

125 One Earth, "How the Blue Wildebeest Restored the Serengeti Ecosystem."

126 One Earth, "How the Blue Wildebeest Restored the Serengeti Ecosystem."

127 George Sayagie, "Kenya: Ravaging Wildfires Halt Migration of Wildebeest Into the Maasai Mara," *AllAfrica*, July 2, 2020, <https://allafrica.com/stories/202007030379.html>.

128 Alexandre Chausson et al, "Mapping the Effectiveness of Nature-Based Solutions for Climate Adaptation," *Global Change Biology* 26, no. 11 (November 2020): <https://doi.org/10.1111/gcb.15310>.

Increasing wildebeest populations has prevented wildfires in the past, therefore, their conservation is critical to helping to stop catastrophic wildfires in the future.<sup>129</sup>

Extreme rains are an equally serious effect of climate change. Similar to the dry seasons, annual changes in rains are used by migrating animals to change locations or remain in place. Rainfall can signal to animals when grass and other vegetation will be available to eat. Rain has historically affected the movement of the Great Migration. In 2013, rains along the pathway toward Serengeti Park caused the herds to turn around and remain in Mara for three additional weeks. In 2014, rains in a part of the Serengeti prevented the herds from moving north for multiple months.<sup>130</sup> Over the past 30 years, increased rainfall has changed migration pathways and timing.<sup>131</sup> The effects of this can be seen not just in the migrating animals, but in the predators who depend on them as a food source. Spotted hyenas in Tanzania rely on the arrival of wildebeest herds each year. However, as the Serengeti has gotten increasingly wet over the last decade, herds are less likely to move and more likely to arrive later, if at all. This is due to an increased abundance of lush green grasses where dry seasons would have forced herds to move. In theory, more food for the herds is a good thing. However, over the 800km stretch covered by the Great Migration, the ecosystem is dependent on the arrival of these herds. While the Serengeti-Mara ecosystem is not ready for migratory herds to stop moving, some animals have begun to adapt. Hyenas in the Serengeti have adapted to late arrivals by migrating wildebeest. Each year, hyena packs travel further to find wildebeest, rather than waiting for them. By using information from network packs, hyenas can communicate wildebeest locations across far distances. This has allowed them to depend on their hunting skills rather than wet season herd arrivals.<sup>132</sup> As rainfall continues to change across the Serengeti-Mara, animal adaptations will continue to

emerge in response to migration changes.

Extreme rainfall can be a serious barrier to migrating animals by causing flooding. Flooding increases after droughts because the ground has less capacity to absorb and distribute water. In 2020, hundreds of tourists were evacuated from the Mara after the Talek River flooded ten tour camps.<sup>133</sup> When floods run into residential areas, the waters can cause disease spread. Two diseases, West Nile Virus and African Horse Sickness, are carried by water, and often appear when flooding occurs.<sup>134</sup> Floods often contaminate the Mara River with pesticides and other agricultural runoff.<sup>135</sup> At the Grumeti River in the Serengeti, excessive rains make the river impassable. Animals who do cross the rushing river may be among the more than three thousand animals who drown annually.<sup>136</sup> However, if the animals choose not to cross the river, they will remain in certain regions for too long, which contributes to migration breakdowns. Weather effects in East Africa can often be caused by two opposite things. The effects of excessive flooding are similar to those of excessive drought.<sup>137</sup> Either way, both weather events lead to vegetation losses and migration barriers.

East Africa is particularly vulnerable to extreme and unpredictable weather events.<sup>138</sup> In fact, unpredictable weather is the main reason many of East Africa's ungulates migrate each year. However, frequent flooding, droughts, and heavy rains are signs of intensified weather in a negative way. East Africa is strongly influenced by the Indian Ocean Dipole, which is similar to the El Niño-Southern Oscillation in the Pacific. Small changes in ocean temperature in the Indian Ocean leads to profound changes in the length of the dry and wet seasons. Therefore, the dipole is a predictor for when the Great Migration will arrive to certain regions of the reserves.<sup>139</sup> Further, as ocean temperatures have changed

129 One Earth, "How the Blue Wildebeest Restored the Serengeti Ecosystem."

130 Serengeti National Park, "The Great Migration."

131 Ryan Truscott, "Spotted Hyenas Adapt to Climate Change in Famed Tanzanian Park," *Mongabay*, May 18, 2022, <https://news.mongabay.com/2022/05/spotted-hyenas-adapt-to-climate-change-in-famed-tanzanian-park/>.

132 Truscott, "Spotted Hyenas."

133 Mondisti, "How Weather Affects."

134 Mondisti, "How Weather Affects."

135 Muiruri, "Fears for a Million Livelihoods."

136 Mondisti, "How Weather Affects."

137 Bhalla, "In Kenya."

138 Bhalla, "In Kenya."

139 Mondisti, "How Weather Affects."



over the decades, the temperature changes have created more extreme weather events.<sup>140</sup> At the same time that they have helped predict the movement of migrating animals, these systems have contributed to weather that has broken down multiple migrations.

Human and agricultural barriers to migration have a variety of solutions, some of which are in action today. Climate-related barriers to migration are a worldwide, variable issue. There are no clear solutions to preventing catastrophic weather events other than working to reduce the effects on migrating animals. Strategies like nature-based conservation, and research into new animal adaptations are essential to understanding adverse climate events in the short term. In the long term, the committee must encourage countries to work with agencies like the UNEP to mitigate climate change on a global scale.

### Previous Migratory Mapping and Conservation Efforts

Mapping out migration patterns is key to bettering the well-being of migratory species. Migratory mapping uses data to track and understand the seasonal movements of herds, which can be used to create conservation strategies. The Global Initiative on Ungulate Migration (GIUM) is a group dedicated to mapping out and preserving migrations. This task force works in partnership with the CMS and is made up of 92 international scientists and conservationists. Created in 2020, its mission is to form a Global Atlas of migrations and understand threats and conservation solutions.<sup>141</sup> This Global Atlas became the “first-ever” inventory on ungulate migration when its first edition was published in 2021.<sup>142</sup> However, as of July 2023, this inventory is still incomplete. This record is formed using animal tracking datasets, local and Indigenous knowledge, and historical records.

Lead author of the GIUM and wildlife biologist Matthew Kauffman emphasized the importance of mapping: “As

landscapes become more difficult to traverse, the maps can help conservationists pinpoint threats, identify stakeholders, and work together to find solutions.”<sup>143</sup> For example, the GIUM has improved knowledge on the impacts of fences on migratory pathways. This type of research has historically been limited to one or two experts in the field. These limitations left a data gap that spans nearly a decade. The current research has shown that fences and human development have been catastrophic for migrations in the Serengeti. Because of existing research, it is possible to draw a direct connection from broken migrations to the development surrounding the park.<sup>144</sup> The GIUM project is the first of its kind in the Serengeti-Mara. Continuing to expand research resources through projects like these will be crucial to preserving the remaining migrations.

Despite its status as a cultural icon and natural phenomenon, the Great Migration is inadequately researched and understood. When the migration has been tracked in the past, it is more likely that it would be for a news story than for data collection. Though there are hundreds of thousands of pictures of wildebeest, giraffes, and other animals crossing the Mara River, it is still nearly impossible to exactly predict when the animals will cross each year. The local governments have focused highly on tourism, which has brought income to the countries. However, it has led to an overabundance of tourist-focused information, with still no scientific understanding of migration loss and patterns.<sup>145</sup>

Few researchers are specifically interested in the Great Migration, and many have slowed their research in the last decade. One scientist, Dr. Joseph Ogutu, is the one of the premier wildebeest researchers in East Africa. He has studied migration losses as they have happened over the last two decades. His research has been referenced by the UNEP as far back as 2011 in early alert announcements.<sup>146</sup> These announcements occur when there is documented

140 UNEP, “UNEP Climate Action Notice.”

141 “Global Initiative on Ungulate Migration,” Convention on the Conservation of Migratory Species of Wild Animals, accessed July 22, 2023, <https://www.cms.int/en/gium>.

142 “International Team Partners with UN to Launch Global Initiative Map Ungulate Migrations,” United States Geological Survey, accessed July 22, 2023, <https://www.usgs.gov/news/international-team-partners-un-launch-global-initiative-map-ungulate-migrations>.

143 United States Geological Survey, “International Team Partners with UN.”

144 Kideghesho, “Serengeti Shall Not Die.”

145 Valentine, “Death of Serengeti-Mara.”

146 Bedelian, “Saving the Great Migrations.”



Trackers are placed on migrating animals to trace migratory pathways

Credit: CMS

understanding of an issue like population loss before it happens. In 2023, many of the losses predicted by Dr. Ogotu and his teams have come true. Fencing, adverse weather, and human development have led to a 60 percent population decline in migratory wildebeest since 1977. Further, yearly losses of migratory wildebeest are intensifying.<sup>147</sup> Because of research focused on pathways specifically, these losses have been predictable. Dr. Ogotu’s research shows that tracking pathways and focusing on population statistics can be a key part of understanding migrations. Moreover, analyzing migratory losses can provide insights on what is causing these losses.

In addition to migration mapping, current preservation efforts are key to understanding the health of the Great Migration. Because they contain the primary habitats of these migratory species, Tanzania and Kenya have many domestic and international policies to preserve this habitat. These include large amounts of conserved areas as well as interaction with international conservationists. Tanzania has a total of 866 protected areas, or 38.38 percent of the country’s area, dedicated to the protection of local wildlife.<sup>148</sup> This includes Serengeti National Park, the country’s largest

national protected area. All of the national protected areas in Tanzania are managed by Tanzania’s National Parks Agency (TANAPA) which gives land grants, makes policy decisions, and works with global agencies to maintain its national parks. However, although this organization is dedicated to conservation, they also serve financial interests. Currently, they are working to expand infrastructure in the southern regions of the Serengeti to allow tourists to access this area more easily.<sup>149</sup> While this may be beneficial to the government, this amount of development will reduce the already small area left for these animals to migrate. Despite working in the best interests of the Great Migration, organizations like TANAPA still have a long way to go.

Kenya has a total of 409 protected areas, or 12.19 percent of the country’s area, dedicated to conservation efforts. However, an important issue for Kenya is the Maasai Mara’s lack of status in the UN. In Tanzania, the Serengeti is a UNESCO World Heritage site, which creates opportunities for more global attention and funding. The Maasai Mara has been on the tentative list for several years, but the reserve still lacks international protection.<sup>150</sup> This region is still protected nationally by the Kenyan Wildlife Service. The Species

<sup>147</sup> Bhalla, “In Kenya.”

<sup>148</sup> “United Republic of Tanzania,” Protected Planet, accessed August 2, 2023, <https://www.protectedplanet.net/country/TZA>.

<sup>149</sup> Nelly Mtema, “TANAPA outlines measures to push number of tourists arrival,” *Tanzania Daily News*, July 25, 2023, <https://dailynews.co.tz/tanapa-outlines-measures-to-push-number-of-tourists-arrival/>.

<sup>150</sup> Wildlife Conservation Society, “Sustainable Wildlife Management Programme.”

Conservation and Management Division is specifically in charge of making sure that endangered species can recover.<sup>151</sup> This organization works along with many international projects to receive funding for their protected areas. However, global recognition would increase attention and available conservation resources for the Mara.

Conservation efforts that create borders and displace people are highly unpopular amongst locals. The Serengeti alone is surrounded by over 30 Indigenous tribes and has a surrounding population of two million people. Because of population growth, the government has had to redefine the boundaries of Serengeti National Park, which has led to a 15 percent loss of conserved land. Some park managers have been quoted as saying that the needs of flora and fauna must outweigh the needs of local people. This has created a legacy of conflict between locals and conservationists. Conservation measures in the past have resulted in monetary losses or massive displacement. This means that local people are taking significant financial losses that can be attributed to the foundation of protected wildlife areas.<sup>152</sup> With a history of inadequate government policies, and negative local attitudes toward conservation, it is crucial that change occurs. In order to protect migratory wildlife for the future, local people need to be protected as well.

Solutions for preserving migration do not have to only come from this region. Europe sets an example for the rest of the world when it comes to its protected area planning. The Natura 2000 network is the world's largest network of protected areas that spans across 18 percent of the entire continent.<sup>153</sup> This network was created to ensure the protection of valuable wildlife and endangered species. However, its approach is primarily community-based management. Many of these protected areas are privately owned. By creating an interconnected network of protected areas, migration

corridors are preserved across the continent.<sup>154</sup> This network was only made possible by the joint efforts of the European Union. With international cooperation, Kenya and Tanzania could work to create something similar that joins communities with nature in their backyards.

With the losses that have occurred over the last several decades, it is clear that land development, climate change and human-wildlife interactions are to blame. Therefore, policies to prevent migration loss must strictly guide human activity near wildlife. The information provided by Dr. Ogutu and his team is essential, and their presence in the press over the last two decades has increased awareness of the issue. However, there are still not enough researchers focused on the Great Migration. Migratory mapping is a relatively new science, and it is important that the CMS focus on helping to further research into migration loss and barriers. Through new initiatives like the GIUM, CMS is making efforts to support research on ungulate migration. With migration losses increasing, the CMS must work to promote migration pathway research and share new understanding of barriers to migration.

## Current Status

### Overtourism in the Post-Pandemic Era

Prior to the 2020 COVID-19 pandemic, global circles were beginning to discuss overtourism. The Responsible Tourism Partnership defines overtourism as locations where there are too many visitors, to the detriment of the area.<sup>155</sup> Environmental damage, pollution, and conflicts caused by tourists all negatively affect locals. With the COVID-19 pandemic, worldwide shutdowns temporarily halted this concern.<sup>156</sup> Now that shutdowns have ended, overtourism has been growing faster than ever. The pandemic caused a buildup

151 "Species Conservation and Management Division," Kenyan Wildlife Society, accessed September 11, 2023, <https://www.kws.go.ke/content/species-conservation-and-management-division-0>.

152 Kideghesho, "Serengeti Shall Not Die."

153 "Natura 2000," European Commission, accessed September 11, 2023, [https://ec.europa.eu/environment/nature/natura2000/index\\_en.htm](https://ec.europa.eu/environment/nature/natura2000/index_en.htm).

154 European Commission, "Natura 2000."

155 Ko Koens, Albert Postma, and Bernadett Papp, *Overtourism? - Understanding and Managing Urban Tourism Growth beyond Perceptions* (Madrid: World Tourism Organization, 2018) 4, <https://www.e-unwto.org/doi/pdf/10.18111/9789284420070>.

156 Giacomo Lee, "Overtourism and Sustainability in the Post-Covid, COP26 Era: Should Travel be Only for the Rich?" *Railway Technology*, September 21, 2021, <https://www.railway-technology.com/features/overtourism-and-sustainability-in-the-post-covid-cop26-era-should-travel-be-only-for-the-rich/>.

in demand for tourism since many people had to cancel trips during the pandemic.<sup>157</sup> In the Serengeti-Mara ecosystem, this is no exception. The 2023 season is expected to be the busiest season since the pandemic, and Kenya projects that it will welcome ten million tourists by 2027.<sup>158</sup> This growing tourism will make massive contributions to the Kenyan and Tanzanian economies, but it also risks harming the wildlife that make their ecosystems so unique. It will be critical that the committee finds a balance between the needs of wildlife and the great tourism demand in these natural sites.

In these countries, tourists have returned in larger groups each year since COVID-19 restrictions were lifted. They often stay near the parks in lodges and camps. To accommodate crowds of tourists, both countries have built new camps, lodges, and tourism centers. In the Mara alone, there are 59 tourism facilities and 153 camps just outside the park. Many of these developments were built in the last two years.<sup>159</sup>

Tourist accommodations like hotels and tour centers use key water sources in the reserves, which reduces environmental water levels.<sup>160</sup> Large numbers also leads to more people entering fragile habitats in vehicles. Tour groups are led in vehicles by guides, or they may rent a vehicle with specific permits.<sup>161</sup> These vehicles threaten migratory pathways by blocking, eroding, and polluting wildlife areas.<sup>162</sup> These developments have already impacted wildlife in their area. It is reported that in addition to the declining populations, living wildebeest are staying in the Mara for shorter periods of time.<sup>163</sup> Other animals, like cheetahs, are also shortening their stay in the Mara. Studies have shown that wild animals avoid areas with lots of human activity, so growing numbers

of tourists are beginning to push wildlife out of the Mara.<sup>164</sup> If not controlled, increased human presence will threaten wildlife in the Serengeti that are already endangered.

The rush to create new tourism centers has also led to poor regulations and inadequately trained staff.<sup>165</sup> Untrained guides are more likely to take risks with their vehicles or allow tourists to behave inappropriately with animals.<sup>166</sup> These behaviors risk the tourists' and the animals' safety. For example, in early 2023, a shocking video of tourist-animal interaction surfaced from the Maasai Mara Reserve. The video showed two cheetahs catching an antelope and settling to eat. In the thirty seconds that followed, a crowd of safari vehicles appeared and circled closely around the feeding animals.<sup>167</sup> No one was injured, but the close proximity to these animals was highly dangerous for several reasons. Moving close to feeding animals can scare them, which could cause them to attack. Large crowds of vehicles might also cause some cheetahs to abandon their food.<sup>168</sup> In habitats that are facing drought and food scarcity, predators cannot afford to leave food. A similar incident happened at the Mara River crossing also in early 2023. Nearly 60 tourist vehicles on the riverbanks followed the animals after their crossing.<sup>169</sup> This level of human presence at the river crossing can have serious consequences. In response to vehicles and crowding tourists, animals like the wildebeest may travel in smaller groups or avoid historic migration pathways.<sup>170</sup> With many migrations already broken down in Kenya, further breakdown due to tourists is a serious threat. After nearly two years of tourism restrictions, the post-pandemic era has been defined by increased human-animal interactions and risk-taking crowds.

157 Dorine Reinstein, "The Elephant in the Room: Overtourism in Africa," *Travel Weekly*, March 27, 2023, <https://www.travelweekly.com/Middle-East-Africa-Travel/Overtourism-in-Africa>.

158 Victor Oluwole, "Kenya Sets Target to Attract 10 Million Tourists in Five Years," *Business Insider Africa*, April 8, 2023, <https://africa.businessinsider.com/local/lifestyle/kenya-sets-target-to-attract-10-million-tourists-in-five-years/ec2hczk>.

159 Reinstein, "The Elephant in the Room."

160 Valentine, "Death of Serengeti-Mara."

161 Reinstein, "The Elephant in the Room."

162 Cheruto Valentine, "Death of Serengeti-Mara: Tourism Over-Exploitation Faulted," *Science Africa*, May 2, 2019, <https://news.scienceafrica.co.ke/death-of-an-ecosystem-how-tourism-is-over-exploiting-serengeti-mara/>.

163 Reinstein, "The Elephant in the Room."

164 Femke Broekhuis, "We need to limit tourist numbers to save cheetahs from becoming an endangered species," *Quartz*, August 13, 2018, <https://qz.com/africa/1354703/tourist-maasai-mara-visits-threaten-cheetahs>.

165 Reinstein, "The Elephant in the Room."

166 Reinstein, "The Elephant in the Room."

167 Maria Cramer and Costas Christ, "The Cheetahs Made a Kill. Then the Safari Trucks Swarmed In," *The New York Times*, January 4, 2023, <https://www.nytimes.com/2023/01/04/travel/masai-mara-safari-overcrowding.html>.

168 Cramer and Christ, "The Cheetahs Made a Kill."

169 Cramer and Christ, "The Cheetahs Made a Kill."

170 Cramer and Christ, "The Cheetahs Made a Kill."

Despite the adverse effects of tourism in the Serengeti-Mara, the tourism industry is important economically for both Tanzania and Kenya. Prior to the pandemic, tourism made up between seven and ten percent of Tanzania and Kenya's national income.<sup>171</sup> While tourism numbers have not yet recovered to their pre-pandemic levels, there was a steep 83 percent increase in tourism revenue over the 2022-2023 season in Kenya alone.<sup>172</sup> Many of the communities surrounding the Serengeti-Mara depend on tourism for jobs as well.<sup>173</sup> In Tanzania, tourism directly contributes to half a million jobs. This is a conservative estimate; this number could be doubled when considering how many jobs it creates indirectly.<sup>174</sup> If overtourism is not controlled, however, tourist sites may have to close to protect wildlife. For example, when Fjaðrárgljúfur Canyon in Iceland was featured in a pop star's music video, the crowds became so intense that the site was closed.<sup>175</sup> This closure was a massive financial loss for Iceland, but it was necessary to preserve the site. For Kenya and Tanzania, which

are both extremely dependent upon tourism, closure of the Serengeti-Mara could be catastrophic for both countries' economies.

Over 2022–2023, the companies and national authorities responsible for tourism in the Serengeti and Mara have implemented solutions to the growing overtourism problem. Earlier this year, the Kenya county government adopted solutions that included stricter regulations and licensing guidelines for wildlife guides. These licensing requirements include a police clearance certificate, a specific type of driver's license, and two forms of Kenyan national ID.<sup>176</sup> Increased regulations allow law enforcement to be more involved with new tour guides and companies. This can slow down the process and ensure that the proper procedures are taken to ensure the safety of tourists and the ecosystem. Following this year's elections, the governor appointed a new warden to oversee the Mara reserve. This senior warden is working on

171 WTTC, *Kenya*, (Oxford: World Trade & Tourism Council, 2022) [https://wttc.org/DesktopModules/MVC/FactSheets/pdf/704/141\\_20220613162800\\_Kenya2022\\_.pdf](https://wttc.org/DesktopModules/MVC/FactSheets/pdf/704/141_20220613162800_Kenya2022_.pdf); WTTC, *Tanzania*, (Oxford: World Trade & Tourism Council, 2022) [https://wttc.org/DesktopModules/MVC/FactSheets/pdf/704/218\\_20220613171254\\_Tanzania2022\\_.pdf](https://wttc.org/DesktopModules/MVC/FactSheets/pdf/704/218_20220613171254_Tanzania2022_.pdf).  
 172 Rédaction, "Kenya: 83% Increase in Tourism Revenues in 2022," *Africanews*, 2022, <https://www.africanews.com/2023/03/22/kenya-83-increase-in-tourism-revenues-in-2022/>.  
 173 Reinstein, "The Elephant in the Room."  
 174 "Too much tourism in the Serengeti?" Serengeti Watch, October 2019, <https://www.conservationaction.co.za/too-much-tourism-in-the-serengeti/>.  
 175 Norie Quintos, "Should Some of The World's Endangered Places be Off-Limits to Tourists?" *National Geographic*, October 12, 2021, <https://www.nationalgeographic.com/travel/article/should-some-of-the-worlds-endangered-places-be-off-limits-to-tourists>.  
 176 "Legal Guide Licensing Framework," Tourism Regulatory Authority, accessed August 16, 2023, <https://safariguides.org/legal-advice/>.

Tour vehicles crowd along the riverbank crossing

Credit: Zenith4237



new policies such as timed entry to the parks, traffic reduction, and encouraging tours in other areas of the park.<sup>177</sup> Other solutions, like limiting guests' visiting windows and focusing on domestic tourism are a possible movement in the right direction for the reserves. Policies like this are common in other protected areas of the world, and they can prevent total closure of natural tourist sites.

The tourist industry can also bring attention to conservation efforts for migratory animals. This is the case for some hotels in the Serengeti-Mara region. Singita, a conservation brand, has several lodges and hotels in this area. In partnership with a nonprofit organization called the Grumeti Fund, Singita has helped spread awareness and raise money for conservation efforts in the Serengeti.<sup>178</sup> In addition to donating their own money, these hotels also leverage their wealthy customers by encouraging them to donate to conservation efforts. Because governments have struggled to raise money to protect these areas, these contributions are very valuable.<sup>179</sup> In one of the regions where one of these hotels is located, buffalo populations have quadrupled since 2003.<sup>180</sup> This is a positive aspect to the exponential increase in tourists. The CMS and other conservation agencies should take advantage of growing tourism. This is a valuable chance to spread information about migratory wildlife while ensuring that tourism is done sustainably and safely for humans and animals alike.

Following the pandemic, government officials are heavily focused on the economic benefits of tourism in the Serengeti-Mara. As the tourism industry recovers, governments and tour agencies are aiming to keep growing returns. For this reason, protection of wildlife has been overlooked. While some government actions have been taken in the last year, the focus has been on increasing tourism numbers exponentially

each season. Local governments have too few regulations on tour vehicles, safari leaders, and tourist accommodations. However, with tourist numbers increasing every year following the pandemic, it is critical that both Kenya and Tanzania are doing work to protect their migratory wildlife. The CMS must collaborate with local agencies and governments to bring back the focus on conservation and protect the Serengeti-Mara before any further damage is done.

## Illegal Poaching and the Growing Bushmeat Trade

Following the emergence of COVID-19, international attention was turned to worldwide poaching and bushmeat trade. Poaching is the illegal capture, sale, or killing of an animal that is protected. Bushmeat is a term used to describe the meat of wild animals.<sup>181</sup> Bushmeat is commonly sold by independent vendors in "wet markets" around the world. Wet markets, also known as traditional food markets, are open-air markets where vendors sell meat and other produce native to the region.<sup>182</sup> Following the COVID-19 outbreak in 2019–2020, the World Health Organization (WHO) released guidance that wet markets and bushmeat trade should be suspended worldwide. This is because the COVID-19 virus is an animal disease that is believed to have originated in wet markets.<sup>183</sup> However, because of the attention given to bushmeat since COVID-19, bushmeat sales have increased worldwide.<sup>184</sup> For many, bushmeat is a cheap and accessible source of protein. Further, for illegal hunters and vendors, poaching and trading can be a primary and secondary form of income. Thus, poaching and bushmeat go hand in hand. With massive job losses in the tourism industry during and after the pandemic, illegal hunting in conservation areas became

177 Reinstein, "The Elephant in the Room."

178 Alexandra Owens, "Are Eco-Luxury Resorts The Future of Sustainability?" The Zoe Report, April 1, 2023, <https://www.thezoereport.com/living/eco-luxury-resorts-sustainable-travel>.

179 Owens, "Are Eco-Luxury Resorts The Future?"

180 Owens, "Are Eco-Luxury Resorts The Future?"

181 Lauren Coad, Jasmin Willis, et al, *Impacts of Taking, Trade and consumption of Terrestrial Migratory Species for Wild Meat*, (Bonn: UN Convention on Migratory Species, 2021) [https://www.cms.int/sites/default/files/publication/CMS\\_Report\\_impacts\\_wild\\_meat\\_terrestrial\\_migratory\\_species.pdf](https://www.cms.int/sites/default/files/publication/CMS_Report_impacts_wild_meat_terrestrial_migratory_species.pdf).

182 WHO Executive Board, Provisional Agenda Item 18, WHO Global Strategy for Food Safety, EB150/26, January 7, 2022, [https://apps.who.int/gb/ebwha/pdf\\_files/EB150/B150\\_26-en.pdf](https://apps.who.int/gb/ebwha/pdf_files/EB150/B150_26-en.pdf).

183 "WHO and partners urge countries to halt sales of wild mammals at food markets," *UN News*, April 13, 2021, <https://news.un.org/en/story/2021/04/1089622>.

184 René Ebersole, "From Forest to Table: Inside the World's 'Bushmeat' Problem," *National Geographic*, May 18, 2023, <https://www.nationalgeographic.com/premium/article/bushmeat-trade-alternatives-feature>.

a lucrative job option.<sup>185</sup> Nearly 300 species are threatened worldwide by bushmeat hunting. In East Africa, bushmeat represents a local food source and an international export.<sup>186</sup>

According to surveys conducted across Kenya and Tanzania, more than 80 percent of households consume bushmeat in some form.<sup>187</sup> It is estimated that greater than 60,000 illegal hunters live surrounding Serengeti National Park alone.<sup>188</sup> Due to food scarcity in communities surrounding the Serengeti-Mara reserves, bushmeat trade has become a source of food and money. Despite animal and habitat protections, the financial gain outweighs the risks of legal trouble. This leads people to illegally hunt and trade animals.<sup>189</sup> Most local hunters are impoverished farmers who are primarily driven to hunt by poverty. Some individuals will even have experienced crop and livestock losses. Others may need to make a lot of money quickly, for education, dowries, or livestock purchases.<sup>190</sup> In many ways, the risks associated with poaching have not outweighed the benefits from illegal hunting and trade. Poachers can quickly earn an average of USD 200, which is equivalent to an annual farming salary.<sup>191</sup> In 2022, a full-time bushmeat tradesman could earn between USD 300–500 in a single month.<sup>192</sup> Because of the quick money, people can easily earn a second income on top of any other jobs. Giraffes are sometimes equated to motorbikes, because by killing and selling only one whole giraffe, one can earn enough money for a bike.<sup>193</sup>

In addition to the financial incentive for illegal hunting and bushmeat trade, there is a large demand for bushmeat in the regions. Both Kenya and Tanzania lead the East African region in bushmeat consumption, with more than 80 percent of households regularly consuming it.<sup>194</sup> The price of beef has

significantly increased since the pandemic, and it is no longer affordable for many small households. Prior to the pandemic, hotels and restaurants were the primary consumers of beef. As tourism in both countries recovers from the pandemic, this demand will likely shift to bushmeat instead. The primary drive towards illegal hunting and bushmeat consumption is poverty.<sup>195</sup> Working to address the systemic causes for this demand is essential to reducing bushmeat consumption and illegal hunting in East Africa.

The cultural context of bushmeat is important to consider. In a study by the Wildlife Conservation Society, it was found that people purchasing bushmeat felt that it was more “natural” than frozen and imported chicken or beef.<sup>196</sup> In addition to cultural demand, international luxury bushmeat trade is a growing concern for the CMS. Every year, 5 million tons of bushmeat is taken from the Congo River Basin and shipped to urban centers across multiple countries in Africa. After reaching these cities, meat is sold in markets, served in restaurants, and even smuggled home by international travelers.<sup>197</sup> This level of hunting and commerce represents a serious threat to multiple species in the region. For Kenya and Tanzania, this has a direct effect on the wildlife participating in the Great Migration. 81 percent of the animals illegally hunted and traded across Kenya and Tanzania are ungulates like zebras, wildebeest, and dik-dik.<sup>198</sup> Trade at this level can lead to ecosystem imbalances and can cause major problems with migrations. However, social change will be a longer process than financial change. Creating cultural shifts away from wild meat is a worldwide struggle in the wake of the pandemic, but the change is essential.

The CMS released a “first-of-its-kind” report on the impacts

185 Scott McLean and Bethlehem Feleke, “Bushmeat poaching is on the rise in Kenya as Covid hunger drives hunt for antelopes and giraffes,” *CNN*, September 15, 2021, <https://www.cnn.com/2021/09/15/africa/bushmeat-poaching-kenya-cmd-intl/index.html>.

186 Ebersole, “From Forest to Table.”

187 Pauline Kairu, “Free-for-all bush-meat trade adds pressure to wildlife conservation efforts,” *The East African*, October 23, 2022, <https://www.theafrican.co.ke/tea/science-health/after-poachers-countries-dread-bushmeat-trade-3994352>.

188 Eli Knapp, “Why Poaching Pays: A Summary of Risks and Benefits Illegal Hunters Face in Western Serengeti, Tanzania.” *Tropical Conservation Science* 5 (December 2012): 434-445, <https://doi.org/10.1177/194008291200500403>.

189 Kideshego, “Serengeti Shall Not Die.”

190 Knapp, “Why Poaching Pays.”

191 Kideshego, “Serengeti Shall Not Die.”

192 Kairu, Pauline, “Free-for-all bush-meat trade.”

193 Kairu, “Free-for-all bush-meat trade.”

194 Kairu, “Free-for-all bush-meat trade.”

195 Ebersole, “From Forest to Table.”

196 Ebersole, “From Forest to Table.”

197 Ebersole, “From Forest to Table.”

198 Kairu, “Free-for-all bush-meat trade.”

of taking, trade, and consumption of illegal bushmeat in 2021. The report was released as a part of a CMS decision to address wild meat usage. Unlike many other current sources on bushmeat and illegal hunting, the CMS report discusses the variation between national hunting laws. In the report, the convention expressed that Central-East African countries are a region of particular concern. Many of the laws are outdated and based on European climates. This means that legal hunting seasons in some African countries are defined by French and English hunting seasons, without consideration for the native climate. This puts migratory species at particular risk of being hunted because of their biological clocks.<sup>199</sup> Further, the report corroborates the fact that poaching often occurs because of poverty and lack of access to alternate food sources. “Subsistence hunters,” or hunters that need to hunt to feed themselves and their families, often face systemic issues that lead them to illegal activity.

Most subsistence hunters are in rural areas, and do not have access to transportation needed to travel to obtain hunting permits. Additionally, the national hunting seasons are often too short to hunt as a sustainable source of food.<sup>200</sup> The CMS outlines goals to globally address bushmeat trade throughout the report. Many of the laws across East and Central Africa need to change to promote animal safety and grow relationships between local hunters and the national government. In order to specifically protect migratory animals, the convention recommends educating locals and other hunters on animals that are vulnerable to overhunting. With larger migratory animals like elephants, lions, and giraffes, overhunting combined with low birth rates could result in catastrophic population loss.<sup>201</sup> The CMS advocates for law changes that will be sustainable in the long term. Working to create lasting solutions is the best strategy to create cultural shifts away from bushmeat over time.

There are many other organizations working against poaching

and illegal bushmeat sale. Although many communities don’t have alternatives to consuming bushmeat, one organization is trying to change that. The Wildlife Conservation Society (WCS) recently developed a program to educate communities on sustainable food alternatives. It is called the Sustainable Wildlife Management Programme (SWM).<sup>202</sup> The program works primarily in tropical regions of Asia, Africa, and South America. The most common response to bushmeat markets is for them to be shut down and sellers to be punished. However, this can have severe impacts on the community’s food sources. Additionally, it restricts Indigenous peoples from consuming culturally significant foods.<sup>203</sup> The SWM works to balance the economic and nutritional needs of community hunters while protecting vulnerable ecosystems. By educating hunters on endangered species and food sustainability, this program has begun to enact change.<sup>204</sup>

For the agricultural communities that often hunt and trade bushmeat, a cultural shift toward sustainable farming and hunting practices can create more variety in food sources and nutrition types. Coupled with financial support for local farmers, these programs are a step in the right direction for reducing illegal hunting in many places around the world. At this time, neither Tanzania nor Kenya have SWM projects ongoing. However, both countries are excellent candidates for such a program. One successful initiative in Kenya and Tanzania is poacher reform groups. Programs from the World Wildlife Foundation (WWF) and African Wildlife Foundation (AWF) provide education and jobs to ex-poachers.<sup>205</sup> Many become park rangers and conservationists themselves. Illegal hunters often learn to do so from their parents or drop out of school with no other options.<sup>206</sup> Poaching reform is an important strategy because it engages communities on a local level to create social change around hunting and bushmeat. Community-level solutions are the key to addressing the growing poaching and bushmeat trade that is threatening the

199 Convention on Migratory Species, “Impacts of Taking, Trade and Consumption.”

200 Convention on Migratory Species, “Impacts of Taking, Trade and Consumption.”

201 Convention on Migratory Species, “Impacts of Taking, Trade and Consumption.”

202 “Sustainable Wildlife Management Programme,” Wildlife Conservation Society, accessed July 30, 2023, <https://www.wcs.org/our-work/sustainable-wildlife-management-programme>.

203 Kideshego, “Serengeti Shall Not Die.”

204 Wildlife Conservation Society, “Sustainable Wildlife Management Programme.”

205 Lina Mwamachi, “Reformed Poachers Turned Conservationists in East Africa,” *Infonile*, January 20, 2023, <https://infonile.org/en/2023/01/reformed-poachers-turned-conservationists-in-east-africa/>.

206 Mwamachi, “Reformed Poachers Turned Conservationists.”



Great Migration.

The post-pandemic era has brought a great deal of international attention to bushmeat hunting and markets. At the same time, increased poaching in protected wildlife areas is seriously threatening migratory wildlife and their habitats. It is critical to address bushmeat hunting with sensitivity for cultural traditions and community resources. Programs like the SWM, and UN programs like the FAO and UNEP are already creating change in regions around the world. The CMS must work to implement such projects in Tanzania and Kenya to address threats and promote positive relationships between locals and wildlife.

## Sustainable Development Goals

As an environmental treaty of the United Nations, the Convention on Migratory Species operates to help meet the Sustainable Development Goals (SDGs). The SDGs are part of a global collaborative effort to reduce inequalities and injustices around the world by 2030.<sup>207</sup> 193 countries adopted the SDGs in 2015 and continue to use the goals to influence global actions and alliances. The CMS works toward achieving the SDGs by protecting wildlife and educating the world about critical migrations. The most pertinent goals for the CMS are SDG 15: Life on Land; SDG 13: Climate Action; and SDG 12: Responsible Consumption and Production.<sup>208</sup>

SDG 15: Life on Land focuses on protecting ecosystems on land to prevent loss of biodiversity. It also advocates for sustainable land use.<sup>209</sup> The CMS lists nearly 700 migratory species that are threatened or inadequately protected worldwide.<sup>210</sup> Ultimately, the goal of the convention is to prevent habitat and migration loss that is already occurring for hundreds of species. Because so many migrations have been lost in the Serengeti-Mara ecosystem, human impacts are essential to consider. Unsustainable uses of the land have directly affected the migratory wildlife in the region.<sup>211</sup>

Preventing biodiversity and migration loss through better policies and relationships with communities is critical. Long lasting solutions to achieve SDG 15 would mean recovery of biodiversity in the long term.

SDG 13: Climate Action is directly tied to the environmental work that the CMS must do to protect wildlife. The effects of climate change seriously affect the migratory species protected by the CMS. In the Serengeti-Mara, migratory species are most affected by the changes in weather patterns. For wildebeest and antelope, the weather works with their instincts to determine their actions. With unusual weather patterns, these animals may not move on time, or may not stay in certain historic habitats for long enough periods. Droughts and floods can also create food scarcity and break down migratory pathways. Climate change is a universal issue for United Nations committees and treaties. The effects of climate change on food, habitats, and safety will continue to create problems for the world to solve. It is crucial that the CMS be a part of the worldwide collaboration to meet climate goals.

SDG 12: Responsible Production and Consumption highlights the CMS's focus on land use and tourism around migratory species' habitats. This goal often deals with agriculture and works on preventing environmental damage.<sup>212</sup> In the Serengeti-Mara, farming expansion is a serious concern. Agricultural land cover has increased more than 200 percent in the Mara since 1973.<sup>213</sup> This increase has had effects on water usage, migratory pathways, and animal habitats. Because farmers have a lack of resources to improve their practices, sustainable and affordable education is essential. Further, conflicts between land use for conservation and land use for farming often create resentment from locals toward sustainable policies.<sup>214</sup> In order to achieve SDG 12, it is essential to work with local communities. Building local relationships with the environment and creating value around conservation is critical.

207 "The 17 Goals," United Nations Department of Economic and Social Affairs, accessed July 4, 2023, <https://sdgs.un.org/goals>.

208 United Nations Department of Economic and Social Affairs, "The 17 Goals."

209 United Nations Department of Economic and Social Affairs, "The 17 Goals."

210 "Species," CMS, accessed June 18, 2023, <https://www.cms.int/en/species>.

211 Bedelian, "Saving the Great Migrations."

212 United Nations Department of Economic and Social Affairs, "The 17 Goals."

213 Muiruri, "Fears for a Million Livelihoods."

214 Kideshego, "Serengeti Shall Not Die."

The CMS is working to achieve the SDGs by preserving global endangered habitats and species. Collaboration with local communities can help to create a world where biodiversity and human-animal relationships are valued.

## Bloc Analysis

Wildlife conservation receives support from a variety of sources. These can be both UN-sponsored and privately invested. Countries that are a part of the CMS treaty believe that wild animals must be “conserved for the good of mankind.”<sup>215</sup> Further, countries with scientists who have joined the CMS Global Initiative on Ungulate Migration (GIUM) are committed to preserving ungulate migrations. This includes the Great Migration between the Serengeti-Mara, although many other countries contain their own migrations.<sup>216</sup> However, some countries are not directly involved with Great Migration conservation. For these, involvement in the UN’s Convention on Biological Diversity (CBD) can be an indicator of their goals toward migration and conservation.

One way in which the committee may divide is along differences in commitments to conservation. Among countries that are committed to conservation, there may also be differences depending on whether the countries contain their own migrations or are committed to sharing resources with countries containing migrations. Certain countries contain large migrations and easily contribute to conservation in their own states as well as in the Serengeti-Mara. Other countries face challenges when it comes to contributing to conservation. These countries may be less involved in environmental policy worldwide and may depend on NGOs and external funding sources to protect their wildlife. It is important for delegates to remember that these blocs are not an exhaustive division of countries in the committee. Each delegate must understand their own country’s involvement with the topic. It will be for

the committee to decide how to address these issues.

## Countries Containing Large Migration Pathways

Many countries around the world contain large migration pathways. For these countries, it is important for them to consider many different interests when it comes to conservation. Many of the countries in this bloc invest a large number of resources into conservation. However, they must also consider the effects of these policies on local communities. These countries must fund their national parks or reserve systems to protect the wildlife and their habitats. At the same time, the locals face the direct effects of conservation actions, positive and negative. Historically, these land decisions have resulted in Indigenous land loss and farmland loss. Like many other countries in this bloc, Kenya and Tanzania will need to prioritize animal welfare while keeping local interests in mind.

Finland, Namibia, Mali, and Sri Lanka are all CMS party states that also contain large animal migrations. Namibia contains the longest migration of any African mammal — the zebra. This migration is extremely similar to the Great Migration in its timing and importance.<sup>217</sup> Similarly, Sri Lanka contains the largest elephant migration in Asia.<sup>218</sup> This migration has serious effects on the small villages surrounding the pathways. Like Kenya and Tanzania, Sri Lankan conservationists have struggled with fencing as a barrier to migration.<sup>219</sup> Finland has one of the largest reindeer migrations in the world. Finland’s Indigenous Sámi population depend on the migrating reindeer for animal resources and livelihoods. Conservation has harmed Sámi locals similarly to how it has harmed Maasai people in Kenya. Mali contains Africa’s longest elephant migration. These elephants are profoundly vulnerable to poaching due to their ivory tusks.<sup>220</sup> Overall, countries in this bloc will each have their own valuable migrations to protect.

Solutions for this bloc will include supporting the Maasai

215 “Bonn Convention Text,” Convention on Migratory Species, accessed July 4, 2023, <https://www.cms.int/en/convention-text>.

216 “Global Initiative on Ungulate Migration,” CMS, accessed June 18, 2023, <https://www.cms.int/en/gium>.

217 Jennifer Holland, “Longest Migration Among African Mammals Discovered,” *National Geographic*, May 26, 2014, <https://www.nationalgeographic.com/animals/article/140527-migration-zebra-mammal-africa-namibia-botswana-environment-conservation?loggedin=true&rnd=1692560933810>.

218 Adrian Phillips, “Sri Lanka: The Secrets Behind Asia’s Mightiest Elephant Migration,” *National Geographic*, February 16, 2020, <https://www.nationalgeographic.com/travel/article/sri-lanka-secrets-behind-asias-mightiest-elephant-migration>.

219 Phillips, “Sri Lanka.”

220 Jeremy Hance, “How Locals and Conservationists Saved the Elephants of Mali Amidst Conflict and Poverty,” *Mongabay*, April 2, 2014, <https://news.mongabay.com/2014/04/how-locals-and-conservationists-saved-the-elephants-of-mali-amidst-conflict-and-poverty/>.

Mara as a World Heritage Site. This will allow the region to be internationally recognized as a conservation priority. This can also help the countries involved to develop stronger conservation management plans. Many countries in this bloc will also seek to establish their own heritage sites where their migrations occur. There will also be solutions such as collaboration with local farmers. Overall, these countries will prioritize solutions focused on the conservation of large migrations and the impacts they have on locals.

### Countries Directly Involved in Worldwide Migratory Conservation Efforts

This bloc consists of countries that are directly involved in migratory conservation efforts. These countries have demonstrated political or financial commitments to conservation efforts. They might have also signed other international agreements on migratory conservation efforts.<sup>221</sup> Countries in this bloc are not home to any large migratory pathways. However, these countries have taken actions to protect migratory species in other countries and are important supporters of conservation efforts in the Mara-Serengeti ecosystem and other parts of the world.

France is one example of a country in this bloc. France has signed many international agreements on conservation efforts such as the Convention on Biological Diversity and the International Convention for the Regulation of Whaling.<sup>222</sup> France has many ongoing conservation projects in East and Central Africa. For example, they launched a project in 2019 to conserve biodiversity-rich habitats in South Africa, Botswana, Zambia, and Zimbabwe.<sup>223</sup> Like other countries in this bloc, France is directly involved in worldwide conservation efforts.

Australia is another example of a country in this bloc. Like France, Australia is a part of a number of international

agreements on migratory species conservation. For example, Australia signed the Memorandum of Understanding on the Conservation of Migratory Sharks. As part of this agreement, Australia works with many other countries to conserve migratory shark species and their habitats.<sup>224</sup> Australia is also a signatory to other similar international agreements on the conservation of marine migratory species and seabirds.<sup>225</sup> There are several regional and international programs Australia is involved in that aim to preserve marine biodiversity in the Pacific and other parts of the world.<sup>226</sup>

Countries in this bloc are invested in conservation efforts worldwide and are likely to support conservation efforts in the Serengeti-Mara ecosystem. These countries may run conservation programs around the Serengeti-Mara. They also may contribute to NGOs like WWF. However, countries in this bloc are also likely to prioritize wildlife and environmental conservation over local interests. It is important that these countries ensure that local interests are considered when discussing conservation efforts.

### Countries Facing Challenges to Migratory Conservation Efforts

Countries in this bloc have limited involvement with international projects on conservation. These countries might rely on external researchers for the majority of the study of their migratory pathways. This could be due to many different reasons, including financial stress or conflict. Countries in this bloc include India, Thailand, Bangladesh and Somalia.

Somalia is one of the most biodiverse countries in the world, but it faces many challenges that limit its conservation efforts. For example, although there is lots of wildlife in Somalia, studies of different species in Somalia have been infrequent. This is largely due to years of conflict in Somalia which have

221 “Timeline of international agreements for migratory species conservation,” Earthweb.info, accessed September 5, 2023, <http://earthweb.info/biodiversity/migration-timeline.html>.

222 “France’s contribution to the protected areas,” Ministry for Europe and Foreign Affairs, accessed September 5, 2023, <https://www.diplomatie.gouv.fr/en/french-foreign-policy/climate-and-environment/sustainable-development-environment/french-policy-on-biodiversity/france-s-contribution-to-the-protected-areas/>.

223 “AFD and Conservation International Launch Final Component of Pronature Project,” AFD, April 20, 2022, <https://www.afd.fr/en/actualites/communiqu-de-presse/afd-and-conservation-international-launch-final-component-pronature-project>.

224 *Memorandum of Understanding on the Conservation of Migratory Sharks*, (Bonn: CMS, February 1, 2023), [https://www.cms.int/sites/default/files/document/cms\\_sharks-mos4\\_national%20report\\_Australia\\_e.pdf](https://www.cms.int/sites/default/files/document/cms_sharks-mos4_national%20report_Australia_e.pdf).

225 “Australia’s international marine conservation engagement,” Australian Government - Department of Climate Change, Energy, the Environment and Water, last modified May 23, 2023, <https://www.dcceew.gov.au/environment/marine/international-activities>.

226 “Australian Government - Department of Climate Change, Energy, the Environment and Water, “Australia’s international marine conservation engagement.”

caused instability in the country.<sup>227</sup> The International Union for Conservation of Nature (IUCN) Red List identified 218 wildlife species in Somalia that are threatened. It also classified 138 of these species as vulnerable, 58 as endangered, and 22 as critically endangered.<sup>228</sup> While Somalia has signed a number of international agreements on wildlife conservation, a lack of collaboration and funding have limited its implementation.<sup>229</sup> Although Somalia has 11 protected areas, only two of them are considered to be functional.<sup>230</sup> These areas have no formal protection since the central government collapsed in 1991.<sup>231</sup> It is important for Somalia to work on developing stronger policies and regulations on wildlife conservation. It will also be important for other countries and organizations to work together to help finance conservation efforts in Somalia and other countries in this bloc.

When proposing solutions, it is important for delegates to consider financial barriers to conservation. NGOs or the UN can provide support for countries that cannot afford conservation efforts. It is important to note that for many countries in this bloc, conservation advancements are not a priority. This can be due to many other issues occurring in the country. However, the CMS is a voluntary treaty of the UNEP. This means that any country that is a party member is committed to the convention's mission. Therefore, countries in this bloc will have similar conservation goals as the other two blocs. It will be a priority for these countries to work on strengthening legal frameworks and protected areas for wildlife. Countries in this bloc will also likely look to work with countries in other blocs and international organizations to help fund conservation efforts in their countries.

## Committee Mission

The Convention on the Conservation of Migratory Species of Wild Animals (CMS) is an environmental treaty of the United Nations Environmental Programme (UNEP). Also

called the Bonn Convention, the CMS convention text was adopted on June 23, 1979, in Bonn, Germany.<sup>232</sup> The CMS is made up of a scientific council, a leader designated by the UNEP, and its party countries. The scientific council is a group of experts who can participate in party meetings and policymaking. Many of these scientists specialize in one species and their conservation. At its inception, the convention had only 28 party states. As of 2022, the CMS has 133 party states.<sup>233</sup> Migrations often cover countries that are “range states” or non-party countries, the convention is likely to communicate and collaborate with countries outside of its members. In the parties' words, the CMS is founded on the fact “that wild animals...are an irreplaceable part of the Earth's natural system which must be conserved for the good of mankind.”<sup>234</sup> The goal of the CMS is to determine which migratory animals are threatened and to return them to stable population numbers.

Migratory species live around the globe, and there are thousands of species across every continent. In the convention text, the CMS designates two lists of animals. The first list is a total collection of endangered migratory animals. Countries party to CMS are individually responsible for contributing to conservation efforts until they are no longer determined endangered. The second list of animals is a collection of species that are heavily endangered and require international agreements.<sup>235</sup> These species require international collaboration for better habitats, population growth, and protection. Only species on the second list are addressed with policies and direct CMS action. When direct action is deemed necessary for a second-list species, CMS party states will form an agreement. Through agreements, the convention performs a variety of actions while collaborating with party states, such as research and designating new protected areas. It can also include removal of invasive species and prevention of habitat encroachment. The CMS also often legislates against hunting, live trading, and consuming wildlife. As long as it supports the

227 “Somalia: Biodiversity,” Interactive Country Fiches, accessed September 9, 2023, <https://dicf.unepgrid.ch/somalia/biodiversity>.

228 Interactive Country Fiches, “Somalia.”

229 Interactive Country Fiches, “Somalia.”

230 Interactive Country Fiches, “Somalia.”

231 Interactive Country Fiches, “Somalia.”

232 “Convention Text,” CMS, accessed August 15, 2023, <https://www.cms.int/en/convention-text>.

233 “Parties and Range States,” CMS, accessed August 15, 2023, <https://www.cms.int/en/parties-range-states>.

234 CMS, “Convention Text.”

235 CMS, “Convention Text.”

goals of the CMS, the party states can receive support for a variety of different conservation programs.<sup>236</sup> The small size and specific focus of the CMS allow for close collaboration with experts and governments from party states. With thousands of migratory species facing threats worldwide, delegates of the CMS must develop solutions to protect and preserve migrations.

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<sup>236</sup> CMS, “Convention Text.”



CMS

NHSMUN 2024



**TOPIC B:**  
**THE CONSERVATION OF PACIFIC SHARK SPECIES**

Photo Credit: istoletyev

## Introduction

Due to their portrayal in movies like *Jaws*, sharks are often thought of as scary creatures that lurk within oceans. Although shark attacks are popularized in the news and a common fear for many beachgoers, sharks actually have more reason to fear humans. Over 100 million sharks are killed by human activity per year, and many species are at the risk of extinction.<sup>1</sup> Of over 500 different species of sharks worldwide, about 75 percent of them are threatened with extinction.<sup>2</sup> Sharks are slow to reproduce, and they take many years to reach reproductive age. This means that decreasing shark populations can be disastrous, as they do not have enough time to regrow their population. Sharks are often victims of bycatch, finning, and overfishing.<sup>3</sup> Since illicit trade is such a large part of the issue, exact numbers are unable to be provided or monitored. However, estimates suggest that over 73 million sharks are killed worldwide per year from finning—the removal of all the fins of a shark.<sup>4</sup>

This is extremely concerning, as marine ecosystems rely on sharks for survival. Sharks play a critical role in maintaining the oceans in several ways. As they are apex predators in the marine food chain, they keep population levels of other species balanced.<sup>5</sup> Furthermore, they aid in the protection of seagrass meadow and coral reef habitats to keep marine ecosystems functioning in a healthy way. Studies have shown that the presence of sharks limits excessive grazing of seagrass from marine herbivores like dugongs. As the seagrass grows, it aids in the protection of blue carbon in the ocean.<sup>6</sup> Blue carbon refers to the amount of carbon that is absorbed by the ocean and marine environments.

Sharks are essential to maintaining nutrient and chemical balances in the ocean. The body of a shark is also a source of blue carbon, as they are composed of 10–15 percent carbon.<sup>7</sup> When sharks die and sink to the bottom of the ocean, decomposition releases the carbon from the carcass and creates a reservoir. These reservoirs can exist for millions of years. However, if sharks are being taken out of the ocean,

this carbon doesn't stay in the sea, but rather rises into the atmosphere.<sup>8</sup> Sharks also move nutrients that are necessary for the survival of many marine species. At shallow depths of the oceans, nutrients tend to be less available. Since sharks often swim upwards from deeper depths to and release natural waste, they are able to move nutrients upwards to shallow areas and nourish them.<sup>9</sup>

Because sharks are extremely important to ocean ecosystems, their loss can be devastating on a large scale. It is estimated that there are currently 71 percent fewer sharks in the open ocean than there were 50 years ago.<sup>10</sup> In less than half a century, humans have reduced the majority of the global shark population. This can be mostly attributed to overfishing and the shark meat trade. Without concrete international policies and solutions, ecosystems around the world are suffering. The presence of sharks is critical for ecosystems, as well as for climate change that is quickly gaining momentum. The effort to ensure shark conservation impacts the world and should thus be a global priority.

1 “Where Our Fear of Sharks Came From,” *Sharks Pacific*, August 20, 2020, <https://sharkspacific.org/where-our-fear-of-sharks-came-from/>.

2 Jillian Morris, “Sharks and Rays,” *Defenders of Wildlife*, August 14, 2023, <https://defenders.org/wildlife/sharks-and-rays>; David Shiffman, “Sharks,” *Smithsonian*, Accessed August 14, 2023, <https://ocean.si.edu/ocean-life/sharks-rays/sharks>.

3 Morris, “Sharks and Rays.”

4 Morris, “Sharks and Rays.”

5 “Save Our Sharks,” *Australian Marine Conservation Society*, accessed June 18, 2023, <https://www.marineconservation.org.au/save-our-sharks/>.

6 “SEAGRASSES MONTH: HOW SHARKS AND PLANTS CAN MITIGATE CLIMATE CHANGE,” *Shark Stewards*, accessed June 24, 2023, <https://sharkstewards.org/celebrating-seagrasses/>.

7 “How sharks keep our oceans healthy,” International Fund for Animal Welfare, July 12, 2022, <https://www.ifaw.org/ca-en/journal/sharks-keep-oceans-healthy>.

8 International Fund for Animal Welfare, “How sharks keep our oceans healthy.”

9 International Fund for Animal Welfare, “How sharks keep our oceans healthy.”

10 International Fund for Animal Welfare, “How sharks keep our oceans healthy.”

## History and Description of the Issue

### Overfishing and Demand: The Shark Meat Trade & Commercialization

According to the International Union for the Conservation of Nature, over one-third of all sharks, rays, and similar fish species are currently deemed at a high risk of extinction due to overfishing.<sup>11</sup> Overfishing is defined as catching too many fish or other species at once, so that the overall population begins to decline.<sup>12</sup> This is an unsustainable practice in which marine species can be overfished nearly to extinction. This is concerning, as the number of critically endangered species around the world has tripled since the first global study in 2014.<sup>13</sup> Overfishing has played a large role in the decline of shark species worldwide, and especially in species-rich areas like the Pacific.

Overfishing has become normalized because of the high demand for sharks and shark products worldwide. A large part of the shark meat trade includes the international trading of shark fins. Shark fins are extremely valuable in terms of trade and industry, as well as culturally in certain parts of the world.<sup>14</sup> Shark products have a variety of uses, such as cosmetic, medicinal, bushmeat, and in pet products.<sup>15</sup> One major contributor to the trade of shark fins is for the consumption of shark fin soup in many countries in Asia.<sup>16</sup> Shark fin soup originates from Imperial China, where the soup served as a status symbol for Emperors. This was a dish regarded with high honor, as it represented the victory of the fight to get these shark fins as well their assumed medicinal

properties.<sup>17</sup> Since then, its popularity has only grown, and today, it is served in prestigious restaurants. Estimates suggest that over 73 million sharks are being killed for the production of shark fin soup worldwide.<sup>18</sup>

Making shark fin soup requires a practice called “finning.” Finning refers to the process of cutting off all the fins of a live shark and then throwing the rest of the body back into the ocean.<sup>19</sup> Without their fins, the sharks have no way to move and will bleed to death. Evidently, this is a very cruel and gruesome process. However, because the fins are worth significantly more than the rest of the shark body, fisheries have no reason to keep the rest of the body.<sup>20</sup> Especially as sharks grow to be quite large, the cost of transporting them back to shore for a lower sale price is not worth it, so the process becomes both painful and wasteful. A shark fin can be sold for as much as \$500 per pound, making it a very attractive option for fisheries all around the Pacific.<sup>21</sup> In 2008, over 10 million kilograms of shark fin were exported into Hong Kong by 87 different countries globally.<sup>22</sup> Top exporters of these dried and frozen fins were Spain, Singapore, Taiwan, the United Arab Emirates, and Indonesia.<sup>23</sup> However, China and Asian demand is not solely responsible for the issue of finning, as sources of shark fin are international. For example, key fisheries from Oman, Pakistan, India, Nicaragua, Costa Rica, Nigeria, Mexico, and the Caribbean have historically been major sources of shark fin.<sup>24</sup>

Finning is a large concern, from both a cruelty and environmental perspective. Historically, certain species of sharks have been finned to the point where the population

11 “Overfishing puts more than one-third of all sharks, rays, and chimaeras at risk of extinction,” *World Wild Life*, accessed July 3, 2023, <https://www.worldwildlife.org/stories/overfishing-puts-more-than-one-third-of-all-sharks-rays-and-chimaeras-at-risk-of-extinction>

12 “Overfishing: The most serious threat to our oceans,” Environmental Defense Fund, accessed September 21, 2023, <https://www.edf.org/oceans/overfishing-most-serious-threat-our-oceans>.

13 WWF, “Overfishing puts more than one-third of all sharks, rays, and chimeras at risk of extinction.”

14 Caty Fairclough, “Shark Finning: Sharks Turned Prey,” *Smithsonian*, last modified August 2013, <https://ocean.si.edu/ocean-life/sharks-rays/shark-finning-sharks-turned-prey>.

15 “PRODUCTS CONTAINING SHARKS,” Robert Stewart Sharkwater Foundation, accessed August 15, 2023, <https://www.robstewartsharkwaterfoundation.org/articles/products-containing-sharks>.

16 Fairclough, “Shark Finning: Sharks Turned Prey.”

17 Fairclough, “Shark Finning: Sharks Turned Prey.”

18 Mark Carwardine, “What is shark finning and why is it a problem?” *DiscoverWildlife*, accessed July 16, 2023, <https://www.discoverwildlife.com/animal-facts/fish/what-is-shark-finning-and-why-is-it-a-problem/>

19 Carwardine, “What is shark finning and why is it a problem?”

20 Carwardine, “What is shark finning and why is it a problem?”

21 Fairclough, “Shark Finning: Sharks Turned Prey.”

22 “The International Trade of Shark Fins: ENDANGERING SHARK POPULATIONS WORLDWIDE,” Oceana, March 2010, [https://oceana.org/wp-content/uploads/sites/18/OCEANA\\_international\\_trade\\_shark\\_fins\\_english.pdf](https://oceana.org/wp-content/uploads/sites/18/OCEANA_international_trade_shark_fins_english.pdf)

23 Oceana, “The International Trade of Shark Fins.”

24 “International Trade in Shark Fins,” *UNEP*, accessed July 3, 2023. <https://www.unep.org/resources/report/international-trade-shark-fins-0>





Dried shark fins for commerce in Hong Kong

Credit: Cloneofsnake

declines close to extinction. An example of this is the islands around the coast of Florida, where the hammerhead shark population dropped so low that a sanctuary had to be built to prevent the species from going extinct.<sup>25</sup> As of right now, the status of 62.5 percent of shark populations are unknown around Florida, despite conservation efforts.<sup>26</sup> This highlights the need for more research, as obtaining this information should be a top priority in order to take appropriate steps towards conservation. Sharks are vulnerable to population decline due to the fact that sharks take a long time to grow and reproduce. Depending on the specific species, they can take years to become mature enough to reproduce.<sup>27</sup> Additionally, when they do reproduce, sharks only give birth to a few young. Before stricter regulations were put into place, it was said that 85 to 90 percent of the blue sharks caught in the United Kingdom were female and caught before they were able to breed for the first time.<sup>28</sup> As a result, the population grows very slowly. When faced with overfishing, populations are at risk of never recovering unless drastic measures are

taken. The first global shark sanctuary was founded in Palau in 2009.<sup>29</sup> Within the sanctuary, commercial fishing, by-catch, and trade of sharks or shark products were strictly banned. Within a decade of these regulations in the sanctuary, the shark populations were able to regrow to a healthy level.<sup>30</sup> With stringent regulations and healthy boundaries, ecologists suggest sanctuaries as one of the leading solutions to give shark populations the opportunity to rebound,<sup>31</sup> This success can be modeled in Palau's results as well, emphasizing restrictions on overfishing as the key to regenerating populations.

Another large impact of overfishing is by-catch and the usage of open fishing equipment. By-catch is the name given to species that are unintentionally caught while an area is being fished. Bycatch often includes unintended species, or individuals of a restricted sex or age.<sup>32</sup> Since some fishing gear is meant to cover vast amounts of area, by-catch is non-selective. These extensive networks commonly trap a variety of species outside of the target species and result in a large

25 UNEP, "International Trade in Shark Fins."

26 "Are Shark Populations Actually Declining in Florida?" Shark Allies, accessed July 28, 2023, <https://sharkallies.org/us-sharks/are-shark-populations-actually-declining-in-florida>

27 UNEP, "International Trade in Shark Fins."

28 UNEP, "International Trade in Shark Fins."

29 "Can Sanctuaries Save Sharks From Extinction?", *Earth.org*, July 14, 2019, <https://earth.org/can-sanctuaries-save-the-shark-from-extinction/>

30 "Can Sanctuaries Save Sharks From Extinction?"

31 "Can Sanctuaries Save Sharks From Extinction?"

32 "What is Bycatch? Understanding and Preventing Fishing Bycatch," World Wild Life, accessed July 16, 2023, <https://www.worldwildlife.org/threats/bycatch>.

amount of biodiversity loss across the ocean. Fishing gear like longlines, trawls, and gillnets result in the highest amount of bycatch. These three methods are particularly dangerous to sharks. Longlines are a fishing line of great length with hundreds or thousands of hooks along it. These hooks have bait and hang at intervals along the fishing line. Longlines are able to catch fish as they attempt to eat the bait.<sup>33</sup> When longlines are placed in the ocean, these hooks catch the largest volume of sharks annually, despite sharks not being the target species for them.<sup>34</sup> When sharks are detected along the longline, they are often brought onto commercial fishing boats to be finned for additional income and the carcass is eventually thrown back. Trawls are large nets that are dragged along the ocean floor by boats at the surface and are able to catch nearly everything they come across. This causes a wide range of destruction on the seafloor and damages coral reefs as well as local ecosystems. Finally, gillnets are meshed nets that fish are able to put their heads but not the rest of their body through. Because the holes are large, they work by trapping the fish in the mesh before they can get out or escape.<sup>35</sup> Typically, gillnets are many miles long and can be placed up to 100 feet deep, making a large range of species fall into their trap. These nets and traps can be difficult to see for many species, so they are extremely effective. These three fishing techniques are economically beneficial, but highly harmful to many species.

Despite the ocean being vast, many pelagic (open-ocean) sharks are suffering huge population declines, with the oceanic whitetip shark being a key one. It has been studied that 17 out of 39 pelagic shark species are currently threatened with extinction, with overfishing being the biggest contributor.<sup>36</sup> Sharks seem to be exploited by the fisheries, even when released back into sea, as their mortality rate increases once caught. Studies show that post-release mortality is over 18

percent for certain species.<sup>37</sup> This clearly indicates that this disruptive method of fishing must be regulated or stopped in order to ensure the conservation of these marine organisms.

Overfishing is often how rising demand for these species are met. In addition to shark fins, shark meat and products are becoming increasingly popular. Commonly, shark fins are more valuable than the rest of the shark meat.<sup>38</sup> However, the recent global trends are showing that the shark meat trade may be larger than the fins. Currently, it is valued at over 2.6 Billion USD. Spain is the global dominator of the shark meat industry and exports it to over 85 different countries. Various countries in the Pacific are a part of this shark meat network, including Japan, Portugal, and Panama. The European Union has become the main supplier of shark meat to East and Southeast Asia, and accounts for over 22 percent of the world's shark meat trade network. This includes species that are on the brink of extinction being exploited within this trade. This emphasizes more than ever that the conservation of these species should be a global priority. Illicit shark meat trade has become a transnational concern, crossing over 200 borders. Countries must treat this issue with urgency and place strict regulations to prevent unsustainable fishing practices. The trade must be managed transparently in order to uphold humane standards.<sup>39</sup> Consumers must also play an active role in being aware of the repercussions of purchasing shark from unreliable or illicit sources to help reduce demand.

In addition to shark meat, a particular ingredient derived from sharks has been highly sought after in the cosmetics industry—squalane. Squalane is commonly found in shark livers, and is used in various cosmetic products like lipstick or skincare.<sup>40</sup> 70 percent of all shark-derived squalane is sold to the cosmetics industry for use, furthering global trade.<sup>41</sup> Squalane has many moisturizing and skin strengthening properties that make

33 World Wild Life, "What is Bycatch? Understanding and Preventing Fishing Bycatch."

34 "Shark," World Wildlife Fund, accessed July 16, 2023, <https://www.worldwildlife.org/species/shark>.

35 WWF, "Shark."

36 WWF, "Shark."

37 Steve E. Campana, Francisco Ferretti and Andrew Rosenberg, *Sharks and Other Elasmobranchs* (United Nations Global Reporting, 2016), [https://www.un.org/depts/los/global\\_reporting/WOA\\_RPROC/Chapter\\_40.pdf](https://www.un.org/depts/los/global_reporting/WOA_RPROC/Chapter_40.pdf).

38 "US\$2.6 billion global trade in shark and ray meat revealed. Better rules and transparency needed to fight overexploitation," WWF, last modified July 12, 2021, <https://sharks.panda.org/news-blogs/updates/latest-news/us2-6-billion-global-trade-in-shark-and-ray-meat-revealed-better-rules-and-transparency-needed-to-fight-overexploitation>.

39 WWF, "US\$2.6 billion global trade in shark."

40 Taylor Tsacoumis, "Is the Beauty Industry Killing Sharks?," accessed June 24, 2023, <https://ali.fish/blog/how-the-beauty-industry-is-killing-sharks>.

41 "SHARK SQUALENE IN COSMETICS," Robert Stewart Sharkwater Foundation, accessed July 16, 2023, <https://www>.

it valuable to the cosmetic industry. Recently, it has been a marketing point for various companies and brands. Squalene can also be found in plant-based sources like olives, rice, and sugar cane, but is 30 percent more expensive to harvest. This is why the cosmetics industry resorts to sourcing it from sharks as a cheaper alternative. In order to harvest squalene from sharks, a process called “livering” is done.<sup>42</sup> Livering simply put is, the removal of a shark’s liver. However, similar to finning, the shark is thrown back into the ocean and dies in a painful and gruesome manner. Many biologists and ecologists are working against the harvesting of shark livers, especially from deep sea sharks. Large deep sea sharks have livers that account for over 20 percent their body weight, making them highly valuable.<sup>43</sup> Out of the 60 shark species that are livered, nearly 50 percent are prone to extinction, as ranked by the International Union for the Conservation of Nature (IUCN). 3 million sharks are killed every year simply for the cosmetic industry.<sup>44</sup> The demand for shark liver in 2012 was said to be 2,200 tons globally and sold for 35 thousand USD per ton.<sup>45</sup> Approximately, 3 thousand sharks are needed in order to make 1 ton of squalene. This demand is only growing, as the value of squalene is increasing and is estimated to be sold for 39 thousand USD per ton by 2024.<sup>46</sup>

As light is shed on this inhumane process, many popular cosmetic companies like L’Oreal, Lush Cosmetics, and Dove have come out and pledged to exclusively use plant-based squalene.<sup>47</sup> However, due to the lack of regulations, cosmetic companies do not usually disclose the presence or source of squalene in their products. In a Stony Brook University research study, they tested for shark DNA in cosmetics as well as various brands of pet foods.<sup>48</sup> Out of the 24 products

tested, 3 were definitely found to contain shark DNA, with endangered species like the scalloped hammerhead shark being one of them.<sup>49</sup> The lack of accountability and regulations have allowed brands to engage in destructive behavior and ultimately driving up the demand for sharks, concerning on all accounts. In many different ways, the demand for shark products such as squalene or fins has caused these populations to decline rapidly. In order to fully protect sharks, it is essential to being by regulating these practices.

### The Deep Impact of Ocean Pollution

The Pacific Ocean is currently the world’s most polluted ocean. At any given moment, there are over two trillion pieces of plastic.<sup>50</sup> Inevitably, this level of ecological degradation has large implications for the marine species within the Pacific. Pollution follows the pattern of human industrialization through increasing settlements and infrastructure. As humans started mass-producing nearly everything in order to support growing human populations, the ocean became a universal dumping ground for companies.<sup>51</sup> One example can be found in an ocean clean-up led by Greenpeace in 2018. In this campaign, Coca-Cola branded plastic was found in bodies of water within 40 out of 42 participating countries.<sup>52</sup> Implicitly, corporations and consumerism play a large role in the issue, which requires accountability to be taken. This continued and massive amounts of toxic waste, chemicals, and plastic were disposed of within the ocean until the 1970s where awareness was spreading about the possible consequences.<sup>53</sup> Despite these consequences being heavily researched and deemed harmful to marine organisms and ecosystems, the ocean continues to be polluted on all fronts. Waste from

robstewartsharkwaterfoundation.org/articles/shark-squalene-in-cosmetics.

42 Tsacoumis, “Is the Beauty Industry Killing Sharks?”

43 Robert Stewart Sharkwater Foundation. “SHARK SQUALENE IN COSMETICS.”

44 Tsacoumis, “Is the Beauty Industry Killing Sharks?”

45 Robert Stewart Sharkwater Foundation. “SHARK SQUALENE IN COSMETICS.”

46 Robert Stewart Sharkwater Foundation. “SHARK SQUALENE IN COSMETICS.”

47 “Shark Free Cosmetic, Personal Care Products and Companies,” Shark Free, accessed August 15, 2023, <https://sharkfree.com/cosmetics/>.

48 Diego Cardenaosa, “Genetic identification of threatened shark species in pet food and beauty care products,” *Conservation Genetics* 20 (February 21, 2019): 1383-1387, <https://doi.org/10.1007/s10592-019-01221-0>.

49 Cardenaosa, “Genetic identification of threatened shark species.”

50 “WHAT’S THE MOST POLLUTED OCEAN?” Clean Beach Initiative, last modified April 21, 2020, <https://cleanbeachinitiative.org/whats-the-most-polluted-ocean>.

51 Simon Piece, “Impacts of Ocean Pollution on Sharks and Rays,” Marine Megafauna Foundation, accessed July 4, 2023, <https://marinemegafauna.org/human-threats-sharks-rays/ocean-pollution>.

52 Ryan Schleeter, “These 10 companies are flooding the planet with throwaway plastic,” *Greenpeace*, October 9, 2018, <https://www.greenpeace.org/international/story/18876/these-10-companies-are-flooding-the-planet-with-throwaway-plastic/>

53 Piece, “Impacts of Ocean Pollution on Sharks and Rays”

past years still has a strong impact on wildlife today, and it only continues to grow. The most common sources of ocean pollution are toxic chemicals such as heavy metals, pesticides, crude oil, plastic, and other debris.<sup>54</sup> Many of these pollutants are commonly used for agricultural or industrial purposes and enter the ocean via run-off, wind, or accidents during transportation.

Sharks are highly impacted by ocean pollution. They can very easily ingest and absorb high levels of pesticides, heavy metals, and other toxic chemicals. Chemicals like pharmaceutical medicines, pesticides, toxic polychlorinated biphenyls (PCBs) infiltrate oceans globally.<sup>55</sup> Waters are subject to massive amounts of pollution, which is carried through the organisms that live within these marine environments in a process called bioaccumulation. Bioaccumulation is the process of chemicals and pollutants becoming more concentrated in organisms the higher they are on the food chain or trophic levels.<sup>56</sup> Sharks are apex predators, so they typically are at the top of the food chain in most ecosystems. Thus, bioaccumulation is highest in animals like sharks, as they consume large numbers of contaminated food (such as other animals). In such circumstances, the pollutant builds up in tissues and organs faster than the organism is able to break it down or excrete it. Biomagnification goes hand-in-hand with bioaccumulation as sharks consume fish at lower trophic levels that also have levels of pollutants within them.<sup>57</sup> Therefore, sharks at the top chain not only accumulate massive amounts of these toxic pollutants but actively consume them through their diet. The actual consequences of bioaccumulation and biomagnification in sharks are currently being studied. However, when studies were conducted on similar large marine animals and fish, it was found that they suffered from neurological issues, had internal damage to tissues, external damage to gills and respiratory

machinery, reduced fertility, cancer, and developmental delays.<sup>58</sup> All of these are serious conditions which impact the wellbeing and reproduction of these species, and can impact conservation efforts as well. This is concerning from a human health perspective as well, since the pollutants can enter people if they participate in shark meat consumption. The thresholds at which these effects were observed in other species were comparable to the levels of chemicals found in several species of Pacific sharks.<sup>59</sup>

Sharks also pass on these bioaccumulative pollutants to their young. It was found that Common Thresher Shark Females transferred about 29 to 54 percent of pesticides and mercury to her unborn young. Shark eggs very easily absorb chemicals from their mothers' bodies. As these sharks start off their life cycle with high amounts of chemicals already in their systems, environmental conditions will lead to further health issues later on.<sup>60</sup> This maternal connection was also investigated for the Red Tide toxic algae blooms, which caused massive amounts of death in Blacktip sharks around Florida. Red Tide blooms occur due to agricultural run-off in nearby oceans or bodies of water.<sup>61</sup> When the bodies of the dead sharks were examined, it was found that the pregnant mothers had passed on these toxins from the algae to their unborn offspring.<sup>62</sup> Red Tides continue to cause issues for sharks in this area.<sup>63</sup> Currently, canals and waterways around this area in Florida have unusually high numbers of sharks, and scientists presume that they are seeking refuge from the Red Tides.<sup>64</sup>

Shark bodies are built differently from other marine organisms. Because of this, the impacts of pollution on their bodies are still being researched. Long-term implications are still a cause for concern though, as the previous results show their significant impact. However, recent studies have found that

54 Piece, "Impacts of Ocean Pollution on Sharks and Rays"

55 Usman Ahmed, "How Does Chemical Pollution Affect the Ocean?" *AZO CleanTech*, October 19, 2022. <https://www.azocleantech.com/article.aspx?ArticleID=1624>

56 "Biomagnification and Bioaccumulation," *Natural Geographic*, accessed July 16, 2023, <https://www.nationalgeographic.org/activity/biomagnification-and-bioaccumulation/>.

57 *Natural Geographic*, "Biomagnification and Bioaccumulation."

58 Piece, "Impacts of Ocean Pollution on Sharks and Rays."

59 Piece, "Impacts of Ocean Pollution on Sharks and Rays."

60 Piece, "Impacts of Ocean Pollution on Sharks and Rays."

61 Baker, "Sharks hide in Florida canal to escape toxic red tide sweeping the coast,"

62 Piece, "Impacts of Ocean Pollution on Sharks and Rays."

63 Piece, "Impacts of Ocean Pollution on Sharks and Rays."

64 Harry Baker, "Sharks hide in Florida canal to escape toxic red tide sweeping the coast," *Live Science*, last modified August 4, 2021, <https://www.livescience.com/sharks-hide-in-florida-canals-red-tide.html>.



Entanglement of sharks in plastic and fishing gear

Credit: Fly Life Magazine

these contaminants can make it hard for the sharks to breathe or metabolize their food effectively.<sup>65</sup> This can very quickly be deadly to sharks, who must be in a constant state of motion in order for their gills to stay open and to be able to breathe.

Another large source of ocean pollution is oil waste. Oil waste from oil spills will rapidly deteriorate marine ecosystems, and is considered more imminently harmful than plastic pollution. Over 2,600 million liters of oil falls into the ocean annually through oil spills, leaks, and land drainage.<sup>66</sup> Oil in the ocean causes animals to suffocate. It can impact their temperature regulation, respiration, growth and circulation.<sup>67</sup> The University of Florida found that marine animals that encountered oil waste also showed behavioral and physiological deformities and their usual patterns of life are disturbed.<sup>68</sup> Because oil is such a toxic and dense substance, they are no exception to the suffering that other aquatic animals endure upon exposure. A recent example of a major oil spill in the Pacific Ocean was in October of 2021, where over 130, 000 gallons of oil spilled

off the California coast.<sup>69</sup> This resulted in various seabirds and marine fish species washing up dead on shore due to the toxic oil exposure. Furthermore, the oil spill resulted in a massive devastation of the Talbert Marsh, an ecological reserve for the local wetlands. This reserve is said to hold dozens of diverse bird species, who have now suffered irreversible damage to their habitats and health.<sup>70</sup>

Sharks and rays use electric signals to detect prey. Because they often live in murky waters, this is very helpful to find prey when sight is not an option. A research study tested to see if oil disturbed the ability of Atlantic stingrays to detect prey.<sup>71</sup> It was found that the oil hindered their electro-sensors, and the rays were unable to detect prey at their usual rate. Surprisingly, the researchers yielded that this impact occurred after only hours of exposure.<sup>72</sup> This means that oil spills that take months and years for adequate clean-up could impair the processes of these creatures at an alarming rate. The efforts made to clean oil-spills go beyond single years or countries, it

<sup>65</sup> Natascha Wosnick and Yuri Niella, Neil Hammerslag et al, “Negative metal bioaccumulation impacts on systemic shark health and homeostatic balance,” *Marine Pollution Bulletin*, (April 2021): <https://doi.org/10.1016/j.marpolbul.2021.112398>.

<sup>66</sup> “Ocean Pollution: How Oil Waste Impacts Marine Life,” SHARKBOOKINGS, last modified June 12, 2018. <https://www.sharkbookings.com/effects-of-oil-spills-in-the-ocean/>

<sup>67</sup> SHARKBOOKINGS, “Ocean Pollution: How Oil Waste Impacts Marine Life.”

<sup>68</sup> SHARKBOOKINGS, “Ocean Pollution: How Oil Waste Impacts Marine Life.”

<sup>69</sup> Neil Vigdor and Melina Delkic, “Major Oil Spill Off California Coast Threatens Wetlands and Wildlife,” *New York Times*, October 9, 2021, <https://www.nytimes.com/2021/10/03/us/pipeline-broken-oil-pacific-ocean.html>.

<sup>70</sup> Vigdor, “Major Oil Spill Off California Coast Threatens Wetlands and Wildlife.”

<sup>71</sup> E.J. Cave and S.M. Kajiura, “Electrosensory Impairment in the Atlantic Stingray, *Hypanus sabinus*, After Crude Oil Exposure,” *Zoology*, (2020): <https://doi.org/10.1016/j.zool.2020.125844>.

<sup>72</sup> Cave, “Electrosensory Impairment in the Atlantic Stingray.”

is a vast collection of effort and cooperation.

Every minute, the United Nations Environmental Programme states that around one entire garbage truck filled with plastic gets dumped into the ocean.<sup>73</sup> Considering that the Pacific Ocean is the most polluted in the world, the growth of the Great Pacific Garbage Patch is almost inevitable. The Patch is composed of over 1.8 trillion pieces of trash, with about 99.9 percent being plastic. In terms of weight, it is estimated that around 79,000 tons of plastic is contained within the Patch.<sup>74</sup> Plastic pollution in oceans has become the topic of discussion in recent years due to the sheer numbers associated with it. Approximately 53 million tons of plastic waste annually is said to enter marine ecosystems.<sup>75</sup> As mentioned, plastic pollution is the most abundant source of garbage that litters the oceans and causes serious impacts on marine species. Entanglement, starvation, drowning, internal injuries, suffocation, and stress are all severe consequences of the increasing amounts of plastics in oceans. Large plastic debris tend to trap sharks, and there are over one thousand documented cases of this occurring.<sup>76</sup> One case describes a mako shark being constricted by a fishing rope, which slowly led to scoliosis, or a curvature in the spinal structure.<sup>77</sup> This severely affects sharks' swimming abilities, and can lead to death very quickly. Sharks also get nets and plastic stuck around their bodies or necks, and the material chafes into their skin over time.

Plastic pollution is a growing concern in the health of sharks as well. Research indicates that over two-thirds of all sharks are found to be contaminated by plastic waste.<sup>78</sup> One study found that whale sharks ingest over 14 thousand microplastics in a typical daily feeding.<sup>79</sup> This could potentially be quite harmful

for these sharks, since plastics are not digestible and can cause internal injury. If too much is consumed, the shark may feel full and reduce their food consumption, leading them to starve to death. Long-term implications are still unknown, especially since tiny fragments from microplastics can accumulate in organs and the blood-stream.<sup>80</sup>

Plastics can also worsen the positive feedback loop of climate change by damaging aquatic ecosystems like mangroves, coral reefs, and seagrasses that take up carbon dioxide. If these habitats are damaged, they will ultimately absorb less carbon dioxide, making ecosystems more vulnerable to the impacts of climate change.<sup>81</sup> The Convention of Migratory Species strives to take precautionary measures to combat this issue to prevent biodiversity loss in our oceans. An international-based approach is crucial to prevent further damage to marine ecosystems as well as to fortify conservation efforts.

### The Impacts of Climate Change on the Habitat and Range of Sharks

Climate change has been at the forefront of biodiversity decline and is significantly impacting marine ecosystems. Climate change has driven loss in marine biodiversity as increasing amounts of various species are becoming critically endangered or extinct and habitats are being destroyed.<sup>82</sup> It has been estimated that more than 1,550 marine organisms are at risk of becoming extinct with climate change impacting 41 percent of these species.<sup>83</sup> A newer example is the herbivorous marine mammals called dugongs. Less than 1,000 mature individuals are found in regions worldwide and are critically endangered in certain habitats like Eastern

73 "Plastic Pollution," UNEP, accessed July 4, 2023, <https://www.unep.org/plastic-pollution>

74 L. Lebreton, B. Slat, F. Ferrari, et al, "Evidence that the Great Pacific Garbage Patch is rapidly accumulating plastic," *Sci Rep* no 8, 4666 (March 2018), <https://doi.org/10.1038/s41598-018-22939-w>.

75 "From Pollution to Solution: A global assessment of marine litter and plastic pollution," UNEP, October 2021, <https://www.unep.org/resources/pollution-solution-global-assessment-marine-litter-and-plastic-pollution>.

76 Isobel Whitcomb, "Thousands of Sharks and Rays May Be Getting Strangled by Plastic Waste," *Livescience*, July 2019, <https://www.livescience.com/65879-plastic-threatens-sharks-rays.html>

77 Whitcomb, "Thousands of Sharks and Rays May Be Getting Strangled by Plastic Waste,"

78 Wheeler, "Research shows that 67% of sharks are contaminated with plastic," *Greenpeace*, July 2020, <https://www.greenpeace.org/usa/news/research-shows-that-67-of-sharks-are-contaminated-with-plastic/>.

79 M.M.H Yong, C. Leistenschneider, J.A Miranda et al, "Microplastics in fecal samples of whale sharks (*Rhincodon typus*) and from surface water in the Philippines," *Microplastics and Nanoplastics* 1, no. 17 (September 2021). <https://microplastics.springeropen.com/articles/10.1186/s43591-021-00017-9>.

80 "Plastics, microplastics and manoplastics," Shark Foundation, accessed July 4, 2023, <https://shark.swiss/sharks/hunted-hunters/plastics>.

81 UNEP, "From Pollution to Solution."

82 "Biodiversity - our strongest natural defense against climate change," United Nations Climate Action, accessed June 19, 2023, <https://www.un.org/en/climatechange/science/climate-issues/biodiversity>

83 Julia Jacabo, "Climate change, human activity 'decimating' marine life, according to IUCN Red List of Threatened Species" *ABC News*, December 9, 2022, <https://abcnews.go.com/Technology/climate-change-human-activity-decimating-marine-life-iucn/story?id=94690943>

Africa.<sup>84</sup> Oceans absorb a large amount of carbon dioxide from the atmosphere and 93% of excess energy originating from human-related emissions.<sup>85</sup> Thus, this absorbance can lead to changes in the composition of the ocean and impact marine life. Sharks are particularly vulnerable to the impacts of climate change and their decline is a strong reflection of this. Within the past 50 years, the number of oceanic sharks has decreased over a staggering 70 percent.<sup>86</sup> Sharks play a crucial role in ecosystems by maintaining the balance of the food chain as apex predators. If sharks start to be absent from ecosystems, this balance is disrupted.<sup>87</sup>

The topic emphasizes the Pacific region as it has over 25 percent of the global shark species and nearly half are native to those waters. Unique habitats like coral reefs are also found in this region and are at-risk of depletion.<sup>88</sup> Which results in habitat loss for surrounding marine species. Habitat loss refers to when habitats are impacted to the point where it can no longer sustain the requirements of the species within it.<sup>89</sup> Three sub-types of habitat loss are most prevalent: habitat destruction, habitat degradation, and habitat fragmentation.<sup>90</sup> Habitat destruction is when the habitat itself is damaged beyond repair. At this point, the habitat cannot sustain species and results in the extinction or decline of species in that area. It is currently estimated by UNESCO that about 35 percent of essential marine habitats are destroyed.<sup>91</sup> Habitat degradation is when the habitat is reduced in quality and species typically migrate elsewhere to prevent extinction. In the Pacific, habitats are particularly at risk because of developments in coastal communities, nutrient run-off, overfishing, marine pollution, and climate change related impacts.<sup>92</sup> As a result, Pacific island countries and territories are susceptible to the

impacts caused by human activity and climate change with a common example being the Great Barrier Reef.<sup>93</sup> The global estimate for marine habitat degradation is 60 percent.<sup>94</sup> Lastly, habitat fragmentation is when the large habitat is split into smaller fragments and separates the population. This makes it difficult for species to thrive as they must compete for fewer resources and their area is restricted for processes like mating.<sup>95</sup> Although habitat loss in the ocean can be natural as a result of tsunamis, hurricanes, or storms, these are quite insignificant compared to the devastation caused by human activity.

Habitat loss in the ocean occurs through processes like pollutants and chemicals running off into the oceans, deoxygenation, and destruction from fishing gear.<sup>96</sup> Run-off finds its way into the ocean through sewage pipes or through rainfall in nearby areas. Excess pollutants and nutrients then enter marine ecosystems and cause destructive processes like eutrophication. Eutrophication is when excess nutrients enter the water and fuel the mass growth of algae and plants in the water.<sup>97</sup> This is detrimental for ecosystems as these plants use up massive amounts of oxygen when they decompose and reduce the amount of oxygen available for other species. Which results in the suffocation and death of various species. Deoxygenation can result from eutrophication as well as other sources like ocean warming. When the ocean warms, certain layers can form making it stratified. Stratification often occurs in bodies of water in warm weather as the temperature impacts water density. Warmer and lighter water with a lower salt content will rise and form a layer above cold and salty water. As the temperature increases and the layers become more pronounced, mixing of these waters cannot occur

84 Jacabo, "Climate change, human activity 'decimating' marine life."  
 85 "Climate Change - How does climate change affect sharks and rays?" *Save Our Seas*, accessed July 4, 2023. <https://saveourseas.com/worldofsharks/threats/climate-change>  
 86 Australian Marine Conservation Society, "Save Our Sharks."  
 87 Australian Marine Conservation Society, "Save Our Sharks."  
 88 Australian Marine Conservation Society, "Save Our Sharks."  
 89 "Habitat Loss- How does habitat loss affect sharks and rays?" *Save Our Seas*, accessed July 4, 2023, <https://saveourseas.com/worldofsharks/threats/habitat-loss>  
 90 Save Our Seas. "Habitat Loss- How does habitat loss affect sharks and rays?"  
 91 Save Our Seas. "Habitat Loss- How does habitat loss affect sharks and rays?"  
 92 United Nations Environment Programme. "Pacific." Accessed August 10, 2023, <https://www.unep.org/explore-topics/oceans-seas/what-we-do/working-regional-seas/regional-seas-programmes/pacific#:~:text=Pacific%20habitats%20and%20species%20face,with%20the%20impacts%20of%20higher>  
 93 UNEP, "Pacific"  
 94 Save Our Seas. "Habitat Loss- How does habitat loss affect sharks and rays?"  
 95 Save Our Seas. "Habitat Loss- How does habitat loss affect sharks and rays?"  
 96 Save Our Seas. "Habitat Loss- How does habitat loss affect sharks and rays?"  
 97 Save Our Seas. "Habitat Loss- How does habitat loss affect sharks and rays?"

and less oxygen will be available below the surface. Oxygen depletes to the point of being called a “dead-zone” and cannot sustain the majority of marine life in such conditions. Within dead-zones, marine life cannot get enough dissolved oxygen to survive and either die or are forced to migrate elsewhere. Concerningly, there are now over 500 dead zones globally.<sup>98</sup>

Shark species are highly threatened by habitat loss. Sharks use their habitats in order to hunt, reproduce, and grow. Although nearly all sharks are threatened due to overfishing and environmental pressure, it has been found that coastal sharks are more likely to be impacted than pelagic species. An example includes the lemon shark. The lemon shark moves towards the coast in order to reproduce and give birth. However, human activity and habitat loss on the coasts has resulted in a decreased survivability for the young of the lemon shark species. Coastal habitats like coral reefs and mangroves are essential for juvenile sharks as it provides shelter as well as abundant sources of food.<sup>99</sup> As human settlement increases and biodiversity decreases, the cascading impacts tend to unfortunately affect each stage of development.

98 Save Our Seas. “Habitat Loss- How does habitat loss affect sharks and rays?”

99 Save Our Seas. “Habitat Loss- How does habitat loss affect sharks and rays?”

100 United Nations. “Can We Save Coral Reefs?” May 2017, <https://www.un.org/en/chronicle/article/can-we-save-coral-reefs>.

101 United Nations. “Can We Save Coral Reefs?”

102 Save Our Seas. “Habitat Loss- How does habitat loss affect sharks and rays?”

103 “Zooxanthellae ... what’s that?”, *National Oceanic and Atmospheric Administration*, accessed July 29, 2023, [https://oceanservice.noaa.gov/education/tutorial\\_corals/coral02\\_zooxanthellae.html](https://oceanservice.noaa.gov/education/tutorial_corals/coral02_zooxanthellae.html)

104 Save Our Seas. “Habitat Loss- How does habitat loss affect sharks and rays?”

105 Save Our Seas. “Habitat Loss- How does habitat loss affect sharks and rays?”

Coral reefs as previously mentioned are essential to ecosystems and for the survival of various species of shark. However, the United Nation estimates that over 70 percent of coral reefs worldwide are at risk of extinction.<sup>100</sup> Nearly 20 percent of these reefs are beyond rehabilitation and are considered dead and 24 percent is reported to currently be on the brink of collapse.<sup>101</sup> As global temperatures rise, corals get stressed and respond to the environmental change by expelling their algae.<sup>102</sup> Zooxanthellae algae and coral have a symbiotic relationship where both benefit as the algae provide coral reefs with nutrients and sugars from photosynthesis and coral reefs allow algae to grow freely on a substrate.<sup>103</sup> This way, both are able to simultaneously thrive. When algae are expelled, corals become exposed and no longer have a supply of food causing coral bleaching.<sup>104</sup> Once coral becomes bleached, they are more vulnerable to starvation or disease, increasing their risk of death.<sup>105</sup> Since coral reefs are such abundant sources of shelter and food to a diverse array of species, this loss is detrimental to marine ecosystems. An example of these impacts is present within the world’s largest coral reef; The

Mass coral bleaching and habitat loss at the Great Barrier Reef

Credit: Great Barrier Reef Foundation





Great Barrier Reef (GBR) off the coast of Australia. Recent reports from UNESCO suggest that the water quality around the GBR is greatly reduced, especially water that is connected to bodies of water inland.<sup>106</sup> Furthermore, it was seen that development around the coast has resulted in a great loss of coastal habitats and long-term protection of the GBR is of utmost priority to conserve the plethora of species that depend on its existence.<sup>107</sup>

As outlined earlier, sharks are apex predators and rely on the lower trophics (levels) of the food chain for optimal survival. Disruptions in the lower levels when habitat loss occurs can be debilitating to shark species as competition for limited resources increases and habitats no longer become viable. Sharks also support coral reef ecosystems by maintaining balance, yet they are becoming locally extinct in these areas.<sup>108</sup> Nearly 60 percent of the 134 different species of coral reef sharks are threatened with extinction<sup>109</sup> If the shark populations in these areas continue to decrease, the coral reef is at risk of collapse. Without the presence of predation from sharks, larger fish will start to eat the organisms that feed on algae in greater and imbalanced amounts.<sup>110</sup> This then leads to a higher ratio of algae to coral and overgrowth can often lead to the collapse of the entire coral reef.<sup>111</sup> Similar impacts on sharks are seen due to the declining seagrasses across the ocean. Seagrasses refer to plants that thrive in temperate and shallow waters and often grow in large meadows.<sup>112</sup> Seagrass is highly crucial as it uptakes large amounts of carbon from the atmosphere. Seagrasses take up carbon 35 times faster over large tropical rainforests and other plant life on land.<sup>113</sup>

Recent research shows that sharks may actually aid in the fight against climate change by preventing the mass consumption of seagrass by marine animals like dugongs or sea turtles. Without excessive amounts of seagrass being eaten by marine herbivores, it can continue to grow and sequester carbon from the atmosphere.<sup>114</sup>

Another large factor impacting shark habitat is the acidification of the world's oceans. As the ocean absorbs a large percentage of atmospheric carbon dioxide, this creates a chemical imbalance in the ocean water and lowers the pH of the water.<sup>115</sup> pH is dictated on a scale from 1 to 14, low pH corresponds to acidic environments and high pH indicates basic or alkaline conditions with neutral being around 7.<sup>116</sup> As carbon dioxide is absorbed into oceans, this makes the water more acidic.<sup>117</sup> Maintaining pH in ocean environments is crucial for the survival and health of marine organisms. pH regulates the ecosystem. For example, some fish species like clownfish rely on pH to detect predators.<sup>118</sup> However, this detection mechanism decreases as waters get more acidic. When such organisms are impacted by chemical changes in the environment, the risk of ecosystemic imbalance increases. This can put entire food chains in jeopardy, impacting all trophic levels of marine animals.<sup>119</sup>

Oceans have gotten 30 percent more acidic since the Industrial Revolution occurred 250 years ago.<sup>120</sup> Carbon emissions continue to rise and so does the acidification of oceans. The United Nations Environment Programme (UNEP) predicts that by 2050, ocean acidity will increase by 150 percent.<sup>121</sup> Which is such a rapid rate of increase that most marine

106 UNESCO, "Great Barrier Reef," Accessed June 24, 2023, <https://whc.unesco.org/en/list/154/>

107 UNESCO "Great Barrier Reef"

108 Sherman, C.S., Simpfendorfer, C.A., Pacoureau, N. et al. "Half a century of rising extinction risk of coral reef sharks and rays." *Nature Communications*. January 17, 2023, <https://www.nature.com/articles/s41467-022-35091-x>

109 Sherman, C.S., Simpfendorfer, C.A., Pacoureau, N. et al. "Half a century of rising extinction risk of coral reef sharks and rays." *Nature Communications*.

110 Shark Stewards. "SEAGRASSES MONTH: HOW SHARKS AND PLANTS CAN MITIGATE CLIMATE CHANGE."

111 Shark Stewards. "SEAGRASSES MONTH: HOW SHARKS AND PLANTS CAN MITIGATE CLIMATE CHANGE."

112 Shark Stewards. "SEAGRASSES MONTH: HOW SHARKS AND PLANTS CAN MITIGATE CLIMATE CHANGE."

113 Shark Stewards. "SEAGRASSES MONTH: HOW SHARKS AND PLANTS CAN MITIGATE CLIMATE CHANGE."

114 Shark Stewards. "SEAGRASSES MONTH: HOW SHARKS AND PLANTS CAN MITIGATE CLIMATE CHANGE."

115 United Nations Environment Programme. "Impacts of Ocean Acidification on Marine Biodiversity." Accessed July 4, 2023. <https://www.unep.org/resources/report/impacts-ocean-acidification-marine-biodiversity>

116 Water Science School, "pH Scale," USGS, June 19, 2019, <https://www.usgs.gov/media/images/ph-scale-0#:~:text=pH%20is%20a%20measure%20of,than%207%20indicates%20a%20base.>

117 United Nations Environment Programme. "Impacts of Ocean Acidification on Marine Biodiversity."

118 "Ocean acidification," National Oceanic and Atmospheric Administration, Accessed August 18, 2023, <https://www.noaa.gov/education/resource-collections/ocean-coasts/ocean-acidification>

119 National Oceanic and Atmospheric Administration, "Ocean acidification."

120 United Nations Environment Programme. "Impacts of Ocean Acidification on Marine Biodiversity."

121 United Nations Environment Programme. "Impacts of Ocean Acidification on Marine Biodiversity."

organisms will not have the ability to adapt or evolve to cope with these conditions.<sup>122</sup> Unfortunately, this increase in acidic environments affects the biology of sharks. Evidence suggests that the increased acid corrodes their skin and impacts the reception system that sharks have to detect their prey through odor.<sup>123</sup> The study uses the smooth dogfish shark species to examine how pH and carbon amounts in water impact their behavior or biology. It was found that the smooth dogfish sharks with higher acidic treatments were infrequently able to detect their prey and could not follow odor cues compared to the control group.<sup>124</sup> The sharks were then exposed to the amount of carbon that is estimated to be absorbed into the ocean by the end of the century if carbon emissions followed current trends and the sharks were deemed nearly non-functional and could not respond to their normal cues. This indicates long-term behavioral complications for sharks and further research must be done on various other shark species to understand the scale of this potential issue. A separate study aimed to look at skin composition variance depending on carbon dioxide levels using puff-adder shysharks. The sharks treated with the most acidic conditions or most carbon levels showed that their scales had suffered significant damage and deteriorated the skin within just one week of exposure.<sup>125</sup> As the trend of carbon emissions shows, the issue of ocean acidification is not to be solved overnight. As human activity continues to fuel hazardous chemicals into the air and ocean, their profound impact is being uncovered as research continues.

Lastly, increasing global temperatures and habitat loss has resulted in many shark species undergoing range shifts.<sup>126</sup> Currently, temperatures have risen 1.1 °C compared to before

industrialization.<sup>127</sup> This number is projected to continue rising if emissions are not reduced drastically in the next decade or so. Range shifts refer to the geographic shift in species to seek a more sustainable habitat.<sup>128</sup> With increasing temperatures, this means that marine animals are moving to cooler and deeper waters as well as towards the global poles in latitude for refuge.<sup>129</sup> The long-term implications of ocean acidification, habitat loss, and climate change is changing the distribution of fish for sharks to feed on, migration, population sizes, etc. Sharks are having to move into more Northern latitudes to find more suitable habitats and their large range makes them more likely to shift their spatial distribution.<sup>130</sup> This was observed in the migration patterns of thresher sharks where once were common near the California coast are now estimated to be more prevalent off the Pacific coast of Alaska.<sup>131</sup> Population range shifts have the potential to be ecologically problematic as resources become a source of competition as more species migrate to certain areas and could displace sharks from historic breeding or foraging sites.<sup>132</sup>

## Limited International Jurisdictions

While the topic of shark conservation has been gaining traction, it has been difficult to implement national policies as sharks are migratory and travel transnationally.<sup>133</sup> Shark populations continue to decline, and overfishing continues to be a large issue despite restrictions on catch and trade. As the subject of shark conservation grew more popular, a variety of regulations and national legislations were enacted to combat the issue. However, this effort is insufficient in protecting and rehabilitating the many critically endangered shark species that continue to be in peril today. In order to fortify agreements

122 United Nations Environment Programme. "Impacts of Ocean Acidification on Marine Biodiversity."

123 "How Ocean Acidification Is Changing The Biology Of Sharks (and not for the better)," *Shark Angels*, Accessed July 4, 2023, <https://sharkangels.org/ocean-acidification-changing-the-biology-of-sharks/#:~:text=Scientists%20have%20found%20evidence%20that,%2C%20and%20consequently%20acidity%2C%20levels>.

124 Shark Angels. "How Ocean Acidification Is Changing The Biology Of Sharks (and not for the better)."

125 Shark Angels. "How Ocean Acidification Is Changing The Biology Of Sharks (and not for the better)."

126 "The Effects of Climate Change on Sharks," *NOAA Fisheries*, July 26, 2021. <https://www.fisheries.noaa.gov/feature-story/effects-climate-change-sharks>

127 United Nations, "Goal 14: Conserve and sustainably use the oceans, seas and marine resources," Accessed July 4, 2023, <https://www.un.org/sustainabledevelopment/oceans/>

128 "Migrating Species," *Land Trust Alliance*, Accessed June 19, 2023, <https://climatechange.lta.org/climate-impacts/migrating-species/>

129 NOAA Fisheries, "The Effects of Climate Change on Sharks."

130 NOAA Fisheries, "The Effects of Climate Change on Sharks."

131 NOAA Fisheries, "The Effects of Climate Change on Sharks."

132 NOAA Fisheries, "The Effects of Climate Change on Sharks."

133 Swanson, Greta. "International Legal Protections for Sharks and Rays in the Western and Central Pacific Ocean." *Environmental Law Institute*. July 14, 2021, <https://www.eli.org/vibrant-environment-blog/international-legal-protections-sharks-and-rays-western-and-central>

and ensure better conservation, international organizations must create a coordinated set of regulations and jurisdictions to follow.<sup>134</sup> Regional fisheries, trade, conservation are all sectors of a large cooperative effort and must additionally work together in order to create a sustainable and feasible solution.<sup>135</sup> The illegal market for shark fins and products generates a large sum of money and the lack of binding international jurisdictions allows many to fish unsustainably. There must a slow transition out of these products as change that is too sudden may disrupt local economies.

The Pacific Ocean is the site of intersection between large shark diversity and active fisheries.<sup>136</sup> Thus, agreements like the Western and Central Pacific Fisheries Convention (WCPFC), the Convention on International Trade in Endangered Species (CITES), and the Convention on the Conservation of Migratory Wild Species (CMS) and its Memorandum of Understanding on Migratory Sharks (Sharks MOU) have been created to conserve migratory shark species.<sup>137</sup> Despite these bodies and regulations, the illicit shark trade is highly unregulated and ports of convenience bypass regulations by not reporting illegal catch.<sup>138</sup> Shark species are often hidden and reports are inconsistent. Without documentation or database to track sharks, fisheries and legal ports cannot determine the source and identity of the fish. In other words, there is no system to help aid port workers and managers determine if sharks or fish were caught legally within regulations.<sup>139</sup> This was seen in Taiwan as the Environmental Justice Foundation conducted an investigation and found that thousands of sharks are finned and caught within Taiwanese vessels.<sup>140</sup> Additionally, in order to bait the sharks, vessels are killing large amounts of dolphins, another highly illegal practice. Despite regulations, these ships effortlessly avoided issues at ports and

continued their illicit trade by offloading the fins elsewhere and keeping them hidden.<sup>141</sup> Fins were even found from critically endangered species like the smooth hammerhead shark.<sup>142</sup> Sharks continue to be targeted despite national laws and require new methods of prevention to suppress the illegal market before species are pushed to extinction .

This sentiment is shared by other conservation organizations in the United States as they state that regulations regarding finning are not consistent with what is necessary to eradicate illicit shark trade.<sup>143</sup> The US law still dictates that sharks may be caught for their fins if the carcass is intact on land. While this prevents finning at sea, it simply occurs on land and results in mass amounts of waste. The director of shark conservation at Pew Environment, Matt Rand states that shark catch has not decreased, and populations are still rapidly declining.<sup>144</sup> The new regulations are not preventing the killing of sharks but have facilitated another loophole for the shark fin trade. Branching off the US, regulations hold no weight in international waters. There is no limit to the amount of sharks that can be caught and illicit practices cannot be prosecuted in said areas, emphasizing the need for an international framework to properly manage the issue.<sup>145</sup> The argument continues that industrial fishing of sharks entirely is unsustainable and certain species require complete conservation as populations have declined by over 85 percent.<sup>146</sup>

However, the scope and complexity of the issue widens when examining a case like the following. Colombia historically fishes and sells significant amounts of rays and sharks. Thus, small-scale shark fishing and industrial catches have been nationally banned since 2017.<sup>147</sup> However, a more recent addition to these regulations prevents local communities from fishing

134 Swanson, Greta. "International Legal Protections for Sharks and Rays in the Western and Central Pacific Ocean."  
 135 Swanson, Greta. "International Legal Protections for Sharks and Rays in the Western and Central Pacific Ocean."  
 136 Swanson, Greta. "International Legal Protections for Sharks and Rays in the Western and Central Pacific Ocean."  
 137 Swanson, Greta. "International Legal Protections for Sharks and Rays in the Western and Central Pacific Ocean."  
 138 Swanson, Greta. "International Legal Protections for Sharks and Rays in the Western and Central Pacific Ocean."  
 139 Swanson, Greta. "International Legal Protections for Sharks and Rays in the Western and Central Pacific Ocean."  
 140 "ILLEGAL FISHING: AN EXISTENTIAL THREAT FOR SHARKS AND THE OCEANS," *Environmental Justice Foundation*, July 13, 2020, <https://ejfoundation.org/news-media/illegal-fishing-an-existential-threat-for-sharks-and-the-oceans>  
 141 Environmental Justice Foundation, "ILLEGAL FISHING: AN EXISTENTIAL THREAT FOR SHARKS AND THE OCEANS,"  
 142 Environmental Justice Foundation, "ILLEGAL FISHING: AN EXISTENTIAL THREAT FOR SHARKS AND THE OCEANS,"  
 143 Suzanne Goldenberg, "Shark conservation is gaining momentum - but are we doing enough?" *The Guardian*, October 27, 2011, <https://www.theguardian.com/environment/2011/oct/27/shark-conservation-gaining-momentum>  
 144 Suzanne Goldenberg, "Shark conservation is gaining momentum - but are we doing enough?"  
 145 Suzanne Goldenberg, "Shark conservation is gaining momentum - but are we doing enough?"  
 146 Suzanne Goldenberg, "Shark conservation is gaining momentum - but are we doing enough?"  
 147 Inigo Alexander, "They became illegal overnight: Colombia's shark fishing ban turns locals into criminals," *The Guardian*, February 16,

sharks as well. Although an environmental step forward, local populations have been suffering as sharks are one of the sole sources of incomes for families in more coastal or rural areas.<sup>148</sup> The policy aiming to further conservation efforts in Colombia are clashing with the local economy and culture of marginalized communities, offering an ethical dilemma.<sup>149</sup> In situations similar to the one in Colombia, international cooperation must be stressed in order to uplift local communities to take on more sustainable fishing measures without fear of severe economic turmoil. Such cases must also be taken into consideration when thinking about international jurisdiction and solutions to such a complex issue.

The two largest international bodies with legally binding shark conservation policies are CMS and CITIES.<sup>150</sup> The other frameworks that currently exist are quite broad and lack implementation or enforcement. Despite these policies in place and talks about developments through the FAO to create an international framework for sharks, policies are still limited in their impacts and conservation efforts.<sup>151</sup> Consistency and efforts must be enforced nationally by signing parties in order to facilitate change in global conservation. Evidently, there are still limitations in the efficacy of policies, regional or international, and require concerted solutions to protect these keystone species.<sup>152</sup>

### Effectiveness of Past Conservation Efforts

The United Nations Environmental Programme encouraged the formation of the Regional Plan of Action for Sharks,

also referred to as RPOA Sharks.<sup>153</sup> The RPOA Sharks encompasses the Pacific Islands Forum Fisheries Agency (FFA), the Secretariat of the Pacific Community (SPC) and the Secretariat of the Pacific Regional Environment Programme (SPREP).<sup>154</sup> This project was funded by the UN Fish Stocks Agreement and had several key Pacific countries involved like the Republics of Palau and Kiribati, as well as Papua New Guinea.<sup>155</sup> The RPOA Sharks is meant to guide Pacific countries on how to manage their shark fisheries sustainably long-term. This includes education and funding for research initiatives to ensure proper care is provided to these shark species. The RPOA Sharks does not necessarily force countries to take any regional or national measures, but just serves as a guide.<sup>156</sup> The development of this program was required to provide a platform for a wide-reaching program to ensure the conservation of sharks in the Pacific region within the guidelines of the International Plan of Action for the Conservation and Management of Sharks (IPOA Sharks).<sup>157</sup>

The goal is for Pacific nations to use RPOA Sharks in order to collect sufficient data to make better decisions and policy choices regarding shark conservation.<sup>158</sup> This inherently would help increase shark populations and prevent their demise. Such a regulation is common in the Pacific as there are several marine regional plans for other species including turtles, whales, dolphins, etc. The FFA has 17 different countries in the Pacific and historically works together on regional issues in the fishing industry.<sup>159</sup> Currently, there are developments being made for a regional program built to monitor, control,

2023, <https://www.theguardian.com/environment/2023/feb/16/they-became-overnight-colombias-shark-fishing-ban-turns-locals-into-criminals>

148 Inigo Alexander, "They became illegal overnight": Colombia's shark fishing ban turns locals into criminals,"

149 Inigo Alexander, "They became illegal overnight": Colombia's shark fishing ban turns locals into criminals,"

150 Swanson, Greta. "International Legal Protections for Sharks and Rays in the Western and Central Pacific Ocean." *Environmental Law Institute*. July 14, 2021, <https://www.eli.org/vibrant-environment-blog/international-legal-protections-sharks-and-rays-western-and-central>

151 Swanson, Greta. "International Legal Protections for Sharks and Rays in the Western and Central Pacific Ocean."

152 Swanson, Greta. "International Legal Protections for Sharks and Rays in the Western and Central Pacific Ocean."

153 United Nations Environment Programme, "Regional Action Plan for Sharks: Guidance for Pacific Island Countries and Territories on the Conservation and Management of Sharks," October 2009, <https://www.unep.org/resources/report/regional-action-plan-sharks-guidance-pacific-island-countries-and-territories>

154 UNEP, "Regional Action Plan for Sharks: Guidance for Pacific Island Countries and Territories on the Conservation and Management of Sharks,"

155 UNEP, "Regional Action Plan for Sharks: Guidance for Pacific Island Countries and Territories on the Conservation and Management of Sharks,"

156 UNEP, "Regional Action Plan for Sharks: Guidance for Pacific Island Countries and Territories on the Conservation and Management of Sharks,"

157 UNEP, "Regional Action Plan for Sharks: Guidance for Pacific Island Countries and Territories on the Conservation and Management of Sharks,"

158 UNEP, "Regional Action Plan for Sharks: Guidance for Pacific Island Countries and Territories on the Conservation and Management of Sharks,"

159 UNEP, "Regional Action Plan for Sharks: Guidance for Pacific Island Countries and Territories on the Conservation and Management of Sharks,"

and surveillance (MCS) fisheries and their impacts. The Western and Central Pacific Fisheries Commission (WCPFC) develops strategies to ensure that fishing vessels and fisheries are compliant with regional agreements and programs and protects migratory fish species.<sup>160</sup> Their mandate encompasses a variety of fish species, sharks included and is recorded within the 1982 United Nations Convention on the Law of the Sea (UNCLOS).<sup>161</sup> Additionally, they facilitate the formation of several initiatives like the Coral Triangle Initiative that aims to promote the conservation of marine biodiversity and habitats against human impact and climate change.<sup>162</sup>

Agreements typically use the IPOA Sharks definition of “shark” when referenced in various agreements.<sup>163</sup> Shark often encapsulates all species of sharks, rays, skates, and chimaeras that are in the scientific class Chondrichthyes.<sup>164</sup> This ensures a universal definition of sharks to understand the true scope of conservation efforts outlined in agreements and treaties. This allows agreements to be more precise with common understanding between parties to avoid misunderstandings or multiple interpretations. With the help of regional mandates and IPOA Sharks, the WCPFC created the Conservation and Management Measure (CMM) in 2006 to protect sharks.<sup>165</sup> This has been re-visited multiple times until the most recent and active CMM 2022-04. The purpose of the CMM 2022-04 agreement is to take an ecosystemic and long-term approach to shark conservation in the Western and Central Pacific Ocean (WCPO) following IPOA guidelines.<sup>166</sup> The document emphasizes individual sovereignty of Pacific States and cannot supersede national policy. Another large

part of CMM 2022-04 is ensuring the full utilization and banning of finning practices.<sup>167</sup> Fishing boats must keep shark carcasses and fins together with unique tags given to both for easy identification.<sup>168</sup> The fins must be apparently from the corresponding tagged carcass to fit within these guidelines to prevent illicit trade. If unregulated materials that break the agreement are found like shark fins or carcasses of certain endangered species like the whitetip shark, fishing vessels must either discard material with supervision or surrender it to the government. Additional penalties differ from government to government.<sup>169</sup> CMM 2022-04 also requires the minimization of by-catch while aiming for safe release measures. Longlines must be limited and conducted in a manner that allows minimal harm to be done to sharks if caught.<sup>170</sup> Additionally, fisheries must comply with the Shark Safe Release Guidelines to ensure humane and appropriate release if caught accidentally.<sup>171</sup> The agreement also has specific requirements for certain species that need further protection and reporting measures so interactions can be documented.

Pacific States also tend to be part of international bodies like the United Nations committees, UNCLOS, UN Fish Stocks Agreement, CMS, or CITES.<sup>172</sup> These bodies allow for the formation of multilateral agreements to guide the direction of conservation of shark species in the region. Within the past ten years, the United Nations has become more focused on the preservation of sharks as concerns regarding the lack of precautionary measures have risen.<sup>173</sup> CMS and CITES intend on bringing countries closer in their efforts to manage shark populations as they have not been biologically able to

160 UNEP, “Regional Action Plan for Sharks: Guidance for Pacific Island Countries and Territories on the Conservation and Management of Sharks,”

161 UNEP, “Regional Action Plan for Sharks: Guidance for Pacific Island Countries and Territories on the Conservation and Management of Sharks,”

162 “History of CTI-CFF”, Coral Triangle Initiative, Accessed August 8, 2023, <https://www.coraltriangleinitiative.org/about>

163 Conservation and Management Measure for Sharks, “CMM 2022-04,” Western and Central Pacific Fisheries Commission, December 3, 2022, <https://cmm.wcpfc.int/measure/cmm-2022-04>

164 Conservation and Management Measure for Sharks, “CMM 2022-04,”

165 Conservation and Management Measure for Sharks, “CMM 2022-04,”

166 Conservation and Management Measure for Sharks, “CMM 2022-04,”

167 Conservation and Management Measure for Sharks, “CMM 2022-04,”

168 Conservation and Management Measure for Sharks, “CMM 2022-04,”

169 Conservation and Management Measures, “CMM 2022-04 22 (03),” *Western and Central Pacific Fisheries Commission*, Accessed August 18, 2023, <https://cmm.wcpfc.int/measure/cmm-2022-04/obl/cmm-2022-04-22-03>

170 Conservation and Management Measure for Sharks, “CMM 2022-04,”

171 Conservation and Management Measure for Sharks, “CMM 2022-04,”

172 UNEP, “Regional Action Plan for Sharks: Guidance for Pacific Island Countries and Territories on the Conservation and Management of Sharks,”

173 UNEP, “Regional Action Plan for Sharks: Guidance for Pacific Island Countries and Territories on the Conservation and Management of Sharks,”



Sharks as a part of Dubai Mall Aquarium  
Credit: Dubai Aquarium

reproduce at high rates to compensate for the shark trade market.<sup>174</sup>

CMS has produced Resolution UNGA/Res. A/RES/67/79 in 2013 to adopt the Conservation Plan for the Memorandum of Understanding on the Conservation of Migratory Sharks (Sharks MOU) under CMS.<sup>175</sup> Through this, their partnership is joint and was supported by the United Nations General Assembly. Through this resolution and partnership, the importance of preserving migratory shark stocks is emphasized and attempts to prevent the catastrophic impacts on the food chain by the extinction of shark species.<sup>176</sup> The CMS Sharks MOU encourages data collection for awareness and research about shark stocks and echoes concerns about the illegal black markets profiting off the exploitation of shark finning and extraction.<sup>177</sup>

While these numerous plans can be commended for their cooperative efforts, the implementation of the NPOA

Sharks policies have been limited.<sup>178</sup> The lack of effectiveness within these regional efforts is proportionate to the lack of implementation. For example, the Marshall Islands and Cook Islands have both drafted a version of NPOA Sharks but neither country has agreed upon these guidelines and implemented conservation efforts.<sup>179</sup> Furthermore, the quality of plans is seen as irregular and evaluations on the projected effectiveness of policies are not done. IPOA Sharks was relatively slow to be implemented worldwide and it was found by the Food and Agriculture Organization (FAO) of the United Nations that most countries did not fulfill the requirements of IPOA Sharks.<sup>180</sup> The goal of immediate and drastic conservation efforts was perhaps too ambitious for many countries and a more detailed and realistic solution and timeline may have been necessary to facilitate an effective and long-term strategy. Monitoring and collecting information about trade should be the first step for all countries aiming to solve this issue to keep illegal activity under control.

174 UNEP, “Regional Action Plan for Sharks: Guidance for Pacific Island Countries and Territories on the Conservation and Management of Sharks,”

175 CMS, “CMS Welcomes United Nations General Assembly Resolution regarding CMS Sharks MOU.” January 14, 2013, <https://www.cms.int/en/news/cms-welcomes-united-nations-general-assembly-resolution-regarding-cms-sharks-mou>

176 CMS, “CMS Welcomes United Nations General Assembly Resolution regarding CMS Sharks MOU.”

177 CMS, “CMS Welcomes United Nations General Assembly Resolution regarding CMS Sharks MOU.”

178 UNEP, “Regional Action Plan for Sharks: Guidance for Pacific Island Countries and Territories on the Conservation and Management of Sharks,”

179 UNEP, “Regional Action Plan for Sharks: Guidance for Pacific Island Countries and Territories on the Conservation and Management of Sharks,”

180 UNEP, “Regional Action Plan for Sharks: Guidance for Pacific Island Countries and Territories on the Conservation and Management of Sharks,”

Weaknesses and bycatch should also be considered, and equipment and regulations should be designed to prevent harm from being done to species caught accidentally as well.<sup>181</sup> Several FAO workshops have outlined similar steps to set conservation goals a step closer to the right direction. While past conservation efforts have not been as effective as intended, the priority should be placed on fortifying current agreements to improve efficacy and creating new regulations that are more feasible for countries to accomplish.

Other past solutions have focused on education and public awareness about protecting sharks. This education would include not only information about fishing practices but about getting rid of stigma surrounding sharks. It is important that people realize what kind of role they play in the ecosystem and how they are a necessary species. In 2003, the UNEP World Conservation Monitoring Centre (WCMC) introduced the Sustainable Management of Aquarium Reef Trade (SMART) Project.<sup>182</sup> The WCMC created this project in response to concerns about the capture of sharks for aquariums.<sup>183</sup> Many studies have found that aquariums and other enclosed spaces negatively impact sharks' wellbeing by limiting their mobility, disrupting their natural behaviors, and causing them stress.<sup>184</sup> However, the aquarium industry is worth USD 330 million.<sup>185</sup> Because of the conflict between marine conservation and the economic gain from aquariums, the South Pacific Forum Secretariat and the Marine Aquarium Council (MAC) came together to create SMART in the Southern Pacific. Specific Oceania states like Fiji Islands, Solomon Islands, and the Cook Islands are to build and maintain sustainable enclosures that are

to be certified by MAC to reduce poverty in those regions.<sup>186</sup> The program focuses on ecosystem health and restoration of coral reefs while ensuring local income via sustainable fishing and ecotourism. National workshops and consultations must be completed first for local industry partners and the European Union (EU) funding will increase the outreach of this program to manage their resources sustainably.<sup>187</sup> This legislation will hopefully keep the shark populations more safe as increased regulations and certifications must be upheld to keep only appropriate species in enclosures. This may take steps forward to prevent illicit capture and entrapment of sharks in the Pacific region.<sup>188</sup>

## Current Status

### Recently Proposed Solutions

With the knowledge of previously proposed agreements and solutions, newer ones have been developed and put forward in the past year. Chronologically, the first being the United Nations Environmental Program's Resolution UNEP/EA.5/Res.14 in March of 2022 to combat plastic pollution.<sup>189</sup> A conference held in Nairobi, Kenya to End Plastic Pollution created a legally binding international agreement to be complete by 2024.<sup>190</sup> The resolution focuses on the start and beginning of the impacts of plastic including production, design, and disposal.<sup>191</sup> An imperative part of the resolution includes the making of an Intergovernmental Negotiating Committee (INC) to be active in 2022 to work towards

181 UNEP, "Regional Action Plan for Sharks: Guidance for Pacific Island Countries and Territories on the Conservation and Management of Sharks,"

182 United Nations Environmental Programme. "From Ocean to Aquarium." UNEP Accessed July 3, 2023. [https://wedocs.unep.org/bitstream/handle/20.500.11822/8341/-From%20Ocean%20to%20Aquarium%20\\_%20The%20Global%20Trade%20in%20Marine%20Ornamental%20Species-20033641.pdf?sequence=3&isAllowed=](https://wedocs.unep.org/bitstream/handle/20.500.11822/8341/-From%20Ocean%20to%20Aquarium%20_%20The%20Global%20Trade%20in%20Marine%20Ornamental%20Species-20033641.pdf?sequence=3&isAllowed=)

183 UNEP. "From Ocean to Aquarium."

184 "The Role Of Sharks In Aquariums: Education Vs. Exploitation," Discovering Marine Species, August 24, 2023, <https://ourmarinespecies.com/c-sharks/the-role-of-sharks-in-aquariums-education-vs-exploitation/>.

185 "UN urges balance between economy and conservation in tropical fish trade," United Nations News, September 30, 2003, <https://news.un.org/en/story/2003/09/80932>.

186 UNEP. "From Ocean to Aquarium."

187 UNEP. "From Ocean to Aquarium."

188 UNEP. "From Ocean to Aquarium."

189 United Nations Environment Programme, Resolution 14/22, March 7, 2022, <https://wedocs.unep.org/xmlui/bitstream/handle/20.500.11822/39764/END%20PLASTIC%20POLLUTION%20-%20TOWARDS%20AN%20INTERNATIONAL%20LEGALLY%20BINDING%20INSTRUMENT%20-%20English.pdf?sequence=1&isAllowed=y>.

190 United Nations Environment Programme. "Historic day in the campaign to beat plastic pollution: Nations commit to develop a legally binding agreement." March 2, 2022, <https://www.unep.org/news-and-stories/press-release/historic-day-campaign-beat-plastic-pollution-nations-commit-develop>

191 UNEP. "Historic day in the campaign to beat plastic pollution: Nations commit to develop a legally binding agreement."

completing the international binding agreement by 2024. In this agreement, it has been stated that parties will attempt to find alternative solutions to the current cycle of plastic.<sup>192</sup> Various ideas like reusable and recyclable products have been discussed with an emphasis on international standards. The UNEP has also established a forum with INC in 2022 for communal discussion on how to lessen the burden of plastic on the environment. Discussions will be supported by research and science to prevent misinformation with progress reports being updated as the forum reconvenes.<sup>193</sup> The forum meeting took place November 26, 2022 in Uruguay with INC for its first session.<sup>194</sup> The goal of this meeting was to understand various perspectives from stakeholders about the life cycle of plastics and how to proceed. The forum facilitated conversation at a global level and addressed how to take action against plastic pollution while taking the perspectives of the stakeholders in mind.<sup>195</sup> The goal of the UNEP is to create a circular economy and move away from single-use plastics. It is suggested that over 11 million tons of plastic related waste end up in the ocean each year and the number may triple by the year 2040.<sup>196</sup> The proposal of a circular economy may serve as a reduction strategy and mitigate over 80 per cent of plastic waste from flowing into oceans by 2040.<sup>197</sup> As previously discussed, plastic waste is extremely pervasive in the oceans. It results in the entanglement, injuries, and death of many marine animals including sharks. To reduce the amount of plastic entering oceans would mean less potential for harm done to the environment and marine biodiversity.

Later on in 2022, a global wildlife summit was able to set forth a plan for shark conservation and combat the mass amounts

of trade occurring around the world.<sup>198</sup> With this proposal, 54 more shark species are considered within the umbrella of necessary conservation.<sup>199</sup> Meaning that sharks nearly accountable for 90 percent of the trade market would be considered protected under CITES.<sup>200</sup> This includes requiem sharks, highly migratory sharks with slow reproduction time and hammerhead sharks.<sup>201</sup> Which are two highly coveted and vulnerable types of sharks in the Pacific Ocean. 183 countries and the European Union accepted this proposal within the two-week meeting period, setting historic precedent for marine conservation.<sup>202</sup>

On a similar note, the WCPFC had their annual meeting at the end of 2022 in order to ban the usage of fishing equipment like shark lines and wire leaders that lead to declines in shark populations.<sup>203</sup> Pelagic shark numbers have decreased by nearly 71 percent in the past 50 years. The WCPFC aims with these regulations to be able to quantify and monitor the growth of at-risk shark species like silky sharks and oceanic whitetip sharks.<sup>204</sup> Shark lines hook onto sharks when paired with longline fishing compared to other fish. Wire leaders increase the retention of a shark that has caught onto a line as they cannot break through the thick and knotted wire.<sup>205</sup> This meeting and ban of such fishing gear was the first time the ban extended national law and went into international waters. The next step would be to enforce the ban and ensure that the harmful equipment is not being used to target sharks intentionally or through bycatch. Only five percent of the fishing via longlines is observed by the WCPFC with experts saying more enforcement would help avoid illegal activity on fishing vessels.<sup>206</sup>

192 UNEP. "Historic day in the campaign to beat plastic pollution: Nations commit to develop a legally binding agreement."

193 UNEP. "Historic day in the campaign to beat plastic pollution: Nations commit to develop a legally binding agreement."

194 United Nations Environment Programme, "Multi-stakeholder Forum INC-1," UNEP, Accessed August 18, 2023. <https://www.unep.org/inc-plastic-pollution/session-1/forum>

195 UNEP, "Multi-stakeholder Forum INC-1,"

196 UNEP. "Historic day in the campaign to beat plastic pollution: Nations commit to develop a legally binding agreement."

197 UNEP. "Historic day in the campaign to beat plastic pollution: Nations commit to develop a legally binding agreement."

198 "Global wildlife summit approves shark protection plan," France 24, November 25, 2022, <https://www.france24.com/en/environment/20221125-global-wildlife-summit-approves-shark-protection-plan>

199 France 24, "Global wildlife summit approves shark protection plan."

200 France 24, "Global wildlife summit approves shark protection plan."

201 "What is a Requiem Shark?" , American Oceans, Accessed August 9, 2023, <https://www.americanocceans.org/facts/requiem-shark/>

202 France 24, "Global wildlife summit approves shark protection plan."

203 Jacobson Philip, "Shark-fishing gear banned across much of Pacific in conservation 'win,'" *Mongabay*, December 8, 2022, <https://news.mongabay.com/2022/12/shark-fishing-gear-outlawed-across-much-of-pacific-in-win-for-conservationists/>

204 Jacobson Philip, "Shark-fishing gear banned across much of Pacific in conservation 'win.'"

205 Jacobson Philip, "Shark-fishing gear banned across much of Pacific in conservation 'win.'"

206 Jacobson Philip, "Shark-fishing gear banned across much of Pacific in conservation 'win.'"



The Shark Conservation Fund announced a government partnership with their Shark Biodiversity Initiative (SBI)<sup>207</sup> in March of 2023. The SBI is a 10-year long agreement committed to shark conservation and improving marine biodiversity with USD 100 million funding.<sup>208</sup> The SBI works to reduce the impact on shark habitat as well in order to facilitate a thriving environment. Governments involved and endorsing the SBI include Panama and Ecuador and are working to emphasize the management of shark populations and the ecosystems that they maintain.<sup>209</sup> SBI involves three major points. One is to increase the amount of Marine Protected Areas (MPAs) to preserve and reduce threats towards shark species and their habitats.<sup>210</sup> Healthier environments with flourishing coral reefs, mangroves, and seagrass will aid in the maintenance of ecosystems at all trophic levels and help combat climate change through carbon sequestration. Second is to increase support from local communities that rely on sharks to help improve shark populations thrive on a long-term basis.<sup>211</sup> The project aims to work with leaders in local areas as well as primary stakeholders to discuss how to protect shark species while conserving the economical prospect in the region. Third is to expand the range of protection of sharks to more regional species. A widespread approach will leave less species susceptible to overexploitation.<sup>212</sup> With this being said, SBI has been launched preliminarily in countries like Papua New Guinea, Malaysia, Mozambique, etc. and is currently in the process of creating 13 regional pilot programs globally.<sup>213</sup>

A recent update by the European Union released in July of 2023 shows that the EU is working towards large strides in shark conservation.<sup>214</sup> The EU came out with the Shark Finning Regulation and was the first body to condemn finning globally. The regulation prevents the finning of sharks on all fishing ships in EU waters or member states. The Common Fisheries Policy (CFP) also prevents the exploitation of vulnerable marine species, like sharks as ecological impact is taken into account.<sup>215</sup> Shark fins are also banned from being on board fishing vessels and cannot be shipped to commercial ports. Fins are only allowed to be detached from the shark body after vessels check in at ports. The EU exports frozen shark fins, around 2,300 tons a year.<sup>216</sup> Thus, the EU's involvement in the issue is crucial to prevent shark population declines or illicit trade activity.

### Case Study: Reef Sharks

Two different scientific studies published in 2023 found that reef shark species, including some Pacific shark species, are facing heightened risks of extinction. Reef sharks are sharks that live in coral reefs, and all species of reef sharks are migratory.<sup>217</sup> Many of these shark species have existed for over 450 million years and have survived six mass extinctions, including the asteroid that killed 75 percent of life on the planet.<sup>218</sup> However, overfishing, as well as habitat loss and climate change, are now threatening to destroy these shark species.<sup>219</sup> These studies also indicate a larger concern for all shark species, not just the few included in this research. The

207 "Shark Conservation Fund Announces Biodiversity Initiative Government Partnerships at Our Ocean Panama," Shark Conservation Fund, March 1, 2023, <https://www.sharkconservationfund.org/press-release-march-1-2023/>.

208 Shark Conservation Fund, "Shark Conservation Fund Announces Biodiversity Initiative Government Partnerships at Our Ocean Panama."

209 Shark Conservation Fund, "Shark Conservation Fund Announces Biodiversity Initiative Government Partnerships at Our Ocean Panama."

210 Shark Conservation Fund, "Shark Conservation Fund Announces Biodiversity Initiative Government Partnerships at Our Ocean Panama."

211 Shark Conservation Fund, "Shark Conservation Fund Announces Biodiversity Initiative Government Partnerships at Our Ocean Panama."

212 Shark Conservation Fund, "Shark Conservation Fund Announces Biodiversity Initiative Government Partnerships at Our Ocean Panama."

213 Shark Conservation Fund, "Shark Conservation Fund Announces Biodiversity Initiative Government Partnerships at Our Ocean Panama."

214 "Question and Answers on 'Stop finning – Stop the trade' European citizens' initiative," European Commission, European Union, July 5, 2023, [https://ec.europa.eu/commission/presscorner/detail/en/qanda\\_23\\_3677](https://ec.europa.eu/commission/presscorner/detail/en/qanda_23_3677).

215 European Commission, "Question and Answers on 'Stop finning – Stop the trade' European citizens' initiative."

216 European Commission, "Question and Answers on 'Stop finning – Stop the trade' European citizens' initiative."

217 "Reef Shark," AZ Animals, last modified May 14, 2022, <https://a-z-animals.com/animals/reef-shark/>.

218 Graham Readfearn, "'Extinction crisis' of sharks and rays to have devastating effect on other species, study finds," *The Guardian*, January 17, 2023, <https://www.theguardian.com/environment/2023/jan/18/extinction-crisis-of-sharks-and-rays-to-have-devastating-effect-on-other-species-study-finds>; CNN Impact Your World, "Several shark species are facing extinction. Here's how you can help," *CNN*, July 11, 2023, <https://www.cnn.com/2023/07/11/us/how-to-help-sharks-shark-week-iyw/index.html>.

219 Readfearn, "'Extinction crisis' of sharks."

researchers of these studies warned that these studies are signs of a “broad extinction crisis” that would have serious consequences not only for sharks, but for humans as well.<sup>220</sup>

The first of the two studies was published on January 17, 2023 in the scientific journal *Nature Communications*.<sup>221</sup> In this study, a team of experts from universities, government oceanic and fishery organizations, and non-governmental organizations across the globe used data from the International Union for the Conservation of Nature (IUCN) Red List to analyze threats to reef sharks worldwide.<sup>222</sup> The IUCN is an international organization that supports conservation efforts across the world.<sup>223</sup> In 2021, the IUCN created the Red List which is a report on the conservation status of 1,200 shark and ray species.<sup>224</sup> This study looked at data on all 1,200 species on the Red List, and 134 of these species were reef sharks and rays.<sup>225</sup> The study found that reef sharks and rays were at a greater risk of extinction than other types of sharks and rays.<sup>226</sup> Of the 134 reef shark and ray species studied, 59 percent face threat of extinction.<sup>227</sup> This is nearly double the extinction risk of all shark and ray species.<sup>228</sup> Furthermore, the researchers found 14 of these species to be critically endangered, five of which are shark species.<sup>229</sup> Three of the species studied have been classified as “possibly extinct” because their existence has not been recorded for 80 years on average.<sup>230</sup> According to this study, the number of shark species facing extinction threats has doubled since the last major global study on shark conservation in 2014. Additionally, the number of endangered

and critically endangered species has more than tripled since the 2014 study was published.<sup>231</sup> The study also found that sharks are one of the most threatened groups that live in coral reefs, as all the reef shark species studied are decreasing globally.<sup>232</sup>

The study cited several reasons for this heightened risk of extinction, but it found overfishing to be the largest cause of the issue. Other dangers to sharks mentioned in the study include climate change and habitat loss.<sup>233</sup> Researchers also found several factors that increased the risk of extinction for shark species. For example, sharks in countries with greater fishing pressure and weaker governance face a higher risk of extinction. Additionally, shark species that are spread across different countries are at a greater danger of becoming extinct because of a lack of consistency in protection measures internationally.<sup>234</sup> Overall, the study found that overfishing, habitat loss, and climate change together affect a third of all reef shark species.<sup>235</sup> The findings of this study have important implications for conservation efforts and reinforce the need for international cooperation.

A few months later on June 15, 2023, another study published in the scientific journal *Science* found that five specific reef shark species were declining at an alarming rate.<sup>236</sup> This study was conducted by a large team of 150 researchers from over 120 institutions globally.<sup>237</sup> These researchers analyzed 22,000 hours of underwater video footage at 391 coral reef locations

220 Readfearn, “‘Extinction crisis’ of sharks.”

221 Sherman et al., “Half a century of rising extinction risk.”

222 Kelly MacNamara, “Two thirds of reef sharks and rays risk extinction: Study,” *Phys.org*, January 17, 2023, <https://phys.org/news/2023-01-thirds-reef-sharks-rays-extinction.html>; Sherman et al., “Half a century of rising extinction risk.”

223 Jared Gans, “Wide-ranging report warns of shark extinction risk,” *The Hill*, June 16, 2023, <https://thehill.com/policy/energy-environment/4053981-report-warns-reef-shark-extinction-risk/>.

224 Sherman et al., “Half a century of rising extinction risk.”

225 Sherman et al., “Half a century of rising extinction risk.”

226 Readfearn, “‘Extinction crisis’ of sharks.”

227 Sherman et al., “Half a century of rising extinction risk.”

228 MacNamara, “Two thirds of reef sharks.”

229 Readfearn, “‘Extinction crisis’ of sharks.”

230 “New study finds unprecedented shark and ray extinction risk,” *Oceanographic*, 2023, <https://oceanographicmagazine.com/news/shark-study/>.

231 *Oceanographic*, “New study finds unprecedented extinction risk.”

232 Sherman et al., “Half a century of rising extinction risk”; Readfearn, “‘Extinction crisis’ of sharks.”

233 Sherman et al., “Half a century of rising extinction risk.”

234 Sherman et al., “Half a century of rising extinction risk.”

235 *Oceanographic*, “New study finds unprecedented extinction risk.”

236 Colin A. Simpfendorfer et al., “Widespread diversity deficits of coral reef sharks and rays,” *Science* 380, no. 6650 (June 15, 2023): <https://www.science.org/doi/10.1126/science.ade4884>.

237 JoAnn Adkins, “Reef sharks are at a much higher risk extinction than previously thought,” *FIU News*, June 16, 2023, <https://news.fiu.edu/2023/reef-sharks-are-at-much-higher-risk-of-extinction-than-previously-thought>.

in 67 different countries and territories to collect information on the presence of five specific reef shark species.<sup>238</sup> They then compared this footage against models of healthy reefs and measured the difference in the presence of these shark species.<sup>239</sup> The researchers found that these five shark species faced declines between 60 and 73 percent globally over the last 50 years.<sup>240</sup> Additionally, individual shark species were not detected at 34 to 47 percent of the reefs studied.<sup>241</sup> All five of the shark species in the study would qualify as endangered on the IUCN Red List according to these findings.<sup>242</sup> Two of the species are now listed as endangered on the IUCN Red List as a result of this study, and two more have been listed as vulnerable. However, the researchers behind this study are working with IUCN to eventually list all five species as endangered on the Red List.<sup>243</sup>

When shark populations are declining, rays start to dominate coral reefs as they become the top predators.<sup>244</sup> This loss in biodiversity in coral reefs, however, has negative consequences for other marine life and for humans as well. This study found that reefs in wealthy countries with strong governance and highly protected areas were more likely to be dominated by sharks. Ray-dominated reefs, however, were more likely to be found in countries facing higher levels of poverty, weak governance, and a lack of protected areas.<sup>245</sup> This implies that countries that struggle with poverty and weak governance also face greater declines in reef shark populations. Similar to the study from January 2023, this study found overfishing to be the main cause of declines in shark populations.<sup>246</sup>

If these shark species were to become extinct, the consequences would be detrimental to both marine life and

humans that rely on coral reefs. Sharks are an essential part of coral reef ecosystems, and no other species can fill their role. They can help keep coral reefs healthier for longer.<sup>247</sup> When shark populations begin to decline, however, it affects other species in coral reefs. For many of these reefs, it is extremely difficult, and in some cases impossible, to recover from the loss of shark species.<sup>248</sup> According to an earlier study from 2020, 20 percent of reef sharks are considered “functionally extinct.”<sup>249</sup> This means that shark species are too rare to fulfill their normal role in coral reef ecosystems.<sup>250</sup> This is very concerning because it threatens to disrupt the balance of marine ecosystems and cause changes that could be irreversible.<sup>251</sup> Furthermore, this loss in biodiversity and ecosystem services could affect human livelihoods and food security.<sup>252</sup> Currently, over half a billion people rely on coral reef fisheries for their livelihoods and food security.<sup>253</sup> Additionally, the loss of ecological function of coral reefs is expected to increasingly affect human communities.<sup>254</sup> Protecting sharks is not only important for the sake of marine life but also for that of humans.

While the previously mentioned solutions are a step in the right direction, these recent studies show that more work must be done to protect reef shark species from extinction. Samantha Sherman, a researcher at Simon Fraser University in Canada and one of the authors of the January 2023 study stated, “The future is not looking great unless we act now.” She added that in order to overcome the issues currently facing reef shark populations, countries must collaborate with each other. “For example,” Sherman said, “bull sharks are in more than 150 countries, but if they’re only protected

238 Elizabeth Claire Alberts, “Several reef sharks at greater threat of extinction than thought, study shows,” *Mongabay*, June 15, 2023, <https://news.mongabay.com/2023/06/several-reef-sharks-at-greater-threat-of-extinction-than-thought-study-shows/>.

239 “New Study Shows Sharks are at Greater Risk of Extinction than Previously Believed,” Shark Stewards, 2023, <https://sharkstewards.org/new-study-shows-sharks-are-at-greater-risk-of-extinction-than-previously-believed/>.

240 Simpfendorfer et al., “Widespread diversity deficits”; Shark Stewards, “New Study Shows Sharks.”

241 Simpfendorfer et al., “Widespread diversity deficits.”

242 Alberts, “Several reef sharks.”

243 Alberts, “Several reef sharks.”

244 Simpfendorfer et al., “Widespread diversity deficits.”

245 Simpfendorfer et al., “Widespread diversity deficits.”

246 Alberts, “Several reef sharks.”

247 MacNamara, “Two thirds of reef sharks.”

248 Readfearn, “‘Extinction crisis’ of sharks.”

249 Readfearn, “‘Extinction crisis’ of sharks.”

250 Shark Stewards, “New Study Shows Sharks.”

251 CNN Impact Your World, “Several shark species are facing extinction.”

252 Sherman et al., “Half a century of rising extinction risk.”

253 MacNamara, “Two thirds of reef sharks.”

254 Simpfendorfer et al., “Widespread diversity deficits.”

in a few, that has extreme impacts on their population.”<sup>255</sup> Furthermore, scientists claim that the potential to rebuild shark populations is high if countries establish more Marine Protected Areas and strengthen fishing management.<sup>256</sup> While there is still a possibility to save these reef shark species from extinction, time is running out. Delegates of CMS must work together to protect shark species from extinction, not only for the protection of marine ecosystems but also for that of human communities that rely on them.

## Sustainable Development Goals (SDGs)

The United Nations created 17 Sustainable Development Goals (SDGs) in 2015 to be completed by the year 2030 in order to achieve progress towards rectifying the main challenges that face the world today. The SDGs cover a wide range of topics and span from economic development, social challenges, to environmental issues. Before the SDGs, the United Nations had the eight Millennium Development Goals (MDGs). Similar in purpose, the MDGs sought out to provide relief to a range of health-related, economic, and environmental issues around the world but were discontinued as many of the goals were unable to be met upon the agreed timeline. This is why the SDGs were created with specific goals and checkpoints in mind to be able to monitor progress and achieve objectives as time goes on. The United Nations employs various bodies and internal organizations to oversee the completion and progress made within these sectors. More importantly, the SDGs provide a platform for collaboration between governments, individuals, and civil society to address complex and interconnected issues that plague the world today. Delegates should look at the topic from the SDG framework to address the global and encompassing nature of debate.

SDG 14: Life Below Water works towards the sustainability and conservation of oceans.<sup>257</sup> The goal emphasizes how human activities are causing detrimental impacts on oceans and ecosystems, as well as impacting the economic situations and livelihoods of many people around the world. SDG 14 directly ties into the topic of shark conservation as there is an

emphasis on protecting marine ecosystems and biodiversity while promoting sustainable fishing practices. This intricate relationship is an integral part of the topic crucial to take steps forward in conservation. As an example, target 14.4 looks towards sustainable fishing and to regulate fisheries to prevent overfishing. When fishing is done unsustainably like shark finning, shark populations and long-term survival have been increasingly threatened. Target 14.4 also aims to regulate Illegal, Unreported, and Unregulated (IUU) Fishing to prevent decline of marine species like sharks via illicit markets and trade. Target 14.5 focuses on marine protected areas (MPAs) and conserving a minimum of 10 percent of marine and coastal areas to allow marine species to thrive freely. Goal 14 also acknowledges the importance of economic reliance on fisheries for a variety of countries around the world. Sharks not only bring value to marine ecosystems from an environmental standpoint, but they attract tourism and educational opportunities. Although Goal 13 is more focused on climate change, Goal 14 takes climate change into account for the changing migratory patterns and habitats within marine environments, including its profound impacts on sharks through their comprehensive targets.

SDG 13: Climate Action works towards combating climate change and its global impacts.<sup>258</sup> The goal focuses on the lack of appropriate timelines and scale of policies regarding climate action plans. Temperatures are rising and leading to an increased frequency of natural disasters and extreme weather events. These pose direct grave risks to marine ecosystems and indirectly through events like ocean acidification. As weather events and ocean conditions begin to change, the balance for optimal survivability of marine animals, including sharks starts to tip. The global temperature has been recorded to have increased by 1.1°C compared to pre-industrial times. This stark increase has resulted in the melting of glacial ice and rising sea levels. In order to prevent temperatures from reaching increases above 1.5°C, emissions need to be cut by over 50 percent by 2030. Thus, fast and immediate action is required. As an example, Target 13.2 aims to increase the

255 MacNamara, “Two thirds of reef sharks”; Readfearn, “‘Extinction crisis’ of sharks.”

256 Gans, “Wide-ranging report.”

257 United Nations, “Goal 14: Conserve and sustainably use the oceans, seas and marine resources,”

258 United Nations, “Goal 13: Take urgent action to combat climate change and its impacts,” Accessed July 4, 2023, <https://www.un.org/sustainabledevelopment/climate-change/>



A whale shark, one of the largest known fish species  
 Credit: Derek Keats

integration of climate change mitigation into planning and national policy. Additionally, 13.B works to raise the capacity for climate change mitigation strategies in less developed countries and small island developing states with a focus on marginalized and local communities. This is crucial for not only addressing climate change but the requirement for a large framework in order to allow countries to make this change and not negatively impact economic activity.

It is encouraged for delegates to recognize the importance of the relevant SDGs as well as exploring the possible connections between others that may be less obvious.<sup>259</sup> Examples may include SDG 8: Decent Work and Economic Growth, SDG 9: Industry, Innovation and Infrastructure, SDG 11: Sustainable Cities and Communities, and SDG 12: Responsible Consumption and Production. Delegates are urged to investigate possible links and solutions between the SDGs to explore the complexities and nuances of the topic.

<sup>259</sup> United Nations, “THE 17 GOALS,” Accessed August 10, 2023, <https://sdgs.un.org/goals>

<sup>260</sup> “About the EPI,” Environmental Protection Index, accessed September 20, 2023, <https://epi.yale.edu/about-epi>.

<sup>261</sup> “Biodiversity and Habitat,” Environmental Performance Index, accessed September 20, 2023, <https://epi.yale.edu/epi-results/2022/component/bdh>.

## Bloc Analysis

### Points of Division

The environmental protection index (EPI) is an index created by Yale and Columbia Universities that assesses a country’s environmental performance in many categories. This project collects data across a range of environmental conditions such as terrestrial and marine protection, carbon emissions, and conservation policies.<sup>260</sup> This index has a category specifically for biodiversity and habitat. This category assesses how much emphasis a country has placed on protecting biodiversity and natural habitats within their territories. This indicator takes into account seven different sources of data, which include marine and terrestrial protected areas, specific species protection, and overall biodiversity.<sup>261</sup>

Because not every country is located on a coast or has access to marine resources, this biodiversity and habitat index is a strong indicator of what types of conservation policies these countries would support. For countries with a high score, these governments have placed a lot of emphasis on protecting biodiversity, and thus would favor strong conservation policies to protect sharks. On the other hand, countries with lower

scores will be more interested in preserving economic and tourist interests, and may not support as strong regulations. By identifying which score a country has, delegates can have an idea of what policies they will support during the committee. Delegates should also take into account their country's 10-year change, as this will indicate how much progress they have made towards conservation in the last 10 years. However, the biodiversity and habitat EPI should not be a delegate's only source of information; delegates should further research specific conservation policies within their own countries. Some examples of such conservation policies are outlined in the blocs below. In committee, the formation of blocs based on country policy is crucial. Delegates will have to use their understanding of their country's policies in order to form blocs to create resolutions that would mimic a realistic simulation of their respective country's stance on the topic.

### **Countries with a High EPI Biodiversity & Habitat Score**

Countries in this bloc will have a biodiversity and habitat score between 75 and 100. This includes countries such as Seychelles, Brazil, Australia, Belgium, and Belize.<sup>262</sup> These countries have invested a high amount of resources into protecting biodiversity and habitats around their territory, and thus are in favor of strong conservation policies. These countries will likely have high scores in other indicators, such as marine protected areas or biodiversity habitat protection. While some of these countries are landlocked and are not directly involved in shark conservation efforts, they have policies that indirectly support conservation.<sup>263</sup>

One example can be seen with the country of Zambia. This country enacted a National Policy on Environment in 2008 with the hopes of addressing poverty challenges alongside environmental challenges. This policy includes a section that empowers citizens to report those who are committing environmental crimes.<sup>264</sup> By doing so, individuals are motivated

to protect their ecosystems, and the environment can thrive. Although not directly related to shark conservation, this country has other policies in place to reduce carbon emissions and pollution, which indirectly affect shark populations.

Countries in this bloc are not without their own challenges. Although they have high scores, they can always work to improve their own internal environmental performance. Belize, as the country with the highest biodiversity and habitat score, still struggles with a lack of funding for conservation initiatives. This means there are still issues of overharvesting and lack of law enforcement in the country.<sup>265</sup> However, its 10-year change has a score of 4.3, which means that the country has improved a lot in the past 10 years. However, the important thing to recognize is that these countries are working hard to protect biodiversity, and generally are in favor of doing everything possible to preserve sharks.

### **Countries with a Middle EPI Biodiversity & Habitat Score**

Countries in this bloc have a biodiversity and habitat score between 45 and 74. This includes countries such as Armenia, Costa Rica, South Africa, Iceland, and Rwanda.<sup>266</sup> These countries have moderate scores in this category, as many of them are still working on establishing policies that will strengthen biodiversity protection. Many countries in this bloc may be directly located along the Pacific ocean, and may have signed agreements on conservation. However, some countries may be struggling in other areas such as the economy, which has caused them to enact policies that are not beneficial to shark populations.

In Costa Rica, eight fishing boats were recently approved to carry out bottom trawling, a type of fishing that drags large nets across the bottom of the ocean and catches everything in its path.<sup>267</sup> This type of fishing is extremely harmful and often results in a high amount of bycatch, often including

262 Environmental Performance Index, "Biodiversity and Habitat."

263 Environmental Performance Index, "Biodiversity and Habitat."

264 *National Policy for Environment* (Lukasa: Ministry of Tourism, Environment and Natural Resources, 2008), <https://www.parliament.gov.zm/node/978>.

265 "How Belize is transforming the Caribbean," *The Nature Conservancy*, November 4, 2021, <https://www.nature.org/en-us/what-we-do/our-insights/perspectives/belize-transforming-caribbean-blue-bond/>.

266 Environmental Performance Index, "Biodiversity and Habitat."

267 "Gobierno da inicio a estudios de pesca de arrastre con ocho embarcaciones camaroneras," *Delfino CR*, March 24, 2023, <https://delfino.cr/2023/03/gobierno-da-inicio-a-estudios-de-pesca-de-arrastre-con-ochos-embarcaciones-camaroneras>.

sharks. Because Costa Rica has a high shark population, this is extremely risky. These fishing boats were approved as part of a study being carried out to determine whether bottom trawling can be sustainable. Many communities are facing economic losses, and bottom trawling could help them to catch large amounts of fish to sell. However, this has received a lot of criticism from activists, who claim that there will be no positive outcomes from this study.<sup>268</sup>

Countries in this bloc are generally working towards improving conservation, but their priority should be strengthening internal legislation that will work towards protecting sharks and biodiversity in general. Stronger accountability measures and community involvement into solutions are two essential aspects for countries in this bloc.

### Countries with a Low EPI Biodiversity & Habitat Score

Countries in this bloc have a biodiversity and habitat score lower than 44. This includes countries such as Egypt, Bangladesh, Saudi Arabia, Uruguay, and India.<sup>269</sup> Many of the countries in this bloc face challenges to conservation, which has led to their low scores. However, in this bloc it is essential to take into account the 10-year change. For example, Jordan has a score of 24.10; however, their 10-year change is 10.30. This means that they have improved their score by 10 points in the last 10 years.<sup>270</sup> This demonstrates how countries in this bloc are not uninterested in conservation, but they simply face a variety of challenges that leaves them unable to prioritize it.

India's score, at 5.80, is the second lowest score out of all countries.<sup>271</sup> However, this country has still carried out specific research focused on shark conservation. There are over 500 published research studies that specifically look at

sharks in India. The problem is that most of these studies lack conservation applications. Much of the research was only focused on single species, and did not have explicit conservation solutions.<sup>272</sup>

However, this is a step in the right direction. Without research on sharks, conservation efforts will never succeed. India has also had many other successful conservation efforts, such as the protection of tiger habitats that has led to reductions in carbon emissions.<sup>273</sup> By focusing efforts on conservation of a variety of species, such as sharks, India can hope to keep its shark populations thriving.

### Committee Mission

The Convention on Migratory Species (CMS) was signed in 1979 and has been active since 1983. CMS is a Multilateral Environmental Agreement under the United Nations Environment Programme (UNEP).<sup>274</sup> The main mission of the CMS is to bring issues pertaining to the conservation and sustainability of migratory species to the global stage.<sup>275</sup> Since migration is often transnational, the CMS is an overarching body that provides a legal international framework to protect migratory species and their habitat. Many animals are under the protection of CMS, including birds, marine mammals, fish, sea turtles, and many more organisms.<sup>276</sup> Not only is the committee focused on species specific conservation and issues but specializes in various environmental issues like bycatch, marine pollution, and overfishing.<sup>277</sup>

Delegates are encouraged to view the background guide and committee through the lens of the CMS mandate. Emphasis must be placed on the conservation of shark species as well as human activity leading to population declines. The

268 "Gobierno da inicio a estudios de pesca de arrastre."

269 Environmental Performance Index, "Biodiversity and Habitat."

270 Environmental Performance Index, "Biodiversity and Habitat."

271 Environmental Performance Index, "Biodiversity and Habitat."

272 Trisha Gupta, Divya Karnad, Shruti Kottillil, Sudha Kottillil, and E. J. Milner Gulland, "Shark and ray research in India has low relevance to their conservation," *Ocean and Coastal Management* 217 (February 2022), <https://doi.org/10.1016/j.ocecoaman.2021.106004>

273 Julia Jacobo, "How tiger conservation in India may be helping to mitigate climate change," *ABC news*, May 25, 2023, <https://abcnews.go.com/US/tiger-conservation-india-helping-mitigate-climate-change/story?id=99567912>

274 *Progress Report on Relevant Activities Undertaken within the Framework of the Convention on the Conservation of Migratory Species of Wild Animals (CMS) for the United Nations Open-ended Informal Consultative Process on Oceans and the Law of the Sea*, (UNEP, 2020), [https://www.un.org/depts/los/general\\_assembly/contributions\\_2020/CMS.pdf](https://www.un.org/depts/los/general_assembly/contributions_2020/CMS.pdf)

275 "CMS," Convention on the Conservation of Migratory Species of Wild Animals, accessed August 14, 2023, <https://www.cms.int/en/legalinstrument/cms>.

276 UNEP, *Progress Report on Relevant Activities Undertaken*.

277 UNEP, *Progress Report on Relevant Activities Undertaken*.

Convention highlights several migratory species that are at-risk of becoming extinct in the first Appendix.<sup>278</sup> These species are prioritized, and Parties cooperate in order to protect these species' populations, habitats, and migration routes. This is in hopes of bringing populations to a biologically favorable conservation status and maintaining this so they can reproduce and increase population sizes.<sup>279</sup> Delegates in this committee should work together to identify creative policies and solutions that will help to promote conservation in shark species around the world. Because of the international nature of shark migrations, this issue requires global cooperation. However, if executed properly, sharks in the Pacific ocean could bounce back and thrive for generations to come.

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<sup>278</sup> CMS, "CMS,"

<sup>279</sup> "Convention Text," Convention on the Conservation of Migratory Species of Wild Animals, accessed August 14, 2023, <https://www.cms.int/en/convention-text>.



## Research and Preparation Questions

Your dais has prepared the following research and preparation questions as a means of providing guidance for your research process. These questions should be carefully considered, as they embody some of the main critical thought and learning objectives surrounding your topic.

### Topic A

1. What are the most controversial aspects of conservation efforts surrounding the Great Migration, particularly with respect to land use, displacement of communities, and compensation policies?
2. How has your country historically addressed issues related to wildlife conservation, especially in areas similar to protected reserves like the Serengeti-Mara?
3. Has your country made any official statements or taken specific positions on the preservation of migratory species in international forums or past committee sessions?
4. How can countries balance the need for agricultural development by safeguarding migratory pathways? What innovative approaches could be considered?
5. What strategies can be implemented to ensure that local communities, whose livelihoods depend on agriculture and livestock farming, are able to maintain themselves, all whilst incorporating conservation efforts into their agricultural methods?
6. How can countries effectively balance the economic benefits from tourism with the protection of migratory species and their habitats? Are there innovative partnerships or funding sources that can be explored?
7. With the increasing impacts of climate change on weather patterns, what adaptation strategies can countries employ to prevent disruptions to migratory behavior and ensure the long-term survival of these species?

### Topic B

1. Does your country have a role in the global shark meat trade? If so, have they addressed it, and is it economically possible to reduce their participation?
2. What strategies can your country employ to substitute squalene in sharks for ethically-sourced squalene in olives, rice, and sugar cane?
3. Are aquariums economically necessary for your country to function? Can your country rely on different means of tourist attraction to combat the undue suffering of shark species?
4. What steps can your country take to mitigate the amount of ocean pollution and chemicals that have accumulated as a result of plastic mass-production?
5. Has your country worked with UN committees on climate change prevention in the past? Is it possible for your country to commit to a net-zero emissions goal in order to restore marine biodiversity? If not, can your country make any legal commitment to reduce their greenhouse gas emissions?

6. Has your country communicated with foreign authorities regarding the movement of migratory species such as sharks, and the steps that must be taken to preserve these critically endangered species? Is it possible to put legal restrictions on shark fishing and sustainability in your country?
7. What educational movements have been made in your country regarding migratory shark species and environmental preservation? How can your country adapt or amend past efforts in order to further protect these threatened species?

## Important Documents

### Topic A

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- UN Environmental Programme. Resolution 13.3. CHONDRICHTHYAN SPECIES (SHARKS, RAYS, SKATES AND CHIMAERAS). UNEP/CMS/Resolution 13.3. February 2020. [https://www.cms.int/sites/default/files/document/cms\\_cop13\\_res.13.3\\_chondrichthyan-species\\_e.pdf](https://www.cms.int/sites/default/files/document/cms_cop13_res.13.3_chondrichthyan-species_e.pdf)
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