# Biodiversity and the Important Role of the African Elephant

**Grades: 4th - 8th**

**Problem:** African elephants help maintain forest and savanna ecosystems for other species and are integrally tied to rich biodiversity. As the largest of all land mammals, African elephants play a crucial role in balancing natural ecosystems. An estimated 20,000+ African elephants are killed every year for their tusks. In addition, climate change and human land use are destroying wild lands and breaking up elephant habitats, forcing ~~the~~ elephants to find food in farm areas, which also leads to retaliatory attacks from humans. The future of this keystone species is at risk and so are the fragile ecosystems that depend on the African elephant for their own survival, including humans.

**Objectives:**

By the end of the lesson, students will:

- Correctly use appropriate science vocabulary, including, biodiversity, keystone species, natural community, interrelationships, characteristics.
- Describe interrelationships between the African elephant and their environment.
- Identify human-caused species loss as one of the major current threats to biodiversity
- Explain how the disappearance of the African elephant affects other species.

**Materials:**

- Video "Why Elephants are Important" produced by The Planet Voice 2022
- Copies of the Biodiversity article
- Copies of the KWL Chart (see below)
- Copies of Students Become the Teachers Planning Sheet and Lessons From My Classmates (see below)
- Copies of articles for each group (see below)
- White paper and colored pencils or markers

**Background Information:**

African elephants, the largest of all land mammals, help maintain forest and savanna ecosystems for other species. They are a keystone species, playing an important role in maintaining the biodiversity of the ecosystems in which they live. They trample forests and dense grasslands, making room for smaller species to co-exist. Elephants also create water holes used by other wildlife as they dig dry riverbeds when rainfall is low. Herds travel over vast ranges and disperse seeds in their dung, which helps generate new plant growth. However, threats to this beautiful and vital creature are numerous. After several decades of population decline due to poaching and habitat loss, the African forest elephant (Loxodonta cyclotis) is now listed as Critically Endangered. The African savanna elephant (*Loxodonta africana*) is listed as Endangered on the IUCN Red List of Threatened Species™.

**Activities:**

**Activity 1: Elephants: A Keystone Species**

1. Students watch "Why Elephants are Important" by the Planet Voice 2022.
2. As students watch the 4:53 video, they record reasons that African elephants are keystone species.
3. At the end of the video, ask students to answer the following: If you were talking with a five-year-old, using pictures and words, how would you explain why the African elephant is a keystone species?

**Activity 2: Introduction to Biodiversity**

1. Students read the Biodiversity article.
2. As they read the article, students complete the first two columns of their KWL Chart (see below), focusing on what they are learning and what they still want to learn about biodiversity and the African elephant.

**Activity 3: The Students Become the Teachers**

3. Students examine the "What I Want to Know" column of their KWL Chart and select one of the areas below where they are most interested in exploring further. (Students can lobby for an additional area of study to be approved by the teacher.)
    1. African elephant: the keystone species
    2. Saving the Elephant and Africa's Biodiversity
    3. The Elephant and Climate Change
    4. Poaching and Human Conflicts
    5. The Elephants' Benefits to Africa
4. After students select the area they want to explore further, they break up into a group of four, with each student assigned the number 1, 2, 3, 4 (and 5 if the groups are that large).
5. Each group is charged with learning as much as possible about the topic they are interested in. The members of the group will be responsible for teaching this information to their classmates.
6. Together, students take turns reading the assigned articles about their topic. When students are finished reading, the groups discuss the information and decide how to present their new knowledge to their classmates.
7. Students work together to prepare a 3-5 minute lesson highlighting the most important information by filling out the Students Become the Teachers Planning Sheet (see below).
8. After each student has completed the planning sheet, students form new groups based on their assigned numbers. (For example: All the 1s will be in a group and all the 2s in a different group)
9. Each student teaches their 3–5-minute lesson to their new group members.
10. After each lesson, students complete the Lessons From My Classmates worksheet (see below).

**Activity 4: KWL Chart**

1. Students fill in the final column of their KWL Chart by recording the new information they have learned.
2. Using their completed KWL Chart, students select 1-2 pieces of information they think are most important and interesting to know about the African elephant's importance to biodiversity.
3. Individually, students transform that information into a colorful and neat cartoon or drawing that can be used to teach elementary students about why the African elephant is so essential.

**Activity 5: Changing Perspectives**

1. Each student assumes the perspective of an African elephant and writes a short letter to a younger student. The "elephant" should explain why they are a keystone species and why it is so important that students learn about their role in the ecosystem.
2. Students exchange their letters with a classmate who will read the letter and provide feedback to ensure the information is factually correct and there are no grammar, spelling, or punctuation errors.

**Activity 6: Sharing Their New Knowledge to Save the Elephants**

1. If there are younger students in the school, the students can create a bulletin board in the school cafeteria or library where the younger students can view it or share the letters and posters with a teacher who will teach the information to their younger students.
2. If there are no younger students in the school, the class can select a local elementary school where they can deliver or mail their final letters and posters.

# Biodiversity

**What is Biodiversity?**

Biodiversity is the variability of living organisms from all sources, including terrestrial, marine, and other aquatic habitats, and the ecological complexes to which they belong; this involves a variety of species and ecosystems. Biodiversity is the most complex feature of our planet, and it is the most vital. Without biodiversity, there is no future for humanity. Biodiversity is the foundation of our economy, livelihoods, food security, health and quality of life worldwide.

**Biodiversity Loss**

The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) recent report identified significant areas of biodiversity loss across all eco-systems:

- Three-quarters of the land-based environment and about 66% of the marine environment have been significantly altered by human actions. On average these trends have been less severe or avoided in areas held or managed by Indigenous Peoples and Local Communities.
- More than a third of the world's land surface and nearly 75% of freshwater resources are now devoted to crop or livestock production.
- The value of agricultural crop production has increased by about 300% since 1970, raw timber harvest has risen by 45% and approximately 60 billion tons of renewable and nonrenewable resources are now extracted globally every year – having nearly doubled since 1980.
- Land degradation has reduced the productivity of 23% of the global land surface, up to US$577 billion in annual global crops are at risk from pollinator loss and 100-300 million people are at increased risk of floods and hurricanes because of loss of coastal habitats and protection.
- In 2015, 33% of marine fish stocks were being harvested at unsustainable levels; 60% were maximally sustainably fished, with just 7% harvested at levels lower than what can be sustainably fished.
- Urban areas have more than doubled since 1992.
- Plastic pollution has increased tenfold since 1980, 300-400 million tons of heavy metals, solvents, toxic sludge and other wastes from industrial facilities are dumped annually into the world's waters, and fertilizers entering coastal ecosystems have produced more than 400 ocean 'dead zones', totalling more than 245,000 km2 (591-595) – a combined area greater than that of the United Kingdom.
- Negative trends in nature will continue to 2050 and beyond in all of the policy scenarios explored in the Report, except those that include transformative change – due to the projected impacts of increasing land-use change, exploitation of organisms and climate change, although with significant differences between regions.

**How does biodiversity affect elephants?**

Elephants modify their environments. And, because different types of animals rely on different types of plants, this can promote species biodiversity, providing new niches for organisms to inhabit. Elephants also modify savannah habitats by pulling down trees and breaking up thorny bushes.

- Within the past century the African elephant population has decreased by 96 percent, from 10 million in 1930 to a few hundred thousand today.
- In the last forty years, elephant habitat has decreased by nearly two thirds largely due to human activities.
- Without urgent intervention conservationists predict elephants will be extinct in the wild within 20 years.
- IUCN has updated its red list of threatened species to include the African elephant. It is now split into two different categories with the Savanah elephant classified as endangered and the forest elephant classified as critically endangered. It highlights a broadscale decline in African elephant numbers across the continent. The number of African forest elephants fell by more than 86% over a period of 31 years, while the population of African savanna elephants decreased by at least 60% over the last 50 years, according to the assessments.

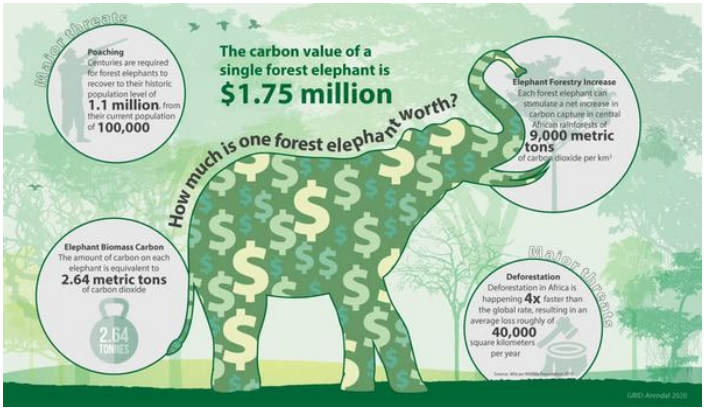
**Further loss to Biodiversity**

- trophy hunting
- legal hunting
- wildlife trafficking and live animal markets
- Traditional Chinese Medicine

- Poaching
- Human animal conflict
- Infrastructure building of mines and oil technology in Botswana, Uganda, Namibia, Tanzania Sierra Leone

**How do elephants contribute to biodiversity?**

Elephants help maintain forest and savanna ecosystems for other species and are integrally tied to rich biodiversity. Elephants are important ecosystem engineers. They make pathways in dense forested habitat that allow passage for other animals. Elephant herds that dwell in forests also help sequester more atmospheric **CO2**. They do so by feeding on fast-growing plants in more open spaces, which facilitates the spread of slow-growing trees with higher wood density. These latter plants are better at sequestering carbon from the air. The article below gives a detailed analysis of how African elephants help fight climate change. (https://elephanatics.org/wp-content/uploads/2021/03/how-african-elephants-fight-climate-change-ralph-chami.pdf)




**Economic Value – What is Nature's $10 Trillion dollar wake-up call to global economy?**

**<u>How much is an elephant worth? Meet the ecologists doing the sums</u>**

**The value of biodiversity is not the same as its price**

**What is IPBES?**

The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) is an independent intergovernmental body established by States to strengthen the science-policy interface for biodiversity and ecosystem services for the conservation and sustainable use of biodiversity, long-term human well-being and sustainable development. It was established in Panama City, on 21 April 2012 by 94 Governments. It is not a United Nations body. However, at the request of the IPBES Plenary and with the authorization of the UNEP Governing Council in 2013, the United Nations Environment Programme (UNEP) provides secretariat services to IPBES. See <u>here</u> for more information on the history of IPBES.

Source: https://elephanatics.org/biodiversity/

**Article for Group 1:**

# A Keystone Species – The importance of elephants on the ecosystem

As the largest land mammal, elephants play an important role in balancing the natural ecosystem. Elephants are therefore known as a "keystone species". Keystone species are those that provide vital ecosystem services which are essential for the survival of other species in the ecosystem. Without these keystone species, the ecosystem would be negatively affected or cease to exist.
So how do elephants contribute to the ecosystem and why are they important to an ecosystem?

**Elephants create small waterholes during drought periods**

When water becomes scarce, elephants create small waterholes when they dig to access underground water. They use their feet and trunks to create holes in the ground to access the water. These elephant-made watering holes are then available to elephants as well as smaller animals who may not have been able to access water in times of drought.

**Elephants are seed transporters**

When elephants travel to different areas they disperse seeds in their dung. This helps to generate new plant growth as seeds are dispersed meters away from where the plant was initially eaten. Some studies have suggested that elephants can disperse seeds over distances of more than 60 kilometres (approximately 37,2 miles)! Elephant dung is rich in nutrients which makes it the perfect fertilizer. This allows seeds to germinate and grow. The seed dispersal allows for new plant growth which eventually creates new habitats and food for other species.

**They provide food for other species and help other species survive**

Elephant dung also creates a food source for dung beetles. Once dung beetles find a fresh pile of dung, they feed on the nutritious solids and fluids contained in the dung. Dung beetles also lay their eggs in the dung balls that they roll. They will then bury these dung balls underground where their larvae can feed and grow. When they bury their dung balls, the dung beetles loosen the tightly packed soil and dig to the layer of soil where plants begin to grow.

The cycle continues when mice and honey badgers feed off the submerged beetle larvae. Elephants, therefore support the survival of the dung beetle population but also assist with the survival of other species such as the honey badger.

Many people do not think of the dung beetle as a creature that is important to the ecosystem. Although this creature is only a small part of the ecosystem, it is vital at keeping the dung at manageable levels. If dung beetles did not have their food supply from the elephants and they did not exist, the absence would be noticeable.

**Elephants modify their environments**

There is not much that can stand in an elephants way and we often think of them as being destructive creatures when they break down branches and push trees over. This "destructive'' nature is however vital for the environment and other species. The trees and branches that they push over may not have been accessible to smaller animals so this helps to ensure that smaller wildlife have access to food. When elephants push down trees to feed, they create habitats for smaller species of animals. These fallen trees create smaller, micro-habitats for species like lizards and spiders which enables smaller species to co-exist together.

When they push over trees and trample over vegetation, they create clearings that allow more light to reach the ground thereby helping low-lying plants to grow and thrive. This also maintains plains and open areas which we refer to as the Savannah biome and enables plains game such as antelope, zebra and buffalo to have access to quality grasses that they prefer.

As one can tell. Elephants play a vital role in the ecosystem and without these animals, the ecosystem would not thrive. It is clear that the presence of elephants benefits the fauna and flora in an ecosystem. Conservation programmes and game reserves that protect elephants are in essence not only looking out for the elephants themselves but also for the plants and animals that depend on them too.

Source: https://lalibela.net/a-keystone-species-the-importance-of-elephants-on-the-ecosystem/

**Article for Group 2:**

# The illegal wildlife trade is a biodiversity apocalypse

An estimated annual $175-billion business, the illegal trade in wildlife is the world's fourth-largest criminal enterprise. It stands to radically alter the animal kingdom.

BY LESLIE ANTHONY
DEC 02, 2017

In October 1994, I was on assignment in Vietnam's northern Truong Son Mountains, hard against the Laos border at an illegal logging camp on the remote Khe Môi River. I was accompanying a group of scientists conducting biodiversity surveys in previously unexplored areas. The primary forest here harboured a wealth of rare mammals, with remnant populations of elephant, tiger, gibbon, pangolin, barking deer and the just-discovered saola — or Vu Quang ox. After several weeks in the jungle, the scientists had extended this bio-bonanza to numerous undescribed species of snakes, frogs and insects, typically found during night excursions.

On reconnaissance one evening, I waded upriver, searching out entrances to smaller streams to return to later. Rounding a bend, I surprised a clutch of men huddled around a fire on a sandbar. Clad in rags, skin darkened by smoke and grit, they radiated conspiracy — and with reason. Behind them sat a brace of ancient rifles and bamboo-frame packs on which were lashed the dried bodies of several gibbons and sun bears — both critically endangered species afforded the highest level of protection under the Convention on International Trade in Endangered Species, also known as CITES. As the men closed ranks to avoid eye contact, I waded past against the far bank, ludicrously pretending I hadn't noticed anything. The poachers were undoubtedly killing time until dark, when they'd presumably make their way downriver to trade their booty along a pipeline to China, the beckoning maw into which most of the world's illegally obtained wildlife flows.

Though I'd never beheld such a scene, I knew precisely what I was looking at: if Southeast Asia's remaining forests were a gold mine of wildlife resources, then exotic outposts such as the Khe Môi were its cutting face, a tableau of lawless isolation where CITES was meaningless. What I didn't know at the time was that the same could be said of Canada's vast forests for the same reasons and, perhaps worse, that one could also buy the equivalent of a powdered gibbon smoothie on the streets of Vancouver.

"There's been a significant increase in wildlife trafficking and poaching over the last decade," says Sheldon Jordan, director general of the wildlife enforcement directorate for Environment and Climate Change Canada and chair of Interpol's wildlife crime working group. Given his dual roles, Jordan has special insight into the reasons behind the surge. "Increased demand for wildlife products is driven largely by more disposable income in Asia and other parts of the world that have food, medicinal and spiritual traditions around these items."

With "wildlife trade" defined as the sale or exchange of any wild animal or plant (including trees), one might also finger both a rising population and sharp increase in the globalization of commerce over the same period. According to TRAFFIC — a network established in 1976 to monitor global wildlife trade — the value of legal wildlife products in the early 1990s hovered around US$160 billion annually; by 2009 that had doubled to US$323 billion, which includes everything from seafood to timber. A hint of the remainder lies in a CITES-compiled list of the 2005 to 2009 legal trade: 317,000 live birds, more than six million reptile skins, 1.1 million beaver pelts, 73 tons of caviar, a reef's worth of coral and 20,000 mammal hunting trophies. Though black-market trade in these same items is, by its very nature, difficult to assess, United Nations estimates of US$7

billion to $23 billion for fauna trafficking alone, and US$57 billion to $175 billion when flora and lumber are added, are staggering — enough that on the scale of illicit global enterprises, wildlife now ranks fourth behind drugs, counterfeiting and human trafficking. Canada's substantial legal wildlife trade — forestry, commercial and recreational fisheries, wild plant harvesting, guided hunting — aids communities when undertaken sustainably. But continued unsustainable harvesting and illegal export and import of wildlife resources both here and abroad threatens to undermine any broader efforts at stewardship, affecting communities and economies worldwide.

What Canada lacks in diversity of desirable species is made up in sheer numbers of organisms, distributed over 10 million square kilometres, an area that could comfortably fit 30 Vietnams. With just more than a third of the population of that small country famously concentrated in a few discrete areas, there are plenty of isolated areas where, for example, poaching bears to harvest gall bladders and paws — both in demand in Chinese traditional medicine — might go unnoticed. The Rise of Environmental Crime, a white paper published in June 2016 by a Norwegian think-tank and cosigned by Interpol, cites the troika of pollution, smuggling and poaching to be rising at five to seven per cent per year — double the pace of world economic growth. Canada is in lock-step with this increase, notes Jordan. "And when you couple that with downward trends in government spending, that means more work for us and fewer resources to do it."

While Environment Canada's wildlife enforcement directorate is responsible for enforcing regulations of, among others, the Migratory Birds Convention Act, the Wild Animal and Plant Protection and Regulation of International and Interprovincial Trade Act, the Species at Risk Act and the Canada Wildlife Act, it has only 75 field officers nationwide. Excluding the Department of Fisheries and Oceans, across all other government organizations and levels in Canada, less than 1,500 people attend to wildlife laws — compared with 70,000 police officers. That makes modern intelligence- gathering methodologies crucial to efficiency, as does using the resulting information to decide where the biggest problems are and how to leverage the right partnerships to deal with them — a sort of jurisdictional triage.

In practice, wildlife trade fits into a broader category of connected "environmental crime" that includes pollution, illegal fishing and logging (with up to one-third of the world's paper obtained from illegally sourced wood, economic impacts accrue for countries such as Canada that strictly regulate such sectors). Jordan works both to squelch internal trade and to identify and cut off export and import routes of everything from butterflies to birds to fish to frogs.

Between 2015 and 2016, the wildlife enforcement directorate logged 4,900 inspections, 908 enforcement measures, 167 new prosecutions and 158 convictions, handing out a record $1.1 million in penalties. Among the infractions: the illegal harvesting of migratory birds in Quebec, the illegal export of narwhal tusks by a Montreal auction house, a litany of bear parts turned up in a New Brunswick border blitz, a Dall's sheep poached in the Yukon (where it's protected) and smuggled into B.C. (where it isn't) so hunters could claim that province as its origin, and the illegal harvesting of endangered American ginseng, a slow-growing, low-seed plant whose colonies require 170 individuals to remain viable. "The reason for that particular trade is maddening," laments Jordan. "A good wild ginseng root is 10 to 15 centimetres long; the more it resembles a human — with branches that approximate arms and legs — the more it's worth, up to thousands of dollars." The wildlife enforcement directorate engages not only in enforcement but also in proactive training and joint efforts aimed at stemming illegal activity while protecting legal trade. For example, non-threatened Canadian populations of globally threatened wildlife provide economic opportunity to communities when managed sustainably. Emblematic is our most iconic large mammal, the polar bear. While Canada's significant efforts to protect its populations ensure their continued health, polar bears continue to confer cultural, sustenance and economic benefits to many isolated Indigenous communities. But when auction prices for hides spiked from $5,000 to $25,000 apiece several years ago, illegal harvest rose in tandem. In response, the wildlife

enforcement directorate joined provincial, territorial and federal agencies to collaborate with Indigenous communities on an approach to identify and track legal polar bear hides from harvest through export, including DNA analysis and tagging with easily scanned microchips. These provide information on when and where a hide was obtained, helping thwart illegal trade while facilitating a more efficient tracking process for legal hides.

But while this system can help with non-compliant exports, the tide of illegal imports, according to Jordan, continues unabated.

In the early 1980s, a curator at Ottawa's Museum of Nature invited me to tour a warehouse across the river in Gatineau, Que., where illegal wildlife items seized at Canadian airports, seaports and border crossings were stored. I recall a dimly lit mortuary of metal shelves stacked floor to ceiling with stuffed, glassy-eyed crocodilians and birds, sea turtle carapaces, conch shells, rolled snakeskins, numerous ivories, and the hides of lions and tigers and bears. Though this particular cache has long since been destroyed, the wildlife enforcement directorate currently maintains small exhibit rooms near Toronto and Ottawa stocked with similar items, plus a pharmacopoeia made from prohibited plant and animal species. While the sheer scope of material remains disturbing, a single rhino horn sitting on a shelf also can't help but conjure a gruesome image of its deceased owner, bleeding in the dirt, horn severed from its head. And that raises a troubling question: How long until these great beasts are gone from our midst?

Not long, considering what amounts to an 8,000 per cent rise in rhino poaching: in 2007, 13 of the animals were killed, while the past four years have each seen more than 1,000 removed from the wild, driven by black-market prices of up to $350,000 per horn. "Ten years ago, someone started a rumour that powdered rhino horn cures cancer — except its only keratin like hair and nails," notes Jordan. "You have as much chance of curing cancer or erectile dysfunction with rhino horn as you do chewing your fingernails."

Pangolins, scaly anteaters of Asia and Africa, are likewise slaughtered at the rate of one million or more annually for the whimsical properties of their scales. Elephant populations are decreasing annually by about 8.5 per cent (against a reproductive rate that optimally allows for only a four per cent increase). In the Horn of Africa, ivory is smuggled from the lawless Democratic Republic of the Congo through unstable South Sudan into Somalia, whose ports are controlled by jihadist organization Al-Shabaab, which happily taxes its passage. "With upwardly mobile collectors in emerging economies paying top dollar for decorative ivory carvings, we could be down to very few wild elephants within a generation," says Jordan. "Many of those countries are at the stage we were at 50 years ago in terms of cultural taboos, so it'll take time."

Meanwhile, Asian enclaves in large North American cities will continue to keep to traditional beliefs despite the cultural — and legal — prohibitions of the West. "There's a large trade in anything charismatic or useful in traditional medicines that mainly has Asian Canadians as clients," says Jordan, echoing news reports about what one might find during a tour of Chinese markets and apothecaries in Toronto and Vancouver, where all manner of live (turtles, fish), dried (geckos, sea cucumbers, shark fins) and powdered (endangered large mammal bits) contraband is transacted. China itself, however, may be coming around, having pledged, at least, to ban ivory by the end of the year. Jordan wishes them luck, knowing the trade will simply go underground for a few years.

Before encountering the Khe Môi poachers, I'd already seen how China's insatiable appetite for alimentation, wishful aphrodisiacs and traditional medicines accounted for many of Vietnam's endangered species — and several that soon would be. When a single king cobra could net US$200 — equivalent to Vietnam's average annual wage at the time — providing for a hungry family trumped all. The traffic I observed in consumable snakes and frogs alone was staggering — thousands crammed into burlap sacks crossing into China every day. Add in lizards, turtles, fish, birds, mammals and invertebrates, with the same occurring in a hundred other

countries, and you had a major global crisis. This was the real China syndrome — not the nuclear meltdown of the eponymous 1979 Hollywood flick, but a biodiversity apocalypse now.

Reptiles are surprisingly common contraband. In 2009, an undercover operation involving the Ontario Ministry of Natural Resources, Environment Canada's wildlife enforcement directorate and U.S. agencies documented the illegal trade of more than 2,400 protected turtles and venomous snakes, charging two dozen people. Three Ontario men rounded up in the sting faced 34 charges for selling two protected species — eastern massasauga rattlesnakes and spotted turtles — across the border. American investigators posing as vendors at commercial reptile shows in New York and Pennsylvania befriended poachers and trawled Internet sites before nabbing one of the men with 33 rattlesnakes hidden in his van. The Pennsylvania show was so popular with Canadian reptile enthusiasts that wildlife enforcement directorate officers set up at the Queenston-Lewiston border crossing between New York and Ontario, charging several under the customs act for smuggling venomous snakes and frogs into Canada. Their $1,000 fines, however, were mere slaps on the wrist that didn't cover the time spent catching, charging and processing them. "Generally speaking, our laws go back many decades and need a tune-up," says Jordan. "It's a challenge to the enforcement community when deterrents are mild. By and large, judges and prosecutors don't use the penalties available."

Though you can receive up to five years in jail for wildlife smuggling in Canada, Jordan has never seen more than a four-month sentence, attributable, he believes, to a perception of environmental crime as victimless among a judiciary hardened by drug crimes with clear human cost. For instance, if a smuggler brings in a kilo of fentanyl, it's assumed a certain number of people will die; not so with a kilo of endangered critters. But where Canadian law leaves things up to the discretion of a court system, U.S. legal proscriptions are stronger, the penalties much harsher: a Waterloo, Ont., man caught heading south with dozens of turtles in his pants is now serving 57 months in an American jail.

Busts can be dramatic — worthy of reality TV treatment. In a case near Cornwall, Ont., Canadian and U.S. authorities monitored a boat as it crossed the St. Lawrence River from New York to Ontario to deliver boxes to a waiting van. With officers descending on the smugglers, a woman took off with the boat, while the man driving the van was arrested. The boxes contained Chinese striped turtles, African sideneck turtles, South American red-footed tortoises and numerous lizards bound for pet stores and private collections. Ontario averages four or five such files a year. "Of course, we don't know how much we're not detecting," Lonny Coote, the wildlife enforcement directorate's director for wildlife enforcement in Ontario, told the Canadian Press in 2016.

According to documents obtained under warrant, Dennis Day, the man arrested, processed more than 18,000 illegal reptiles with a street value of $700,000. Convicted of smuggling in 2013, his sentence was a $50,000 fine and six months in jail to be served on weekends. The boat driver was charged and convicted by U.S. officials. A third conspirator, who owned a Montreal reptile store, received a $45,000 fine and was successfully sued by the store's landlord after 250 reptile carcasses were discovered inside the building's walls.

Smuggling comes with such surprises. In another case, a Richmond, B.C., individual who'd been shunting iconic wildlife in and out of Canada was lured to New York for a buy and arrested there. "Then we called the officers waiting outside his antique shop in Richmond. They went inside to retrieve his computer on which all the evidence would reside — you know, who were the suppliers, who were the clients — but they also found ivory and coral, as well as ecstasy and marijuana," says Jordan. "He was clearly involved in organized crime."

According to Jordan, wildlife trade is attracting organized crime because of its outrageous profit margins — higher, in many cases, than for illicit drugs (see sidebar "Proceeds of crime," below). "That element has

definitely increased over the 15 years I've been working. Every couple of years, a bear gall-bladder ring is taken apart … One in Quebec involved 80 people."

When it comes to illegal wildlife trade, stemming the tide of supply requires lowering the high-water mark of demand, a difficult proposition when you're up against human nature, ingrained cultural beliefs and big money. Though this equation has always existed, it's compounded by the nouveau riche of emerging economies who can now afford products previously seen as luxuries.

As long as someone is willing to pay good money, desperate people will continue to kill gorillas simply to cut off their hands. And demand for supposed aphrodisiacs is as likely to go away as traditional Chinese medicine that relies on animal parts, despite the largely superstitious basis of both. In late 2006, Zhang Gongyao, a medical history professor at Central South University in Hunan, ignited a furor in China when he wrote: "Chinese traditional medicine has neither an empirical nor a rational foundation. It is a threat to biodiversity. And it often uses poisons and waste as remedies. So we have enough reasons to bid farewell to it."

On that Vietnam sojourn two decades ago, illegal wildlife trade was apparent everywhere: local markets sold putatively protected animals, restaurants specialized in them, the Hanoi hotel where I stayed had a snake dealer in the lobby, gift shops brimmed with animal contraband and illegal — yet state-sanctioned — logging was legion. Worst was the mid-coastal port of Vinh, where our group was guided on an incomprehensibly heart-wrenching tour to view live animals — sun bears, clouded leopards, pangolins, monitor lizards, pythons and birds kept under appalling conditions in hopes they could somehow be sold before they died. My biologist companions had tears in their eyes as we left town.

Canada's task seems clearer in Jordan's top three issues: the export trophy trade in vulnerable species, the import of high-value prohibited material such as ivory and rhino horn, and the emerging threat of invasive species, which can wreak havoc on ecosystems and also carry parasites and pathogens that can harm Canadian wildlife. The good news? Technology is aiding enforcement — drones and remote-triggered cameras have made it easier to identify and locate wildlife poachers both abroad and in Canada. The bad news is that environmental criminals are using the same technology — as well as the Internet, where you can purchase anything and, perhaps in the near future, have it dropped at your house via drone. Says Jordan: "These are the challenges we're up against as a world community."

**PROCEEDS OF CRIME**

The street value of an illegal live gyrfalcon? An estimated $360,000. The value of a kilo of heroin, the most expensive narcotic by weight? About $135,050. The following chart compares the prices (in Canadian dollars) of select illegal wildlife and drugs based on a recent report from the wildlife enforcement branch of Environment Canada — more proof wildlife crime is big business.

| SPECIES/DRUG | EST. PRICE |
|---|---|
| Gyrfalcon | $360,000 alive |
| Bear bile | $200,430 per kilo |
| Heroin, brown | $135,050 per kilo |
| Methamphetamine | $109,165 per kilo |
| Cocaine, salts | $79,805 per kilo |
| Wild ginseng | $46,110 per whole root |
| Opium | $30,695 per kilo |
| Polar bear pelt | $17,000 |
| Hashish | $14,735 per kilo |
| Ecstasy | $8,045 per 1,000 tablets |
| Marijuana | $7,365 per kilo |
| Narwhal tusk | $3,935 per metre |

Source: https://canadiangeographic.ca/articles/the-illegal-wildlife-trade-is-a-biodiversity-apocalypse/

**Article for Group 3:**

# Want to Fight Climate Change? Start by Protecting These Endangered Species

Giant forest elephants and blue whales play an enormous role in climate sequestration. Can putting a financial value on that role help conserve them — and us?

December 7, 2020 - by Rocky Kistner

Despite their massive size, African forest elephants remains an elusive species, poorly studied because of their habitat in the dense tropical forests of West Africa and the Congo.

But the more we learn about them, the more we know that forest elephants are in trouble. Like their slightly larger and better-known cousins, the bush or savannah elephants (*Loxodonta africana*), forest elephants (*L. cyclotis*) face rampant poaching for their majestic ivory tusks and the growing bush meat trade. More than 80% of the population has been killed off in central Africa since 2002.

Today fewer than 100,000 forest elephants occupy their dwindling habitat. Conservationists worry they could soon head toward extinction if nothing is done.

And now a new threat has emerged: A study published this September found that climate change has resulted in an 81% decline in fruit production in one forest elephant habitat in Gabon. That's caused the elephants there to experience an 11% decline in body condition since 2008.

But other research, also published in September, suggests a possible solution to both these crises.

## Elephants and Carbon

It all boils down to carbon dioxide.

Forest elephants play a huge role in supporting the carbon sequestration power of their tropical habitats. Hungry pachyderms act as mega-gardeners as they roam across the landscape searching for bits of leaves, tree bark and fruit; stomping on small trees and bushes; and spreading seeds in their dung. This promotes the growth of larger carbon-absorbing trees, allowing forests to sequester more carbon from the air.

A July 2019 study by ecologist Fabio Berzaghi, a researcher at the Laboratory of Climate and Environmental Sciences in France, estimated that if forest elephants disappeared African forests would lose 7% of their biomass — a stunning 3 billion-ton loss of carbon.

And they're not unique in this oversized role, although the closest equivalent lives in an entirely different type of habitat.

Last year a team of researchers led by Ralph Chami, an economist and assistant director at the International Monetary Fund, published a groundbreaking report on the monetary value of great whales, the 13 large species that include blue and humpback whales. The study accounted for whales' enormous carbon-capturing functions, from fertilizing oxygen-producing phytoplankton to storing enormous amounts of carbon in their bodies when they die and sink to the seafloor. After also including tourism values, Chami's study estimated each whale was worth $2 million, amounting to a staggering $1 trillion for the entire global population of whales.

"It's a win-win for everyone," Chami says of his economic models, which place a monetary value on the "natural capital" of wildlife, including the carbon sequestration activities of whales and elephants. "By allowing nature to regenerate, [elephants and whales] are far more valuable to us than if we extract them. If nature thrives, you thrive."

Soon after the publication of Chami's whale study, Berzaghi called and asked if the economist could run the numbers on forest elephants too. Chami agreed, and this September they published the results. The elephants, they calculated, are worth about $1.75 million each due to their forest carbon sequestration value alone.

Even more importantly, they found that if forest elephants were allowed to rebound to their former populations, their carbon-capturing value would jump to more than $150 billion.

And as climate change worsens, Chami says forest elephants will become even more valuable in terms of their carbon sequestration role — and as individuals. "The loss of their habitats has the impact of causing them more stress and to have fewer babies," he says.

## Turning Numbers Into Action

Despite these stunning, if theoretical, numbers, the researchers knew they needed a financial plan that could be implemented and sustained in the real world.

That starts with keeping elephants alive.

Poachers receive pennies on the dollar for elephant tusks that, once they finally reach consumers, can fetch prices of up to $40,000 on the illegal ivory market.

Chami says that pales in comparison to the $1.75 million an elephant could be worth for its carbon sequestration services, an amount that works out to roughly $80 a day over an elephant's 60-year average lifetime.

But how do you deliver that value to the people who live near elephants, including people who perhaps currently poach the animals? Chami turned to worldwide carbon markets, which encourage countries or companies to offset their greenhouse gases by investing in restorative measures in other parts of the world.

To activate that proposed value, Chami brought together a group of conservation, business technology and economic experts to develop a pilot project that could promote the protection of forest elephants in Africa. Together, they aim to create a legal framework and a secure financial distribution system that would use of carbon markets to pay local communities to protect forest elephants. Individual elephants would be tracked using satellite technology to ensure their safety. As long as the elephants remain alive, communities could receive regular payments from a carbon market funded by corporations, individuals and governments to offset their pollution. Elephants could become "living assets" for countries that protect them.

Those assets could add up. Chami says the population of 1,500 elephants in Gabon's Loango National Forest would provide $2.4 million in annual revenue.

"We need to build a market around living elephants," Chami says. "The poachers can become the caretakers."

That's an exciting concept to wildlife experts, who have already had some success empowering communities through tourism. But for elephants that live in remote areas of African forests, tourism is less of an option. A market that places a value on elephants for their global carbon sequestration and climate contributions opens a new opportunity for support.

"It potentially changes how people think of the value of elephants," said Ian Redmond, a renowned African conservationist who's working with Chami and others to fund forest elephant protection efforts.

Redmond says he's thrilled about this new plan because it incentivizes locals to protect their natural resources, not exploit them.

"It's a gamechanger, not just for its ecological benefits, but for poverty reduction," he says. "It's a mechanism of change for people in the forest for people who before now only get money if they kill something. Now there's an economic incentive to protect the elephants and their carbon-rich habitat so everyone benefits, locally and globally."

The trick, the experts say, is getting money dispersed fairly and securely to local communities. Chami's team says the revolution in new secure financial networks such as blockchain, the building block of digital monetary systems like Bitcoin, can help establish a monetary system that can be more efficient and transparent than traditional banking systems. Africa's ahead of the curve when it comes to dealing in these new digital monetary technologies, which, though not perfect, can be a positive anti-corruption tool in the murky world of international carbon markets and debt swaps sometimes linked to fraud and influence peddling.

Walid Al Saqqaf, a startup founder and technology expert who produces the weekly podcast Insureblocks, is working closely with Chami and conservationists like Redmond to tap into global carbon exchange markets and create a framework for local funding efforts. Al Saqqaf says the secure nature of blockchain technology can attract international governmental agencies as well as private sector banks and insurance companies who will increasingly want to offset carbon footprints by investing in carbon-sequestering natural resources. "We take a toxic asset such as carbon and transform it into carbon for social good," Al Saqqaf says.

The group is setting up technology, legal and science working groups to develop a cohesive plan that could go into effect next year, although the conservation team says it's too early to announce specifics of the pilot program. They say they are in early discussions with African governments hoping to protect their elephants as well as private enterprises interested in offsetting carbon emissions.

## A Ticking Clock, But Forward Motion

Meanwhile the threats from both climate change and poaching continue. A study published this June found that, despite efforts to reduce the ivory trade, elephant poaching rates remain "near their peak and have changed little since 2011."

The rapidly growing risks of extinctions, fueled in part by climate change, have pushed the team to quickly get their ground-breaking plan up and running. "We are in a race against time," Al Saqqaf says.

While the work on elephants remains on the drawing board, Chami's earlier study on the economic value of whales has already started generating real-world action. A G20 working group recommended this year that member countries take whales into account for their climate mitigation and ecosystem values. In Chile a national initiative is using Chami's economic model to help design a project called the Blue Boat Initiative, a sophisticated satellite and sea-based plan supported by the Chilean government to protect whales from ship collisions.

"The valuation of ecosystem services is very relevant because it allows us to show the oceans are not only a raw material," says Patricia Morales, general manager of Fundacion Cortes Solari, a private foundation that supports the Blue Boat Initiative and other climate and environmental issues. "We need to move from the current paradigm to the blue economy."

Chami says the positive global response to their work is rewarding, but it's far from complete. His team — which plans to apply this methodology to other species — knows the dire state of the natural world, and the challenges of creating new international funding and conservation models are huge. But Chami and his colleagues say that by "translating science into dollars," researchers can build a powerful market-based mechanism that can reverse society's incentive to destroy the natural world.

"We need to learn to live in balance with nature," Chami says. "Our sustainability depends on protecting our ecosystems."

Source: https://therevelator.org/climate-change-forest-elephants/

**Article for Group 4:**

# Extinction: Elephants driven to the brink by poaching

25 March 2021

**By Victoria Gill**
Science correspondent, BBC News

**The ivory trade, loss of vital habitat and a deeper understanding of elephant biology have all combined to reveal a previously underestimated threat to Africa's elephants.**

African forest elephants are now critically endangered, an update from the **International Union for the Conservation of Nature (IUCN)** reveals.

Savanna elephants are also endangered.

And "declines over decades" have driven the species into the two highest categories of extinction threat.

African elephants were previously assessed as one species on the IUCN's Red List.

**Genetic evidence** showed them to be two distinct species more than a decade ago.
But accurate assessments - of populations, trends in their numbers and the threats they face - take many years.

- **Elephants counted from space for conservation**
- **Ivory from shipwreck reveals elephants' decline**
- **Extinction crisis: Leaders say it is time to act**

The IUCN estimates 415,000 elephants remain in Africa.

But the number of forest elephants fell by more than 86% during the past three decades. In addition, the number of savanna elephants fell by at least 60% over the past 50 years.

The situation differs from country to country. In Botswana, for example, it has been argued that there are **so many elephants that the ecosystem cannot naturally support them**. But, on a continent-wide scale, the giant mammals are in decline.

Dr Ben Okita, who co-chairs the IUCN elephant specialist group, called the latest assessment an "alarm bell".

Despite peaking in 2011, poaching for ivory remained a "significant driver" of the decline, he told BBC News.
"It is one of the major causes," he said.

"But there's another silent killer that requires a very high level of attention - that's land degradation and fragmentation."

"It is a big challenge for species that require very large areas and that move long distances."

"Wild animals do not know international borders.'

"So to turn things around, we have to have co-operation across those borders and to plan for better land use."

"Where animals share that land," Dr Okita explained, "it is important to use it in a way that is compatible for them."

"I know the will is there with African governments and with the communities that live alongside these animals," Dr Okita explained.

"So we just need to make it happen."

"I am optimistic, very optimistic, that we can turn things around."

Isla Duporge from Wildlife Conservation Research Unit at the University of Oxford, said: "While on the surface this looks bleak, the fact it's being flagged is actually positive."

"The separation of the species is also a positive, because we can do something about it on a more concentrated level - depending on which species we're looking at and in what location."

"More information is always better."

## 'Drastic declines'

Amy Fraenkel, executive secretary of the Convention on the Conservation of Migratory Species of Wild Animals, said: "I hope that it will lead to greater conservation actions for both species.

"In particular, the forest elephant has suffered drastic declines over the past few decades."

Ms Duporge said conservationists doing work "on the ground in Africa" to protect habitats would be the most crucial players in the effort to protect the animals.

"Those are the organisations to donate your money to," she said.

Source: https://www.preda.org/2021/extinction-elephants-driven-to-the-brink-by-poaching/

# Article for Group 5:

# How Humans Benefit From a Highway of Trails Created by African Forest Elephants

The paths the pachyderms make aid plants, other animals, and local people—whose way of life is threatened by the species' decline

**Helen Santoro**

October 15, 2020

Early one summer morning, anthropologist Carolyn Jost Robinson woke up in a campsite nestled in the dense, tangled rainforest of the Central African Republic. The cacophony of African grey parrots and cicadas filled her ears and the smell of the rich clay soil—musty decay with a hint of cocoa—permeated her nostrils.

Using a highway of winding trails formed by African forest elephants, Jost Robinson navigated to her research site in the Dzanga-Sangha Protected Area, which lies in the republic's southernmost tip. "You're lost in your mind—the smells and the sounds," says Jost Robinson, who is director of sociocultural research and community engagement at Chengeta Wildlife, an organization that trains and supports anti-poaching operations.

For decades, Jost Robinson and Melissa Remis, a professor and head of the anthropology department at Purdue University, have traveled to this Dzanga-Sangha and followed the intricate elephant trails to study the behaviors of western lowland gorillas and small antelopes called duikers. But for many years, they never stopped to look at the trails themselves. "When you're doing research it's easy to forget what you're moving through," says Jost Robinson. In 2012, they decided to study the paths that gave them easy access to water, campsites and data. It was then that they fully recognized the significance of this complex networks of trails.

Now, in a study published this August in *American Anthropologist*, Remis and Jost Robinson examined how elephants have shaped the landscape and created paths that are essential for researchers, animals and locals alike. "They are the engineers of the forest," says Remis.

Today, this ecosystem of trails and the surrounding forest are endangered by the impacts of elephant poaching and logging. The loss of these paths will greatly affect the indigenous people, the BaAka, who use them to hunt small game and search out medicine and other resources in the labyrinthine rainforest. As policymakers tackle how to continue protecting the elephants and preserving the forest through zoned conservations areas, the researchers say officials must also consider the BaAka. "For conservation to be successful, we need to take into account the needs of everybody," says Remis. "You can't just conserve the wildlife without also protecting the people."

African forest elephants are intelligent and social animals that travel in small family groups. Unlike savanna elephants that inhabit open areas in sub-Saharan Africa, forest elephants are smaller and more elusive, living in tightly packed rainforests. But they are still large, weighing in at up to around 13,000 pounds. Once, these animals roamed across a large span of African forests, but because of habitat

destruction and poaching, they are now confined to 25 percent of their historical range. The exact number of elephants is difficult to track, but scientists estimate that the number has dropped from several million in the 1930s to less than 100,000 today.

The Dzanga-Sangha, which is roughly 2,000 square miles, is a haven for these colossal creatures, housing around 4,000 elephants. Each day, they travel from the forest's fruit trees to a large clearing with mineral-rich water known by locals including the BaAka as the Dzanga Bai, or the Village of Elephants. The pachyderms trample the ground and topple trees, producing thousands of miles worth of trails. Everything within the reserve—from forest buffalos to small rodents to tourists to indigenous residents—move along these paths.

Along with flattening the earth, elephants are the "landscape gardeners of the wild, opening up habitats and accessing water in drought, giving vital access to important resources for other species," says Kate Evans, a behavioral ecologist and founder and director of the charity, Elephants for Africa. Additionally, they eat an abundance of fruit and disperse the seeds through their dung. Without them, scores of tree species will be left without a means to spread their seeds. Nutrients like nitrogen, which are also distributed through the elephants' feces, will be concentrated to smaller areas, limiting future plant growth. Trails will become overgrown, restricting other animals' easy access to water and food. Altogether, the forest structure and ecology will be forever changed.

The BaAka, the foraging community that is among the area's oldest inhabitants, also use these elephant trails, or *bembo*, as an integral part of their culture and livelihood. Oral histories show that the BaAka have traveled the bembo in search of food and resources, including medicine and hunting technologies, and to exchange marriage partners and dances with neighboring communities. They also have specialized elephant hunters, or *tuma*, who use these trails to maneuver throughout the forest.

In 2012, the researchers interviewed seven BaAka men to learn more about the tuma. "I am the elephant. The elephant is me—you are the elephant," Komo, one of the BaAka men who was given a pseudonym, told the researchers while raising his hands to his head and flapping them like elephant ears. According to Komo, and as described by Remis and Jost Robinson in their study, elephants are "sentient creatures with complex emotions and social lives, formidable enemies to be outsmarted and majestic packages of meat to sustain communities."

During traditional elephant hunts, the tuma say they were guided along the elephant trails by forest spirits that protected the hunters. They would follow the trails for two to three days until they found an elephant, which they killed using spears. The meat was then distributed wildly with other communities.

Today, this age-old relationship is under threat. The number of African forest elephants is on the decline, namely due to poaching for their ivory tusks. Consequently, elephant hunting is illegal throughout the Central African Republic and the tuma can no longer hunt them. Also, as the populations of small villages inside the Dzanga-Sangha have grown over the decades, wild game and other resources that the BaAka and others depend on have been strained. As a result, in the 1970s, the BaAka moved out of the rainforest and into villages in search of economic opportunities and resources. After the establishment of the Dzanga-Sangha in 1990, conservation zoning rules regulated movement within the forest and hunting became limited to a 189-square-mile zone. This restricted access to other hunting territories that some BaAka used to track smaller game, including duikers and porcupines.

“When our ancestors went into the forest to eat animals, nobody could chase them out,” Komo told the researchers. “We are out in the open now, in the place of the outsiders, with nothing left for us.”

Moving forward, Jost Robinson and Remis hope to include the needs of the BaAka in conservation discussions. Similar to the agreement between the Cameroon government and the Baka, an indigenous group that inhabits Cameroon and Gabon, the researchers support the enactment of laws that allow the BaAka to be part of the conversation around managing the Dzanga-Sangha. This may include allowing them greater access to elephant trails in conservation zones within the forest that are currently off limits, Remis says.

Currently, the team is working to engage local policymakers, but it’s an uphill battle. The Western idea of conservation often focuses on flagship species like elephants and rarely considers the people who depend on those species, Remis explains. This is because of Western conservation’s roots in colonialism, says Siân Waters, an honorary fellow at Durham University in the United Kingdom and founder of the Barbary Macaque Awareness and Conservation organization. Many conservationists belittle or ignore local people’s ideologies and needs in conservation decisions.

Waters has noticed that conservationists are more willing nowadays to discuss the field’s imperialistic roots. But it’s a difficult and arduous process. “It’s uncomfortable and painful,” she says. “It is hard because you’re fighting every day with your own biases.”

Fifteen years ago, deep in the Dzanga-Sangha, Jost Robinson navigated down an elephant trail with two BaAka colleagues, lost in thought about the data she needed to collect for her PhD research on duikers. Suddenly, she received the quiet signal that indicated elephants were ahead. It was a female and her calf. The group sat quietly for two hours, not wanting to disturb the giant creatures that could charge. Finally, the elephants moved on, their large feet further flattening the path that their ancestors created.

“Elephant trails can open up a way for everyone to think about how people interact with the environment,” she says. “They’re a common ground to think about how to approach forest protection.”

*Editors' Note, October 16, 2020: The original article mistakenly stated the scientists heard howler monkeys in the forest; that species of monkey does not live in the Central African Republic. This article has also been updated to clarify how scientists are working with local policymakers.*

Source: https://www.smithsonianmag.com/science-nature/how-humans-benefit-highway-trails-created-african-forest-elephants-180976045/#:~:text=%E2%80%9CElephant%20trails%20can%20open%20up,how%20to%20approach%20forest%20protection.%E2%80%9D

## Additional Group Articles:

**Group 1:**

- **Four Reasons the Environment Needs Elephants**

**Group 2:**

- **Elephants and Biodiversity**

**Group 3:**

- **The Secret Work of Elephants**

**Group 4:**

- **Human-Wildlife Conflict**

**Group 5:**

- **When elephants are protected, humans also benefit**

# KWL Chart

**Directions: As you read, take notes be recording your thoughts in the appropriate columns in the chart below.**

| Biodiversity and the Important Role of the African Elephant | | |
|---|---|---|
| **What I Know** | **What I Want to Know** | **What I Learned** |
| | | |

# Students Become the Teachers Planning Sheet

**Directions: As you read your article(s) with your group members, fill out the sheet below by recording your group number, the topic you are exploring, the key information you want to share, your engaging plan for teaching that information, and the questions you will ask to check for their understanding of your topic.**

| **Group #** | **Our Topic:** |
|---|---|
| **Key Information We Want To Share** | **Engaging Way We Will Share the Information** |
| | |

**Our 3-5 Minute Teaching Plan**

**Questions We Will Ask To Make Sure Students Learned the Information:**

# Lessons From My Classmates

**Directions: Each member of your group will share a 3-5 minute lesson about their topic. Be sure to record their topic and your notes from each lesson in the appropriate boxes below.**

| **Lesson 1** | **Topic:** |
|---|---|
| **My Notes:** | |

| **Lesson 2** | **Topic:** |
|---|---|
| **My Notes:** | |

| Lesson 3 | Topic: |
| --- | --- |

**My Notes:**

| Lesson 4 | Topic: |
| --- | --- |

**My Notes:**