Summit Questa Middle School - Davie, Florida

What started out as a GeoMentoring volunteer position at Summit-Questa has now integrated into the school's existing curriculum. They promote their school with access to this geospatial technology. This past year students that selected and participated in a StoryMap Series in Advanced Science received a Certificate as part of their end of the year awards ceremony.

8th grade students produced Story Maps as an independent study. GeoMentor Michelle Doyle worked with students for a few hours per month during their lunch break. Classes covered technical knowledge and motivational Story Map examples. The students took it on their part to apply the knowledge as part of their Science curriculum on the current state of the major biomes in the world. The students' papers follow this cover sheet and their corresponding Story Maps can be found here: https://summit-questa.maps.arcgis.com/home/index.html

Student Papers that Inspired Story Maps

Aidan Coffey
Advanced Science
Ms. Monica
5/24/16

The Amazon Rainforest

Story Map Link: http://arcg.is/1VjPf9P

Imagine not being able to breathe. Why, you may ask. The pollution of the Amazon Rainforest, which provides around 20% of the Earth's oxygen, is the answer. The Amazon Rainforest, which is the size of lower 48 US states, is shrinking every day because of logging, farming, and cattle ranching. All of the tree loss has resulted in billions of tons of carbon emissions into the air. If the Amazon isn't saved, this world won't be either.. In an effort to save it, a total of 275,000 trees have been planted in the rainforest.

After extensive logging and cattle ranching, the water pollution is also getting worse. Some scientists theorize, as stated previously, that half of the Amazon Rainforest could be gone by the year 2030. If this happens, then billions of tons worth of carbon emissions will be released into the atmosphere. This would cause a butterfly effect. A butterfly effect is where on action leads to another action, and that action would lead to another action, and so forth. In this scenario, the billions of tons of carbon emissions would make the Ozone layer thinner. This would result in more U.V. rays from sun exposure. That would result in even higher rates of global warming which would melt some of the polar icecaps. Ultimately, low land places, such as Florida would be submerged in water.

The Amazon Rainforest provides one of the most important natural resources in the world. Since the plant life always recycles carbon dioxide into oxygen, it has been described by scientists as "the lungs of our planet." In total, the Amazon produces around 20% of the oxygen that we breathe. Along with that, some of the plants found in the region are being examined by scientists and medical practitioners. They believe that these plants can cure, or will help battle: cancer, AIDS, diabetes, arthritis, and Alzheimer's. And finally, mines such as gold, zinc, tin, silver, and copper can be found in the Peruvian parts of the Amazon Rainforest. With the deforestation of the Amazon Rainforest, these vital resources will be gone, leaving many people in need of medicine and in want of of precious minerals. In addition to that, the decrease in minerals will deplete the economy, therefore stopping economic growth which directly affects the the forest.

On average, about 1300 species of birds live in the Amazon. As do all birds, they migrate based upon the temperature. However, now, birds are returning from their migration, they return to places that there are no forests. During the migration process, a bird can lose up to 30% of their body weight, and they rely on the now nonexistent rainforests to make up for it. This greatly affects the food chain. If the birds don't eat, there will be an overpopulation of their prey, which will result in the food chain completely changing. The animals that the birds eat will have a problem because they will overpopulate.

The Amazon rainforest is vanishing. By 2030, as stated previously, it will be gone. There are many factors that contribute to this. The Ozone is a layer in the atmosphere that protects the Earth from the sun's harsh UV rays. When the loggers cut down trees, it increases the amount of carbon emissions.

Over the past couple of years, billions of tons of carbon emissions have beenreleased into the air. All of these emissions makes the climate hotter. It also increases floods and rain. Now with the acid rain problem, the carbon emissions directly correlate with the warmer temperatures and the increase of flooding.

The Amazon Rainforest has a vast population of different plants and animals. There are over 40,000 plants in the Amazon. Along with that, there are 427 different types of mammals, 1,300 different species of birds, over 400 species of amphibians, and around 3,000 different types of freshwater fish. Also, there are around 100,000 smaller invertebrates. With the advent of pollution, however, the number is shrinking. Currently, 130 different types of plant species go extinct every day.

During the different seasons, these animals switch diets, like during the summer they may have more fruit, yet during the winter they may have more meat, it varies based on the climate. With all of the deforestation, the animals will not have a clean, sustainable natural habitat. This will stunt offspring of the species, and ultimately cause many of them to go extinct.

The Amazon Rainforest deforestation will eventually result in harmful levels of carbon dioxide in the atmosphere. The disruption of migratory patterns for indigenous birds, animal extinction through the loss of habitat, and the wholesale destruction of plant life are all inevitable outcomes.

Kaden Caulfield
Advanced Science
Pantanal Swamp

Pantanal Swamp

Story Map Link: http://arcg.is/1RUOvWk

The Pantanal Swamp is a grand ecosystem that has been untouched by human development. The Pantanal is a small section of the largest wetland in the world. The actual span of the swamp is about 54,000 and 75,000 square miles and roughly 80% of the Pantanal floodplains are submerged during the rainy seasons. About 13,000-23,000 years ago the Pantanal swamp was nothing but desert. Erosion affects the environment and continues to occur in the Pantanal Swamp and affects the aquatic animals in ways such as limited breathing from all the debris in the water and less habitat for the dry land species. The human population has also had its effect on the Pantanal Swamp.

Population growth has and will affect all natural ecosystems that were here long before us. The search for new land used for resources and development is part of our human nature and continues to drive us. Therefore, we will continually be in search of new resources and new settlement areas. The initial growth on the Pantanal has not been drastic, but humans will continue to expand into the swamps. Only 2% of the actual swamp has been deforested and inhabited. Another big issue for the Pantanal Swamp is unceasing erosion.

Not many natural disasters occur in the Pantanal Swamp because of the climate and the constant rainfall, and it is not on a fault line. The most destructive forces are erosion and flooding of the dry areas. The erosion leads to different issues, such as the surface area required for dry living organisms to thrive depleted. The quality of the water would also be changed when the substrate keeps pouring into it. The erosion allows for harmful bacteria to inhabit the exposed roots or trunks of trees that can potentially kill off the trees. Deforestation and the chopping down of trees.

Every year tons of trees are taken from the Pantanal Swamp are used for construction. About 800,000 to 1,000,000 Metric Tons of co2 emissions are emitted from the swamp every year which is from all the work being done from the deforestation. Ranching changes the ecosystem making it impossible for native plants or animals to thrive. Cattle will be able to thrive so well that they will outcompete the native species which will eventually lead to extinction of the original species of animals and plants. This special ecosystem holds some of the most endangered species of animals in the world,

Hundreds of species of animals live and thrive in the Pantanal. A few species of animals that are interesting include: Brazilian jaguars, capybaras, blue and yellow macaws, marsh deers and red bellied piranhas. Less than 2% of the Pantanal wetlands are under government protection. Which can lead to environmental destruction and complete extinction of these animals.

In conclusion, the Pantanal is in for a long hard road as more and more polluters and business people keep coming in and directing their attention to this pristine place. Research shows that the more erosion that continues to occur the more ill effects it will have on the natural environment. Hopefully this ecosystem will be able to thrive and prosper for years to come and the world starts to wake up to the dangers of deforestation.

Santiago Mejia
Advanced Science
Congo Basin
Story Map Link: http://arcg.is/1XW5nMZ

The Congo Basin makes up one of the most important wilderness areas left on Earth. At 500 million acres, it is larger than the state of Alaska and stands as the world's second-largest tropical forest. The massive forest spans across six countries. With rivers, forests, savannas, swamps, and flooded forests, the Congo Basin teems with life. It has been inhabited by humans for over 50,000 years, but as the population grows, more problems develop in the Congo Basin. These problems are becoming more serious than ever, because they not only affect the forest as a whole, but also the entire world. Transportation, for example, allows poachers and hunters to reach vulnerable animals in remote areas deep in the forest. Also, as the world demands timber and other natural resources, the deforestation of the Congo Basin increases. If everything remains as it is now, the Congo Basin will be destroyed in the next few decades, and that will have a negative impact on the entire planet.

A growing concern to many, such as the Congo Basin forest partnership, is the deforestation that is currently taking place. There are many causes to this, but the main one is the demand for natural resources from other countries around the world. The Congo Basin is rich with natural resources that companies can use to their benefit, such as coltan and cassiterite, because they are one of the main minerals used in mobile phones. A large body of peer reviewed scientific papers actually show that deforestation is increasing in the Congo Basin. For example, a paper from a team led by a Belgian researcher showed that deforestation doubled in the region between 1990 to 2000, and 2000 to 2005.

The population of the world is slowly increasing. That means that every single part of the world will have more humans, including the largest tropical forests in the world, the Amazon Basin and the Congo Basin. The Congo Basin has been inhabited by humans for more than 50,000 years and it provides food, fresh water, and shelter to more than 75 million people. As the population grows, however, mining, logging, and hunting become major problems that affect the forest as a whole. Diamonds, gold, coltan, copper, cobalt, tin, manganese, lead, zinc, coal, and uranium are all being mined out of the forest every year and the rates are increasing. This situation can be seen from two opposite points of views. Oil and mineral exploitation occurs mostly in the forested areas of the Congo basin, clearing roads and encouraging settlement and deforestation. In a way, mining can discourage deforestation by pulling rural populations into the cities that surround the Congo Basin, as witnessed in Gabon and the Republic of Congo, and by making agricultural export less profitable.

Like the Amazon Basin in South America, the Congo Basin has earned a global reputation for the variety of wildlife found inside its forests. Gorillas, elephants, buffalo and other giants mingle on shadowy trails and in sun-filled clearings. Some of the world's most spectacular and endangered wildlife lives in the Congo Basin, including one-half of the remaining elephants on the continent. An estimated ten thousand species of plants, of which 3,000 are found nowhere else, 1,000 species of birds, and 400 species of mammals. 216 species of amphibians, 280 species of reptiles, 700 species of

fish, and over 900 species of butterflies are found in the forest. Surprisingly, other forests around the world have even a larger quantity of inhabitants compared to the Congo Basin.

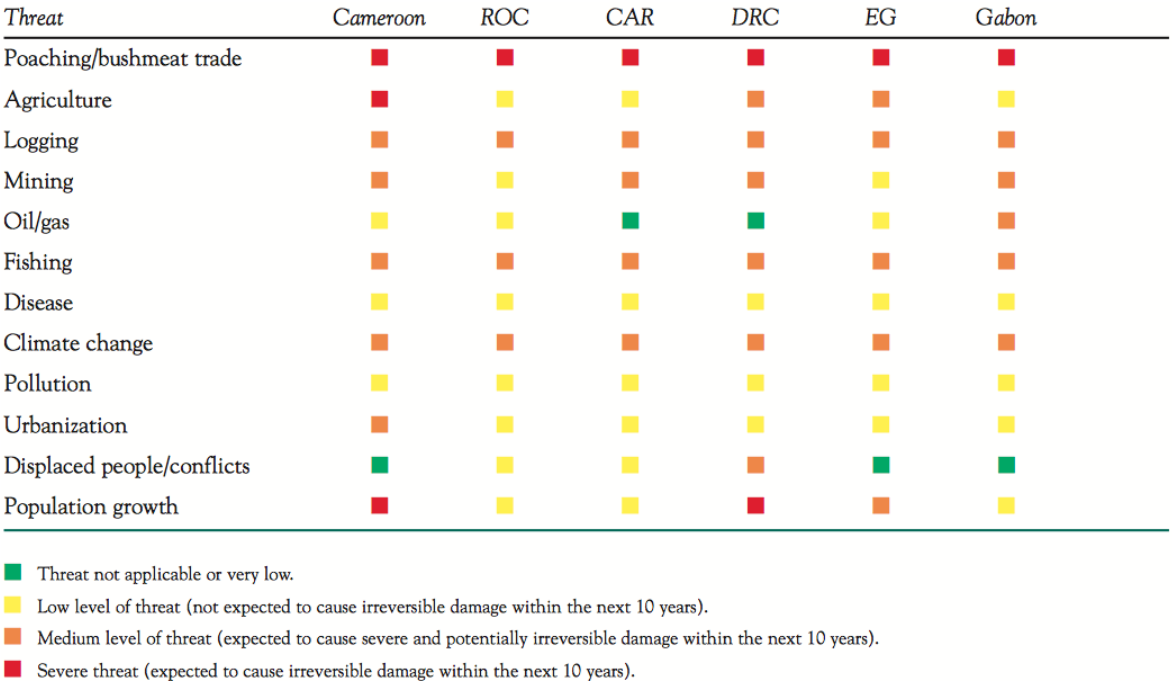
The Congo Basin's lush forests absorb and store carbon dioxide, which helps slow the rate of global climate change. Unlike other forests, 75% to 95% of the rainfall is generated within the region. This isolation may make the central African rainforests less able to withstand climate change. Furthermore, many highly localized endemic species, such as gorillas, can only thrive in tightly defined ranges, and are vulnerable to minor changes in climate.

Transportation within the Congo Basin increases along with deforestation, since there are less things that can prevent movement in the forest. Timber companies build roads that allow hunters and poachers to reach vulnerable animals in remote areas in the forest. The hunting of these animals leads to the commercial bushmeat trade. The bushmeat trade is the illegal and unsustainable over-hunting of wildlife for meat and income. Just in the Democratic Republic of the Congo, over one million pounds of bushmeat are consumed each year. The over-hunting of animals in the Congo Basin disrupts the balance of the food chain, and the forest begins to lack species. Animals like monkeys and antelope are common targets, although species such as gorillas and bonobos are also at risk. Elephants, however, are the ones that will go extinct if nothing is done. The international demand for ivory drives the hunting of elephants, which can lead to the extinction of the endangered species. The logging roads that are being built have opened up large areas of the Congo to commercial hunting, leading to a poaching epidemic in some areas and a more than 60% drop in the forests elephant population in less than a decade.

Several organizations, including the World Wildlife Fund, are addressing the illegal hunting and trading of vulnerable animals indigenous to the Congo Basin. Deforestation is also of concern to the Congo and the globe. The World Wildlife Fund (WWF), a member of the Congo Basin Forest Partnership, collaborates with local governments and communities to sustainably manage the forests and protect the wildlife. WWF works to ensure more sustainable methods of extracting natural resources, such as trees, oil, and minerals, with minimal impact to wildlife and forests. To reduce pressure for fuel wood, WWF has been part of a tree plantation program in the Democratic Republic of Congo (DRC). Over 10 million trees have been planted to help preserve mountain gorilla habitat. Poaching continues to be a growing problem in the Congo Basin. WWF's support and work has enabled local authorities to increase anti-poaching measures in the Congo Basin. Other organizations have also taken action to protect the Congo Basin. Funded by the European commission, the ECOFAC program, which began in 1992, focuses on "conserving biodiversity, especially through protected areas; promoting sustainable use of forest resources to promote development and improved livelihoods without mortgaging the future; and encouraging regional cooperation." Between 1995 and 2002, the Central African countries of Cameroon, Central African Republic, Democratic Republic of the Congo, Republic of the Congo, Equatorial Guinea, and Gabon were making efforts to ensure biodiversity conservation and the sustainable management of forests. "This collaborative spirit became embodied in the 1999 Yaoundé Declaration, signed in Cameroon by the Heads of State of six countries. This historic Declaration—and the associated action plan (*Plan de Convergence*) that followed—created a framework to achieve shared forest conservation goals and endorsed the development of new transboundary and regional conservation efforts." The United States and Africa joined twenty-seven

public and private partners to launch the Congo Basin Forest Partnership at the World Summit on Sustainable Development on September 4, 2002. This partnership was established to accomplish the Yaoundé Declaration goals.

The Congo Basin is an amazing forest filled with tons of wildlife, but it seems to get smaller and the problems become greater daily. Eventually the mining will stop because small amounts of the minerals will remain. These major issues that the Congo Basin is facing are very hard to end, but it is possible if the world comes together once again. If all goes well and the goals of the current organizations and partnerships are achieved, planet earth may sustain humans for the many years that come.



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Sophie Vega

Ms. Monica/Mr. A
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28, May, 2016

The Interior Alaska-Yukon Lowland Taiga Biome

Story Map Link: http://arcg.is/22vaB3p

The Taiga, also known as the Boreal or Coniferous Forest, is the most extensive terrestrial biome on the planet. The Interior Alaska-Yukon Lowland Taiga is a widespread spruce biome located primarily in Alaska (U.S. State) and Yukon (Canadian Territory), stretching from the Richardson Mountains in Canada to the Bering Sea. The ecoregion contains an extensive collection of ecological facets due to regional differences in its drainage, microclimate, and topography. The main complication that the taiga faces today is habitat loss due to human population, pollution, and logging in some of the areas near heavily populated towns. Many assiduous conservationists and biologists are now working to preserve the wildlife of the beautiful Alaska-Yukon forests.

The Interior Alaska-Yukon Lowland Taiga has long-lasting, dry, frigid winters, and short, warm summers. The winter temperatures usually range from around -31 degrees fahrenheit to -1 degrees fahrenheit, while the summer temperatures typically range from 62 degrees fahrenheit to 72 degrees fahrenheit. Annual rainfall ranges from about 10 inches to 22 inches. Most of the precipitation in this biome is rain and snow. The terrain is mostly comprised of lowlands, bottomlands that line the main streams and rivers, and rolling hills.

The ecoregion's marshes, streams, and river valleys sustain populations of breeding birds including goldeneyes, grouse, grebes, flycatchers, and loons. Moose, caribou, and snowshoe hare are common by the main rivers, as are mink, river otter, marten, and muskrat. Black bear, grizzly bear, wolf, red fox, raven, osprey, and bald eagle are other examples of wildlife in this ecoregion.

Some of the threatened and endangered species of the Alaska-Yukon Taiga include: Wood Bison, Siberian Cranes, Canadian Lynx, Snow Leopards, Whooping Cranes, Peregrine Falcons, Amur Tigers, Siberian Tigers, and Beavers, especially the North American Beaver. This specific beaver is one of the many keystone species in this biome because of the important role it plays in its ecosystem. The North American Beaver benefits the taiga in a number of ways by decreasing the occurrence of damaging floods, removing contaminants from water sources, decreasing erosion, providing food for aquatic species and other animals, restoring water aquifers, maintaining the flow of various waterways, and much more. The removal of a keystone species from a delicate ecosystem could render a habitat unstable, and cause many future problems for the dependent species within a given ecosystem, which is why it is imperative that the Taiga is conserved.

Many animals across the country, the continent, and across the hemisphere migrate to the Alaska-Yukon taiga. An approximation of five billion of about 200 species birds fly north to various breeding grounds in Alaska. The moderate temperatures, incomparable conditions for raising offspring, and abundance of plants and insects for food make the Interior Alaska-Yukon Lowland Taiga an ideal place to migrate to in the brief summer mating season. In addition to the birds, multiple species of

caribou (Central Arctic caribou, Porcupine caribou, and Western Arctic caribou) migrate across the Alaska-Yukon Taiga.

The residence of humans near the Interior Alaska-Yukon Lowland Taiga has impacted the ecoregion in many ways. Habitat loss has occurred mainly in areas that have fallen victim to clearcutting and logging, mostly in the Tanana Valley State Forest and in Fairbanks, Alaska. Fairbanks, Alaska has also been a victim of logging. The main destruction of the surrounding biome has occurred mostly around the cities and villages of Alaska and the Yukon. Other examples of human disturbance includes recreational hunting of mammals, fish and birds, ore mining, agricultural use along some of the main rivers. Despite the impact on the ecoregion by the many powerful fires that occur, the habitat is mostly intact.

The most common and widespread natural disturbance in the Interior Alaska-Yukon Lowland Taiga is wildfire. Scientists are now confirming the rapid increase in fires is the most recent indicator of climate change that is wreaking havoc on the state, its forests, habitats, its glaciers, and the permafrost underneath the ground. The new combustive era that Alaska is entering could completely transform the ecosystems within the state. Its forests make up about 18% of the United States of America, and although they have always occasionally caught fire and burned, the flames are now so powerful, they are starting to affect not only the forests, but also the cities and villages in Alaska/Yukon. Many are losing their homes due to the raging blazes.

The usual temperature of Alaska has increased about 3° Fahrenheit over the last sixty years, which is more than twice the increase of temperature in the rest of the US. Climate change has caused the winter season to rise an estimated 6° Fahrenheit and altered ecosystems. The temperatures in Alaska are predicted to rise anywhere from two to four degrees fahrenheit by 2050.

In addition to the rise in temperatures, the thawing of permafrost in Alaska is another result of climate change. 25% of the Northern Hemisphere is comprised of permafrost, which reserves high amounts of carbon. If the permafrost were to melt, it would release all of the methane and carbon dioxide, gases which trap immense amounts of heat, into the air. Its melting would also cause landslides, ground subsidence, alterations in plant structure at high latitude, erosion, and the dissipation of lakes and ponds.

Wildlife officials have taken the matter of habitat loss into careful consideration and many wildlife preservations have been implemented to protect both the flora and fauna of the Alaska-Yukon taiga. Yukon Flats National Wildlife Refuge, (located in east-central Alaska) Koyukuk National Wildlife Refuge, (located in west-central Alaska) Innoko National Wildlife Refuge, (located in western Alaska) Arctic National Wildlife Refuge, (located in northeastern Alaska) and Vuntut National Park, (located in northwestern Yukon Territory) are some of the most important and significant wildlife preservations.

Overall, The Interior Alaska-Yukon Lowland Taiga is a very important biome for the wildlife and the environment in Alaska and Yukon. The ecoregion's unparalleled collection of ecological facets due to regional differences in its drainage, microclimate and topography show the significance of the biome. And although the main complication that the taiga faces today is habitat loss due to human population, pollution, and logging in some of the areas near heavily populated towns, many assiduous

conservationists and biologists are now working to preserve the wildlife of the beautiful Interior Alaska-Yukon Lowland Taiga.

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Research Paper

Story Map Link: http://arcg.is/1sZFWkw

Steven Pera
5/18/16
ArcGIS
Biomes

Russian tundras constitute a vast an area across the Asian continent. We know these tundras for their cold, desert-like conditions. Many of these tundras have been affected by mankind in different ways. The different topics that will be discussed in this paper are how humans have impacted the tundra through pollution, a depletion natural resources, and international action. Some of the tundras in Russia has been affected more, acutely. Many plants and animals have been affected by these factors. Even though there is not as much life in the Russian tundras as there would be in a rainforest or the ocean, negative effects, like pollution, have made living in this biome even more difficult.

The extraction of natural resources from the tundra biome has resulted in the pollution of the tundras of Russia. These resources are nickel, copper, gold, tungsten, uranium, diamonds, natural gas, coal, and oil. It is a fact that Russia contains over thirty percent of all of the world's natural resources. This is the main reason why Arctic Russia is considered the most developed area of all of the Arctic. Extracting these resources has affected the tundras of Russia in many negative ways. The first example is the noise pollution that the extracting makes because when the machines are active they make a racket and give the organisms that live in the environment psychological problems and hearing loss which hinders an animal's ability to survive. A second example is when the machines that extract the oil are active, they release harmful gases and dusts into the environments. When the dust settles into a body of water, it makes the water uninhabitable for the organisms that live in it like fish. Extracting the natural resources in Russia has had a negative impact on the environment.

The pollution that we have caused is a major problem in the tundra biome. An example to show how this is a problem is when the Chernobyl Nuclear Power Plant in Ukraine detonated in reactor four and spread radiation across Ukraine, Belarus, and western Russia. The radiation caused more than five million people to be contaminated with radioactive minerals. Due to this explosion the mortality rates of coniferous plants, soil invertebrates, and mammals have increased. In addition, reproductive casualties have occurred in plants and animals as a result of this incident. Another example of how pollution has affected the tundra is when the Kharyaga Oil Field released oil due to the loss of pressure in a pipeline. This caused oil to be released about three point five kilometers into the Nenet Tundra. Oil spills such as this negatively affect the environment in three main ways. Firstly, when oil is on water, it blocks sunlight from passing through it which prevents aquatic organisms from getting sunlight. Secondly, when oil penetrates the plumage or fur of a bird it makes it difficult to regulate temperature. It also makes the plumage/fur heavier which hinders the birds ability to fly. Thirdly, oil is an extremely poisonous substance which makes life very difficult for the organism that digests it. Oil spills are, sadly, considered common in the tundras of Russia. The pollution of the tundras are of major concern in Russia.

Pollution is an international concern for some of the world's main conservation groups. One group is known as the Arctic Council that focuses their efforts on preserving the Arctic tundras. The priority areas are scientific research, environmental safety, technology, and international cooperation. They focus their attention on the waters around Russia.

Another group is called the World Wildlife Fund. It has three objectives: preserve the region's biodiversity, make sure that the natural resources in the area are sustainable, and to reduce pollution and wasteful consumption. The group focuses their efforts on seven main themes: marine, freshwater, endangered species, oil and gas, protected areas, climate change, and toxic waste. An example of how this group is preserving the tundras of Russia can be found in their work with an endangered animal, the Amur Tiger, which is located in eastern Siberia. The species almost went extinct until the WWF showed up and brought them out of endangerment. Without the efforts of the World Wildlife Fund the Amur Tiger would be extinct today.

In conclusion, Russian tundras are a majestic biome that must be preserved for future generations. Natural resources are the reason why people are so willing to take the risk of polluting the tundra. Pollution is often a consequence that is caused when we extract minerals and fossil fuels from the earth. Finally, international action needs to be taken in order to solve the problems created by the pollution of the tundra.

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