

Project Summary: The Great Lakes Region

For my final project, I decided to focus on the Great Lakes region and its importance as an ecosystem services provider. As a graphic designer, I felt that the best way to portray the region's importance was with an infographic. My thinking behind this was that people would be more inclined to learn about the region and ecosystem services if the information were presented in a visually interesting and approachable manner. Because the region is a major part of the economy, its conservation is necessary. If more people realized just how important the Great Lakes region is, more steps would be taken to make sure the quality of its ecosystem is not degraded. As an introductory guide to ecosystem services and the Great Lakes region, the infographic I designed is divided into three sections (what ecosystems services are, what ecosystem services are provided by the region, and ecological threats to the provision of these resources) to present the information in a clear manner.

The first section defines what ecosystems are. Prior to taking this class, I had no knowledge of ecosystem services. I understood that goods like water and food came from the environment, but it never occurred to me that natural processes like groundwater filtration by marshes and flood protection from coastal sand dunes were benefits provided by ecosystems [1]. Therefore, the beginning of the infographic establishes exactly what ecosystems are, which are "the benefits people obtain from the ecosystem [2]." To show the range of ecosystem services, I also decided to include the four categories they are put in. These are provisioning, regulating, supporting, and cultural [3]. The idea that cultural services, such as tourism and other recreational activities, are provided by the ecosystem along with other services that aren't immediately obvious should be eye-opening to the viewer learning this information for the first time and cause them to think for a moment about how human activities impact ecosystems.

The next section illustrates examples of the ecosystem services provided by the Great Lakes region. The most obvious good available is the freshwater. However, many people may not know that "the Great Lakes contain the largest supply of freshwater in the world [4]." Surely such a large amount of water provides habitats to many fish. Actually, the "largest and most valuable assemblage of freshwater resources in the world is in the Laurentian Great Lakes of North America [5]." Additionally, "about 65 million pounds of fish a year are harvested from the lakes, contributing more than \$1 billion to the Great Lakes economy [6]. Other examples of ecosystem services of the Great Lakes region include references to tourism and the natural processes marshes and coastal sand dunes provide as previously mentioned.

Now armed with a basic understanding of ecosystem services and how important the services provided by the Great Lakes region are, the viewer then comes to the third and final section which illustrates threats to ecosystem services. Coastal developments and the presence of toxic chemicals in freshwater, which enter food webs and can cause both human and ecological health concerns, is probably the most well-known threat [7]. Overfishing, on the other hand, may not be one of the first things someone would think of when considering ecological threats. Many people do not consider the limited nature resources like fish have, especially when dealing with commercial

purposes. Overfishing has put fish species at risk of extinction, such as the lake sturgeon, and has reduced biodiversity and the types of fish available for commercial use [8]. Considering the fact that fish harvesting in the region contributes more than \$1 billion to the Great Lakes economy, fishing must be regulated there in order to ensure the amount of fish available for commercial use does not become depleted. Another threat that is even less obvious is how the use of synthetic fertilizers leads to the stimulation of algal growth [9]. This of course has deleterious effects on water quality and aquamarine life.

The major issue regarding conservation efforts is the simple fact that many people are not aware of how valuable ecosystems are. Additionally, many informational pieces tend to be very text-heavy or poorly designed, leading many people to overlook the value of the information they present or ignore them altogether. My goal with this infographic was to design something that would feel approachable to a viewer and make them want to read about ecosystem services and the Great Lakes region, providing them with a basic understanding of these concepts and hopefully causing them to seriously consider the human impact on ecosystems and even look further into ecology.

Annotated Bibliography

- 1.Center for Coastal Resources Management, "Ecosystem Services", http://ccrm.vims.edu/coastal_zone/integrated_guidance/Chapters/Ecosystem_Services.pdf, Accessed 22-Apr-2013.

Marshes provide habitats for animals. They improve water quality by filtering groundwater, and they also reduce erosion. Coastal sand dunes serve as protective barriers from flooding and erosion, provide reservoirs of sand to replenish the beach zone, and provide habitats for a variety of plants and animals.

2. USDA, "Ecosystem Services FAQ's", http://www.fs.fed.us/ecosystemservices/About_ES/faq.shtml, Accessed 22-Apr-2013.

Ecosystem services are the benefits people obtain from the ecosystem. These not only include goods such as food, wood, and water, but include natural processes such as erosion control and pollination as well.

- 3.National Wildlife Federaton, "Ecosystem Servces", <http://www.nwf.org/Wildlife/Wildlife-Conservation/Ecosystem-Services.aspx>, Accessed 22-Apr-2013.

Ecosystem services are divided into four categories. Provisioning services are those that are obtained from nature, such as water, wood, and food. Regulating services are benefits that occur naturally, such as pollination and water purification. Cultural services are non-physical benefits that include things like recreation, creativity, and spirituality. Supporting services are naturally occurring processes that support the other ecosystem services, such as photosynthesis and the water cycle.

4. Great Lakes Environmental Research Laboratory, "About Our Lakes: Introduction", <http://www.glerl.noaa.gov/pr/ourlakes/intro.html>, Accessed 22-Apr-2013.

The world's largest supply of freshwater is in the Great Lakes. These lakes hold about 18% of the world's total freshwater and about 90% of America's total freshwater. They provide drinking water to 40 million U.S. and Canadian citizens.

5. Evans, Marlene S.. "Historical Changes in the Major Fish Resources of the Great Lakes." *Toxic contaminants and ecosystem health: a Great Lakes focus*. New York: Wiley, 1988. 104-105. Print.

The largest and most valuable assemblage of freshwater fish resources in the world is in the Great Lakes. They contain about 90% of the world's freshwater. A misunderstanding of how limited fish resources are led to a major reduction in fish populations.

6. Great Lakes Environmental Research Laboratory, "About Our Lakes: Economy", <http://www.glerl.noaa.gov/pr/ourlakes/economy.html>, Accessed 23-Apr-2013.

The Great Lakes region is economically significant. About 65 million pounds of fish a year are harvested from the lakes, contributing more than \$1 billion to the Great Lakes economy. Recreation and tourism also contribute greatly to the economy. Sport fishery is one of the major attractions.

7. GLEAM, "Toxic Chemicals", http://www.greatlakesmapping.org/great_lake_stressors/1, Accessed 22-Apr-2013.

Toxic chemicals are a significant environmental health issue. They enter food webs, which can cause serious human and ecological health concerns. Examples of this are mercury and copper. This has led to fish consumption advisories and concerns for safe drinking water.

8. http://www.great-lakes.net/teach/envt/fish/fish_4.html, Accessed 23-Apr-2013.

Overfishing in the Great Lakes has led to reductions of populations of differing fish species, such as the lake herring and lake sturgeon. This has resulted from the commercial demand of specific species.

9. GLEAM, "Nonpoint Pollution", http://www.greatlakesmapping.org/great_lake_stressors/7, Accessed 22-Apr-2013.

Nitrogen and phosphorus loading results from the use of synthetic fertilizers. These nutrients travel from land runoff into freshwater. This nutrient loading causes algal blooms, depleting the amount of underwater oxygen and reducing the quality of the water.

THE GREAT LAKES REGION

ITS IMPORTANCE & WHY YOU SHOULD CARE

THE LAURENTIAN GREAT LAKES

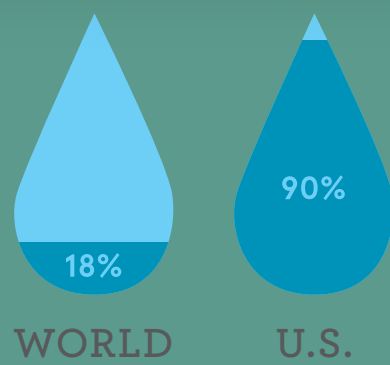
provide a host of ecosystem services, which are the benefits people obtain from the ecosystem. Examples of these include things we use directly such as wood, fish, and water, as well as natural processes like erosion control and pollination. Conservation of the Great Lakes Region is absolutely important if we want to continue reaping the benefits from the services it provides.



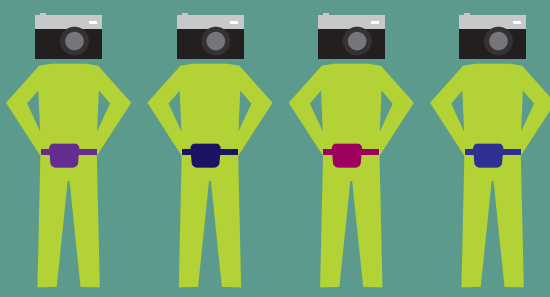
THERE ARE 4 CATEGORIES OF ECOSYSTEM SERVICES



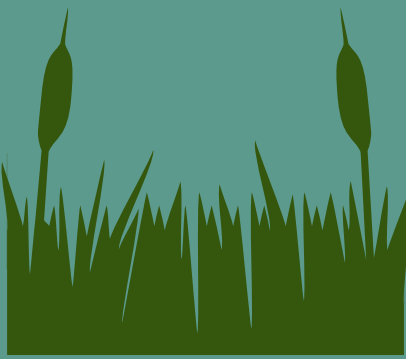
WHAT ARE SOME ECOSYSTEM SERVICES PROVIDED BY THE GREAT LAKES REGION?



The Great Lakes contain the largest supply of freshwater in the world, holding about 18% of the world's total freshwater and about 90% of the United States' total freshwater. They provide drinking water to 40 million U.S. and Canadian citizens



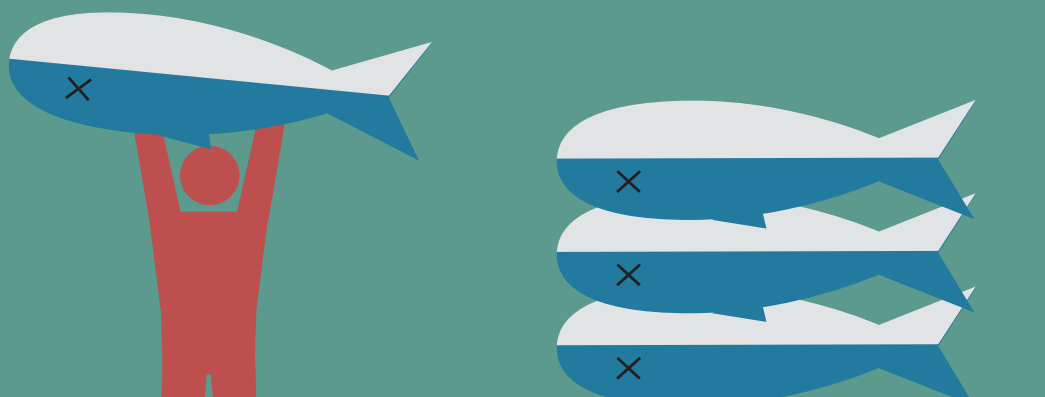
The Great Lakes provide popular tourism. The region is home to many park systems, conservation and wilderness areas, and beaches.



Marshes provide habitats for animals. They improve water quality by filtering groundwater, and they also reduce erosion.



About 65 million lbs. of fish a year are harvested from the lakes, contributing more than \$1 billion to the Great Lakes economy.



Sport fishery is a huge tourist attraction, which helps to build the economy of the Great Lakes region. It contributes \$4 billion to the economy.



Coastal sand dunes serve as protective barriers from flooding and erosion, provide reservoirs of sand to replenish the beach zone, and provide habitats for a variety of plants and animals.

WHAT ARE SOME THREATS TO THESE SERVICES?

The quality of the Great Lakes ecosystem has been degraded by intensifying human activity.



A large number of toxic chemicals, such as mercury, have been detected in Great Lakes waters. These chemicals enter food webs and can cause both human and ecological health concerns.

Overfishing has put certain species at risk of extinction, such as the lake sturgeon. This has reduced biodiversity and the types of fish available for commercial use.



The use of synthetic fertilizers in agriculture has led to nonpoint pollution. This means that the nutrients present in the fertilizers, particularly nitrogen and phosphorus, are brought to freshwater by way of land runoff. Nutrient enrichment stimulates algae growth, which in turn leads to oxygen depletion for fish.

If we wish to continue using the great ecosystem services provided by the Great Lakes region, action must be taken to conserve this necessary ecosystem.

Coastal developments, such as residences and power plants, have increased the amount of pollutants entering freshwater. They have also led to the loss of native species, as well as the destruction of aquatic and terrestrial habitats.

