ROYAL CANADIAN ARMY CADETS

MASTER CADET

INSTRUCTIONAL GUIDE

SECTION 1

EO C521.01 – RECOGNIZE THE IMPACT OF HUMAN ACTIVITY ON ECOSYSTEMS

Total Time: 90 min

PREPARATION

PRE-LESSON INSTRUCTIONS

Resources needed for the completion of this self study package are listed in the lesson specification located in A-CR-CCP-705/PG-001, *Master Cadet Qualification Standard and Plan*, Chapter 4. Specific uses for said resources are identified throughout the self study package within the section for which they are required.

Self study packages are intended to be completed by the cadet independently. More information about self study packages can be found in the foreword and preface.

Review the lesson content and become familiar with the material prior to facilitating this lesson.

Photocopy the self study package located at Attachment A for each cadet.

Photocopy the answer key located at Attachment B but **do not** provide it to the cadet.

PRE-LESSON ASSIGNMENT

Nil.

APPROACH

A self study was chosen for this lesson as it allows the cadet to examine in greater detail the impact of human activity on ecosystems at their own learning pace. This encourages the cadet to become more self-reliant and independent by focusing on their own learning instead of learning directed by the instructor.

INTRODUCTION

REVIEW

Nil.

OBJECTIVES

By the end of this lesson the cadet shall have recognized the impact of human activity on ecosystems.

IMPORTANCE

It is important for cadets to examine the impact of human activity on ecosystems. By knowing the impacts of various activities, cadets will be able to counsel their subordinates and peers. That knowledge will give them the tools to minimize their impact on the environment.

SELF STUDY PACKAGE INSTRUCTIONS

OBJECTIVES

The objective of this self study package is to have the cadet recognize the impact of human activity on ecosystems.

RESOURCES

- Self study package, and
- Pen / pencil.

ACTIVITY LAYOUT

Provide the cadet with a classroom or training area suitable to complete the self study package.

ACTIVITY INSTRUCTIONS

1. Provide the cadet with a copy of the self study package located at Attachment A and a pen / pencil.
2. Allow the cadet 90 minutes to complete the self study package.
3. Provide assistance as required to the cadet.
4. Collect the self study package once the cadet has finished.
5. Correct the self study package with the self study package answer key located at Attachment B.
6. Provide feedback to the cadet and indicate whether or not they have completed the Enabling Objective (EO).
7. Return the completed self study package to the cadet for their future reference.
8. Record the result in the cadet's logbook and Cadet Training Record.

SAFETY

Nil.

END OF LESSON CONFIRMATION

The cadet's completion of the self study package will serve as the confirmation of this lesson.

CONCLUSION

HOMEWORK / READING / PRACTICE

Nil.

METHOD OF EVALUATION

Nil.

CLOSING STATEMENT

The information in this package should enable the cadet to recognize the impacts of some of their actions either when leading groups during outdoor activities or when faced with personal decisions. The cadets will

have awarereness that all actions have varying impacts and they will also be able to create that awareness in younger cadets.

INSTRUCTOR NOTES / REMARKS

Nil.

REFERENCES

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RECOGNIZE THE IMPACT OF HUMAN ACTIVITY ON ECOSYSTEMS

SECTION 1: THE CONCEPT OF ECOSYSTEMS
SECTION 2: THE CHANGES IN ECOSYSTEMS DUE TO OUTDOOR RECREATION
SECTION 3: THE IMPACT OF PERSONAL ACTIVITIES AND LIFESTYLE CHOICES

SECTION 1
THE CONCEPT OF ECOSYSTEMS

How much do you know about the environment surrounding you?

First, let's look at ecology. What is ecology? Ecology is the branch of biology that studies the interactions of living things with each other and their physical environment. All living things on Earth may be arranged into various levels of organization. One of these levels is the ecosystem, which represents the highest level in a hierarchical organization of biological systems (which ranges from the cell to organism to population to ecosystem).

Think of the last time you were outdoors. Do you remember seing living things like grass and people? Do you remember seeing non-living things like concrete, soil, or maybe puddles or snowbanks?

An ecosystem contains all of those parts that you can see (eg, soil, water, insects, rocks, birds, trees, and people), and also parts you cannot see (eg, microscopic organisms like bacteria and fungi, or molecules of food and nutrients that are in water, soil, and air).

Often, ecosystems are confused with habitats.

Do you know the difference between habitat and ecosystem? If so, write it down.

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Habitat describes the conditions a particular organism needs to live (eg, a whale needs salt water and fish to eat, gophers need plants to eat and soil to burrow in, and giant sequoias (a tree) need lots of water and soil nutrients.)

Ecosystems include much more than just the requirements needed for a particular type of organism to live. Ecosystems include interactions among many types of organisms and abiotic (non-living) parts of the environment too. A healthy ecosystem shows a pattern of organization in the functional relationships between its components.

Etymologically, the word ecosystem derives from the Greek *oikos*, meaning home, and *systema*, meaning system.

Did you know?

British ecologist A.G. Tansley proposed the word "ecosystem" in 1935.

American Raymond L. Lindeman offered the now classic definition in 1942.

Very geographically large ecosystems (eg, arctic or tall-grass prairie) are often called biomes.

Do you think it is possible to artificially create a closed ecosystem?

Do you think we could create a functional ecosystem?

Are humans capable of such a thing?

Well one thing is sure… You bet we have tried!

Between 1987 and 1991, Project "Biosphere 2", a man-made, materially-closed ecological system in Oracle, Arizona (USA) was constructed. It allowed the study and manipulation of a biosphere without harming the Earth's, and the exploration of the possible use of closed biospheres in space colonization.

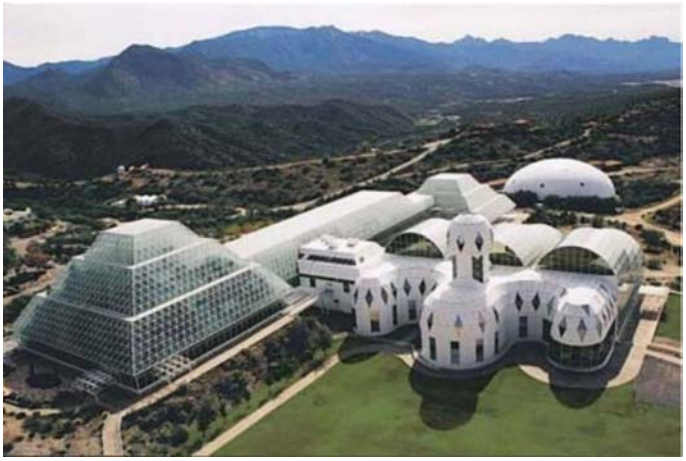


Figure 1 Biosphere 2, Arizona

Note. From *The Call of the Biosphere: Dangerous Diminishment*, by The Call of the Land, 2009. Retrieved February 17, 2010, from http://thecalloftheland.wordpress.com/2009/03/01/the-call-of-the-biosphere-dangerous-diminishment/

At a size comparable to two and a half football fields, it remains the largest closed system ever created.

Biosphere 2 contained representative biomes:

- rainforest,
- ocean with a coral reef,
- mangrove wetlands,
- savannah grassland,
- fog desert, and
- an agricultural system.

Biosphere 2 had two closure experiments in which crews lived in the facility for up to two years.

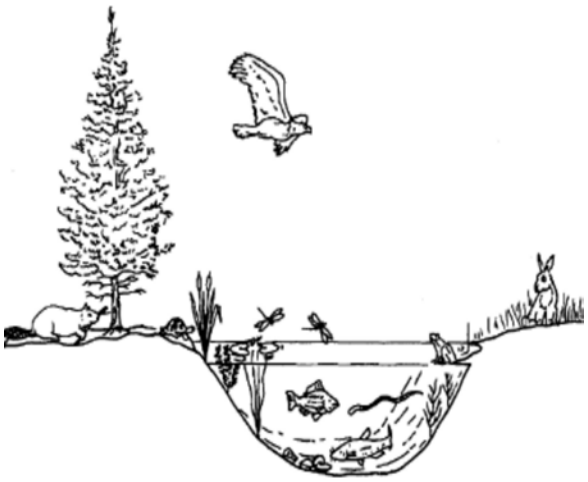
The name Biosphere 2 comes from Earth’s biosphere, Biosphere 1, Earth's life system and the only biosphere currently known.

Look online at http://www.b2science.org for more information on Project Biosphere 2.

Aquatic Ecosystems

We can identify two main types of aquatic ecosystems: salt water and freshwater. Aquatic ecosystems usually support a wide variety of life forms, including micro-organisms, bottom dwellers, free-floating and rooted plants, fish, birds, reptiles, and amphibians. Habitat conditions affect the type and number of species present. Wetlands are areas that are permanently or temporarily submerged in water—such as marshes, swamps, bogs, and sloughs.

A Pond Ecosystem



This is a pond **ecosystem**. There are many organisms of different species in this location interacting with the air, water, and land components of this environment.

Figure 2 Pond Ecosystem

Note. From *Population Diversity*, by J. M. Buckely, 2003, Oswego City School District Regions. Retrieved February 16, 2010, from http://regentsprep.org/regents/biology/units/organization/population.cfm

Did you know?

"Canada contains more than 1.2 million square km of wetlands covering about 14% of its total land area. This represents one quarter of all wetlands in the world. The only ecosystem designated for conservation by international convention, wetlands are highly valued as wildlife habitats and as natural water filters."

- Environment Canada (http://www.ec.gc.ca/default.asp?lang=En&n=E7F27BBB-1)

All ecosystems must have three basic kinds of nutritional interactions in order to be stable and self-sustaining. These nutritional interactions involve producers, consumers, and decomposers.

Do you know the difference between producers, consumers and decomposers? Can you give examples of each?

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Producers are capable of using the sun's energy to make glucose (sugar) through the process of photosynthesis. Plants and algae are examples of producer organisms. Sometimes producer organisms are called autotrophs (because they are somewhat "self-sufficient"). Phytoplankton, which is so small it cannot be seen with the naked eye, is a producer found in water. It is at the bottom of the food chain.

Consumers depend upon other organisms for their food (eg, fish, birds). Sometimes consumer organisms are called heterotrophs. Many different categories of consumer organisms exist. A herbivore eats primarily plant material, while a carnivore eats primarily other animals. An omnivore is a consumer that eats both plant and animal material. Humans are an example of an omnivore.

Decomposers are a special category of consumer organism. Decomposers break down dead organic matter and change it to simpler nutrients which can be recycled in the ecosystem. For example, bacteria and fungi (molds and yeast) are decoposers.

Think about the effect that a change in producers would have on an ecosystem. How about the effect from a change in consumers? In decomposers?

Activate your Brain #1

What is another term used to describe geographically large ecosystems?

_____

The greater the number of different populations that interact within an ecosystem, the more stable and self-sustaining the ecosystem becomes. The number of different populations within an ecosystem is sometimes referred to as biodiversity. Biodiversity is also important for providing us with compounds for new medicines, and seeds for new crops. A loss of species or change in species composition can threaten an ecosystem's health and affect our economic and socio-cultural sustainability.

***Activate Your Brain #2*:**

Explain why biodiversity is important to humans.

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Define ecosystems in your own words.

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In summary, ecosystems are spaces where resources are constantly cycled. An understanding of the dynamics of each ecosystem is essential to the management of land and sea and to the productivity of the environment as a whole.

Did you know?

- Water is the only substance found on Earth naturally in three forms—solid, liquid and gas.
- Once evaporated, a water molecule spends about 10 days in the air.
- 68.9% of Earth's freshwater exists in the form of glaciers and permanent snow cover.
- In Canada, there is more water underground than on the surface.
- The Great Lakes are the largest system of fresh, surface water on Earth, containing roughly 18% of the world's fresh, surface water.

- Environment Canada (www.ec.gc.ca/water/en/e_quickfacts.htm)

SECTION 2
THE CHANGES IN ECOSYSTEMS DUE TO OUTDOOR RECREATION

The axiom "Leave nothing but footprints; take nothing but photographs; kill nothing but time," is an excellent guide for travelling in outdoor environments, but it may not be enough; even footprints can be damaging. Footwear with hard soles, whether boots, shoes or sandals, can tear the fragile surface of a meadow and accelerate erosion on hillsides.

List ways in which you believe outdoor activities may impact ecosystems.

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There are many ways in which the activities carried out by humans may impact the surrounding environments. Here are a few examples of some activities that have impacts:

- Pressure on the ground from walking, running, skiing, snow shoeing, etc;
- Power from a boat that must be dissipated in the water (turbulence); and
- Very high speed air movement created by aircraft.

Did you know?

About 70% of the Earth is covered in water.

- Environment Canada (www.ec.gc.ca/water/en/e_quickfacts.htm)

Physiological Reactions of Plants to Touching, Shaking, Bending, Wounding, and Defoliating.

A widespread effect of outdoor recreation is a plant's reaction to the gentle stimulus which may be a very occasional touch, or repeated brushing in more frequently used locations.

Reaction to touching. Most plants respond to contact with a bioelectric change that is essentially the same as the one that occurs in an animal's nervous system. This impulse originates even when stimulus is not injurious. Repeated contact by brushing has been shown to affect some species negatively (eg, affecting growth of seedlings or reducing the length of the stem) and to affect others positively (eg, inducing their resistance to frost and drought by strengthening the stems).

Reaction to shaking. Shaking tends to be more intense than touching, although there is still no disruption of plant tissue. Plants that are put through robust shaking show a reduction in size (eg, length or leaf numbers). However, there are some parameters, linked to plant strength, that increase, such as stems' weight or the weight of the leaves.

Reaction to bending. In addition to triggering the reactions previously discussed, more extensive tissue changes occur when a plant is repeatedly bent. "Reaction tissue" (wood) is created by some plants.

Reaction to wounding. The wounding response appears to be more long-lasting, although of similar magnitude to that produced by touching, bending or shaking. Plants react by creating various substances; some may have healing virtues, while others may have defensive virtues. In other words, a plant may create a

substance that will allow it to heal or a substance that will try and prevent the wounding from happening again by acting like a poison. Creating such substances requires a significant amount of energy from the plant. If the plant is seriously wounded, this demand may be difficult to sustain. It may also affect the plant's growth because energy normally needed for growth goes toward plant repair.

Reaction to defoliating. First, it is important to understand that leaves are important to a plant because they play a role in photosynthesis—the process that allows a plant to take the energy from the sun and turn it into energy. Plants that have a low reserve of energy are more susceptible to adverse conditions such as frost, heat, and drought. Severe defoliation also leads to a reduced root system, which impairs the plant's capacity for absorbing water and nutrients.

***Activate Your Brain #3*:**

What is a plant's first reaction when it is touched?

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In conclusion, damage to plants by recreational activities have various physiological and biochemical consequences.

Changes in Vegetation as a Result of Wear

There is a link between the number of walkers or vehicles driving on vegetation and the resulting reduction in plant cover. The more vulnerable plants are the first ones to be eliminated. Then, with an increase in the amount of visitors, the more resistant plants are eliminated until no living vegetation remains.

Look at Figure 3. Notice the effects trampling on large plants and on small plants. What are your observations?

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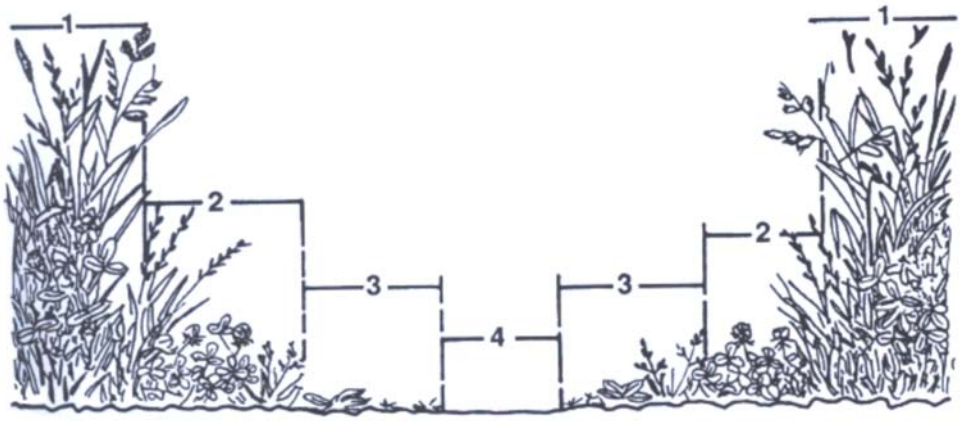

Figure 3 Effects of Trampling

Note. From *Recreation Ecology*. (p.37), by M. Liddle, 1997, London, England: Chapman & Hall.

Figure 3 illustrates how taller plants are affected the most by trampling. Zones 2, 3, and 4 show how taller plants are the first to disappear while zone 3 highlights that the smaller plants are the last ones to do so. It is unfortunate because of the importance the structure of the vegetation has for other plants and animals.

In order to minimize your impact, be aware that the impact of wear is least in the growing season. This is also the time when the fastest recovery can take place.

Another way humans' actions affect vegetation is by a change in diversity.

Look at Figure 4. Do you recognize the plant?

Figure 4 Arctium Lappa, Commonly Called Burdock

Note. From *Pflanzenbilder*, by Imagines Plantarium, 2009. Retrieved February 16, 2010, from http://www.imagines-plantarum.de/index.html

Did you know?

In the 1940s, George de Mestral, from Switzerland, went on a hunting trip with his dog during which they both got covered in Burdock. After observing under the microscope how burdock hooked on his dog's hair and his clothes, he had the brilliant idea to invent VELCRO. The name VELCRO is inspired by "velvet" and "crochet".

- About.com (http://inventors.about.com/library/weekly/aa091297.htm)

It is possible that you have returned from a hike or an afternoon outdoors with Arctium Lappa stuck to your pants; or dirt on your boots; maybe even branches in your hair.

Outdoor activities often result in seeds being carried in the mud on people's shoes, attached to clothing and in pockets or bags. In addition to the "personal" transport of seeds, seeds may also be carried long distances by adhering to motor vehicles. This results in an increase of diversity. This transport on a global scale is demonstrated by a common path flora existing in nearly all temperate regions. Diversity has been shown to increase with slight wear but decreases as the intensity of wear rises.

***Activate Your Brain #4*:**

How do outdoor activities impact diversity?

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Disturbance to Animals

According to Liddle, M. (Recreation Ecology, p. 346), interactions between humans and wildlife can be categorized into three types of disturbance:

Type 1–Interruption of tranquility. The animal sees, hears, smells or otherwise perceives the human but there is no contact or alteration of behaviour. The consequences of this type of disturbance may be positive or negative for the animal. Consequences may include disturbance of essential activities, severe exertion, displacement and sometimes death depending on the severity of the disturbance. Different species of wildlife have different tolerance levels for interactions with humans. Even within a species, tolerance level varies according to the time of the year, breeding season, the animal's age, the habitat type, and the individual animal's experience with humans. In general, the larger the animal, the greater the effect of this disturbance.

Type 2–Change to the habitat. The animal's habitat is changed by the creation of pathways, camping, the presence of food, or the clearing of native vegetation (eg, building rest areas, visitor centres, facilities, or even large tourist complexes). Easy access to food as a result of human action, or an animal adapting to urban living also fit this category. The consequence of this type of disturbance may also be positive (eg, the increase in the numbers of mice or birds around picnic areas and campsites may be attributable to the increase in food supply) or negative for the animal (eg, disappearing of the animal's habitat or the animal's dependency for food). There

are many recorded increases in wildlife population as a result of habitat change. The opposite effect, where the number of animals decreases is often regarded as the usual consequence of this disturbance.

Type 3–Injury or death. The animal is affected by direct and damaging contact, such as hunting and fishing, although it may be extended to stepping on small animals, collisions with vehicles, and other accidental contacts that have the similar results. By definition, this type of disturbance is harmful to wildlife, causing injury or death.

Did you know?

"Living species of animals and plants are now vanishing around the world one thousand times faster than at any time in the past 65 millions years."

- Earth in the Balance. A. Gore (p.24)

Impact of Water-Based Recreation

Did you know?

- The Great Lakes sustain a $100 million commercial fishing industry.
- The Great Lakes sustain a $350 million recreational fishing industry.

- Environment Canada (www.ec.gc.ca/water/en/e_quickfacts.htm)

The effects of recreational activities on aquatic animals are less well understood than the effects on plants, partly because animals react to the presence of humans, and to the results of their activities, in very different ways. They may be affected by sight and sound, as well as by any associated pollution or other change in the environment. Furthermore, animals are often strongly dependent on plants for food, shelter, breeding sites, or simply for somewhere to sit, so that they may suffer indirectly if plants themselves are affected. This also applies to zooplankton (tiny invertebrates that live in the water and that are an important source of food for marine organisms), in the open water and to birds and mammals at the margins of a water body.

The physical impacts of water-based recreation include:

- shore vegetation may be destroyed by shore-based fishermen, campers and people gaining access to the water either for swimming or launching boats;
- high speed propellers may act as rotating knives, cutting floating macrophytes (aquatic plants);
- the turbulence created by motor driven craft may increase the suspended material and hence the turbidity (muddiness, cloudiness) of the water column;
- wash from powerboats will erode unprotected banks in lakes and rivers;
- pollution released affects oligotrophic situations (where it is relatively poor in plant nutrients) such as mountain lakes, mangroves and some coral reefs.

Did you know?

- Every year, 1.5 million recreational boaters enjoy the Great Lakes.
- One drop of oil can render up to 25 litres of water unfit for drinking.

- Environment Canada (www.ec.gc.ca/water/en/e_quickfacts.htm)

***Activate Your Brain #5*:**

List the three types of disturbance that may affect animals.

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Did you know?

The Rule of Threes states that:

You can survive:

- three minutes without air,
- three hours in extreme weather conditions,
- three days without water, or
- three weeks without food.

It can also be extended to:

- three seconds without thinking, and
- three months without hope.

- Survival and Outdoor (http://www.suvod.com)

SECTION 3
THE IMPACT OF PERSONAL ACTIVITIES AND LIFESTYLE CHOICES

Think about all the products you use on a daily basis. Do you know where the products come from? Do you know what they are made of? Do you think about the waste these products generate?

You live in a consumer-driven world. All the products you consume have an impact on the world you live in. As an individual, you should be aware of the impact your personal activities and lifestyle choices have on the environment. You should:

- know your impacts;
- favour improvements; and
- share what you learn.

Humans have developed methods for evaluating their impact on the environment. Some of the terminology associated with this is as follows:

Life Cycle Assessment (LCA). A method that assesses raw material production, manufacture, distribution, use and disposal including all intervening transportation steps necessary or caused by a product's existence: the sum of all those steps or phases is the life cycle of the product. Some categories of assessed damages are ozone layer depletion, habitat destruction and land use.

Carbon footprint. Estimation of the total greenhouse gas emissions (all six of the Kyoto Protocol greenhouse gases) caused directly and indirectly by a person, organization event or product. A carbon footprint is measured in tonnes of carbon dioxide equivalent (tCO_2e) which allows the different greenhouse gases to be compared on a like-for-like basis relative to one unit of CO_2.

Ecological footprint. In simple words, it is the amount of land required from nature to support a typical individual's present consumption. It is measured in land areas called global hectares (gha). The ecological footprint concept demonstrates the material dependence of human beings on nature.

Did you know?

The present ecological footprint of an average Canadian or American demonstrates that if everyone on Earth lived like the average North American, we would need at least three such planets to live in a sustainable manner.

- Wackernagel, M & Rees, W., Our Ecological Footprint - Reducing Human Impact on Earth, 1996

***Activate Your Brain #6*:**

What is the unit of measure for:

- Carbon footprint: _____
- Ecological footprint: _____

Paper Bags versus Plastic Bags

One of the pioneering LCA studies is the analysis of the merits of paper versus plastic. Factors such as the amount of wood or chemicals used, the amount of electricity needed and the gases produced in the process are only a few among all of the factors that are considered. According to Earth News Review, here are some comparisons that can be made between standard plastic bags and paper bags.

Standard Plastic Bags:

- They can take over 500 years to biodegrade.
- An estimated 500 billion to 1 trillion plastic bags are used worldwide annually.
- Over 100 000 birds and marine life die each year due to plastic bags.
- Only 1%–3% of plastic bags are being recycled.

Paper Bags:

- The production of a paper bag generates 70% more air and 50 times more water pollutants than plastic bags.
- It takes more than 4 times the energy to manufacture a paper bag than a plastic bag.
- It takes 91% less energy to recycle a pound of plastic than it does a pound of paper.
- Only 10–15% of paper bags are being recycled.

Resource Conservation Manitoba (http://www.resourceconservation.mb.ca/news/Policy/bags_jan08.html) estimates that Manitobans carry home more than 200 million disposable plastic bags from grocery and retail stores every year.

On the other hand, CHANNAL "Changing Newfoundland and Labrador" (http://www.channalinc.ca/2009/04/14/paper-vs-platic-no-way-go-reusable) reports that over 55 million plastic shopping bags are being taken home each day by Canadians.

What do you think about the use of the reusable bags? What if you had to do the LCA for them… Do you think you'd be surprised?

Did you know?

- Approximately 300 L of water is required to produce 1 kg of paper.
- It takes an average of 215 L of water to produce 1 kg of steel.

- Environment Canada (www.ec.gc.ca/water/en/e_quickfacts.htm)

Sunscreen and Its Effects on Coral Reefs

When was the last time you went swimming outside? Did you put sunscreen on to protect your body from the sun? Did you think about the impact that sunscreen would have in the water?

Common ingredients in sunscreen contribute to the growth of a virus in the algae that live inside coral reefs. Researchers estimate between 4000 and 6000 tonnes of sunscreen wash off swimmers each year worldwide,

threatening to turn about 10 percent of coral reefs into bleached skeletons. The dangers are greatest where the most swimmers are drawn to the beauty of those reefs.

Did you know?

African and Asian women walk an average of 6 kilometres each trip in order to fetch water.

- Environment Canada (www.ec.gc.ca/water/en/e_quickfacts.htm)

Did you know?

Water uses and consumption:

- Toilet flush: 15-19L
- Shower (5 min): 100L
- Automatic dishwasher: 40L
- Dishwashing by hand: 35L
- Hand washing (with tap running): 8L
- Brushing teeth (with tap running): 10L
- Washing machine: 225L

- Environment Canada (www.ec.gc.ca/water/en/e_quickfacts.htm)

Cars

According to the Wall Street Journal: "For every 1.6 km (1 mile) it travels, the average car in the United States emits about 0.5 kilogram (1 pound) of CO_2. Given typical driving distances, that translates into about 4500 kg (10 000 pounds) of CO_2 per car per year."

A study by the University of Michigan found that, over its expected life, an American-made midsize sedan emits the equivalent of 57 000 kg (126000 pounds) of CO_2 which includes all emissions, from the making of the car's raw materials, through the shredding of the car once it's junked. The vast majority of those emissions—86 %—came from the car's fuel use.

Laundry Detergent

How can you wash and dry clothes in an environmentally-friendly way?

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Ways to make a "low-carbon" load of laundry include:

- using liquid detergent instead of powder—making solid detergent uses more energy than making the liquid variety;
- washing in cold water—doing the wash in cooler water reduces the carbon footprint of each load by 0.66 kg (0.3 pounds); and
- hanging clothes to dry instead of using the dryer—it cuts the carbon footprint of every load by 2 kg (4.4 pounds). This is the best way to reduce the environmental impacts of a load of laundry.

Also, some companies have adapted their products to make the load of laundry more ecologically friendly. They include:

- ecological detergent,
- concentrated detergent (requires less packaging),
- ecological laundry ball,
- highly-efficient laundry machines, and
- low maintenance clothes.

Did you know?

Canada is the largest producer of hydroelectricity, followed by the United States and Brazil.

- Environment Canada (www.ec.gc.ca/water/en/e_quickfacts.htm)

Have you ever wondered how much impact your outdoor activities have? Did you ever consider that the equipment you were wearing may have just as much, if not more impact on the environment as your activities themselves?

Litter in the wild

Have you ever thrown an orange peel in the field thinking, "Animals are going to take care of it"? Have you ever walked past a pop can wondering how long it would take for it to disintegrate? Have you ever picked up a package of Individual Meal Package (IMP) from the ground and wondered for how long it had been there?

Items used by humans disintegrate at a different rate. Some items will take days to disintegrate while some items take much longer. Let's see how much you know about this!

Did you know?

The percentage and types of litter found outdoors:

Fast Food waste: 33%
Paper: 29%
Aluminium: 26%
Glass: 6%
Plastic: 2%
Other: 2%

- The Good Human (www.thegoodhuman.com/2008/04/23/how-long-does-litter-take-to-disintegrate/)

Did you know?

Here is how long litter lasts in the wild:

Orange peel: 2–5 weeks
Paper bag: 1 month
Cigarette butt: up to 5 years
Leather shoe: 45 years
Plastic bottle: 430 years
Aluminium can: 200–500 years
Disposable diaper: 550 years
Glass bottle: Approx. 1 million years
Styrofoam container: 1 million years

- The Good Human (www.thegoodhuman.com/2008/04/23/how-long-does-litter-take-to-disintegrate/)

What are your thoughts about those numbers?

_____

_____

Congratulations, you have completed your self study package on the impact of human activity on ecosystems. Complete the following exercise and hand the completed self study package to the training / course officer who will record your completion in your Master Cadet logbook.

FINAL EXERCISE

Cadet's Name: _____ Date: _____

1. Determine if the following statements are true or false.

		True	False
1	You can survive about a month without food and water.		
2	Habitat describes the conditions a particular organism needs to live.		
3	Etymologically the word ecosystem derives from the Greek *oikos*, meaning "home," and *systema*, meaning "system."		
4	All ecosystems must have three basic kinds of nutritional interactions: producers, consumers, and decomposers.		
5	In reaction to defoliating, "reaction tissue" (wood) is created by some plants.		
6	The ecological footprint analysis is a tool that enables us to estimate the resource requirements in terms of productive land area.		
7	The way to most reduce the environmental impacts of a load of laundry is to wash in cold water.		
8	The impact of wear is least in the growing season and this is also the time when the fastest recovery can take place if the area is given a rest period.		

2. List the three types of disturbance that may affect animals and explain one of them.

Type 1 - _____

Type 2 - _____

Type 3 - _____

Explanation:_____

_____

_____

_____

ACTIVATE YOUR BRAIN ANSWER KEY

Activate your Brain #1

What is another term used to describe geographically large ecosystems?

These very large areas are often called biomes.

***Activate Your Brain #2*:**

Explain why biodiversity is important to humans.

Biodiversity is important for providing us with compounds for new medicines, and seeds for new crops. A loss of species or change in species composition can threaten an ecosystem's health and affect our economic and socio-cultural sustainability.

Activate Your Brain #3

What is the first reaction of a plant when it is touched?

Most plants respond to contact with a bioelectric change that is essentially the same as the one that occurs in an animal's nervous system.

Activate Your Brain #4

How do outdoor activities impact diversity?

Outdoor activities often result in seeds being carried in the mud on people's shoes, attached to clothing and in pockets or bags. In addition to the "personal" transport of seeds, seeds may also be carried long distances by adhering to motor vehicles. This results in an increase of diversity.

***Activate Your Brain #5*:**

List the three types of disturbance that may affect animals.

The three types of disturbance that may affect animals are:

- Type 1 - Interruption of tranquility.
- Type 2 - Change to the habitat.
- Type 3 - Injury or death.

***Activate Your Brain #6*:**

What is the unit of measure for:

- Carbon footprint: __tCO_2e__
- Ecological footprint: __gha__

FINAL EXERCISE ANSWER KEY

Cadet's Name: _____ Date: _____

1. Determine if the following statements are true or false.

		True	False
1	You can survive about a month without food and water.		X
2	Habitat describes the conditions a particular organism needs to live.	X	
3	Etymologically the word ecosystem derives from the Greek *oikos*, meaning home, and *systema*, or system.	X	
4	All ecosystems must have three basic kinds of nutritional interactions: producers, consumers, and decomposers.	X	
5	In reaction to defoliating, "reaction tissue" (wood) is created by some plants.		X
6	The ecological footprint analysis is a tool that enables us to estimate the resource requirements in terms of productive land area.	X	
7	The way to most reduce the environmental impacts of a load of laundry is to wash in cold water.		X
8	The impact of wear is least in the growing season and this is also the time when the fastest recovery can take place if the area is given a rest period.	X	

2. Explain the three types of disturbance that may affect animals.

Answers should include one of the following:

Type 1–Interruption of tranquility. The animal sees, hears, smells or otherwise perceives the human but there is no contact or alteration of behaviour. The consequences of this type of disturbance may be positive or negative for the animal. Consequences may include disturbance of essential activities, severe exertion, displacement and sometimes death depending on the severity of the disturbance. Different species of wildlife have different tolerance levels for interactions with humans. Even within a species, tolerance level varies according to the time of the year, breeding season, the animal's age, the habitat type, and the individual animal's experience with humans. In general, the larger the animal, the greater the effect of this disturbance.

Type 2–Change to the habitat. The animal's habitat is changed by the creation of pathways, camping, the presence of food, or the clearing of native vegetation (eg, building rest areas, visitor centres, facilities, or even large tourist complexes). Easy access to food as a result of human action, or an animal adapting to urban living also fit this category. The consequence of this type of disturbance may also be positive (eg, the increase in the numbers of mice or birds around picnic areas and campsites may be attributable to the increase in food supply) or negative for the animal (eg, disappearing of the animal's habitat or the animal's dependency for food). There are many recorded increases in wildlife population as a result of habitat change. The opposite effect, where the number of animals decreases is often regarded as the usual consequence of this disturbance.

Type 3–Injury or death. The animal is affected by direct and damaging contact, such as hunting and fishing, although it may be extended to stepping on small animals, collisions with vehicles, and other accidental contacts that have the similar results. By definition, this type of disturbance is harmful to wildlife, causing injury or death.

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