CAMOSUN COLLEGE GEOGRAPHY 100
ECOSYSTEMS AND NATURAL RESOURCES
Course Outline, Winter 2003

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COURSE DESCRIPTION:

This course is intended to acquaint students with the characteristics of our physical environment and the influence our human activity has on these surroundings. At the conclusion of the course, the student will be expected to know the properties of earth's major ecosystems and biomes; human population dynamics; and resource availability and conservation. The emphasis of lecture coverage will range from a global scale to local issues and concerns.

LEARNING OPPORTUNITIES:

Lectures: There will be two hours of lecture a week. The blackboard will be heavily utilized and overheads and slides will augment the traditional lecture style.

Labs: There are nine labs in the course. Each lab contains exercises to familiarize students with the tools of geography and many of the issues faced by geographers. Attendance during lab periods is mandatory. In the case of illness, the instructor must be contacted prior to the class time and an alternate arrangement must be made; otherwise, a mark of zero will be assigned. All labs are worth 2% each, except Labs 3,4, 6 and 7 which are worth 3.5%.

Presentations: The course material can, at times, become moderately depressing. To counteract any feelings of bleakness that might occur from this immersion, 10% of your mark is placed on a more optimistic project. You are responsible for researching and designing a 7-8 minute presentation on a person/group/company that has or is making a positive contribution to the environmental health of this city/province/globe OR that has created an innovative solution to a local/national/international problem.

Audio Reviews: David Suzuki produced an audio series for the C.B.C. Program *Ideas* in the winter of 1999. These tape cassettes are available on reserve in the library. You will be required to listen to them and take notes on what you hear. These notes will then be submitted for a pass/fail grade.

Audio Review Due Dates:	Summary of Episode 2: Big Foot	**Jan 22**
	Summary of Episode 8: Complex Pleasures	**Apr 2**

Midterm Exam: Two midterm exams will be given during the term. They will be held on and **February 12** and **March 19** and will be a selection of short-answer, multiple-choice, and short essay-type questions.

Final Exam: There will be a three-hour final exam during Exam Week. This exam will be comprehensive, requiring students to demonstrate knowledge of the important concepts presented during the whole course, but the emphasis will be placed on material from the second half of the course.

EVALUATION:

Midterm Exam 1	15%
Midterm Exam 2	20%
Lab Exercises	24%
Presentation	10%
Participation	3%
Audio Reviews	2%
Final Exam	26%
	100%

TEXTBOOK:

Our Environment: A Canadian Perspective by Diane Draper, ITP Nelson Publishing, 1998/2002.

There are two versions of the textbook available; the newest edition is sold by the bookstore but, since it is an expensive hard-cover, you are welcome to use second-hand copies of the old edition. I have also requested that two copies of the textbook be placed on reserve in the library for your use.

GRADING:

The standard grading scale of the Division of Arts and Science will be used for this course.

A+	>95%	B-	70-74%
A	90-94%	C+	65-69%
A-	85-89%	C	60-64%
B+	80-84%	D	50-59%
B	75-79%	F	<50%

COURSE SCHEDULE

Week of:	Monday Night	Wednesday Night	Readings
Jan 6	Course Introduction	Lab 1 – Topographic Maps 1	Chap 1
Jan 13	Ecosystems	Lab 2 – Topographic Maps 2	Chap 1
Jan 20	Biomes	Lab 3 – Rithet's Bog **	Chap 3
Jan 27	World Views	Lab 4 – World Views	Chap 2
Feb 3	Human Population	Lab 5 – Population	Chap 4
Feb 10	Non-renewable Energy (Lab 6 – Mining)	**MIDTERM #1**	Chap 10
Feb 17	Renewable Energy	**PRESENTATIONS**	Chap 11,13,14
Feb 24	Wildlife	**PRESENTATIONS**	Chap 12
Mar 3	Agriculture	**PRESENTATIONS**	Chap 6,14
Mar 10	Parks	**PRESENTATIONS**	
Mar 17	*St. Patrick's Day*	**MIDTERM #2**	
Mar 24	Water	Lab 7 – Water	Chap 7,13,14
Mar 31	Forestry	Lab 8 – Forestry**	Chap 9,13,14
Apr 7	Atmosphere	Lab 9 – Lifestyle	Chap 5,13,14
Exam Week	FINAL EXAM		

**Audio Review Notes are due on these days

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LAB 1: TOPOGRAPHIC MAPS #1

This exercise deals with various features of topographic maps. You will find that knowledge of how to use these will be useful not only in your courses, but in regular life for recreations, travel, and planning. A topographic map is a detailed and accurate graphic representation of cultural and natural features on the earth's surface. These maps are used for city planning, field research, navigation, trip planning.....any activity that requires information about the earth's surface. Features that are found on topographic maps can be divided into the following categories:

Culture: roads, buildings, urban development, hospitals, railways, schools, etc.
Water: lakes, rivers, streams, swamps, rapids, etc.
Relief: mountains, valleys, slopes, depressions, plains, etc.
Vegetation: wooded vs. cleared areas, vineyards, orchards, coral reefs, etc.
Toponymy: place names, feature names, highways names, etc.

Topographic maps use symbols and colour to differentiate between the above categories of information. Individual maps will have a legend on the back with a complete listing of the symbols used to differentiate the map features. Colours, on the other hand, are more generic and seven different colours are commonly found on topographic map sheets. The colours are:

Black: used for cultural features (buildings, railways, boundaries) and names;
Red: used for paved roads, highway numbers, and is often used for urban areas;
Orange: used for unpaved roads, unclassified roads, streets;
Blue: used for water features and names and is also used for the UTM grid;
Green: used for vegetation;
Grey: used on the back of the map to indicate the different symbols.

Purple can also be found and usually represents added, updated information on the map sheet.

1. On the Sidney topographic map sheet, what colour are the following two features: /1

Sidney townsite _____

Beaver Lake _____

SCALE:

Maps can never be the same size as the area they represent. The area must be reduced to manageable proportions, but at the same time the map must be an accurate representation of the area. In order to keep the accuracy of distances, a set scale is determined for the map.

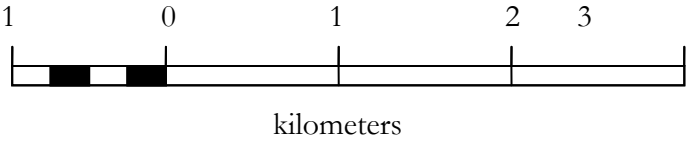
Scale refers to the relationship between distance on a map and the corresponding distance on the ground. For example, at a scale of 1:50 000, one unit of measure on the map represents 50 000 equivalent units of measure on the ground. So, if the unit of measure was centimeters, one centimeter on the map will represent 50 000 centimeters (or 500 meters) on the ground.

The scale must be consistent over the entire map and is usually indicated at the bottom or in one corner of the map sheet.

There are three ways of expressing scale:

Verbal Scale: written or spoken words to describe the scale.
Example: "one centimeter represents five hundred meters."

Graphic Scale: a line is drawn on the map and divided into units. The length of each unit is equivalent to the distance on the map sheet while the numbers on the bar represent the equivalent distance on the ground.
Example:



Representative Fraction: uses a fraction (with a numerator and denominator) to express the relationship between the distance on the map and the distance on the earth's surface. The numerator is the map distance and the denominator is the ground distance. The scale can be expressed as a fraction (1/50 000) or as a ratio (1:50 000).
Example: 1:10 000 means that one unit of measure on the map represents 10 000 equivalent units of measure on the ground. In other words, the distance measured between two points on the map is only 1/10 000th of the real distance on the ground. The real distance had been reduced 10 000 times!

Small versus large scale:

Small scale maps are ones with very small representative fractions (1: 500 000) and each map represents a very large area. Maps representing entire provinces or countries are small scale maps. Large scale maps are ones with larger representative fractions (1/ 25 000) and the area represented is much smaller. City maps, street maps, architectural plans are all large scale maps.

2. Express the scale of the Sidney topographic map sheet in three different ways. /3

3. Is the Sidney map a large, medium, or small scale map sheet? /1

DISTANCE:

The scale of a map is an essential piece of information for determining distances between features. In order to find out the distance between two points on the ground, one must measure the distance on the map. This is the map distance - but it is not the ground distance. To figure out the ground distance, we must use the scale information to convert the map distance. There are two ways to do this:

Use the graphic scale: take a piece of string or a piece of paper and measure the distance on the map. Then lay the paper or string along the graphic (bar) scale and read off the distance. This is the easiest scale to use but it is not very accurate.

Use the representative fraction: this is a very accurate method if it is done correctly. Measure the distance between two points on the map sheet in milli- or centimeters. Multiply this number by the denominator of the representative fraction to give the real distance on the ground. *NOTE* this number is in the same units used to measure the distance on the map. Convert this distance from milli/centimeters to more practical units like meters or kilometers.

Example:

The map scale is 1: 50 000.

On the map, the distance between point A and point B is 7.2 cm.

A cross multiplication is required:

$$\frac{\text{map}}{\text{ground}} = \frac{1}{50\,000} = \frac{7.2\text{ cm}}{x}$$

so, $1x = 7.2 \text{ cm} \times 50\,000 = 360\,000 \text{ cm}$

To convert centimeters to kilometers, divide by 100 000 so distance between point A and point B on the ground is 3.6 kilometers.

4. Using the graphic scale bar on the Sidney topographic map sheet, give the distances between the following locations in **both** kilometers and miles: /4

Victoria Airport Terminal to the tip of Wymond Point

_____

Sidney Spit lighthouse to the southernmost point of James Island

_____

One of the most useful features of topographic maps are the *locational grid systems*, or a system for positioning features on the map to the actual earth surface. The two most common locational grids are the system of latitude and longitude and the Universal Transverse Mercator system.

LATITUDE AND LONGITUDE

The earth is assumed to be a sphere with its axis passing through it's north pole and south pole. If a plane passes through the center of the earth, as when cutting an orange in half, it's intersection with the earth's surface is a great circle. Another of these great circles is the *equator* - a circle that runs horizontally around the earth midway between its poles. Its distance from each pole is 90 degrees, and the equator, being a complete circle, is divided into 360 degrees.

Parallels of latitude are smaller circles around the earth that run parallel to each other and to the equator. Parallels of latitude are equidistant from one another and one degree of latitude measures a distance of approximately 111 kilometers on the earth's surface (there is some error in this grid system and the actual earth distance is 110.6 km at the equator and 111.7 km at the poles). Each degree of latitude is divided into 60 minutes, otherwise notated as 60'. One minute of latitude is the equivalent of one nautical mile on the earth's surface (1 nautical mile = 1.1 statute mile = 1.85 kilometers). On topographic maps, parallels of latitude appear as horizontal straight lines that are read along a vertical axis.

Latitude defines position on the earth north or south from the equator. The latitude of a place on the surface of the earth is the vertical distance from the equator to that nearest parallel of latitude. Latitude is zero degrees on the equator, 90 degrees N at the north pole, and 90 degrees S at the south pole. Latitude can never exceed 90 degrees. See following diagram.

Meridians of longitude are lines, halves of great circles really, that extend from pole to pole always at right angles to the equator. A line drawn through any location on the earth's surface, north and south to the poles, is the meridian of that location. Meridians appear as vertical, parallel straight lines on topographic maps. Each degree of longitude represents 111 kilometers of the earth's surface at the equator, 72 km at 50 degrees North, and only 56 km at 60 degrees North.....so lines of longitude are **not parallel** to each other but, instead, converge at the poles. Each degree of longitude can be divided into minutes (denoted with ') and seconds (denoted with ")

Longitude defines position on the earth east or west from the meridian of Greenwich, which is called the *prime meridian*. The longitude of a place on the earth is the horizontal distance between the prime meridian and the meridian nearest to the place. It is measured East or West from the prime meridian (zero degrees longitude) and therefore cannot exceed 180 degrees or halfway around the earth, where east meets west (a location that is called the *International Date Line*). The prime meridian and the international date line divide the earth's surface into the 'eastern' and 'western' hemispheres

5. Using the Sidney topographic map sheet, give the latitude/longitude grid reference for the following locations: /8

the center of Roche Harbour ferry dock

_____

Turn Point

_____

Rum Island

_____

the summit of Bear Hill

_____

UNIVERSAL TRANSVERSE MERCATOR

A second type of locational grid system is called the Universal Transverse Mercator grid, otherwise known as UTM or the 'military grid system'. The military grid is a rectangular grid superimposed on the map sheet. The UTM grid is based on a projection of the earth in which the lines of latitude and longitude always intersect at right angles - therefore, the grid is rectangular rather than converging (like it is with latitude and longitude). Based on this projection, the map of the world is divided into large grid zones which cover 6 degrees of longitude and 8 degrees of latitude. These large grids, over 200 000 square meters in area, are further subdivided into grids of 100 000 meters and 1000 meters. Each 100 000 meter grid square is identified by two letters. This grid consists of a network of lines (usually blue in colour) with similarly coloured reference number located on the edge and in the center of the map sheet. Each square represents one square kilometer, and so each side of a square represents 1000 meters.

6. Using the Sidney topographic map sheet, give the UTM grid references for the following locations: /8

Tom Point _____

the **summit** of Little Mountain _____

Island View Beach campground _____

Cordova Bay golfcourse _____

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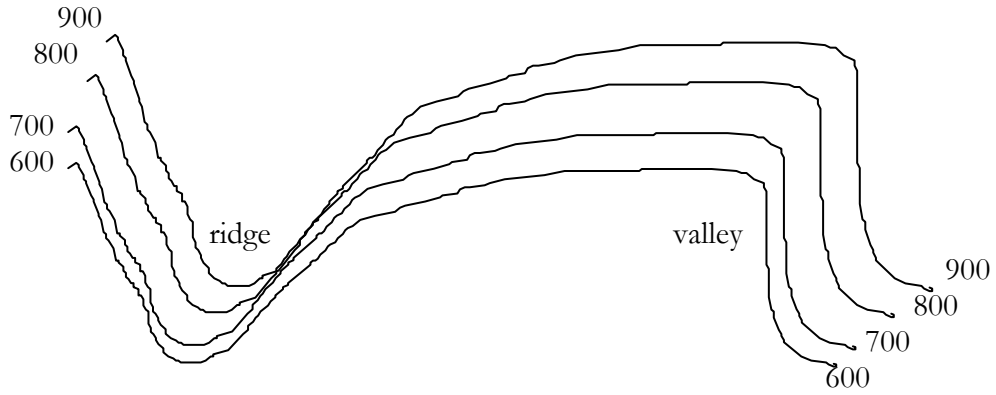
LAB 2: TOPOGRAPHIC MAPS #2

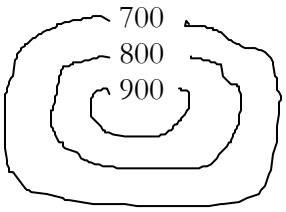
Relief, or topography, refers to the variations in elevation and shape of the land surface. There are various means of showing this 'third dimension' on a flat map sheet:

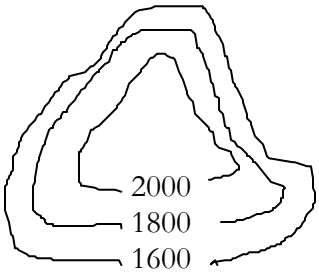
> **Contours**: are lines that connect a series of points of equal elevation. Contour lines are usually drawn in brown on topographic maps and the interval of elevational increase that each line represents is stated at the bottom of the map.
>
> **Spot heights**: are specific points that have been surveyed and for which precise elevation is known and marked on the map. These spot heights are usually noted in brown italics.
>
> **Altitude zonation**: this technique of using different colours for different bands of elevation range is often used on small scale maps. Low elevation ranges are usually coloured in shades of green, while higher elevation zones are coloured in shades of brown or purple for the highest mountain ranges moving to white for ice covered areas or areas that are above the tree-line.

Contour lines are spaced at intervals, varying from map to map, and that interval is usually stated at the bottom of a map sheet. The steepness of a slope is shown by the spacing between contours. On steep slopes, the contours are very close together, and on gentle slopes the contours are spaced farther apart. Valleys are shown by V or U shaped contours and the V always points uphill. Ridges are also shown by V or U shaped contours but the V always points downhill.

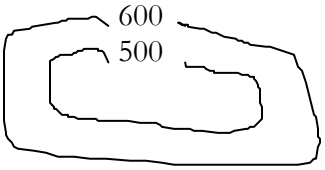


Hills are shown by a series of enclosed contours within one another. A round hill will be shown as a series of concentric circles; a pyramid shaped mountain will be shown as a series of enclosed triangles.

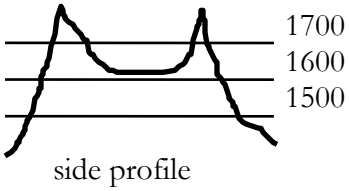




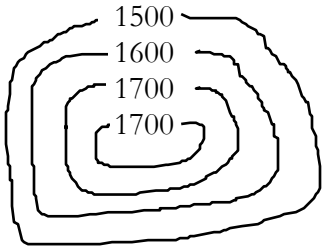
Depressions or hollows are also shown by a series of concentric circles but the contours are hachured (meaning that there are short lines at right angles to the contour lines). The hachures point to the center of the depression.



Depressions at the top of a hill (e.g. , a volcanic crater): first depression contour always has the value of the normal contour encircling it.

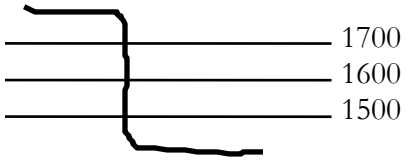


side profile



topographic representation

Vertical cliffs are deceptive on topographic map sheets. The contour lines stack one on top of each other which makes it difficult to distinguish them on the map.



1700 1400

(note that the 1600 and 1500 contour lines are missing because they are stacked underneath the 1700 line)

1. Using the contour lines provided on the Jacobsen Glacier map sheet, determine the elevation of the following features: /2

953663 _____

Ape Lake _____

2. Has altitude zonation been used on the Jacobsen Glacier map sheet? Explain. /2

3. Name one feature on the map and the spot height that has been given for it. /2

4. You have suddenly been placed in charge of the universe and your first task is to design an island for the South Pacific. Your boss has given you these criteria: the elevation on the island is 800 meters; there is a volcanic crater; one river drains off the crater; there is a vertical cliff down to the sea on the northern shore; and the contour lines must be in 100 meter intervals and there is a passenger ferry on the west side of the island. Draw the map for your boss with a title, a north arrow and a legend. /20

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LAB 3: RITHET'S BOG

In this exercise, you will take a walk around Rithet's Bog. The purpose of the lab is to view an ecosystem in transition, to try to understand what is occurring there. You should have read Chapter 3 in the text before going to the bog, and you should bring your ecosystems class notes. This is a real, live ecosystem – and you may quickly discover that they are more complex than they look in textbooks.

Your job is to follow the path around the bog, reading the lab as you go and answering the questions at various stops. Open your eyes! Look at what's nearby and in the distance, and try to imagine the big picture of how the bog functions. The questions do not require an in-depth understanding of ecology – my main intent is to get you outside and doing field work.

Write your answers on your own paper. Use a pencil while you are at the bog, and tidy them up and complete them at home. Copy them onto fresh paper if the rough answers get too thrashed.

Keep your answers short! The assignment is due in lab next week.

A. Location of Rithet's Bog

Rithet's Bog, a 42 hectare park administered by Saanich Municipality, is located in Broadmead in Saanich, next to the Pat Bay Highway.

If you are driving or cycling: If you are approaching from the south, the easiest way is to come along Quadra and turn right on Chatterton Way. The bog will be on your right. From the highway, take the Quadra exit, turn right on Quadra and immediately left on Chatterton. If you are approaching from the north on the Pat Bay Highway, take the Royal Oak exit, cross over the highway and turn right on Chatterton Way. If you are approaching from the north on West Saanich Road, turn left on Royal Oak, cross over the highway and then right on Chatterton.

If you are taking the bus, there are bus stops (travelling north or south) on Chatterton Way at Dalewood Lane, beside the Bog.

The lab begins at the interpretive sign at the northwest corner of the bog, at Chatterton and Dalewood. You will circle the park counter-clockwise.

B. Some Words of Advice and Words of Caution

The length of the bog perimeter trail is 2.8 kilometres. The trail is wide, smooth and quite level. **Allow yourself about two hours to walk around the bog and make rough answers to the questions.** Biking, rollerblading, snowshoeing, etc. are not permitted on the trail - only feet! If it has been raining, the trail could be soggy…

When you walk around the bog, remember that you are in a fragile ecosystem. Don't leave anything behind; don't pick any wildflowers, cattails, etc.; don't disturb any of the many creatures that inhabit the bog; and don't leave the main trail – you'll most likely end up in water up to your waist. You can bring your dog, but please keep it leashed.

Don't be in a rush to complete the work. Take time to listen to the sounds of the bog and observe this unique ecosystem. If you have a pair of binoculars, you may want to bring them with you. Walking in an environment like Rithet's Bog can be very therapeutic. Relax and enjoy!

And oh yes, don't forget to bring a pencil, paper and some water.

You are welcome to do this exercise in groups (and to carpool), but each student must hand in their own, original answers! You may also wish to bring a friend – this is a nice spot for a walk.

C. A Little Ecology and History of Rithet's Bog

Ecology

Rithet's Bog is a raised bog, the last of its kind in Greater Victoria. This is a type of wetland containing layers of peat which gradually built up from decaying sphagnum moss and other bog plants. The peat is actually thicker near the bog's centre, giving it a gently 'raised' or 'domed' appearance. The bog is 'ombrotrophic': it gets its nutrients primarily from rain water, instead of from mineral-rich groundwater or soil. This lack of minerals also makes bogs acidic (they have a low pH).

Rithet's Bog is also a basin bog, which means that it is located in a small depression in the surrounding landscape. Water gets trapped in the depression, and forms a wetland. Wetlands, including bogs, exist dues to poor drainage and high water levels, and they are home to vegetation which is adapted to these conditions. Sphagnum moss is a dominant bog plant. It is very spongy (capable of holding 20 times its weight in water!) and can draw nutrients directly from water.

Basin bogs can develop from gradual, natural succession. This means the bog originally began as a lake with sedge-dominated vegetation (big, coarse grasses found along shorelines of lakes), and gradually evolved into a fen (more on this later) and then a sphagnum-dominated bog. However, the bog was seriously disturbed by human activity, and only now is starting to return to its natural state.

Rithet's Bog consists mainly of a central Shore Pine forest and the surrounding abandoned agricultural fields (now in various stages of succession). The vegetation in these areas is divided into nine communities (or 'habitat zones') which are identified during the walk.

History
The bog is named after Robert Rithet, an early resident of the area. Rithet bought a large piece of land that included the bog in 1893. Much of the bog and the surrounding area was cleared for crop production and livestock grazing. In the 1930s, drainage ditches were constructed through the cultivated fields in an attempt to lower the water table and improve farming.

Following Rithet's death in 1954, his holding company sold the 39 hectare parcel of land which included the bog to another farmer. However, flooding in the agricultural land closest to the central forest, eventually led to a decrease in field area, with the northern and western parts of the bog remaining the principle agricultural areas..

In 1965, Broadmead Farms Ltd. Purchased the 243 hectares of land that surrounded but did not include the bog, for a residential subdivision. Later that year, when the bog was offered for sale, Saanich Council did not support a motion to acquire the bog and the adjacent uplands for a park. Broadmead Farms then purchased the property. Several development projects were proposed for the bog by Broadmead Farms; but in 1994, after several years of negotiations, the 42 hectare parcel of land containing Rithet's Bog was donated to Saanich by the Guinness family, owners of Broadmead Farms. At this time, the remaining agricultural activities in the bog ceased. It is now a park.

Today, much of the work of protecting the bog, eliminating invasive species and educating the public is being done by the Rithet's Bog Conservation Society. One project that is currently underway involves partially damming the creek which drains the bog, in hopes of restoring natural water levels. You may also see evidence of willow cutting, to open up areas for bog vegetation to re-colonize.

D) The Walk and the Questions

Begin the walk at the interpretive sign at the corner of Chatterton Way and Dalewood Lane. Read the sign and study the map!

1) **List the habitat zones found in the bog. Which three occupy the most area?** **/ 5**

2) **Look closely at the map. Which habitat zone seems to match the old agricultural fields most closely?** **/ 2**

3) **Label the attached map of the bog (NOT THE ROAD MAP!) according to the habitat zones. You can invent a number or letter code for each zone to simplify the map.** NOTE: This map will come in handy as you do this lab; look at it often! **/ 3**

Take the trail and travel south. **As you walk, start a list of animals you see.**

Just below the interpretive sign is an attempt to grow Garry Oaks, an uncommon and threatened species. The planting does not look very successful at this time – look inside the white plastic tubes and you will see withered little oak saplings. You will see similar plantings elsewhere in the park.

As you walk along the trail, you will notice that much of the meadow to your left is quite flat and dominated by shrubs and grasses. Farther in, there are dense young willow trees which approach the trail not far to the south. This is one of the old agricultural fields, going back to nature. The willows and other plants have colonized the field (spreading from the less-disturbed centre of the bog), and these plant communities are in transition, gradually shifting toward a new equilibrium community structure.

Willows are a common at the fringes of bogs, but not usually in such abundance; their high density here is a result of the disturbed water levels of the bog. The Rithet's Bog Conservation Society and Ducks Unlimited are chopping a bunch of them down, hoping that they will die off and be replaced by more threatened bog plants (assuming some of their other projects also work).

4) **When the bog was drained and cleared for agriculture, the natural plant communities were disrupted or removed. What is the ecological term for this type of event?** **/ 2**

5) **Now that the fields are no longer used, plants are re-colonizing the area, and community structure is changing. What is this an example of?** **/ 2**

6) **The artificial drainage ditches in the centre of the bog are still there. Given this, would you expect these fields to return to their previous (natural bog) community structure? Why, or why not?** **/ 4**

Continue walking south, and look at the land surrounding the bog as you go. You'll notice that the bog is ringed by rocky hills – it lies in a depression in the bedrock. The bog is the lowest part of a sub-basin of the Colquitz Creek watershed. As you approach the southwest corner of the bog, you will pass a bridge where Chatterton Way crosses the outlet stream of the bog. This is the lowest ground in the bog, where the water finally finds its way out of the depression. There are some very large deciduous trees beside the creek: cottonwoods. These trees often grow on floodplains next to streams.

You will notice a new concrete-and-metal structure beneath the bridge. This is a weir, which acts as a small dam across the creek. It has been installed by the Rithet's Bog Conservation Society.

7) **When it begins to rain more often in the winter, what effect do you think this weir will have on water levels in the bog? Will this change be to the advantage of natural bog plants, or to the plants you see today (grass, willow, etc.)?**

/ 4

As you continue walking, you will turn east, away from Chatterton Way. On the right you will see overgrown hedgerows composed mainly of common hawthorn, reminders of the previous land use of the bog.

As you walk along the trail, you will notice a perimeter ditch to your right. In the ditch you may spot common Watercress, with its dark green foliage and bright white flowers. This plant is non-native, as it was brought to the region as a food source for early settlers. It has since colonized a large area in the bog – it is an invader species! The ditch itself was dug in the mid-1990s to intercept runoff from the roads and neighbourhoods and prevent it from getting into the bog.

8) **If it is desirable to restore high water levels in the bog, why would the Conservation Society try to prevent runoff from roads and houses from entering the park?** **/ 3**

Keep walking. The trail will swing north, then east as you pass a rock outcrop on your left. It then will turn south again and drop into a low, shady area. This is a small fen. You will know you are in the fen by the occasional presence of standing water beside the trail. Fens are also wetlands, but unlike bogs, they obtain their nutrients from mineral-rich groundwater – they are 'minerotrophic'. The pH of fens is usually around neutral or even slightly alkaline, due to the presence of minerals. This little fen likely exists here because of a natural spring of groundwater.

9) **Notice that the fen lies lower than the rest of the bog. Why do you think it has not been 'raised' as high as the central bog?**

/ 2

Continue walking until you reach the bench at the top of the rise. Here you have a clear view of the heart of the bog - you can spot it as the 'island' of tall trees in the middle of the shrubby bog. This is the central Shore Pine forest. It supports more plant species with limited local distribution than all of the other vegetation communities in the bog, except perhaps the Garry Oak rock outcrops. The forest is dominated by Shore Pine, with an understory of Labrador Tea (an uncommon plant this far south in Canada) and salal. Bracken is also common within the forest.

At first glance, the Shore Pine forest seems similar in community structure to what it was prior to human interference. After construction of the drainage ditches in the 1930s, however, the pines reportedly had a growth spurt since they weren't so waterlogged. Now they are starting to die off – this may be due to a combination of old age, soft ground and

fluctuating water levels unlike those of a natural bog. Due to the altered hydrology, they are not reproducing successfully, and their niche is being overtaken by salal and Labrador Tea shrubs.

The Shore Pine forest also supported sphagnum moss. However, the sphagnum moss is dying off in Rithet's Bog. In fact, one subspecies of sphagnum is considered to be "critically imperilled".

10) Why do you think that sphagnum is disappearing in the forest?

/ 2

As you continue walking, you will pass through more Garry Oak habitat, turn north, and eventually emerge on Fir Tree Glen Road. By now you may have noticed a lot of Himalayan Blackberry bushes. Great to eat, but these are another non-native (or exotic') invader species!

11) What habitat zone do these bushes seem to prefer? Why are these bushes a concern in terms of the ecology of the bog?

/ 2

Stay left on the road and keep walking around the perimeter of the bog. You may see old fence posts, remnants of the bog's previous land use. The posts support diverse moss and lichen populations. After walking on Fir Tree Glen Road, the trail begins again on your left.

You will cross a bridge crossing a small stream – this is the main water source for the bog. Note that the vegetation here is different from what you have seen in the bog. You are now in the remnants of a Coastal Douglas-fir forest. Much of the hillside area surrounding the bog would have looked like this before development took place. Tree species that you will see here include Douglas-fir, Garry Oak, Big-Leaf Maple and Arbutus. This forest zone is unique to the southeastern coast of the Island and the Gulf Islands.

Soon the trail will turn left and emerge onto Dalewood Lane. Here you get excellent views of the bog. Stop at the covered viewpoint. Look at your list of animals, and consider the bog's trophic levels (primary producers, primary consumers, and so on).

12) **Based on what you've seen, are there more plants or animals in the bog? Explain whether your answer makes sense in terms of trophic levels and energy loss.**

/ 4

Return to the interpretive sign where you began your walk. The view from the central pine forest to Chatterton Way on the right represents a transect showing the different successional stages of the old fields and disturbed bog.

13) Draw a side-view sketch of this transect, including the edge of the pine forest, Chatterton Way, and the habitat zones in between. Label the habitat zones, and indicate with an arrow where you think the earliest stage of succession is found.

/ 5

You are done!

Before you leave, take one last look at the interpretive sign, and check for any errors on your map or information that can help you complete the questions.

I hope you have enjoyed this first taste of field work – as far as enjoyment is possible while doing forced labour!

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LAB 4: WORLD VIEWS

The two articles I have assigned for this lab are old and dog-eared. In an age where we value immediate, hot-off-the-internet, cutting edge news, these kinds of writings too often get overlooked; in our quest for the new, we seem to forget that almost everything that is thought or said today has been thought of said before. Instead of re-thinking the old, its worth our time to just review it and then spring-board into new, uncharted territory. So, let's review and spring-board……

Both Abbey and Berry pursue discussions of the relationship that humans have with the natural world. Wendell Berry, a famous U.S. conservationist, examines our perceived separation from the natural world (pg.22) and our cultural preoccupation with "specialization" (pg.19). He coins the phrase "terrarium view of the world" (pg.28) and focuses on the idea that humans must balance the need to preserve wilderness with the reality of "kindly use" (pg.30). His overall theme seems to be that we must directly confront our perception of our role with nature (or, in other words, examine our world view).

Edward Abbey, an infamous U.S. preservationist, who is seen by many as the grandfather of eco-terrorism, writes a more user-friendly and, at time, obnoxious attack on the U.S. Parks Service's approach to wilderness protection (pg.55). He articulates three different worldviews of park protection (pg.54) and provides a list of his recommendations for the future of U.S. park protection (pg.60). His overall theme seems to be that progress, in the form of the automobile and Industrial Tourism (pg.56), is taking humans into areas where they don't necessarily belong and for the wrong reasons.

These are LONG and COMPLEX excerpts. Read them when you feel "into it", not on a deadline. Once you've processed the author's points, wrote your own essay on your reactions to their themes. If you need more direction than this, try and focus your mind on one of these or similar questions:

1. What is the optimal relationship between humans and nature? Should we distinguish between those two things?
2. Is a "specialist" approach compatible with sustainable resource management?
3. Do you now feel we should all be farmers, connected to the earth, and never visit National Parks? ☺
4. Both A&B put forward the idea that some land should be preserved without our presence. Do you agree or disagree?
5. Do you consider yourself to be a critical consumer?

These are just some questions to jump-start your thinking. DO NOT ANSWER THEM ALL. Do write a well thought-out, personal summary of your thoughts, queries or solutions that came into your mind as you read these old treasures. Hand-written or typed, single- or double-spaced, as long as you want…..I don't care about the details. Just make it authentic, legible, and spell-checked and hand it in to me by the last day of classes (though may I encourage you to do it well before then because you'll be swamped come April!)

PRESENTATION ASSIGNMENT

It is time that you start preparing for your personal presentation later in the term. You will be given 7-8 minutes of class time to present an inspirational person or topic. This project is intended to:

1. introduce you and your classmates to people/things that are working towards reducing environmental degradation or improving overall environmental health;

2. improve your ability to speak in public (and you level of comfort);

3. test your innovative/creative ability to convey information as dynamically/inspirationally as possible.

To ease your workload, it would be best to focus on local initiatives/activists but national or global projects/people are also eligible.

GUIDELINES:

* **PICK A GOOD TOPIC!** Everyone is going to pick the Sierra Club or Western Canada Wilderness Committee and that's fine....but make yourself stand out from the crowd! Pick that guy who recycles BC Hydro poles.....or that woman who only puts out two bags of garbage all year.....or that organization that works on improving the energy efficiency of the average home. YOU ARE NOT ALLOWED TO USE ROOMMATES OR FAMILY MEMBERS!

* **BE CREATIVE!** You can present in any style that you are comfortable with. You can do a show-and-tell, you can do a straight-up speech, you can show slides, you can video your subject and provide a commentary, you can do an interpretive dance..... The only restrictions for me are time and appropriateness. Just let me know what kind of technical equipment you need, and it will be there.

* **PRACTICE!** Your presentation will improve dramatically the more you practice it. And the better you know your material, the less flustered you will be, the more eye contact you will make, the less likely it will be that you will have to read your talk, and the better your mark!

* **KEEP TO THE TIME!** I will be docking marks from your total for every minute you exceed the 8-minute time limit.....so stick to it.

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LAB 5: HUMAN POPULATION

Once upon a time, a king who had won a chess match with another king told the loser that he wanted some wheat as his prize. The amount of wheat was to be determined by counting out the grains using the squares on the chessboard. The first square would represent one grain of wheat, the second would represent two, the third four, and so on with each square being worth double the previous one and continuing through all 64 squares. The second king thought this sounded like a sweet deal for him so he agreed....

Table 1 shows how much wheat the first king would have to give away if they only went through half the chessboard squares! Just think if they'd bargained for cash and not wheat!!

Table 1: Results of Doubling

Interval	Units	Interval	Units	Interval	Units	Interval	Units
0	1	10	1,024	20	1,048,576	30	1,073,741,824
1	2	11	2,048	21	2,097,152	31	2,147,483,648
2	4	12	4,096	22	4,194,304	32	4,294,967,296
3	8	13	8,192	23	8,388,608		
4	16	14	16,384	24	16,777,216		
5	32	15	32,768	25	33,554,432		
6	64	16	65,536	26	67,108,864		
7	128	17	131,072	27	134,217,728		
8	256	18	262,144	28	268,435,456		
9	512	19	524,288	29	536,870,912		

Clearly, the first king knew what he was doing. This is called **exponential growth**. Doubling a small number does not seem to make much difference, but eventually you are doubling a large number, which makes a very large difference. Since Hunter-Gatherer times, the human population has grown exponentially peaking at a growth rate of 2.1% between 1965 and 1970. If the growth rate had remained constant at 2.1% per year, the human population would have doubled every 33 years! The growth of a population is linked to its crude birth rate and crude death rate. The **growth rate** of a population is equal to the birth rate minus the death rate.

The current growth rate of the world's population is 1.3%. If this remained constant, our population would double every 53 years - still well within your lifespan. Doubling time can be determined using the **Rule of 70**. If the population were growing at rate of 1%, it would take 70 years to double. The general rule is that the doubling time for a population is approximately equal to 70 divided by the annual growth rate.

Population Growth

By the summer of 1999, the world's population had reached 6,002,000,000.....six billion people. That is 5 billion *more* people than there were in the world just 200 years ago. In 1999, it is estimated that 77 million people will be added to the population. By the year 2050, the population is projected to reach 9.3 billion. As Draper noted, some people feel that population is *the* environmental issue - that unless we control population growth through whatever means necessary, we are doomed to run out of food and other resources and degrade the environment to the point that we can no longer survive.....hardly an upbeat perspective. Few issues are as controversial or political as the issue of population growth.

The whole population issue is controversial in part because it gets wrapped up in the issues of women's rights and couple's rights - specifically, the right to choose how many children to have. However, a key reason for the controversy lies in the distribution of growth between developed and developing countries. About 90% of the ongoing population growth is taking place in the developing countries of Africa, Asia, Central America, and South America. Advocates of population control maintain that population growth is developing countries must be reduced through coercion if necessary if humans are to have a sustainable future. Developing countries point to resource consumption in the developed world, which consumes the lion's share of the world's resources, and say that it is the developed world that threatens sustainability and that we have no right to tell them what to do with regard to their population (or anything else). At the Earth Summit in Rio de Janeiro in 1992, many developing countries refused to allow population growth on the agenda because it would deflect the world's attention from the developed world's major role in the environmental crisis.

So what is *the* environmental issue then? Population or consumption? While many debates about population are too polarized to see both sides, in reality, it is probably both. The developing world houses 80% of the world's population however, the developed world consumes "60% of the world's food, 70% of its energy, 75% of its metals, and 85% of its wood" (Hartmann, 1999:86). Population in the developing world causes local environmental destruction and resource extraction as people struggle for survival - but the developed world's consumption leads to global scale environmental destruction and resource extraction. In fact, much environmental degradation and resource extraction in developing countries is for the purposes of export to the developed world. Moreover, some authors argue that environmental degradation and resource extraction in developing countries is in fact not caused by population *per se*. Rather it is caused by poverty and inequality that leads to unfair distribution of resources and land forcing many people to scramble for subsistence and overexploit the limited resource they can access.

In Chapter 4, Draper proposes the following formula by Paul Erlich:

Total number of individuals	X	Environmental impact/individual	=	Total environmental impact

This is essentially the same formula that Wackernagel and Rees operationalized in their Ecological Footprint calculations. The total impact of an area or country is determined by both the total number of individuals and the environmental impact per individual.

In Lab 2 you were asked to determine, based on Wackernagel and Rees' estimate of 1.8 hectare per capita footprint, whether the population of the world would exceed the world's carrying capacity by the year 2050 when the population could reach 9.2 billion. This calculation was based on the assumption that consumption levels would remain constant at 1.8 hectares per person. But how do the results of Erlich's and Wackernagel and Rees' formulas change when people in the developing world decide that they would like access to the same consumer goods and luxuries that the developed world enjoys?....

PART A: Population Basics

Below is data on total population, birth rate and death rate for India and Nigeria in 5 year intervals for the last 50 years.

India

Year	Population	Birth Rate	Death Rate
1951	376,222,000	45.0	26.0
1956	412,204,000	44.0	23.0
1961	454,946,000	43.0	21.0
1966	506,966,654	41.0	18.0
1971	567,843,145	40.6	16.9
1976	635,592,992	36.9	15.0
1981	705,308,228	35.0	13.4
1986	784,462,082	32.7	12.1
1991	866,924,093	29.1	10.6
1996	950,205,125	27.0	9.1
2001(projected)	1,034,380,575	24.4	8.2

Source: U.S. Census Bureau, International Database

Nigeria

Year	Population	Birth Rate	Death Rate
1951	32,448,689	47.7	27.0
1956	36,000,057	47.7	26.5
1961	40,096,433	47.5	25.6
1966	44,837,951	47.4	24.4
1971	50,540,349	47.1	22.4
1976	57,901,381	46.9	20.2
1981	67,905,025	46.7	18.0
1986	76,558,245	44.7	15.8
1991	89,262,640	44.4	14.0
1996	104,094,527	42.9	12.9
2001 (projected)	120,537,104	41.0	13.3

Source: U.S. Census Bureau, International Database

1. Graph paper will be provided in lab for you to graph the population, birth rate and death rate for each country. Use the left y-axis to graph the birth and death rates, the right y-axis to graph population, and the x-axis to graph the years. /4

2. Analyze the graphs based on the diagram and description of the demographic transition in *Our Environment*. What stage of the demographic transition does India appear to be in? What stage of the demographic transition does Nigeria appear to be in? Explain your answers. /4

3. In 1992, the growth rate for India was 1.68% and the growth rate for Nigeria was 2.92%. What is the doubling time in years for each of these countries? /2

Population pyramids provide important information regarding the nature of the population in a country or region. A population pyramid is a graphic representation of population numbers. It separates the total number of males and females in specific age brackets called **cohorts** and stacks these into a pyramid shape. The shape of the pyramid (narrow, tall, short, squat) provides information on the nature of the population whether or not the population is growing, stable or shrinking.

A **growing** population is shaped like a triangle with a wide bottom and a narrow top - indicating that there are a lot of young people with high reproductive potential and fewer older people, often due to high death rates. Countries in the developing world often have population pyramids that reflect a growing population. A **stable** population has a pyramid shaped more like a column in which the number of people in each age cohort is relatively equal and both birth rates and death rates are low. Countries in the developed world generally have stable populations. Countries in southeast Asia that are undergoing rapid industrialization (what Draper calls moderately developed countries) will have a pyramid that looks like it is transitional from growing to stable. A **declining** population has a pyramid that is shaped like and inverted triangle with a larger number of people in the older age cohorts than in the younger cohorts. A population that has a declining population pyramid may actually be beginning to diminish in size. This is unusual, but some highly industrialized countries, particularly in Europe, are beginning to show this pattern.

4. Below are population pyramids for Zimbabwe, France, Canada and Indonesia for 1999. Label each diagram according to the country you think it represents and provide two pieces of evidence from each diagram to support your labeling. /12

5. Two of the pyramids appear to have a 'bulge' in the 30 to 55 age cohorts. Why do you think this is? /2

6. Some developing countries, such as Thailand, that are in the process of industrializing and have become moderately developed countries, have implemented strong measures to reduce population growth. How is this evident in Thailand's population pyramid and when did they introduce the measures? /2

References:

Draper, D. (1998) *Our Environment: A Canadian Perspective*. Toronto: ITP Nelson.

Goldfarb, T. 1999, *Taking Sides: Clashing Views on Controversial Environmental Issues*.

U.S. Census Bureau. (1998) *International Database*. www.census.gov

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LAB 6: MINING

Mining is yet another controversial environmental issue and this time (like most other times), the controversy stems from differing world views. Here are two dominant perspectives on the mining industry in B.C.

The Environmental View: Environmentalists maintain that mining causes significant damage to local ecosystems. Mining destroys wildlife habitat, disrupts wildlife migration patterns, exposes wildlife to greater hunting pressure through the creation of access roads, releases chemicals and dust into the air, changes water drainage patterns, and uses a huge amount of high energy and water for smelting and transport. They point to the potential for long term acid mine drainage that will continue to damage surface and ground water quality for years after the mining, posing a significant threat to fish, wildlife and humans alike. Acid mine drainage is caused when sulphide bearing minerals in rock are exposed to air and water causing the sulphide to change to sulphuric acid. This acid in turn dissolves the heavy metals in surrounding rocks into ground and surface water destroying aquatic habitats and poisoning the water for fish and human consumption. Sulphide bearing minerals are commonly exposed in the mining of gold, silver, copper, iron, zinc, and lead.

The Industrial View: The mining industry maintains that the impacts caused by mining are minimal. Since mining began in Canada, over 150 years ago, only 0.03% of the Canadian land base (279 277 ha) has been disturbed or utilized by the mining industry. AS a result, their impacts are minor compared to the forest or agriculture industries. Moreover, all of the impacts to local ecosystems as a result of chemicals and acid mine drainage can be controlled through technology. The acid mine drainage currently ongoing at 26 sites in B.C. is a thing of the past cause by poor historic mining practices that would never be permitted under current regulations. They argue that the impact of mining on wildlife is exaggerated by environmentalists that have never visited mine sites, and that the area can be remediated to fully replace the habitat temporarily destroyed and roads can be decommissioned. They point to the fact that rather than being scared away, wildlife routinely stops by mining sites and that mine sites often provide refuge for aging or ill wildlife. Furthermore, they stress, mining brings much needed jobs and revenue to B.C.

The Environmental View: Environmentalists retort that despite the fact that total area actually developed for mining is small, exploration ranges over a much larger area (15 772 035 ha in 1995). While the ecological footprint from a single exploration project might be small, the cumulative footprint of the human activity, and machinery and fuel being transported and utilized in the backcountry is not insignificant. Moreover, they claim that while technology exists to deal with the acid mine drainage problem, it is a scientifically

uncertain technology that is prone to problems. Despite the fact that they had the best experts working on acid mine drainage and made significant efforts to control the problem the Equity Silver Mine in northern B.C. will require pollution controlled for the next five centuries. Furthermore, even if the tailing ponds thereby prevent the escape of any acid, tailing ponds are not immune to accidents, earthquakes or sabotage. To further rebut, environmentalists note that the decommissioning of roads is sporadic and inconsistent across Canada and that even the temporary disruption of wildlife habitat could have significant long term repercussions on First Nation communities who depend upon that wildlife for sustenance. They also point to the fact that mining often creates a huge amount of infrastructure and dependency in one-industry towns that often die off once the mine closes.

The Industrial View: The mining industry has responded that the heavy regulations, creation of protected areas and restrictions on land use are driving mining out of B.C. They have claimed that regulatory, land use and other concessions are required to keep mining in our province. In particular, they feel they should be given the right to conduct mining exploration and development in protected areas and maintain that they will ensure the protection of the environment if they do so. They point to the rising demand for minerals in the world and the huge role of mineral products in our lives, and claim "your life wouldn't be the same without mining".

The Environmental View: Environmental groups contend that recent fluctuations in the mining industry have (as they always have) more to do with rises and falls in world mineral prices than any land use decisions. Moreover, they point to the fact that mines continue to open in Canada and that exploration investment and net revenues of mining companies operating in Canada are actually up over the last five years. While they acknowledge the importance of minerals in our lives, they maintain that efforts should be made to reduce the demand for minerals and recycle and reuse minerals that have already been extracted from the earth.

The Whitehorse Mining Initiative

The Whitehorse Mining Initiative (WMI) was a national process carried out between 1992 and 1994 involving representatives from the mining industry, government, environmental groups, communities, First Nations and labour groups to try and resolve some of the conflicts associated with mining. Some key agreements produced as a result of the WMI include:

- "Completion of a representative protected areas system free from industrial activity,,
- The need to employ the precautionary principle in assessing potential environmental impacts of mining, and
- Open, fair and accountable decision-making, including adequate resources for public participation" (Environmental Mining Council of B.C., 1998).

Mining in B.C.

The complaints of the mining industry in B.C. are falling on increasingly sympathetic ears in a provincial government anxious for mining jobs and revenues. Recent initiatives include the creation of a *Mining Rights Amendments Act* in 1998 to provide incentives for exploration and development, and compensation when claims are expropriated to create protected areas.

The provincial Environmental Assessment Office recently approved the reopening of the Tulsequah Chief mine on the Tulsequah River, near Juneau, Alaska, despite the fact that the proponent failed to conduct the appropriate studies and provide the information required under the *Environmental Impact Assessment Act.*

At the same time, the government is continuing to create new protected areas in B.C. and is sticking to its plans to exclude mining from protected areas and regulate mining more heavily in areas that are considered to be sensitive areas for wildlife, water or other ecosystem features.

Shared decision-making generally employs the principles of **interest-based negotiation**. Participants are expected to negotiate on the basis of their **interests**, which are the underlying concerns, needs, fears, hopes of the participants, instead of on their "positions", or their pre-formulated solutions. In interest-based negotiations, all parties try to seek so

PART A: Energy Resource Decisions

There's Gold in Them There Hills

"The Rehsif Mining Company out of Vancouver has discovered gold in the Gniwe Valley of the Nusomac Hills. This is an historic find that is expected to create revenues in excess of $1 billion over the 20 year life of the project and will bring prosperity and long-term economic stability to the nearby community of Noswad and the Enwodsnal First Nation. The company plans to apply to the provincial government to get a permit to develop the mine immediately....."

Noswad Daily Paper, October 10,1999

Environmentalists in Noswad read the article in their paper with horror. They had known about exploration activities in the Nusomac for several years, but did not expect that anything would be found. Besides, the Nusomac Hills, and in particular the Gniwe Valley, were a prime recreational and ecological area. It was no secret that the local environmentalists and many community members expected that the Nusomac would be a shoo-in for protected area status as soon as the sub-region got its turn to participate in developing a land and resource management plane for the area. The Premier had pretty much promised them as much himself in the letters he had sent in response to their letters requesting protected area status for the Hills.....

> "Thank you for your letters requesting protected area status for the Nusomac Hills. The Regional Protected Areas Team clearly agrees with your assessment that the Nusomac is a prime recreational area and clearly offers important habitat for caribou, grizzly bears and other wildlife. As you point out, the Yabluof River which runs through the Nusomac, is the home to a world class salmon sport fishery. The Regional Protected Areas Team has determined that Nusomac is an important candidate for protection. As you know however, the province is committed to adding to its protected areas though a process of shared decision-making as part of Land and Resource Management Processes (LRMPs), in which all the stakeholders in the sub-region have the opportunity to determine which areas they think deserve protected area status. Your area is part of the Airotciv sub-region, which is

scheduled to participate in an LRMP in three years. If other members of your community feel as strongly about the Nusomac as you do, I am certain it will receive protected area status.

Yours sincerely,

The Premier
April 14, 1999"

Mining Proposal to be Fast-Tracked

"The Rehsif Mining Company has applied to the provincial government to proceed immediately to the environmental impact assessment process to determine whether the Gniwe Valley mine can be developed even though a Land and Resource Management Process (LRMP) has not yet been conducted for the sub-region. Despite the fact that the Nusomac Hills have been long eyed for protected area status, the company claims that the community benefits from the potential revenues from the project cannot be ignored, and that the land can be remediated such that the area can be turned into a park in 20 years, once mining has been completed.

Noswad Daily Paper, October 17, 1999

Province Announces Process to Decide Fate of Hills

"The Premier announced today the fate of the scenic Nusomac Hills would be determined at least in part through facilitated shared decision-making process involving all stakeholders from the community and the Rehsif Mining Company. According to the Premier, 'Due to the province's commitment to shared decision-making and the agreements reached under the Whitehorse Mining Initiative, as well as the historic significance of the Nusomac as a potential protected area, the province decided to involve all the stakeholders in the decision regarding the proposed mine in the Gniwe Valley of the Nusomac Hills. The potential revenues and benefits to the community associated with the mine are significant, but so too is the ecological contribution of the Nusomac. The province is committed to ensuring that the best deal possible - one that maximizes the benefits to all British Columbians - is developed through this shared decision-making process'. The Premier indicated that normally the area would go through an LRMP to determine whether the Nusomac should be protected or open to development. However, because an LRMP process for the sub-region is still three years away, and the need for certainty on the part of both the mining company and the community, they are proceeding with this smaller scale process. The Premier stated that the results of the shared decision-making process would determine whether there is enough support for the Environmental Impact Assessment Review for the mine to go ahead, or whether the area should just be turned immediately into a park with no potential for mine development. She also indicated that compromise solutions that turned parts of the area into a park or considered mining developments within a park would also be accepted by the province".

Vancouver Sun, October 22, 1999.

PART B: The Provincial Decision
The next few "Spec" pages are provided to give you some needed background on the proposed mine development, the wildlife in the region, and the people and economy of the area. A map of the area is also provided.

In two weeks I will ask that you submit a small report (<5 pages double spaced) to the British Columbia Premier providing your recommendations for the Nusomac.

> **Should he allow the mine, designate the area a park or create a combination of both?**

As you can tell from the preceding press reports, this issue is placing the current government in a very difficult decision. Make sure that your report provides the Premier with enough explanation and justification of your recommendation so that he can effectively handle the inevitable media scrums after the decision is announced.

References:

Draper, D. (1998) *Our Environment: A Canadian Perspective*. Toronto: ITP Nelson.

Environmental Mining Council of B.C. (1998) *More Precious than Gold: Mineral Development and the Protection of Biological Diversity in Canada*. Victoria: Environmental Mining Council of B.C.

Environmental Mining Council of B.C. (1999) *Mining and Environmental Primer*. http://cmcbc.miningwatch.org/primer/default.htm

Golightly, G. (1998) "A Gleam at the End of the Tunnel: Government Attempts to Shore up Industry," *Mining Review*, Fall, pp. 15-16.

Mining Industry of B.C. (1999) Mining.....your life wouldn't be the same without it. (brochure)

Northern Mining Editor. (1998) "Environmentalists themselves a threat: Scaremongering," *The Northern Miner*, October 5-11, p.4.

Province of British Columbia, Environmental Assessment Office. (1996) *Final Report Kemess South Project Assessment Committee*. http://www.eao.gov.bc.ca/PROJECT/mining/kemessso/r&r.htm.

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LAB 7: WATER

After a summer of water restrictions, you should be vaguely familiar with the shortfall in water the Greater Victoria faced this year. As part of the Capital Region's (CRD) continuing mandate to ensure the delivery of increasing volumes of high quality water to satisfy their customers' need, they proposed, back in the early 1990s, to expand the holding capacity of Sooke Lake Reservoir. This reservoir currently holds approximately 50 million metres3 of water and, with expansion, this is expected to double. In order to expand, the existing dam on Sooke Lake will need to be raised 6 metres. This increase in dam height will cause a submergence of an additional 150 hectares of land and the logging of 240 hectares.

The Environmental Impact Assessment that was conducted for this proposed expansion was done by Axys Environmental Consulting and they identified numerous potential problems. Among these problems are:

Shoreline erosion and sediment suspension: During the first ten years after expansion, the wave action that is common on a lake the size of the Sooke reservoir, will erode the newly submerged topsoil. This will be most intense in the first few years as the water works the banks into a new shape and stability. The eroded soil will be held in suspension, causing cloudiness in the water column and a potential water quality problem.

Rise in groundwater table: raising the water level of Sooke Lake Reservoir will cause changes to groundwater levels in areas that are adjacent to the new shoreline which, in turn, may result in die-off of water intolerant vegetation (large conifers).

Truncation of existing streams: as the water level of the lake rises, the existing river channels will be flooded. The current deltas where the streams meet the lake margin will be submerged and the rivers will be forced to realign their deposition.

Water quality: water temperature will be reduced, phosphorous and mercury levels in the lake will be influenced by different microbial activity, and turbidity (or suspended sediment) will be increased.

Vegetation: 124.6 hectares of Douglas-fir forest will need to be removed, 12.6 hectares of shrub vegetation will need to be removed, 8.3 ha of unmodified old growth forest will be lost.

Fish: inundation of the shoreline will result in short-term improvement in rearing a spawning conditions on the lake margins but this will decline to present rates within 10

years. Flooding will permanently eliminate rearing and spawning habitat in Whiskey, Judge, Begbie, and Rithet Creeks.

Wildlife: flooding of the reservoir will result in permanent losses of food and cover habitats for deer and small population declines are expected for terrestrial furbeareres, small mammals, bird and reptiles.

These findings raise some serious concerns about the decision to raise the Sooke Lake Reservoir dam to accommodate a growing population. Environmental organizations have put forward alternatives to this plan (water conservation incentives, increased water charges, rationing and zeriscaping incentives, and fines for misuse).

PART A: Alternatives for the CRD

In the next two weeks, I'd like you to prepare a short paper (<5 pages) detailing alternative strategies to raising the Sooke Lake Reservoir dam. In your final paragraph of this paper, I would like you to declare whether or not the alternatives you have described could make enough freshwater available for the growing population of Victoria or if you feel that an expansion of the watershed is required. Find and use statistics on water consumption rates and use patterns for Victoria.

Use appropriate in-text citation and provide a list of your references.

References:

Axys Environmental Consulting Ltd. (1994) *Greater Victoria Water District: An Environmental Impact Assessment of the Proposed Expansion of the Sooke Lake Reservoir - Final Report*.

Draper, D. (1998) *Our Environment: A Canadian Perspective*. ITP: Nelson.

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LAB 8: FORESTRY

The province of British Columbia is divided into 37 **Timber Supply Areas** (TSA), which are administered by the Ministry of Forests and are the main units in which our forests are managed. In B.C. we set the **Annual Allowable Cut** (AAC) of timber for each Timber Supply Area through a process called the Timber Supply Review (TSR).

The province started conducting the Timber Supply Review process in 1992. A separate Timber Supply Review is conducted for each TSA. The Timber Supply Review uses computer models to assess the total timber available for harvest in a TSA, based on the number of trees in the TSA, their projected growth rates, current management practices, and expected timber losses due to pests, disease or fire. Using this information, a **base case harvest** that outlines the potential timber available for harvest in cubic metres (M3) per year for the next 250 years is estimated. Due to the uncertainty in much of the data utilized to carry out the TSR analysis, many 'sensitivity analyses' are also run. Sensitivity analyses are utilized to adjust factors, such as the expected growth rate, up and down, to see what impact higher or lower values have on the timber available for harvest.

The Chief Forester in the province then utilizes the results of the TSR for each TSA to set the **Annual Allowable Cut** (AAC) for each TSA and this amount will stay in effect until the next Timber Supply Review is conducted. Each Timber Supply Review takes about 22 months to complete, due to the complexity of the data collection and analysis. As a result, TSRs are only intended to be conducted every five years for a TSA. The first round of Timber Supply Reviews (TSR1) started in 1992 and was completed in 1996 (the process is staggered to TSRs are not being conducted in every TSA at the same time). The second round of Timber Supply Reviews (TSR2), started in 1997, is currently underway around the province and will be completed for all the TSAs in 2001.

This lab will focus on some of the calculations and analyses that are part of the Timber Supply Review process. It is not intended to replicate the TSR process, which is highly technical and complex involving the use of large computer models. Rather it is intended to give you a feel for some of the considerations that must be taken into account in determining an appropriate AAC.

PART A: Site Index Analysis

A key part of the TSR is the determination of the total volume of timber available for harvest in both the mature old growth stands and the managed, second growth stands in the TSA. Because the timber supply has to be projected over a period of 250 years, the 'growth' of the stands in the TSA has to be simulated using computer models. Because the growth patterns of older mature forests and managed second growth forests differ, different models are utilized for each. In the case of the second growth stands, the Table Interpolation Program for Stand Yields (TIPSY) is utilized to estimate volumes over time. TIPSY utilizes information regarding tree species, number of trees planted or regenerating naturally, management actions (such as thinning, regeneration delay, and site productivity) to determine the total volume of timber produced by the stand over time.

Site index is the measure utilized to describe the productivity of a site. Site index is a very important component of the growth projection. On the next page is some TIPSY data for Coastal Douglas Fir for 1 hectare stands for **three** different sites with different site indices. The Douglas Fir at each site received the same treatment - 1100 1 year old trees were planted on a 1 hectare site and were thinned to 750 during the first 10 years.

1. Graph paper will be handed out so that you can graph the Total Merchantable Volume (m3/ha) versus the age of the stand for each of the three site indices. Put all three site indices on the same graph. Either use a different colour or a different type of line for each site index or label each of your lines. /6

2. Based on your graphs, what impact does site index have on Total Merchantable Volume? Why? /3

3. Looking at the tables, what is the relationship between site index and the number of trees? (hint: the higher the site index, the? the number of trees at age 120). /1

4. What is the relationship between site index and diameter at breast height? /1

5. Given the relationships you have described on the previous page and the information on the site index charts, describe the characteristics you would expect a Douglas Fir stand growing on a high index site to have compared with one growing on a low index site? /6

6. Mean Annual Increment (MAI) is the ratio of volume of timber over age since planting. MAI is utilized by the Ministry of Forests to determine the appropriate time to harvest a stand. In theory, harvesting should occur when the MAI is highest. This is when the stand reaches its highest rate of growth. It is also called **culmination age**. When the MAI starts to decline, the stand is no longer growing as quickly. If the MAI is utilized to determine the harvest age for each of the 3 stands above, at what age will each of the stands be harvested? /3

7. Douglas Fir on high index sites (sites >= 35) is often harvested when a stand reaches a Total Merchantable Volume of at least 550 m5/ha. If that were the criteria applied in this case, at what approximate age would the 35 site index stand be harvested? /1

PART B: Determining the Timber Harvesting Land Base

Another key part of the TSR process is the calculation of the **Timber Harvesting Land Base** (THLB). This is a process by which all the land in the TSA is analyzed and areas that are:

- not managed by the Ministry of Forests including private land, urban areas, non-forested areas and waterbodies;
- inoperable in the sense that they cannot be accessed using existing equipment;
- unproductive or non-commercial forest types such as brush or deciduous trees;
-forest roads, and;
- areas required for wildlife, recreation and riparian needs

are subtracted from the total area in the TSA. The land remaining after these subtractions is considered to be the Current Timber Harvesting Land Base.

8. Below are the subtractions for the Strathcona TSA on Vancouver Island. Use the numbers provided to calculate

a) the Total Productive Forest managed by Ministry of Forests,
b) the Total Reductions to the productive forest and,
c) the Current Timber Harvesting Land Base for the TSA. /3

9. What percentage of the total productive forest in the TSA is considered to be part of the Current Timber Harvesting Land Base? What percentage of the total productive forest is set aside for other forest values, such as areas with soil stability concerns, high recreational values, etc.? /4

References:

Draper, D. (1998) *Our Environment: A Canadian Perspective*. Toronto: ITP Nelson

Ministry of Forests (1997) *Strathcona Timber Supply Area Timber Supply Review Data Package.*

Ministry of Forests (1999a) *Strathcona Timber Supply Area Analysis Report.* http://www.for.gov.bc.ca/tsb/tsr2/tsa35/report/httoc.htm

Ministry of Forests (199b) *Timber Supply Analysis Technical Workshop Course Notes.*

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LAB 9 LIFESTYLE

In "Complex Pleasures", Episode 8 of David Suzuki's series *From Naked Ape to Superspecies,* the book Your Money or Your Life by Joe Dominguez and Vicky Robin was mentioned. In fact, Vicky, as President of the New Road Map Foundation was interviewed for her thoughts on our present day consumerism. In their book, Vicki Robin and Joe Dominquez assert that:

Money is something we choose to trade our life energy for.

They elaborate on this idea by saying "our life energy is our allotment of time here on earth, the hours of precious life available to us." If you are an average 20 year old now, you can anticipate 493,526 hours (or 56.3 more years) in your life. Sounds huge! When you're a geezer like me, you find you've whittled away quite a few of those hours and now only have 411,125 (46.9 more years) left. And don't write on your Christmas card to your folks that, if they're nearing 55, they are probably down to 213,890 hours (24.4 more years). Every hour you spend at work, you are trading your life energy for money.

Now, hey, everyone would say "yeehaw, count me away today, I'd prefer to spend my life energy at the beach".....until they had the bill collector pounding on the door. It's true that we all need access to money in order to live in our current society. I have to go to work in order to pay my rent, my food, my hydro, my telephone, my water, and my bus fare. Those, for me, are non-negotiable. But, if faced with the choice of say, a DVD player (to replace my VCR) and the ten hours of work it will take to buy it, I may say "nah, what I have is fine, I'd prefer to spend my ten hours hanging on the beach/taking my dog up Mt. Finlayson/sleeping in." When you really grasp the concept that you "pay" for money with your time, you become more picky about how you choose to spend it!

Dominguez and Robin calculated that half of your remaining hours will be spent on 'body maintenance' - sleeping, eating, eliminating, washing and exercising. You have the remaining 240,000 hours of life energy remaining for such discretionary uses as:

- your relationship to yourself
- your relationships to others
- your creative expression
- your contribution to your community
- your contribution to the world
- holding down a job

Now that you know that money is something you trade life energy for, you have the opportunity to set new priorities for your use of that valuable commodity. In this lab I am going to ask you to follow through two of Dominguez and Robin's exercises, the computation of hourly wage and the money log.

PART A: The Real Hourly Wage

Most people calculate their hourly wage by taking their salary and dividing by the number of hours that they worked: "I earn $240 a week and I work 24 hours over 6 days, so I trade one hour of my life energy for $10." But, Dominguez and Robin throw some wrenches into that figure when they ask you to think of ALL the ways you use your life energy that are directly related to your money-earning employment.

Commuting: getting to and from work incurs an expenditure of time or money or both, whether you drive, walk or take transit. If you drive, you must include parking fees, gas, maintenance costs, lease payments and insurance charges. For a 20 minute commute (40 minutes a day), Dominguez and Robin estimate that you can factor in and extra cost of approximately $25/week.

If you bus, we'll exclude the civic taxes that you'd also pay and just calculate your fare and traveling time. If it takes you 20 minutes in a car, it will probably be 30 minutes by bus (an hour a day), and if the fare stays at $1.75/ride, your extra cost will be $15/week.

Dressing: are the clothes you wear to work the same ones you wear on your days off or do you need a uniform or a more 'professional' wardrobe? Steel-toed boots? A backpack? A surveyor's vest? Waterproof paper? Rain gear? Dresses and heels? Suits and ties? How about the time you spend applying mascara or shaving? Dominguez and Robin estimate that you will spend an extra 90 minutes a week on dressing for success with an average extra cost of $15/week.

Meals: once you get a 'real' job, you start to learn the value of coffee breaks. You can sit around and gossip or generally catch-up with co-workers. Before you know it, you'll be off to birthday lunches, Friday pub nights, going away buffets, Christmas parties and holy smokes, the daily muffin-n-tea starts to add up. Thursday and Friday nights will begin to turn into pizza-at-the-bar and "yay, the week's over!" celebration dinner out nights because you're too bagged to go shopping or cook. You can easily slip down the slippery "I'm off to the deli to grab lunch" trap because you didn't have time in the morning to make a lunch (you were too busy tying your tie). Before you know it, you can burn up approximately 5 hours a week and end up spending and extra $20-30/week.

Dominguez and Robin include "***Daily Decompression Time***", "***Escape Entertainment***", "***Vacations and Expensive Playthings***", and "***Job Related Illness***" in their tallies but, I figured that your are too young and zestful to really require those categories!

1. Use the following table to calculate your real hourly wage. If you currently have a job that you'd like to run this test on, feel free to pencil in your numbers beside the example entries. /10

Life Energy vs. Earnings

	Hours/Week	Dollars/Week	Dollars/Hour
Basic Job	24	$240	$10
Adjustments: Commuting Car Bus Dressing Meals			
Total adjustments			
Job with adjustments			

Source: Dominguez and Robin, 1992

2. Given this information, how much does each dollar you spend cost you in life energy (time)? /2

3. Take this time to mull over your Christmas purchases. List the names of the top four people on your Christmas gift list on the left column of this table. Complete the other categories. /4

Family/Friends:	**Gift Idea**	**Cost of Gift ($)**	**Life Energy Cost (hrs)**

4. Does knowing how much time each of these gifts will cost you change your perspective at all? (there's no right answer here, feel free to be honest). Why or why not? /2

PART B: Your Money Log

We have established that money equals your life energy, and you have just learned to compute just how many hours of life energy you exchange for every dollar. Now I'd like you to become conscious of the movement of money in your life by keeping a Money Log. It is going to sound simple, but, believe me, its not easy. From today until next week's lab, I want you to keep track of every single cent that comes into or goes out of your life.

What a total pain. Yup, that's right, it is going to be a bit of a hassle but you'll be amazed at how money can leak out of you pockets. Keep a piece of paper with you during the day to record purchases ***as they happen***. Then spend a minute at the end of every day copying your list onto the pages that follow. Recap the day as you do this because I'll bet you there will be some minor transaction that you will have missed during the day.

You are not being asked to do this because I care what you spend your money on - I won't be calling the police if you write down "pot" as one of your purchases. Instead I want <u>YOU</u> to care what you spend your money on and by recording ***every cent*** you will become aware of your financial habits. Granted, since you're students, you probably don't have a lot of money to 'play' with but, most of my friends (myself included) established their spending practices back in college and university. Some put lots of cash into Friday's pub night, some splurged on eating out, others were clothes fiends. Movies, videos, arcades, book purchases, road trips, MEC outdoor equipment.....everyone put their money where their interests were, even if it wasn't a LOT of money. Track yourself, you may be surprised. /10

5. What, if anything, did you learn about yourself from this lab exercise? /2

References:

Dominguez, Joe and Vicki Robin. *Your Money or Your Life*. Penguin, New York.

Draper, D. (1998) *Our Environment: A Canadian Perspective*. ITP: Nelson.