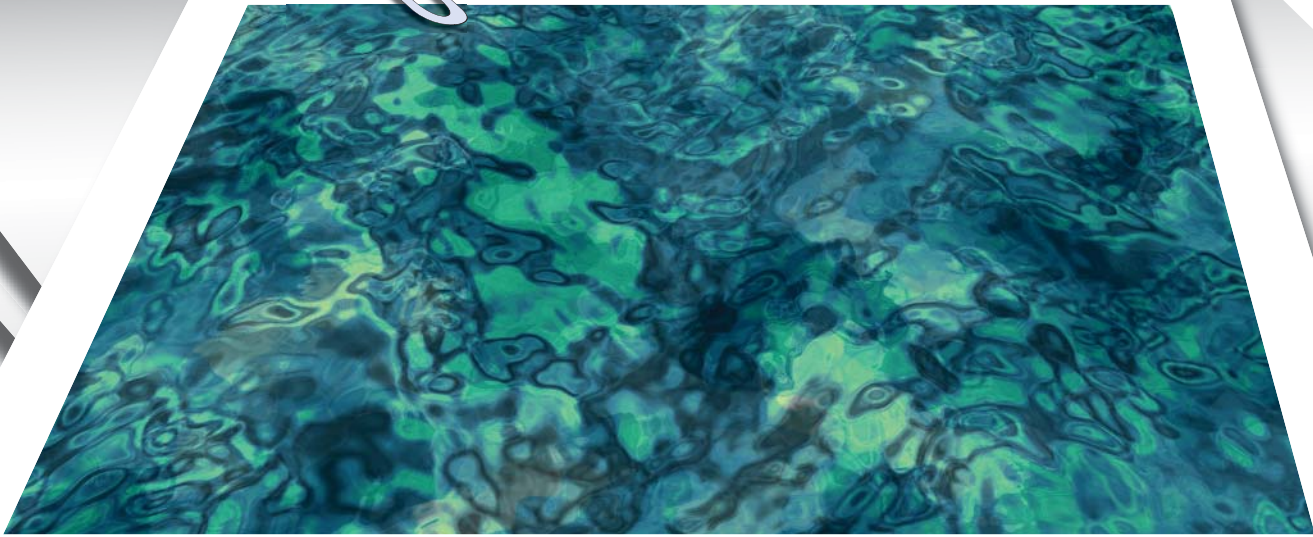
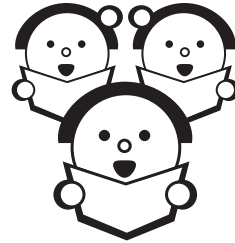
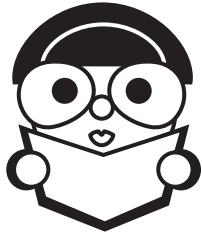


QUENCHING OUR THIRST

WATER MANAGEMENT TODAY



TEACHER'S GUIDE

GEOGRAPHY
SECONDARY 1

IDC PROJECT 2007



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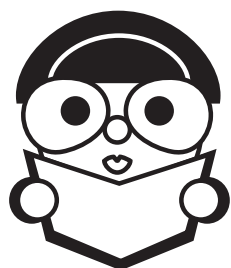
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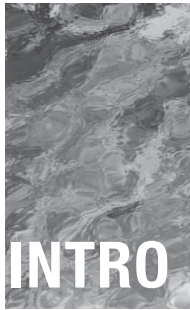
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TEACHER GUIDE





INTRO

A LEARNING AND EVALUATION SITUATION

This Learning and Evaluation Situation (LES) has been designed to promote the development of Competency 3 *Constructs his/her consciousness of global citizenship* in a meaningful manner, although the other two competencies will also be indirectly addressed. The students will explore different venues through a series of relevant activities that will develop their capacity to exercise critical judgment and synthesize information. Connections are made with both the broad areas of learning (BAL) and cross-curricular competencies (CCC).

The students will not only become cognizant of a current issue of fundamental significance, ‘the world water crisis’, but will also realize that they can make connections between what they have learned, and what they can contribute as concerned citizens in the future.

THE PROJECT

- | | |
|---------------|--|
| Part 1 | To develop an awareness of the fundamental importance of fresh water to life |
| Part 2 | To develop an awareness of the extent of the water problem |
| Part 3 | The Case of Montreal and Cairo |
| Part 4 | To create a program, and forecast the future |

LES is the term for the process of developing and evaluating a competency. It includes the targeted subject-specific and cross-curricular competencies, a series of learning activities and one or more complex tasks.

(A. Mackenzie, IDC, 2007.)

In this LES, each part begins with:

1. An overview of the student’s task
2. The materials required by the student, the teacher and the classroom
3. A suggested duration of time
4. Q.E.P.-friendly evaluation tools.

THE LINK BETWEEN THE Q.E.P. AND THE PROJECT

The **broad areas of learning (BAL)** in this LES are designed to attune the students to an issue related to 'the fundamental importance of fresh water to life'. The areas considered are: *Environmental awareness and consumer rights, media literacy, and citizenship and community life.*

Inter-disciplinary connections are suggested to enable students, with the teacher's help, to recognize the importance of exercising the English Language Arts competencies *Reads and listens to written, spoken and media texts, and Writes a variety of genres for personal and social purposes.*

The four **Cross-curricular competencies (CCC)** considered are:

Intellectual competencies

- To solve problems
- To use information and ICT
- To exercise critical judgment

Personal and Social competencies

- To cooperate with others

The observations recorded throughout this LES by the teacher and the student should reflect the student's development of the **subject-specific competency (Competency 3):**

Constructs his/her consciousness of global citizenship

- Shows the global nature of a geographic phenomenon
- Examines human actions in terms of the future
- Evaluates solutions to global issues

Competency 1 *Looks at the organization of a territory*, and competency 2 *Interprets a territorial issue* will perforce be included.

Icons are used to indicate the links to the Q.E.P. and to identify materials needed during activities.



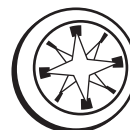
THE TEACHER
(e.g. teacher's guide, required materials...)



THE STUDENT
(e.g. student logbook, required materials, ...)



THE WHOLE CLASS
(e.g. posters, maps, images, charts, ...)



THE ESSENTIAL
QUESTION



BROAD AREAS
OF LEARNING



CROSS-CURRICULAR
COMPETENCIES



COMPETENCY
TO BE EVALUATED



TO DEVELOP AN AWARENESS OF THE FUNDAMENTAL IMPORTANCE OF FRESH WATER TO LIFE.



HOW IMPORTANT IS FRESH WATER TO LIFE?

TIME

± 45 minutes



BROAD AREAS OF LEARNING:

Environmental Awareness and Consumer Rights



CROSS-CURRICULAR COMPETENCIES:

Intellectual competencies:

To solve problems

Personal and Social competencies:

To cooperate with others



SUBJECT-SPECIFIC COMPETENCY

Looks at the organization of a territory

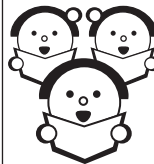
MATERIALS REQUIRED



- A. Ideas for questions that will lead to the proposed discussion
- B. Teacher Guide
- C. Three or four Envelopes (A) each with 6 illustrations



- A. Student Logbook



- A. A poster with the essential question
- B. Poster with the pertinent competency (competency 1 *Looks at the organization of a territory*)

ACTIVITY 1.1

(work done in teams)

1. Initiate a discussion on the importance of water to life.

Sample starters:

How important is water to everyday life?

Can life survive without water?

What do scientists first look for when they search for life in a planet?

1. Bring to the students' attention the poster bearing the essential question.
2. Divide the class into groups (suggested number, 3 students per group).

Inform students that they will evaluate themselves and their group members on the competency *Cooperates with others*. Discuss with the class the rubric at the end of Part 1 of the Student Logbook. Clarify the meaning and purpose of the criterion and the 5 levels of qualitative difference in the rubric.

4. Give each group Envelope A containing six photos of widely different geographic regions;

- a desert
- a tropical forest
- a deserted island
- a mountainous area
- an island
- a bombed village

Fresh water is absent from each of the six photographs. The students have to imagine being lost in each of the geographic regions presented. Knowing that they are lost and isolated from the outside world, the team members brainstorm strategies that will hopefully take them back to civilization. Invite them to stretch their imagination and exercise their creativity in order to survive. Each group has to present three basic needs for survival in each of the circumstances. Ideally, water should be present in their final list of basic needs. If not, discuss with them the rationale for its inclusion.

5. In the large group, allow 5 minutes for each team to present their opinions to the class while the teacher encourages students to accept the ideas of others.

CURIOSITY CORNER

The teacher could consider the information that follows and use it whenever it is suitable, e.g. before or after the students' presentation of their ideas on the basic needs of life.

In a desert the vegetation is exceedingly sparse and temperatures soar to 58°C, 136° F during the day and tumble to 0°C, 32°F at night.

In a tropical forest, look out for monkeys. They are excellent indicators of what humans can safely eat or drink. Also, in the early morning one can sometimes find dew or mist running off the leaves in the form of water.

In a cold desert avoid putting ice in the mouth, as a source of possible water, for it would lower the body temperature even further.

In the case of a bombed village, one has to remember that the water reservoirs are one of the first targets chosen by the military when advancing on a position.

The isolated island is surrounded by salt water which if drunk would dehydrate the individual even further. The kidneys can only function if the water drunk is less salty than the sea water.

ACTIVITY 1.2

LESSON PLAN

(work done individually)

1. Each student independently prioritizes the items needed for survival in each geographical region and expresses his/her reasons in the Logbook.
2. Wrap up by calling to the students' attention the vital importance of water to life on the planet. Also mention that whenever scientists search for life on other planets, their first concern is to find evidence of the presence of water.

EVALUATION

Evaluate the student on the cross-curricular competency *Cooperates with others* (Activity 1.1) and subject-specific competency 1 *Looks at the organization of the territory* Activity (1.2).

(See the evaluation sheets that follow)

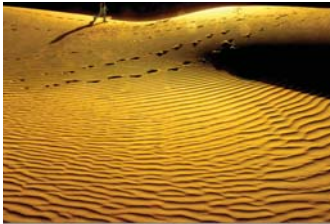
NOTES

ACTIVITY 1.1

You have just discussed with other members of your class the basic needs for survival in the six different geographical regions presented. Write down your own opinion giving reasons for your choices. Before starting, look at the rubric provided so that you know what is expected when writing your ideas down.



Tongass Rainforest by Flickr user Swanksalot



In the Deser/Feeling Like Walking by Flickr user Horizon



The Chugach Mountains by Flickr user 'ckindel'

NOTES



Lonely Island by Flickr user gari.baldi



Bombed Hospital by Flickr user The Rocketeer



Badlands by Matt Binns

NOTES

EVALUATION CHECKLIST FOR THE COMPETENCY COOPERATES WITH OTHERS

Very good (VG) | Good (G) | Needs improvement (NI)

Class:

Learning and evaluation situation						
List of students Date and evaluation criteria						
1.						
2.						
3.						
4.						
5.						
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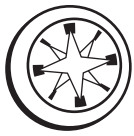
RUBRIC FOR THE COMPETENCY LOOKS AT THE ORGANIZATION OF A TERRITORY

CRITERIA	1 LIMITED	2 DEVELOPING	3 MEETS STANDARDS	4 EXCEEDS STANDARDS	5 EXCELS
IDENTIFICATION AND EXPLANATION OF THE ORGANIZATION OF THE TERRITORY ¹	Provides limited explanations	Provides partial explanations with some logical thought	Provides clear and logical explanations	Provides thorough and insightful explanations with justifications	Provides very original and insightful explanations
USE OF GEOGRAPHICAL VOCABULARY ²	Uses limited or no geographical vocabulary. Certain words are misused	Uses some geographical vocabulary	Uses an acceptable range of geographical vocabulary with clarity and precision	Uses a broad range of geographical vocabulary with clarity and precision	Demonstrates mastery of geographical vocabulary and introduces new words and concepts not provided previously by the teacher
PRESENTS POSSIBLE SOLUTION(S) TO OBTAIN WATER ³	Unable to offer solutions even if teacher intervenes several times	Offers some solutions with some help from teacher	Offers solutions with very little help from the teacher	Offers viable solutions to the problem with no intervention from the teacher	Offers creative and original solutions to the problem with no intervention
<p>1. Identifies the type of territory (forest, urban, etc) and explains causes for lack of water. 2. Uses geographical terminology such as: urban, rural, region, isolated, desert etc. 3. Uses several approaches to analyze the problem.</p>					

In this particular case, all the criteria created weigh the same.

2 PART

TO DEVELOP AN AWARENESS OF THE EXTENT OF THE WATER PROBLEM



IN WHAT WAY IS THE WATER CRISIS A GLOBAL ISSUE?

TIME

± 45 minutes



BROAD AREAS OF LEARNING:

Environmental Awareness and Consumer Rights



CROSS-CURRICULAR COMPETENCIES:

Intellectual competencies:

To solve problems



SUBJECT-SPECIFIC COMPETENCY

Constructs his/her consciousness of global citizenship

Shows the global nature of the geographical phenomenon in question

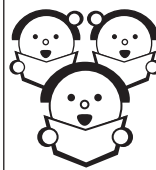
MATERIALS REQUIRED



- A. Ideas for questions that will lead to the proposed discussion on deserts.
- B. Teacher Guide
- C. Three or four Envelopes (B), each with 8 Information Sheets.



- A. Student Logbook
- B. World Atlas



- A. A poster with the essential question
- B. Posters with the pertinent competency (Competency 3 *Constructs his/her consciousness of global citizenship*)

ACTIVITY 2.1

(work done in teams)

By now, the students have realized that water is fundamental to life. Unfortunately, such a vital commodity is dwindling in many parts of our planet. The regions most affected are, of course, the deserts and semi-deserts. It is alarming to imagine that more than 33% of the land surface of our planet has acquired characteristics of a desert which include very low precipitation, high daily temperature ranges, and sparse vegetation, all of which offer a low potential for human habitat.

Part 2 of this LES is a cursory study of the deserts of the world. It offers a clear and foreboding image of things to come in a global scale should the present situation of the water crisis continue. A concerted collective effort is needed to curb its momentum and it is imperative to educate the young towards an awareness of this problem.

1. Initiate a discussion that will lead to the definition of a desert.

Sample starters:

Why are there areas in the world with very few people, animals or vegetation?

What does a desert look like?

What problems do you think there might be in a desert?

Is it possible for anyone to live in such an inhospitable place?

Is there something that could be done to arrest the advance of desert areas?

- Bring to the students' attention the poster bearing the essential question.
- Divide the class into groups, as suggested in activity 1.1.
- Inform them that they will be evaluating themselves again. Discuss with the class the rubric at the end of Part 2 of the Student Logbook entitled Illustrated Map Rubric.

In teams the students are expected to study the eight Information Sheets, and with the aid of an atlas, a world planisphere or a globe, are able to conclude that in most continents there are vast inhospitable areas unacceptable to human habitation. A global picture of the water problem should now begin to emerge.

Eight Information Sheets on the most important deserts are given plus one Information Sheet that incorporates graphs :

- A. Cold Deserts – The Antarctic Desert and The Patagonian Desert
- B. The Sahara Desert
- C. The Gobi Desert
- D. The Taklaman Desert
- E. The Namib Desert
- F. The Kalahari Desert
- G. Simpson’s Desert
- H. The Mojave Desert

Each student will then be given a blank world map and is instructed to convert it into a World Map of Deserts. Review with them the basic principles of map making, i.e. the title, the legend, the compass, naming the continents and the oceans, and finally create the thematic map demanded. They should then color the desert areas according to what they have learned from reading the Information Sheets. However, these are far from being comprehensive. The students should research in the atlases to find the following four more deserts to be included in their world map.

- A. The Arabian Desert covering most of the Arabian Peninsula
- B. The Atacama Desert running down the west coast of Chile
- C. The Thar Desert in the northwest of India
- D. Turkestan Desert in southern Russia.

The Desert Links section is divided into general information on deserts, and specific links for further information on the eight deserts mentioned above.

On each Information Sheet is a small map of the continent(s) where the particular desert(s) is/are located. Tell the students to shade the region where they think the desert is situated. After completing this activity on each Information Sheet, the student has done the preliminary work needed to create his/her World Map of Deserts.

INFORMATION SHEET 1

COLD DESERTS



The Antarctic and the Patagonian (Argentina) cold deserts are situated in the southern hemisphere. They receive abundant rainfall in winter, and have fairly warm, short summers, with occasional rain.

Most plants found in cold deserts are deciduous with spiny leaves to protect themselves from extreme temperatures. Some lichen has been found in Torgerson island, Antarctica.

The most common animals found in cold deserts are jack rabbits, kangaroo rats,

kangaroo mice, grasshopper mice, and antelope ground squirrels.



Satellite image of Antarctica



Kangaroo Rat



Lichen on Torgerson Island

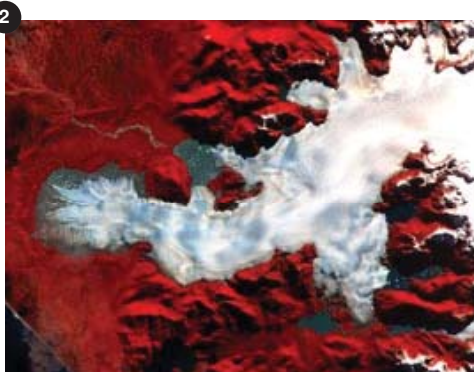
Antarctica Desert

Location: Antarctic.

Area: 14 245 000 square kilometres.

Precipitation: 15mm./yr.

Climate: Cold



Satellite image of Patagonia

Patagonian Desert

Location: Argentina.

Area: 673 000 square kilometres.

Precipitation: 26mm /yr.

Climate: Cold

NOTES



INFORMATION SHEET 2

THE SAHARA DESERT



SAHARA MEANS
DESERT IN ARABIC

The Sahara is the second largest desert after Antarctica. It is believed to be 2.5 million years old. Located in North Africa, it has one of the harshest climates in the world and yet, it is inhabited by some 2.5 million people, mostly from Egypt, Mauritania, Morocco, and Algeria. Because they move from region to region in search for better conditions, they are known as nomads. Daytime temperatures can reach 58 °C while at night it can plummet to -6 °C.



Satellite image of the Sahara Desert.

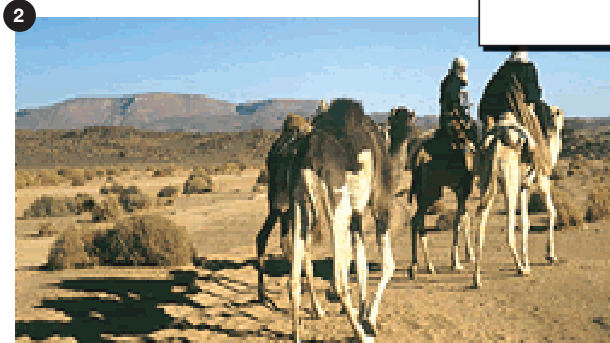
The largest city in the Sahara is the Egyptian city of Cairo, in the Nile Valley.

Location: North Africa.

Area: 9 million square kilometres.

Precipitation: 250mm/yr.

Climate: Hot



NOTES



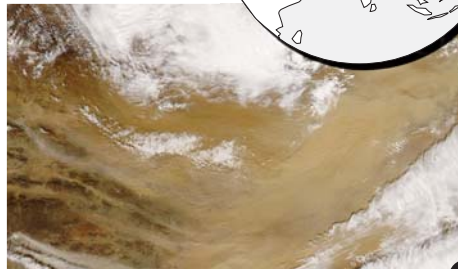
INFORMATION SHEET 3

THE GOBI DESERT

GOBI MEANS VERY LARGE
AND DRY IN MONGOLIAN



The Gobi is the largest desert in Asia and the third largest in the world. Within 24 hours, the temperatures can vary from a freezing -32°C to a sizzling 58°C . It is one of the few deserts that can boast of having frost and even snow capping its dunes at times.



Satellite image of a dust storm in the Gobi Desert

The Gobi desert is world renowned for its fossil finds, as well as dinosaur eggs. Historically, it was the birth place of the famous Mongolian empire (1206-1405), founded by Genghis Khan.

Location: Mongolia.

Area: 1 295 000 square kilometres.

Precipitation: 194mm./yr.

Climate: Cold and Hot



Bactrian camels by the sand dunes of Khongoryn Els, in Mongolia.

NOTES



INFORMATION SHEET 4

THE TAKLAMAKAN DESERT



1 A Tarim Basin mummy photographed by Aurel Stein circa 1910.

TAKLAMAKAN MEANS THAT "IF YOU GO IN, YOU WON'T COME OUT".

The Taklamakan is the largest "sand only" desert in the world situated in Central Asia, in the Western region of China. Formerly a fertile region due to lack of rainfall, it has become a barren, bleak, uninhabited 900

kilometer stretch of drifting sand dunes where very little vegetation thrives. It is extremely hot during the day and very cold at night.

Four thousand years old mummies of various ethnic origins including European have been found in this area.



2 Dust Storm in Taklamakan from space, June 25, 2005.

Location: Central Asia-Western China.
Area: 270 000 square kilometers.
Precipitation: 10-38mm./yr
Climate: Extremely hot and cold.

NOTES



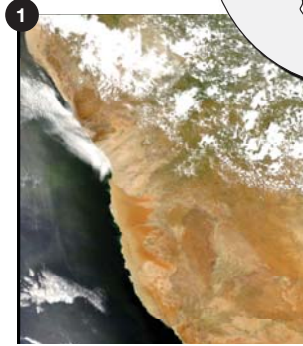
INFORMATION SHEET 5

THE NAMIB DESERT



The Namib Desert is considered to be one of the oldest and driest deserts on Earth. Formed approximately 80 million years ago, it runs along the Atlantic Ocean coast of Namibia for 1600 kilometers - a barren, almost uninhabited coast often covered by fog. It is the habitat of the welwitschia plant that survives by absorbing the moisture from the fog that rolls from the sea and it can live up to 2000 years !!

Its sand dunes reach the height of 340 meters



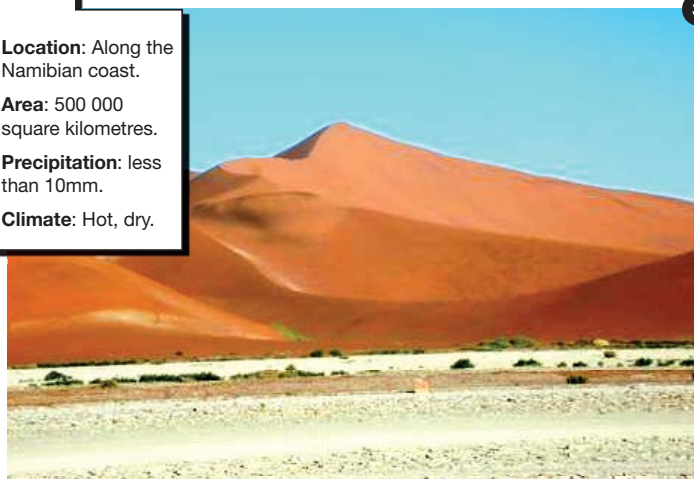
Satellite image of the Namib Desert

Below is an image of the Dune Sea of the Namib Desert. Note the irregular and complex patterns. These patterns are poorly understood by geologists.

(±100 meters higher than Mount Royal in Montreal), considered among the highest in the world.



Location: Along the Namibian coast.
Area: 500 000 square kilometres.
Precipitation: less than 10mm.
Climate: Hot, dry.



NOTES



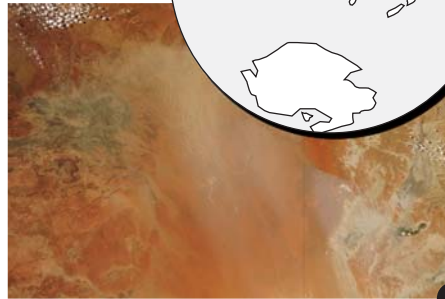
INFORMATION SHEET 6

THE SIMPSON DESERT



The vast Simpson Desert is situated in Central Australia. It has the world's longest parallel sand dunes, running in a north-south direction. While the vegetation holds the dune in position, the dune system protects the wide variety of desert flora and fauna from the harsh terrain that surrounds it.

The Simpson Desert Regional Reserve Park was created to protect the local desert wildlife. The landscape consists not only of dunes but also of lakes, grassland and woodlands. The trees soak up water from underground water.



Satellite image of a dust storm in the Simpson Desert



Location: Central Australia
Area: Approximately 170,000 square kilometres.
Precipitation: Less than 200 mm / year.
Climate: Hot.

NOTES

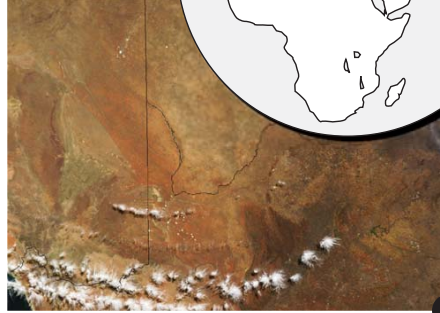


INFORMATION SHEET 7 THE KALAHARI DESERT



**KALAHARI MEANS
THE GREAT THIRST.**

The Kalahari Desert is a large semi-arid desert of red sand covering much of Botswana, part of eastern Namibia, and the northern part of the Cape Province. It offers excellent grazing for animals after a rainfall. Its wildlife consists of baboons, elephants, antelopes, giraffes, zebras, and lions. Its Animal Reserves act as a sanctuary to animals and vegetation. It is also the ancestral land of the Bushmen.



1 Satellite image of the Kalahari Desert.

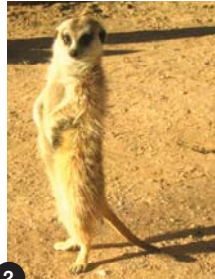
The temperatures of this semi-arid desert are more amenable than those found in a true desert. Summer temperatures range from 20°C to 40 °C and winter ones do not go much below 0 °C.

Location:
Botswana

Area: 9 000 000
square kilometres.

Precipitation: 175
- 250mm./yr.

Climate: Semi arid,
hot, cold.



2 Meerkat



3 Fairy Wren

NOTES



INFORMATION SHEET 8

THE MOJAVE DESERT



The Mojave Desert is the smallest desert in North America. It is located in the south eastern part of California. On the eastern side of the desert the Colorado River runs through it and on the Western side are the Sierra Nevada Mountains. It is known as the high desert due to its high elevation. In the north, it is a cold desert and in the south a hot desert.

The Mojave Desert contains some interesting features; for example The Kelso Dunes are the largest of the Mojave dune fields, reaching 152 to 182 meters in height. When you run down these dunes you can hear an unusual "barking" sound. This phenomenon is not entirely

understood. Rain occurs mostly in the winter season from October to March.



Satellite image of the Mojave Desert and Los Angeles



Location: South Eastern California.
Area: 65 000 square kilometers.
Precipitation: 150mm/yr.
Climate: Cold desert–north
 Hot desert–south.



NOTES





3 PART

THE CASE OF MONTREAL AND CAIRO



WHAT ARE THE SIMILARITIES AND INEQUALITIES IN WATER MANAGEMENT BETWEEN TWO GREAT METROPOLISES?

TIME

± 75 minutes



BROAD AREAS OF LEARNING:

Environmental Awareness and Consumer Rights



CROSS-CURRICULAR COMPETENCIES:

Intellectual competencies:

Uses information



SUBJECT-SPECIFIC COMPETENCY

Construct his/her consciousness of global citizenship

Shows the global nature of a geographical phenomenon

Recognizes instances of inequality and complementarity according to territories

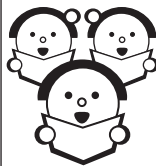
MATERIALS REQUIRED



- A. Teacher Guide
- B. Three or four Envelopes (C), each with colored illustrations of the two metropolises, Montreal and Cairo.



- A. Student Logbook
- B. World Atlas



- A. Poster with the essential question
- B. Posters with the pertinent competency (competency 2 *Interprets a territorial issue*)

ACTIVITY 3

In Part 3, the student looks more closely into what water management entails in densely populated areas. Two urban territories were chosen: Cairo, a city entirely dependent on one river, the Nile, surrounded by an unforgiving desert; and Montreal, a metropolis collecting water from a variety of sources, lakes and rivers, surrounded by fertile farm land. These two cities will inevitably have some similar water management problems but also widely different ones. In both cities, the river system is essential for their economic development.

It is advisable to review the previously taught concepts of **metropolis**, **slums**, **growth** and **imbalance** (competency 1 and 2) as they have a direct impact on competency 3.

In the process of studying the above, the student will develop the geographical techniques of *interpreting a map*, *interpreting a picture*, and *interpreting a table*.

Information pertinent to water management is given for each of the two metropolises, Cairo and Montreal. The information is diverse. Photographs, texts, maps and statistics are offered.

Call to the students' attention that water issues have many facets. Water management affects several aspects of a city's dynamics and poses a series of concerns, e.g. is the standard of drinking water sufficiently high or is it a health hazard; is the sewage system functional enough not to pollute the water; are the surrounding farmlands polluting the water supply; can the water-guzzling industry be placed under sustainable control? These are some pointers that should help students classify the information presented and enable them to successfully complete the activities proposed.

Whenever possible students should consult a world atlas.

Lead the students to read the given information and view themselves as environmental detectives searching for information on the situation of water in these two great cities. In fact, they will be gathering evidence not only to complete the activities of Part 3 (simple tasks), but also to successfully transfer the information to enrich the final two activities (complex tasks) proposed in Part 4.

THE CASE OF MONTREAL AND CAIRO

1. Read carefully the following information on the two great metropolises of Montreal¹, Canada, and Cairo², Egypt.
2. Label each Information Box (except number 1 and 2) according to its content, e.g. geographical position, role of the river, quality of drinking water, domestic water, industrial wastewater, agricultural wastewater, improvements introduced, proposed future improvements, etc.
3. Enjoy establishing similarities and differences between these two important urban centers by completing Activity 3.1 (work done in teams) and Activity 3.2 (work done individually).
 - A. A person from Montreal is a Montrealer.
 - B. A person from Cairo is a Cairene.

WHERE IN THE WORLD ARE THEY?



	MONTREAL	CAIRO
1. Hemisphere		
1. Continent		
1. Country		
1. Province/State		
1. The river that flows through		
1. Neighboring bodies of water		
1. Neighboring countries		

NOTES

MONTREAL

Information Box 1: Aerial view of Montreal



Photo taken and graciously lent by Ron Clarke.

WHAT DO YOU SEE?

In the foreground _____

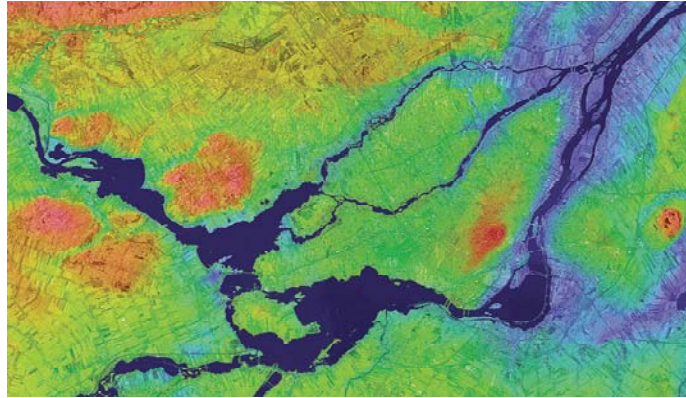
In the middle ground _____

In the background _____

NOTES

Information Box 2: Montreal River System

WRITE MONTREAL IN THE PROPER PLACE.



RADARSAT-1 data – Courtesy of the Canadian Space Agency 1999

Information Box 3 Title: _____

Montreal is the largest city in Quebec with 3.5 million inhabitants. It is the largest inland harbor in the world, and is situated on one of the world's greatest commercial waterways. It collects water from two lakes (Saint Louis and Deux Montagnes) and three rivers (Rivière de la Prairie, Ottawa, and St. Lawrence).

Information Box 4 Title: _____

The first Canada-Quebec joint environment program of the St. Lawrence was carried out from 1973 to 1979. A committee identified various water problems and suggested ways to deal with them. Throughout the years many programs were created, all of them sharing one clear objective: to treat the waste water.

Presently, the city of Montreal is spending 10 billion dollars to maintain and improve the quality of **drinking water** and its **distribution** to all its citizens. It will take many years before the project is completed but the objective is to meet, at all times, the high water standards set by Quebec laws.

Because Montreal industries, business and institutions consume huge quantities of water in their daily operations, the city of Montreal will install 23 000 water meters to measure and compare water consumption in residential areas to water consumption in industrial and commercial areas.

Information Box 5 Title: _____

Montreal drinking water is of high standard. However, in 2006, tests were conducted revealing that houses built before 1970 have lead pipes. Although there is very little health risk involved in such houses, the authorities have declared that their owners can have the lead pipes removed at no cost.

NOTES

Information Box 6 Title: _____

Research done between 1992 and 1998 showed that the St. Lawrence River water, around Montreal, was full of pesticides originating from the surrounding farms, orchards and vegetable growing regions. It raised serious concerns about the health of aquatic life and the safety of drinking water. Monitoring programs, such as St. Lawrence Vision Action, were soon introduced to improve the water quality and reduce pesticide use by 50%.

Information Box 7 Title: _____

Vessels of all types, cargo, container or passenger, arrive at the Montreal harbor everyday. Modern vessels are constructed with water tanks, known as ballast tanks, for stability and keeping the propeller submerged. These tanks are filled with water from wherever the vessels have docked before they arrive in Montreal harbor. This means that in their ballast water they may carry non-indigenous aquatic species dangerous to the local ones. To avoid an ecological disaster, in 1990 regulations were introduced to maintain the good quality of the St. Lawrence River water by introducing a series of measures that assured the control of ballast water in every ship that enters the Montreal port.

Information Box 8 Title: _____

The Quebec Department of the Environment has been working with industrial associations for a number of years to develop strategies to decrease the St. Lawrence River pollution caused by discharge of industrial waste. Clean-up certificates are issued to those that comply with the regulations.

Information Box 9 Title: _____

AN INDUSTRIAL EXAMPLE, THE CASE OF PAPER INDUSTRY

The paper industry in and around Montreal uses toxic chlorine-based bleaches, later discharged into the St. Lawrence River heavily polluting it. Concern of its impact on the health of the community and the environment led to a series of regulations being introduced in 1992. Considerable success has been achieved.

Information Box 10 Title: _____

Since the St. Lawrence River is shared by both Canada and the United States, the two countries decided to work closely to resolve transboundary environmental issues. In 1909, The Boundary Waters Treaty was signed to resolve differences and promote control of water pollution .

NOTES

CAIRO

Information Box 1: Aerial view of Cairo



View of Cairo by Flickr user tympsy.

WHAT DO YOU SEE?

In the foreground _____

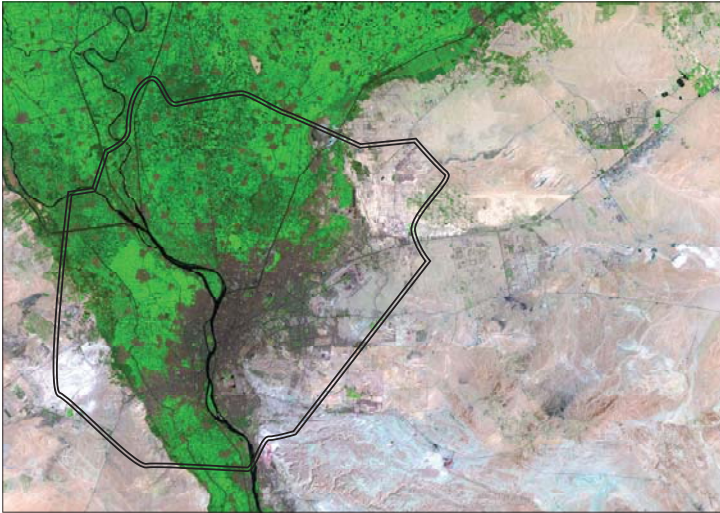
In the middle ground _____

In the background _____

NOTES

Information Box 2: Cairo River System

WRITE CAIRO IN THE PROPER PLACE.



Courtesy of the NASA Earth Observatory

Information Box 3 Title: _____

In the fifth century B.C., a Greek historian, Herodotus wrote, " Egypt is the gift of the Nile" . It is the longest river in the world, meandering from the Sudan and flowing northward across Egypt before emptying into the Mediterranean Sea. It runs through ten countries (Ethiopia, Sudan, Egypt, Uganda, Kenya, Tanzania, Burundi, Rwanda, Democratic Republic of Congo, and Eritrea) making an agreement on a common policy of water management almost impossible. They continuously fight as each country interprets the 1959 Nile Agreement to their individual advantage. The Nile is everything to the Egyptian people. It is their life, their food, their existence.

Information Box 4 Title: _____

Cairo, the capital of Egypt, is situated in the northern part of the country. It is located on the banks and islands (Gezira and Roda) of the Nile River, immediately south of the point where the river leaves its desert-bound valley and breaks into two branches into the low-lying Nile Delta region.

NOTES

Information Box 5 Title: _____

Cairo is the largest population center in Africa with 17.5 million inhabitants. Its only source of water is the Nile. Unfortunately, it is also the only receiver of Cairo's wastewater. The rapid growth of Cairo's population makes the problem of improving the already poor quality of drinking water and the deficient wastewater networks a difficult task for the authorities.

POPULATION GROWTH IN CAIRO	
1900	570 000
1920	865 000
1930	1 139 000
1950	2 426 000
1960	4 022 000
1970	5 950 000
1980	7 772 000
1990	10 228 000
1994	12 895 000
2000	14 000 000
2006	17 500 000

Daily natality increase of 1 000 per day

Information Box 6 Title: _____

Present-day Cairo is a chaotic city. Housing is so hard to find and so expensive that 3 million people live on the rooftops. Needless to say, such housing has no running water.

Information Box 7 Title: _____

Keeping the residents of Cairo supplied with water is difficult because the city's pipelines are old.

- 12% of the pipelines are over 40 years old
- 60 % of the pipelines date before 1970.
- The pipelines are too narrow to meet the current needs.
- In Old Cairo, 40% of the water running through the pipelines leaks and floods the foundations of buildings.

The government has undertaken to modernize the existing pumping and water purification plants but progress has been slow.

NOTES

Information Box 8 Title: _____

Fifty to sixty-five percent of Egyptian industry (chemical, textile, metal, food, and engineering) is found in Cairo. The industry discharges, often without pre-treatment, 56 million m³ of industrial waste substances annually into the Nile. Since 1995, a top priority of the Egyptian Environmental Agency has been to treat this industrial wastewater but the outcomes are far from satisfactory.

Information Box 9 Title: _____

Many underprivileged Egyptian women play an important role in domestic water management. They are responsible not only for collecting, storing, and using water, but also for its disposal. Further still, they wash their laundry and utensils in the river. This carries a health issue since these women come into direct contact with the polluted waters of the Nile. Access to some tap water has been offered but many prefer to go to the river for they want to continue their social life of lively chatting with their relatives, friends and neighbors.

Information Box 10 Title: _____

Cairo suffers from water pollution as the sewer system tends to fail and overflow. On occasion, sewage has escaped onto the streets to create a health hazard. It is hoped that this problem will be solved by a new sewer system funded by the European Union. The dangerously high level of mercury in the city's water system has global health officials concerned over related health risks.

REFERENCES CONSULT THEM TOO!

MONTREAL

<http://www.ccmatthews.com>
http://www2.ville.montreal.qc.ca/pls/portal/docs/page/eau_potable_en/chantiers.shtm
http://www.slv2000.qc.ca/plan_action/phase3agriculture/
http://www.slv2000.qc.ca/20_ans/programmes_a.htm
<http://canada.usembassy.gov/content>

CAIRO

<http://proutworld.prout.org/features/nile.htm>
<http://en.wikipedia.org/wiki/Cairo>
<http://www.hf-fak.uib.no>
<http://www.cdc.gov/ncidod/eid/voliono11/04-0237.htm>

NOTES

ACTIVITY 3.1

(work done in teams)

1. Consider the information just read, and complete ACTIVITY 3.1.
2. Remember to consider such topics as: geographical situation; importance of the river(s); population; housing ; agricultural regions; industrial regions, wastewater; sewage ...
3. Compare and contrast the two metropolises using simple but short and pertinent sentences that explain the similarities or the differences.

CHARACTERISTICS	MONTREAL	CAIRO	SIMILAR OR DIFFERENT?

NOTES

ACTIVITY 3.2

(work done individually)

1. Identify any three problems of water usage the Cairenes might have to face daily.

A. _____

B. _____

C. _____

2. Give a tentative solution to **one** of the mentioned problems.

3. Identify any three problems of water usage the Montrealers might have to face daily.

A. _____

B. _____

C. _____

4. Give a tentative solution to **one** of the mentioned problems.

NOTES

A RUBRIC FOR AN ACTIVITY ON COMPARING AND/OR CONTRASTING

CRITERIA	1 LIMITED	2 DEVELOPING	3 MEETS STANDARDS	4 EXCEEDS STANDARDS	5 EXCELS
TOPIC FOR COMPARISON	The information rambles and fails to pinpoint one aspect for comparison/ contrast. No details are provided.	Briefly mentions one topic of comparison/ contrast but gives few details.	Describes the topic for comparison/ contrast and gives some details.	Clearly defines topic for comparison/contrast and goes on to give specific details .	It defines with clarity and creativity the topic for comparison/contrast and goes on to give many specific details .
INFORMATION UNIQUE TO EACH TERRITORY	Makes no mention of any unique information.	Gives very little information.	Gives some information that is unique for each case.	Gives a great deal of unique and interesting information.	Offers an abundance of pertinent and thought-provoking information.
GIVES INFORMATION ON SIMILARITIES/ DIFFERENCES BETWEEN TERRITORIES	Does not compare/contrast the two territories.	Only points out one or two ways that are similar/different.	Points out several ways that the two are similar/different.	Shows in many ways that the two are similar/different.	Outlines a multitude of insightful similarities and differences between the two territories.
ORGANIZATION	Lacks topic sentences in every item. The sections follow no logical sequence.	Of all the items, only one has a topic sentence and the sequence of the sections is confusing .	Only some items have a topic sentence and the sections are somewhat sequential.	Every item begins with a clearly stated topic sentence followed by a logical sequence.	A topic sentence precisely defines each item and leads to a logical sequence .

Adapted from eduweb.sdsu.edu/triton/sddiarriz/rubric

EVALUATION CHECKLIST FOR THE COMPETENCY USES INFORMATION

Very good (VG) | Good (G) | Needs improvement (NI)

Class:

Learning and evaluation situation						
List of students Date and evaluation criteria						
1.						
2.						
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31.						
32.						

4 PART

TO CREATE A PROGRAM AND FORECAST THE FUTURE



IN WHAT WAY IS THE WATER CRISIS A GLOBAL ISSUE?

TIME

± 200 minutes



BROAD AREAS OF LEARNING:

Environmental Awareness and Consumer Rights



CROSS-CURRICULAR COMPETENCIES:

Personal and Social competencies:

To cooperate with others



SUBJECT-SPECIFIC COMPETENCY

Construct his/her consciousness of global citizenship

Recognizes possible solutions to the global issue

Shows that the commitment of communities is essential for solving global problems.

Defends his/her position

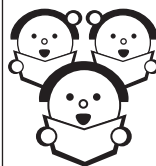
MATERIALS REQUIRED



- A. Teacher Guide
- B. A copy of the Gazette article of March 11th, 2007, for each student.



- A. Student Logbook



- A. Poster with the essential question
- B. Poster of Competency 3, *Constructs his/her consciousness of global citizenship.*

ACTIVITY 4.1

(Work done individually)

In Part 4, the student will be engaged in two complex tasks.

In the first complex task, the student assumes the role of a Director of the Montreal Water Management Department. She/he is faced with the sweltering summer of 2022, and to avoid further water shortages and maintain the quality of life of the citizens, develops a program to cut water consumption in half. This program will be based on the statistical data given to the students. It would be advisable at this point to show how statistics can strengthen an argument or proposal.

In the second complex task, students create a pamphlet as a way of spreading the word about the impending problem of lack of drinkable water, which can reach catastrophic proportions if everyone does not contribute to minimizing the problem. The pam-

phlet should later be distributed in the school and/or community. The idea is for students to act as facilitators in the campaign against the ignorance on the topic.

The two activities will hopefully make the students more aware of and sensitive to the seriousness of the problem of the water crisis.

This LES is but a small contribution to the development of the student's consciousness of global citizenship.

Evaluate:

a. Competency 3 (geography) : *Construct his/her consciousness of global citizenship* (refer to rubric at the end of Part 4)

b. Cross-curricular competency: *Cooperates with others* (use the evaluation checklist of Part 1)

ACTIVITY 4.1

(Work done individually)

1. You are the Director of the Montreal Water Management Department. The summer of 2022 has been unusually hot, and the city is experiencing a severe shortage of water. Draw up a program that will hold each Montrealer accountable for addressing the water crisis by adopting daily specific measures.
2. Upon your request, Statistics Canada sent you the following data.

USAGE OF WATER BY MONTREALERS		
Each Montrealer consumes 400-500 liters of water a day which is equivalent to about 1440 cans of soft drink.		
Consumption of water	Liters	Percentages
Drinking and cooking	4-5	1
Baths and showers	76-95	19
Laundry dishes, cleaning	80-100	20
Toilets	120-150	30
Garden, car wash, pool	120-150	30

1. Your program proposal has to cut in half the water consumption, while retaining the quality of life enjoyed by Montrealers. The proposed measures must be simple, easily performed, effective and ecologically friendly, e.g. take a shower instead of a bath and install an efficient showerhead.
2. Give reasons for your choices.
3. Integrate the following concepts into your essay: **metropolis, urban sprawl, density**. Remember to justify your opinion by referring to the research documents you consulted.

ACTIVITY 4.2

(Work done in teams)

1. Divide the class into the same groups as in activity 1.1
2. Hand out a copy of the Gazette article (March 11, 2007) to each student. Allow 15 minutes for perusal and discussion among the members of each group.
3. Then initiate a class discussion on the seriousness of the eminent lack of water on the planet in the near future.
4. Lead the students to express an opinion, orally, on the essential question: In what way is the water crisis a global issue?
5. Sample starters to spark the debate:
Do you waste water?

Have you seen people wasting water? How? What should be done?

How can you prevent water waste?

Will Canada ever experience water shortage? Give your reasons.

Is this issue, the water crisis, new to you?

1. Allow for proposals *for* and *against* to be debated, while emphasizing the need for each one of us to be accountable for addressing the water crisis, no matter how insignificant the contribution might seem. Emphasize the idea that *every effort counts*.

NOTES

ACTIVITY 4.3

((Work done individually))

1. The message of the Gazette article (March 11th, 2007) is so important for the survival of life itself on the planet that each one of us should make an effort to let its content be known.
2. What can a teenager do to help? He/she can write an informative and appealing pamphlet to be distributed in the school and/or community. The pamphlet the students are about to create should carry the message of the article. Although they must not copy any part of the article, they may paraphrase a few lines and no more. The rest should be the result of their own research.

The Gazette, Montreal, Sunday, March 11, 2007

EXPECT WATER SHORTAGE IN 20 YEARS

'CHANGES NOW AFFECTING EVERY CONTINENT'

Hundreds of millions could face starvation by 2080, world's top scientists predict

Seth Borenstein
ASSOCIATED PRESS

Washington – The harmful effects of global warming on daily life are already showing up, and within a couple of decades hundreds of millions of people won't have enough water; top scientists will say next month at a meeting in Belgium.

At the same time, tens of millions of others will be flooded out of their homes each year as the Earth reels from rising temperatures and sea levels, according to portions of a draft of an international scientific report...

The report offers some hope if countries slow and then reduce their greenhouse gas emissions, but it notes that what's happening now isn't encouraging...

Many – not all – of those effects can be prevented, the report says,

if within a generation the world slows down its emissions of carbon dioxide and if the level of greenhouse gases sticking around in the atmosphere stabilizes.

If that's the case, the report says, "most major impacts on human welfare would be avoided, but some major impacts on ecosystems are likely to occur."

NOTES

NOTES

COMPOSITION OF YOUR PAMPHLET

GENERAL

Fold into 3 equal parts a 8"X11½" sheet.

COVER PAGE

The students should:

1. make the cover as attractive as possible, concentrate on appropriate visuals and be succinct with words;
2. try to come up with a catchy title;
3. remember that the appeal generated by the cover should become a lure for the reader to look further into the pamphlet.

TEXT

The text should consist of a small essay of 200 to 250 words.

Students should consider:

1. taking a firm and confident position on the issue of " The water crisis as a global issue";
2. writing in a compelling and engaging manner, so that the reader is convinced;
3. developing the topic with information based on research (Internet, school, library, public library etc);
4. creating arguments that flow smoothly. It will give power to the theme being presented;
5. editing the work.

ILLUSTRATIONS

Only 4 or 5 pertinent illustrations should be used.

**GOOD LUCK
AND BE CREATIVE!**

RUBRIC FOR WRITING A PAMPHLET OR AN ESSAY

CRITERIA	1 LIMITED	2 DEVELOPING	3 MEETS STANDARDS	4 EXCEEDS STANDARDS	5 EXCELS
Purpose	Vaguely addresses the topic	Offers an opinion somewhat related to the topic	Adopts a position on the topic	Adopts a firm position on the topic	Adopts an informed and confident position on the topic
Research	No evidence of research	Little evidence of research	Some evidence of research	Interesting ideas based on research done	Relevant content based on sound research
Organization	Ideas are vague	Argument is not very easy to follow	Argument is fairly easy to follow and connects to topic	Argument flows easily and stays on topic	Argument flows smoothly and gives power to the topic
Development	No expression of ideas	The ideas are not always clear	The ideas are clear	The ideas are interesting	The ideas are well developed
Editing	No evidence of editing Repeated errors in grammar, spelling and syntax	Editing ineffective . Grammar, spelling, and syntax errors	Some attention to editing Evidence of errors	Editing is thorough . Some errors	Editing is effective Few or no errors

CREDIT AND REFERENCES

Page numbers on teacher guide:

The Mojave Desert, p. 27, 1. Satellite image of the Mojave Desert and Los Angeles, Earth Sciences and Image Analysis Laboratory, NASA Johnson Space Center. 2 & 3, United States Geological Survey.

Cold Deserts, p. 20, 1a & 1b, Kangaroo rat and Lichen, Dr. Lloyd Glenn Ingles, © California Academy of Sciences. manzanita@calacademy.org. 2 & 3, Satellite image of Patagonia, courtesy NASA U.S./Japan ASTER Science Team.

The Gobi Desert, p. 22, 3. Satellite image of Gobi Desert dust storm, NASA Visible Earth. 1. Doron, Wikimedia. 2. Bactrian Camels, Frances Elizabeth Hanan © California Academy of Sciences, manzanita@calacademy.org.

The Sahara Desert, p. 21, 1. Sahara desert as seen from space, Nasa Earth Observatory 2. Dromedary, Sahara desert, Wikimedia.

The Kalahari Desert, p.26, Satellite image of Dust Storm, NASA. 2. Meerkat, Muriel Gottrop, Wikimedia (April 2005). 3. Fairy Wren, LiquidGhoul, Wikimedia.

The Simpson Desert, p.25, 1. Wikimedia. 2. Camels in the Simpson desert, 1936, Wikimedia. 3. Satellite image of a dust storm, NASA.

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The Desert of Death, p.23, 1. A Tarim Basin mummy, Aurel Stein, circa 1910, Wikimedia. 2. Dust Storm in Taklamakan from space, June 25, 2005, NASA.

Aerial View of Montreal, p.32, © Ron Clarke, consultant Lester B Pearson School Board.

Satellite View of Montreal, p.33, RADARSAT-1 data, Canadian Space Agency, 1999.

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