YORK/SENECA INSTITUTE FOR SCIENCE, TECHNOLOGY AND EDUCATION

YSISTE

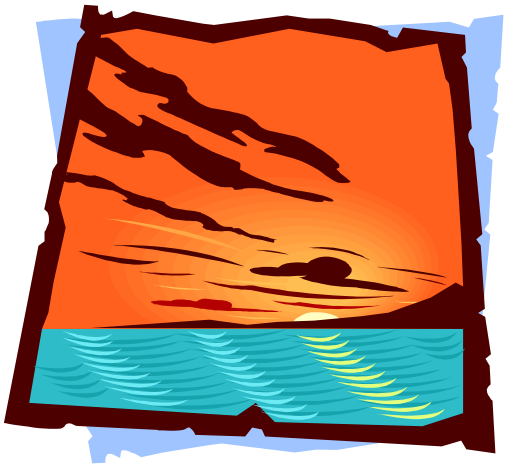
ASSESSMENT OF SCIENCE AND TECHNOLOGY ACHIEVEMENT PROJECT (ASAP)

Science and Technology Exemplars

Grade 8: Earth and Space Systems – Water Systems

Exemplar Task (8ES/PT01/Feb 2002)

Wasting Water



Preface

This task is one of a series developed by the Assessment of Science and Technology Achievement Project (ASAP) which is being used for the ASAP Science and Technology Exemplars Project.

This task is organised in three parts:

A. Task Overview
B. Student task sheet – designed to be photocopied for the students
C. Teacher Information – providing essential information relating specifically to this task

For further information, contact the ASAP office at 416-736-5006 or email: asap@edu.yorku.ca

Task Overview

Description of the Task:

This is a culminating activity designed to assess a cluster of expectations for this grade and strand. Students should have been taught the concepts and skills required to perform this task prior to attempting it.

Students will research the physical, social and economic impact of human intervention on one aspect of the Earth's water systems. They will reflect upon the issues that they have found and prepare a short presentation of their findings

Materials and Equipment Required:

Access to a variety of information sources including printed materials and the Internet
A variety of reporting materials and equipment including electronic resources if available

Suggested Timeline:

4 x 45 minutes for research and reporting
2 X 45 minutes, as a class, for presentation

Suggested Grouping:

Pair/share

Safety Considerations:

Appropriate considerations for equipment and tools used

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Student Task Sheets

Wasting Water

According to the United Nations, by the year 2005 two-thirds of the world's population will be facing serious problems of water supply. The need for the earth's water will be exceeding its supply in a relatively short period of the time.

At the same time, freshwater ecosystems such as lakes, rivers and marshes are disappearing or being altered at an alarming rate. Some countries have already destroyed 50 to 80% of their natural wetlands. In just a few decades, the populations of many freshwater-dependent species have fallen to critical levels.

Water covers about two-thirds of the Earth's surface but most is too salty for use. Only 2.5% of the world's water is not salty, and two-thirds of that is locked up in the icecaps and glaciers. Of what is left, about 20% is in remote areas, and much of the rest arrives at the wrong time and place, as monsoons and floods.

We are facing a global water crisis!

Choose one of the following technological innovations in modern society:

- Large-scale “Factory-Farming”
- Clear-cut Logging
- Pulp and Paper Mills
- Fish Farming
- Nuclear Power Generation
- Offshore Oil Drilling
- Disposal of human sewage

For your chosen technological innovation:

1. Suggest the problem(s) that the innovation is attempting to solve in society, and describe the nature of the technology being used.
2. Identify and evaluate its positive and negative effects to society.
3. Explain how the technological innovation has impacted the earth’s water supply.
4. Evaluate the economic and environmental effects of the innovation on the world and the availability of freshwater.
5. Prepare a five minute presentation on the effects of the technological innovation to a United Nations committee using any media you think appropriate.

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Teacher Information Sheets

This task addresses the following cluster of expectations. Expectations assessed by the rubric are highlighted in bold.

Understanding Basic Concepts

- identify the various states of water on the earth's surface and the conditions under which they exist (e.g., glaciers, snow on mountains, and polar ice-caps are solid states of water; oceans, lakes, rivers, and groundwater are liquid states of water; the atmosphere contains water in its gaseous state)

Developing Skills of Inquiry, Design and Communication

- **formulate questions about and identify needs arising from events relating to the earth's water, and explore possible answers to these questions and ways of meeting those needs (e.g. search print and/or electronic resources for information and prepare a map showing the changes in world ice distribution patterns over several geological time periods; conduct research to explain why fossils of ocean fish are found in places geographically removed from present-day oceans)**
- **use appropriate vocabulary, including correct science and technology terminology, to communicate ideas, procedures, and results (e.g., use terms such as *salinity, currents,* and *basins* when describing oceans and their characteristics)**
- **communicate the procedures and results of investigations for specific purposes and to specific audiences, using media works, written notes descriptions, charts, graphs, drawings, and oral presentations (e.g., prepare a multimedia presentation on the effects of tides on Canadian shores; create a concept map linking the different stages of the water cycle)**

Relating Science and Technology to the World Outside the School

- **evaluate human use of water and economic and environmental effects of that use (e.g., filtration plants, tourism, industrial applications, control of water flow)**

Prior Knowledge Required:
Before attempting this task students should have been taught the following:

- about the various states of water in the earth's surface
- about the different stages involved in processing water for use by humans
- about the positive and negative effects of the development of natural resources on the earth's water supply
- about human use of water

Students should be familiar with the following science and technology terminology:

Glacier, polar ice caps, oceans, lakes, rivers ground water, atmosphere, environment, ecosystems, sustainability, global warming, ozone layer

Prior Skills Required:
Before attempting this task students should have experience of the following:

- presenting ideas and information to peers
- research skills using printed and electronic media
- working in groups of two

Suggested Introductory Activities:
The following activities are suggested to introduce this task to the students:

- review the knowledge required for the task
- read the scenario to the class
- as a class brainstorm approaches that can be taken

Cross-strand Links:

Every strand in the Science and Technology document has common set expectations clustered under the title ***Developing Skills of Inquiry, Design and Communication.*** This task is therefore appropriate to assess and evaluate these skills for every Grade 8 strand.

Cross-curricular Links:

Links can be made to *The Ontario Curriculum Grades 1-8 Language,* Oral and Visual Communication: Grade 8 as follows – Use of Words and Oral Language Structures: use the specialized vocabulary appropriate to the topic in oral presentations; Non-verbal Communication Skills: use tone of voice and body language to clarify meaning during conversations and presentations; use resource materials (e.g., visual aids) to illustrate ideas in presentations; Group Skills: contribute collaboratively in group situations by asking questions and building on the ideas of others; work with members of their group to establish clear purposes and procedures for solving problems and completing projects.

Considerations for Split/Grade Classes:

Appropriate strategies are as follows:

- Teach one grade while the other grade completes the task which does not require active teacher guidance
- Create separate learning centers for student investigation specific to each grade topic and strand. The methods of science and technology (inquiry and communication) would provide the whole class focus
- Introduce self-directed student activities connected to specific expectations
- Reorganize students into grade groupings for the purposes of teaching a given topic
- Teach specific grade expectations when part of the class is working with another teacher
- Make thematic connections by clustering the overall expectations around a unifying organizer such as “Form and Function”.

RUBRIC FOR GRADE 8: Wasting Water

Knowledge/Skills	Level 1 **The Student:**	Level 2 **The Student:**	Level 3 **The Student:**	Level 4 **The Student:**
Inquiry Skills • demonstrates the required skills and strategies of inquiry (e.g., conducts research, questions assumptions, identifies cause – effect relationships, compiles information, reports to specific audiences)	• applies few of the required skills and strategies	• applies some of the required skills and strategies	• applies many of the required skills and strategies	• applies all, or almost all of the required skills and strategies
Communication of Required Knowledge • clarity and precision of work using a variety of media and forms of expression • use of appropriate science and technology terminology	• communicates with little clarity or precision • rarely uses science and technology terms correctly and in context	• communicates with some clarity or precision • sometimes uses science and technology terms correctly and in context	• generally communicates with clarity and precision • frequently uses science and technology terms correctly and in context	• consistently communicates with clarity and precision • always uses science and technology terms correctly and in context
Relating Science and Technology • evaluates the social, economic and environmental effects of human impact on the earth's water systems	**The Student:** • provides statements without informed analysis	**The Student:** • gives partial judgments that demonstrate some analysis	**The Student:** • gives judgments that demonstrate informed analysis	**The Student:** • gives reasoned judgments that show thorough analysis