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1. INTRODUCTION

Air pollution affects the health of all Canadians with children being identified as one of several groups most sensitive to elevated concentrations. Recent medical research has identified asthma as the most common chronic respiratory disease of children and accounts for approximately 25 percent of school absenteeism in Canada. Furthermore, research has also indicated a strong positive correlation between deterioration in air quality and increased hospital admissions.

To address the delivery of air quality education and awareness to young Canadians, Environment Canada's New Brunswick Weather Centre, in partnership with the Clean Annapolis River Project (CARP), a community-based environmental management group, have developed an Air Quality Outreach module targeted towards elementary and middle school aged children, Grades 4 to 8. The principle objective of this module is to introduce students to the fundamentals of air quality science, combining both a theoretical and a "hands-on/interactive" approach. This will allow both children and teachers to better understand the complexities of air quality on human health as well as allowing them to take a more informed decision to protect themselves, their families and their environment, especially on days when air quality is of concern. This module was developed specifically to complement Environment Canada's highly successful *Sky Watchers Program*, an interactive atmospheric science program suitable for Grades 4 to 8, designed specifically to support the science curriculum.

The intent of this paper is to highlight the module objectives, in addition to the experience gained through the delivery of a non-traditional atmospheric science to elementary and middle school students.

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2. RATIONALE

Until recently, air quality outreach in Canada has been somewhat limited in scope. This may be due to the fact that a large portion of the Canadian population resides in rural areas which are not perceived by the general public to be prone to air quality episodes. This perception is principally due to the absence in these areas of large industry and/or transportation networks. This is commonly referred to as the *"if I can't see it or smell it, then it doesn't exist syndrome"*. This has begun to change in recent years due to the rapid increase in public information now available. As one of Environment Canada's top priorities, air quality forecasts are now routinely available to many Canadians. In addition, technology has developed to the point whereby real-time or near real-time access to local and regional air quality data can be easily obtained. Increased coverage of air quality events, media outreach and Canadian Lung Association and community-based programs have also greatly helped to advance the knowledge of air quality issues in Canada. However, the majority of outreach information currently available is targeted towards the adult population.

Medical research has identified children as one of several groups most susceptible to health related problems as a result of exposure to air pollutants. To encourage and enhance children's knowledge and awareness of air quality issues, Environment Canada, in partnership with CARP, have developed an air quality module specifically developed for this target audience. Through the presentation of air quality science concepts and related activities, children are better informed and are able to contribute in any decision making process with respect to their health, the health of their families and friends, and the environment in which they live.

2.1 Objective(s)

Through the use of classroom-based, school-based and community-based components, the Air Quality module seeks to develop air quality awareness in school children, grades 4 to 8, and their teachers. The program learning components

build upon Environment Canada's *Sky Watcher Program*, which already enjoys familiarity in many schools throughout Canada.

The principle objective(s) of the module are:

- to introduce both students and teachers to the fundamentals of air quality science, combining both a theoretical and a "hands-on/interactive" approach
- to advise students and teachers how to access and use the various air quality tools and programs available, such that they are better able to take an informed decision
- to increase the awareness of both students and teachers of the simple steps they can take to protect themselves from the effects of exposure to air pollution
- to stimulate thought and encourage inquiry
- to make the learning experience enjoyable

2.2 Module Components

Based on the design and format of Environment Canada's *Sky Watchers Program*, the Air Quality module is both an inquiry-based and an activity-based unit. A systematic approach to air quality science is presented, with a focus on the formation and behavior of ground-level ozone and particulate matter. Through a series of lectures, students are able to ascertain what smog is, the local and regional behavior of smog, the effects of pollution on human health and the environment, and what they can do, as individuals, to reduce air pollution. Air quality prediction is also extensively discussed with the strong correlation between local, regional and synoptic-scale meteorological conditions and poor air quality being emphasized.

The learning experience is broadened through a series of classroom-based activities that are designed to stimulate practical application of the air quality theory. Activities vary from the simple measurement, graphing and data analysis of ground-level ozone concentrations, to a board game whose objective is to communicate to the students, the various feedbacks between air pollutants, human health and planet earth. Other activities are based on air quality forecasting and the relationship between local weather and pollution. Students are able to obtain historical and real-time observations, forecasts and related

information from Environment Canada's website enabling them to play the role of an air quality forecaster. This activity has been proven quite popular with both students and teachers alike. The exercise has the added benefit of not only helping them to understand the complexities of air pollution science, but through the "hands-on" use of the materials and tools, the students are better able to understand, and subsequently make use of the daily air quality information provided to them by Environment Canada.

2.3 Other

The *Sky Watcher* Air Quality module enjoys the added advantage in that it can also be used as a self-contained unit. This is beneficial for those schools or groups not registered with the *Sky Watchers* program. As such, the module has proven to be quite popular with community-based environmental groups, such as the Atlantic Coastal Action Plan (ACAP) groups in Atlantic Canada. The module recently was chosen as a principle component of a major clean air initiative of the ACAP, (Eastern Charlotte Waterways Inc., ACAP Saint John and CARP) under the auspices of the North American Centre for Environmental Cooperation (NACEC). Designated "The Air for Health Education Program", the objective is the promotion of air quality and health issue links in school curriculums. This program is currently underway (2002-2003 school year), resulting in module access to a large number of elementary and middle schools in the provinces of New Brunswick and Nova Scotia.

3. FUTURE PLANS

It is anticipated that additional web-based activities will be developed and available in the near future. As well, a survey of schools currently using the module is planned to provide the necessary feedback for program evaluation.

Additional plans include the development of an air quality module targeted at the high school level (Grade 10). Currently in production, and scheduled for completion in 2003, this module will form part of the *Project Atmosphere Canada Program* and will be available for download via the Internet for schools across the country.

4. CONCLUSION(S)

Environment Canada's *Sky Watcher* Air Quality module is viewed as a useful educational vehicle for the introduction of the fundamentals of air quality science to elementary and middle school students. The knowledge gained through module

use, allows the student to become better informed about air quality issues and the link between air pollution and human health.

5. ACKNOWLEDGEMENTS

The author would like to thank the staff of the New Brunswick Weather Centre whose dedication to providing air quality services to Atlantic Canadians has been instrumental to the success of this program. Also a special thanks to Billie Beattie, Claude Cote, Georgiana Chung, Susan Howe, Stephanie Melhman and David Waugh, whose help and encouragement during module development were certainly welcomed and appreciated.

6. REFERENCES

Atlantic Coastal Action Plan Site (ACAP)

<http://www.atl.ec.gc.ca/community/home.html>

Canadian Lung Association

<http://www.lung.ca/cando>

Clean Annapolis River Project (CARP)

<http://www.annapolisriver.ca/>

Environment Canada Clean Air Site

http://www.ec.gc.ca/air/introduction_e.cfm

MSC-Atlantic Regional Green Lane Site

<http://www.ns.ec.gc.ca/>

MSC-National Site (Access to *Sky Watchers*)

<http://www.weatheroffice.ec.gc.ca/>

Ontario Medical Association

<http://www.oma.org/>