BC Clean Air Research Fund

Final Report

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**BC CLEAR is sponsored by the BC Ministry of Environment, jointly managed with Metro Vancouver and Environment Canada.
The Fraser Basin Council administers the program in partnership with the BC Lung Association.**

PROJECT OVERVIEW

Abstract

All children are at increased risk from air pollution, with 1 in 10 children in BC affected by asthma.

British Columbia has an Air Quality Health Index which reports local air quality in relation to its effects on health. BC was the first province in Canada to offer this Index and has an opportunity to once again be a first-in-Canada through a program designed to increase awareness of the AQHI among those who play a key role in motivating behavior change within families and communities, and who are at increased risk from air pollution – children.

The BC Air Quality School Flag Program engaged elementary school teachers, students, their parents and the school community to learn about and use the AQHI as a health management tool within the school setting and at home. The opportunity to participate in this pilot program was promoted to elementary school administrators and educators throughout British Columbia in November 2013 and the pilot was implemented in twelve schools across the province in January and February 2014.

The program focused on raising awareness of air quality and health, the AQHI and air quality stewardship through the flying of Air Quality Flags (in both virtual and onsite environments) and by providing classrooms and teachers supporting tools, resources and curriculum-linked materials. The following is a short list of resources developed or repurposed for the pilot, available for download from www.airqualityflags.ca .

Coordinator Handbook – http://www.airqualityflags.ca/wordpress/wp-content/uploads/2013/09/CoordinatorHandbook.pdf
School Poster - http://www.airqualityflags.ca/wordpress/wp-content/uploads/2013/09/flag-program-poster_FINAL.pdf
School Coordinator Webinar Guide - http://www.airqualityflags.ca/wordpress/wp-content/uploads/2013/09/Webinar-Handout.pdf
Learning Stations- http://www.airqualityflags.ca/wordpress/wp-content/uploads/2013/09/Learning-Stations.pdf
Program Summary –
Frequently Asked Questions - http://www.airqualityflags.ca/wordpress/wp-content/uploads/2013/09/Air-Quality-Flag-Program-Frequently-Asked-Questions.pdf /
Terminology - http://www.airqualityflags.ca/air-terminology/
Stewardship Options - http://www.airqualityflags.ca/wordpress/wp-content/uploads/2013/09/Air-Quality-Stewardship.pdf

Through pre-pilot and post-pilot interviews and surveys, the program identified and measured changes in awareness of the relationship between air quality and health, the Air Quality Health Index and air quality stewardship actions among participating teachers and students through both quantitative and qualitative research methods.

The BC Air Quality School Flag Program represents cross-agency and cross-border cooperation with interest and support from the US Environmental Protection Agency, Health Canada, Environment Canada, BC Ministry of Health and the Fraser Basin Council.

FINANCIAL OVERVIEW

Revenue Description

Note: Value of In-Kind contribution from US EPA estimated based on human and fiscal resources committed to development and expansion of US EPA School Flag Program over previous five years.

Table 1 Projected Total Project Revenue (cash and in-kind)

Organization			2013/14		Total
BC CLEAR – Fraser Basin Council			$20,000		$20,000
Environment Canada			$20,000	$5,000	$25,000
BC Ministry of Health - PHSA			$15,000		$15,000
US EPA				$195,000	$195,000
Thompson Rivers University – To be confirmed				$5,000	$5,000
CSI Communication Solutions Inc.				$10,000	$10,000
PG Air				$5,000	$5,000
TOTAL			$55,000	$220,000	$275,000

Table 2 Actual Revenue for Reporting Period (cash and in-kind)

Organization			2013/14		Total
			Cash	In-kind	
BC CLEAR - Fraser Basin Council			$20,000		$ 20,000
Environment Canada			$20,000	$5,000	20,000
BC Ministry of Health - PHSA			$15,000		$ 15,000
US EPA				$195,000	$ 195,000
Thompson Rivers University				$5,000	$5,000
CSI Communication Solutions Inc.				$10,000	$10,000
TOTAL			$55,000	$215,000	$270,000

- ***Total funded contributions toward project = $55,000***
- ***Total value of in-kind support received throughout project = $210,000***

Expenses Description

Table 3 Projected Expenses for Reporting Period (cash and in-kind)

Project Costs	**Expenses**		
	All Sources		
	Cash	*In-kind*	*Total*
Salaries and fees	$27,500	$105,000	$132,500
Travel and accommodation	$ 500	0	$ 500
Equipment and supplies	$15,000	$10,000	$ 25,000
Communications and outreach	$ 7.000	$90,000	$ 97,000
Analysis	$ 5,000	$5,000	$ 10,000
TOTAL PROJECT COSTS	$55,000	$210,000	$ 265,000

- *Total funded contributions toward project = $55,000*
- *Total value of in-kind support received throughout project = $210,000 which includes estimated $195,000 in value of established program by US EPA.*

Table 4 Actual Expenses for Reporting Period (cash and in-kind)

Project Costs	**Expenses**		
	All Sources		
	Cash	*In-kind*	*Total*
Salaries and fees	$27,100	$ 105,000	$132,100
Travel and accommodation	$ 500		$ 500
Equipment and supplies	$ 8,227	$ 10,000	$ 18,227
Communications and outreach	$ 15,289	$ 90,000	$105,289
Analysis	$ 4,824	$ 5,000	$ 9,824
TOTAL PROJECT COSTS	$55,940	$210,000	$265,940

Please explain expense discrepancies (if any)

RESULTS OVERVIEW

Activity Description

Table 5 Summary of Activities for the Reporting Period

RESEARCH AND DEVELOPMENT	APR. – NOV. 2013	Activity Details and Results
Liaison with pilot partners on contributions, outreach capacity, roles, responsibilities		
Inventory and review of all applicable agencies and resources	July 2013	
Focus testing with target audience	Aug. 2013	Focus testing informed branding, messaging and outreach tools
Development of program branding and creative guidelines	Sept. 2013	
Development and repurposing of all program resources	July – Oct. 2013	Program Video Coordinator Handbook Repurpose Environment Canada AQHI Learning Stations and Clean Air Heroes curriculum linked resources. Letter to parents FAQ AQHI Program Flags Stewardship Activities
Development and launch of website	July - Oct. 2013	www.airqualityflags.ca
Development and programming of participant school pages and widget	Oct. - Nov. 2013	Displays customized virtual flag page for each participating school and enabled pilot program to offer raising of online flag in addition to physical flag.
Development of social media strategy, accounts and campaign content and measurement tools	Oct - Nov. 2013	See report on social media metrics
Development of program orientation webinar and resource		
Recruitment of research partner and development of methodology and tools	Sept. – Dec. 2013	
RECRUITMENT OF PILOT PARTICIPANTS	OCT – DEC. 2013	
Recruitment Outreach with education associations		More than 2,300 education leaders reached through outreach to: BC Teachers Federation, BC Science Teachers Association Provincial Intermediate Teachers Association (PITA), BC Principals and Vice Principals Association (BCPVPA), Vancouver Elementary Teachers Association (TESTA) Environmental Educators Provincial Specialist Assoc. (EESPA)
Recruitment outreach with school districts		Emails and phone calls to every district in BC that reports and AQHI. See results in pilot program report.
Participant Registration		12 schools / teachers registered to participate in pilot in January and February 2014
PRE-PILOT PARTICIPANT READINESS AND	NOV – DEC. 2013	

RESEARCH		
Program webinar for administrators / teachers		Five schools participated in program orientation webinar. All other participants received orientation resources and orientation guide by email.
Program Presentations to teachers / students		Two schools participated in a face-to-face introduction of the program and processes that included interaction with the teachers and students.
Research methodology and tools Ethics Review Process		Ethics review and approval received from Thompson Rivers University Ethics Review committee re: evaluation proposal and tools.
Pre pilot survey to teachers		https://www.surveyfeedback.ca/surveys/wsb.dll/s/1g2f83
PILOT IMPLEMENTATION	JAN – FEB. 2014	
Ongoing liaison with pilot participants		
Monitoring and measurement of participant experience and qualitative measurement collection		
POST PILOT ANALYSIS AND REPORTING	MARCH 2014	
Analysis of pre-and post-pilot surveys and qualitative feedback		
Development of Program Recommendations		
Development and Submission of Final Report		

Deliverable Description

Please include copies of completed deliverables with the interim report (e.g. publications, presentations, research reports, etc.).

Please see full report on activities and deliverables (including samples), research goals and outcomes as well as program recommendations within Appendix 1: BC Air Quality School Flag Program Final Report.

Appendix 1: BC Air Quality School Flag Program Report

APPENDIX A:
Air Quality Flag Program Pilot, British Columbia

Final Report, April 3, 2014

Submitted by:

MARKETING FOR HEALTH AND ENVIRONMENT
AIR SHIFT GROUP

This research was supported by a financial contribution from the BC Clean Air Research (BC CLEAR) Fund. BC CLEAR is sponsored by the BC Ministry of Environment, and is jointly managed with Metro Vancouver and Environment Canada. The Fraser Basin Council administers the program in partnership with the BC Lung Association.

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Executive Summary

The first Canadian pilot of the Air Quality School Flag program achieved a number of goals and provided valuable insight into how to support the expanded success of this outreach effort by other organizations and in other locations across Canada in the future.

Firstly, the program was successful in increasing awareness of air quality, its connection to health among those who were exposed to or participated in the program. It advanced the awareness and understanding among its target audiences; teachers, students and the school community, that there are frequent good air days and occasional bad air days and that these should be considered when planning outdoor activities.

Secondly, it encouraged children to engage in outdoor activity while being mindful of their own sensitivities to air quality.

Both of these successes were validated through surveys and exit interviews with participants in this pilot.

As an outreach initiative aimed at children, the Air Quality Flag Program proved to be an effective mechanism for increasing awareness among school age children of the quality of their air, the Air Quality Health Index and their collective responsibility to the air they share.

That said, the pilot also revealed a distinct challenge – one not unfamiliar to outreach related to air quality and the AQHI. The lack of variation in the AQHI scale, and the infrequency in which the Index reports anything other than good air quality, made it challenging to sustain teacher and student interest. As the AQHI was designed, in part, to advise people of when the

local air quality has changed so as to support improved management of personal health, a lack of change in the Index scale reported over sustained periods of time made it difficult to keep interest and attention. The same was true for the air quality flag program. Sustained interest in both the program and action of displaying a coloured flag was difficult over an eight-week period and required coordination and ongoing outreach to schools and teachers.

As such, we believe the program may be more widely accepted and be considered as higher relevance to schools and teachers if it was modified to be an alert based program with outreach to teachers and schools limited to times when the AQHI reports moderate, high or very high risk range. At such times, outreach could potentially align with public health and/or Ministry of Environment notifications and advisories.

Specifically, we recommend a full program introduction and delivery to schools / teachers of 6-8 weeks, followed by an ongoing alert based protocol of communication with schools when changes occur in the Index.

In relation to outreach in the school system, the program aligned well with science, socials and math within the Grade 5 BC curriculum. It also revealed the importance of the classroom based resources in supporting and reinforcing learning related to air quality and health, regardless of the risk range being reported through the AQHI. Resources encouraged teachers to align air quality, health and AQHI information with other subjects and interests in their classroom such as graphing, social responsibility and study countries and other areas of the world.

Phone interviews with participating teachers at the end of the pilot indicated that teachers found comparing their community's air quality with other cities in other parts of the country and world had a positive impact on students' understanding of the topic. This kind of lesson suggestion should be incorporated into resources provided to teachers in future air quality school flag outreach.

Perhaps most importantly, as this was a first of its kind pilot in Canada, was the confirmation from the majority of teachers that they would continue to use the air quality school flag resources in their classrooms.

In summary, this pilot achieved its goal of introducing a new air quality outreach program intended for children while using both qualitative and quantitative feedback mechanisms to evaluate the introduction and highlight ways in which the program could be enhanced in the future.

With interest in the program from government and public health groups in other parts of the country, we are optimistic the investment devoted to the creation of the program, the program website and related outreach materials will support further implementation.

Program Structure

The BC Air Quality Flag Program pilot, developed and delivered between August 1, 2013 and March 6, 2014, captured the attention of students and educators in BC as well as air quality and health advocacy groups across Canada and internationally. It resulted in almost 1,000 children ages 9 to 11, as well as their teachers, families and wider school communities, learning about air quality, its impacts on health, the Air Quality Health Index, and the importance of getting active outside.

Specifically, the program was developed to:

- Inform children about air quality, its effects on health, and the Air Quality Health Index (AQHI).
- Introduce the practice of checking the AQHI when planning outdoor activities.
- Measure awareness of air quality, health and the AQHI among target audiences.

The program was delivered over four phases including: 1) research and readiness; 2) recruitment and baseline survey among teachers and parents; 3) program implementation and management, and; 4) evaluation.

Twelve schools across BC signed up to participate in this eight-week program, which included processes for choosing and raising flags, curriculum linked resources, classroom activities and ongoing blogging by students on air quality and its connection to health.

The program evaluation, completed by Dr. Robert Hood, PhD, Associate Professor, Thompson Rivers University, has been included as **Appendix B**.

Phase one, July 1-November 1, 2013: Research and readiness, which included;

- Identification of needs and opportunities including interviews with school administrators, principals and teachers regarding program intent, goals and opportunities for participation.
- Confirmation of roles and responsibilities with program partners including Health Canada, Environment Canada, US EPA, Fraser Basin Council and the BC Provincial Health Services Authority.
    - Request to review and repurpose EPA's School Flag Program concept and review/repurpose School Flag Program Guide for Schools, June 2013. (request made and accepted by EPA's School Flag Program coordinator).
    - Content vetting request sent to Health Canada in August of 2013, and schedule established with Health Canada for Air Quality Flag Program tools in September 2013 (content sent and vetted, per schedule).
    - Funding schedule established and manage with Environment Canada, Fraser Basin Council and BC Provincial Health Services Authority.
- Focus testing with group of Grade 5 and 6 children on terminology and program concepts.
- Development of program identity and graphic standards.
- Development of research methods and tools.
- Development of website, www.airqualityflags.ca, including customized programming for school participant web pages and

AQHI "data pull" from Environment Canada to allow children to choose and "fly" virtual Air Quality Flags.

- Development of Air Quality Flags information and recruitment video.
- Repurposing of EPA and Environment Canada resource materials to align with AQHI and Air Quality Flag program pilot.
- Integration of individual school blogs within virtual flag pages.
- Evaluation approach and design
- Pre and post program survey development
- Post program survey development
- Research Ethics Review process through program research partner Dr. Robert Hood, Associate Professor, Thompson Rivers University.

Phase two, October 1-December 15, 2013: Participant recruitment and baseline survey, which included;

- Outreach to school district senior administrators.
- Outreach to school principals and vice principals in BC school districts where the AQHI is reported.
- Outreach to elementary teachers.
- Enrollment of twelve (12) schools / classrooms and completion of participant approval process.
- Participant orientation webinars or face-to-face presentations.
- Distribution of program materials.

Phase three, January 7-March 4, 2014 – Pilot program implementation, which included;

- Daily monitoring of participant engagement including daily checking of local, current AQHI, flying of on-campus flags, virtual flags and participant blog posts.

- Providing teachers question prompts about air quality to pose to students re: blogging.
- Writing a weekly blog post on airqualityflags.ca directed at participating schools and social media followers.
- Providing ongoing support and answering questions for teachers and students to ensure successful program implementation.

Phase four, March 5-March 31, 2014 – Evaluation

- Post program survey distribution and data collection.
- Phone exit survey with teachers.
- Analysis of quantitative (surveys) and qualitative (school blog posts) and post program phone interviews with teachers
- Reporting to program partners.

What follows is a more detailed overview of the activities from each phase of the pilot, a summary of the target audience research and lessons learned that may help shape further expansion of this program with support of governments, NGO's or for-profit sponsors, across Canada.

Phase One – Research and readiness

Needs and opportunities

Air pollution's harmful effects on health have been well documented, specifically among at-risk audiences (children, the elderly, people active outdoors, and those with respiratory and cardiovascular conditions and disease), yet awareness of air quality and its effects on health is generally not well understood among the general public in British Columbia and other parts of Canada.

Children are at increased risk from air pollution because of their underdeveloped respiratory systems, and time spent playing outside. Currently, about one in 10 children in BC suffer from asthma. (BC Lung, News Release, August. 2008 - http://www.bc.lung.ca/mediaroom/news_releases/nr_20_2008.html)

Yet, there has been no province-wide program introduced to educate and engage children, within an elementary school setting, on air quality, health, the Air Quality Health Index and air quality stewardship.

Developed with multi-agency cooperation from the US Environmental Protection Agency's School Flag Program and Health Canada, the BC Air Quality Flag Program was created and introduced by the AirShift Group to encourage teachers, students and, secondarily, their parents, to learn about and use the AQHI as a health management tool, while encouraging outdoor activity, within an elementary school setting. Program funders with a mandate for increasing public understanding and action around air quality and health protection were identified, including Environment Canada, Fraser Basin Council and the BC Provincial Health Services Authority.

Research of other "best practice" health and environment school-based outreach programs as well as interviews with students, teachers and school

administrators confirmed the program approach should be easy, inclusive, fun, and support learning outcomes, where possible, within the provincial elementary school curriculum.

Consultation with select principals revealed that schools and teachers had the autonomy to determine how best to deliver curriculum within classrooms. This research reinforced that participation in the pilot would best be sought on a voluntary basis based on interest and capacity.

Target audience focus testing

Focus testing with a small group of 10- and 11-year-old students was conducted to understand current awareness of air quality and its relationship to lung health and to test preliminary branding concepts and key words. Focus testing was designed to extract personal stories from children about their thoughts and opinions on air pollution that could help shape the program identity and content. With parental permission to participate sought in advance, students were also provided a series of preliminary program identity concepts and asked to express their opinion by raising one of three flags – green (support), yellow (not sure), and red (do not support).

Grade 5 students in Kamloops from three different elementary schools were part of a focus group to test air quality terminology and concepts prior to development of the program identity and graphic standards.

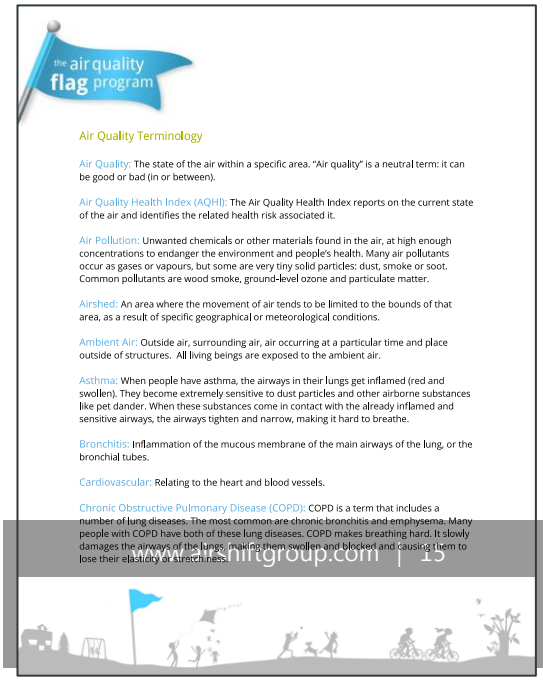
Phone and face-to-face interviews were conducted with five individual principals and two school district superintendents in August and September to gather feedback on program goals, content, approach and schools' participation requirements. These conversations helped confirm and shape next steps in the program development and school recruitment phases of the project.

Development of program identity and graphic standards

Public opinion research conducted by Health Canada since the AQHI was introduced in Canada revealed low awareness and understanding of air quality and its relationship to health among most age groups, including children and youth.

As the primary audience for the Air Quality Flag Program was children in Grades 5 and 6, a program identity was developed to appeal directly to this audience, while recognizing the content must interest and inform teachers, principals and parents as well.

Although air quality and lung health are serious topics, the creative approach was developed to be simple, inclusive and accessible so students would interact, pay attention to air quality "categories", raise the flag virtually and on-campus, and blog. Short, dynamic headlines and relevant content that aligned the program with curriculum and the importance of outdoor activity served to inform teachers and school administrators, recognizing these groups have limited time for new program uptake.



Development of research methods and tools

Tools identified and developed for evaluation included:

Pre and post online surveys: Evaluation of the Flag Program, provided in Appendix B, was designed to estimate changes in awareness and air quality stewardship actions through pre and post program surveys for both teachers and parents of the elementary school student participants. A key assumption was parents would become aware and informed about air quality and health via their children.

Blog as part of the virtual, air-quality-flag page for each school: A program blog was used at each school to enable questioning, learning and discussion about air quality and health.

Post program phone interviews with teachers: Additionally, teachers were interviewed post-program with questions about the value of the AQHI Flag Program, what worked and what did not work, and what they learned from the program. Questions and a summary of the results are also included in Appendix B.

NOTE: Only a small number of responses were received from parents on the pre survey, and while the limited response demonstrated the electronic survey was accessible, the original pre and post survey research design was abandoned for the parent group. Further examination of the pre and post surveys from teachers showed another unanticipated problem. Each teacher was asked to enter a unique code in order to match the pre and post surveys to enable a pairwise comparison of responses. Data revealed that pre and post codes were similar for only four teachers. Therefore, the technique to compare was abandoned given that the sample was so small. Results outlined in Appendix B are for the post program survey only, given

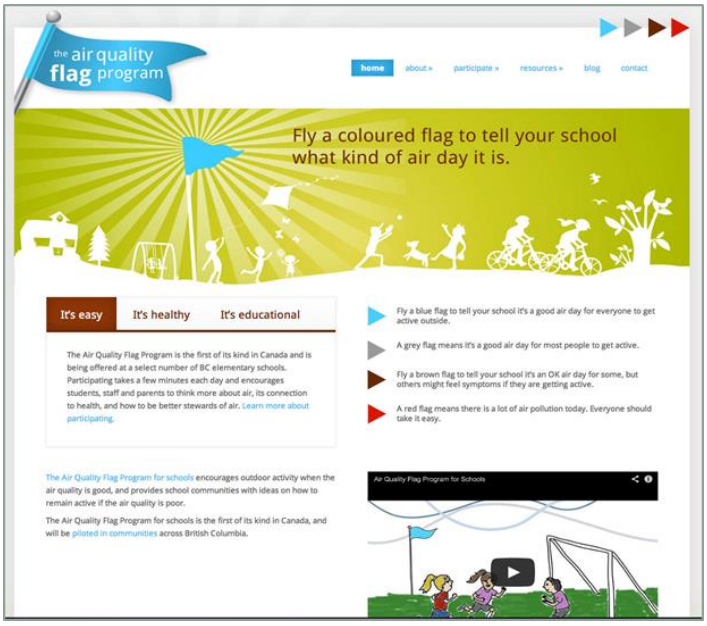
it was the only survey to ask questions about the effectiveness of the AQHI Air Quality Flag Program.

These unanticipated problems led to a decision to do post program telephone interviews with teacher participants to ascertain benefits and challenges of the program, as well as qualitative feedback on increases in awareness of air quality, its impacts on health and the Air Quality Health Index, through a series of questions and answers. These results are outlined in Appendix B.

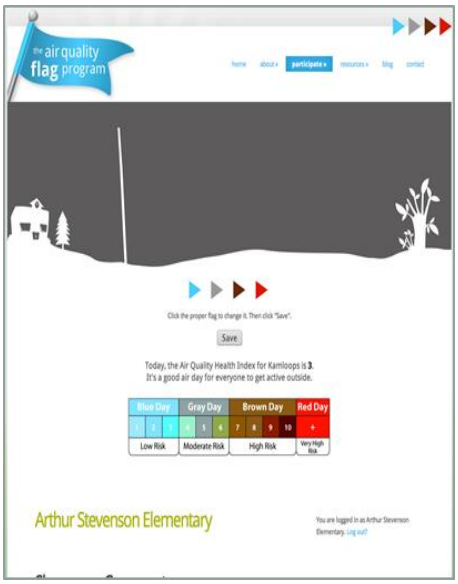
Development of www.airqualityflags.ca

The Air Quality Flag Program website – www.airqualityflags.ca – served as the foundation for school recruitment, program implementation, and shared information on program funders and supporters. The website was launched Oct. 4, 2013 and over the course of the pilot had 1,139 visitors and more than 4,000 page views. It hosted an informative two-minute Air Quality Flag Program recruitment video and provided teachers with all the information they needed to sign up for and participate in the program, and access and download tools and resources.

The website featured an individual air quality flag page for each participating school. These pages were programmed to pull the local, current AQHI data from Environment Canada. A customized "flag widget" allowed teachers and/or students to raise a virtual flag on their webpage each day, with flag colours corresponding to risk categories within the AQHI.



Schools were also assigned an individual login to raise a virtual flag and post blog content. The widget was designed so students could participate in picking the flag colour for the day, flying it virtually and choosing their on-campus flag, accordingly. Individual school pages were refreshed automatically each night at midnight so classrooms came back to a "fresh screen" in the morning, Monday to Friday over the eight-week program.



On campus flags

Flags were the primary symbol for this program. While the US EPA Flag Program is based on flags intended for school flag poles, research with teachers and school administrators revealed a uniquely Canadian challenge – the fact that school flags are rarely raised and lowered and that this is primarily under the responsibility and authority of the school custodial staff. To overcome this challenge, this pilot provided participating schools with flag posts in addition to a set of four coloured flags.

Development of recruitment video and supporting program resources

To provide a brief overview of the program and support phase two recruitment of pilot participants, a short video was produced and hosted on the website and on YouTube, uploaded in November 2013. In keeping with the desired expression of the brand identity, the video presented the program from a child's point of view using simple animated graphics. Once the recruitment period concluded, the video was used as an informational tool by several participating schools to introduce the program to students. Several participating schools showed the video at their school assembly.

In keeping with the desired expression of the brand identity, the video presented the program from a child's point of view using simple animated graphics. It gained more than 270 views during the recruitment and implementation phases of the pilot.

Development and repurposing of support tools and resources

With cooperation from the US Environmental Protection Agency (EPA), this pilot repurposed some of the EPA's flag program resources to align with Canada's AQHI and the BC Air Quality Flag program identity. Additional curriculum resources were developed to support AQHI and air quality classroom activities and information that would integrate within the BC Grade 5 curriculum.

The following is a list of all the resources developed or repurposed for the pilot;

- Coordinator Handbook (Repurposed and updates from EPA): A reference guide for school administrators, classroom teachers or parent leaders on how to participate in the pilot and maximize the program within their school / class.
- Learning Stations: Repurposing of Environment Canada's curriculum-linked AQHI learning stations for Grade's 5 and 6.
- Clean Air Heroes: Additional curriculum-linked materials for Grades 5 & 6 developed by Environment Canada (2013). This document was not re-branded, but still made available on the Air Quality Flag Program website in both English and French.
- Letter to Parents: This resource was developed to support communication between teachers/school administrators and parents of students participating in the Air Quality Flag Program. An additional purpose of the letter was to provide the program coordinator's contact information to parents in case more information was needed.

- Program Summary: An overview of the Air Quality Flag Program used to support participant recruitment and outreach.
- Frequently Asked Questions/ Terminology: Both of these documents, together and individually, provided more information on the program and were used as student resources.
- Stewardship Options: Tips and tactics on ways to reduce emissions. This was a helpful resource to direct teachers to – particularly if it was a leadership or "green team" that was using/sharing the program for an environmental purpose.

Phase Two: Participant recruitment

Participant recruitment was undertaken in a number of ways with the goal of attracting at least 10 and up to 20 schools within BC communities where the AQHI is reported, including:

- Liaison with superintendents in school districts with an AQHI who were informed about the program and research methodology and asked to share information with their principals and vice-principals.
- Program news item in the BC Principals and Vice Principals Association's weekly newsletter to more than 2,300 recipients.
- Follow up phone calls and emails to elementary school administrators in AQHI communities.
- Outreach with education based and health or air quality based non-profit groups such as DASH BC, BC Healthy Schools and PG Air with requests to share information on the program.
- Twitter campaign @airqualityflags to support school recruitment and program awareness throughout the pilot.
- Air Quality Flag Program blog hosted on the homepage of airqualityflags.ca to attract schools and inform them on air quality topics throughout the pilot.

These approaches helped secure 12 schools into the program and also served to raise awareness of the pilot and the AQHI with numerous schools that were curious, but were not ready to commit to the program.

Twitter (@airqualityflags) attracted 38 followers, most who worked in health and education fields in BC, Canada and the UK. More than 130 tweets, and

more than 40 retweets and favourited tweets during the recruitment and program implementation phase helped draw interest in the pilot. The flag program blog also attracted 30 people who spent an average of 2:40 minutes on the blog between October 1 and December 1 of 2013. Information sharing prompted interest from organizations in other parts of the country including the Province of Alberta's Environment and Sustainable Resource Development Ministry and Toronto Public Health.

Calls to action within recruitment outreach materials directed participants to a sign-up page on airqualityflags.ca. Once a participation form was complete, individual schools and/or teachers were contacted to acknowledge their registration and were provided an outline of the program.

The following schools signed up to participate in the program:

1. Lord Byng Elementary, Richmond
2. Barriere Elementary, Barriere
3. Peden Hill Elementary, Prince George
4. Arthur Stevenson Elementary, Kamloops
5. Mountview Elementary, Williams Lake
6. Brentwood Elementary, Saanich
7. Pauline Haarer Elementary, Nanaimo
8. Chase River Elementary, Nanaimo
9. Wiltse Elementary, Penticton
10. Clearbrook Elementary, Abbotsford
11. King Traditional Elementary, Abbotsford (online only)
12. Armstrong Elementary, Armstrong (online only)

Orientation presentations and distribution of materials

Orientation: When schools registered to participate, they were asked to complete a 30-minute program orientation in person or online, which reviewed how to:

- Incorporate program into subject areas and lesson plans.
- Login to access and update individual air-quality-flag web pages (virtual flag page) and blog.
- Fly flags on campus.
- Establish a flag bearer schedule and incorporate air quality awareness into school routines.
- Access and use program resources and curriculum-linked materials.
- Access and participate in a pre and post online survey.

This process ensured understanding among teachers and helped to identify opportunities to introduce the flag resources and connect them to curriculum. Shortly thereafter, each participating school was provided flag equipment and assembly instructions.

Pre survey: At the same time flags were being distributed to participants, a survey was distributed to teachers and to parents (through a letter sent home with students) to gain baseline awareness about air quality and health and the Air Quality Health Index. Results of this survey are discussed on page 5 of Appendix B, however, these results were not included in the final evaluation.

Phase Three – Pilot implementation

Monitoring of participant engagement including flying of physical flags, virtual flags and participant blog posts

During the pilot period, between January 8 and March 4, 2014, the Air Quality Flag coordinator connected with participants weekly through an Air Quality Flag blog on airqualityflags.ca and through liaison with teachers and students on individual school web pages, which also hosted a blog function.

Weekly blog posts on airqualityflags.ca served as a useful tool to engage audiences to think more about the air, opportunities to get active outdoors, and about air stewardship. Blog topics focused on specific air quality issues and/or misconceptions, and shared occasional kudos for creative use of the program by classrooms.

Of the 10 schools that participated, half raised a virtual flag more than 80% of the time with one school raising it every day throughout the pilot, Chase River Elementary in Nanaimo. Regular check-ins with schools through the flag coordinator revealed schools were using their on-campus flags and reporting the AQHI during morning announcements as well.

To motivate students to blog on individual virtual flag pages, teachers were provided with question prompts, which were also available for download from the website. All school blog posts were moderated before posting. Nine of the 10 schools blogged on their individual school pages at least five times, with 3 of the 10 schools blogging almost every day. Sample posts include:

"It is 3.7c in Brentwood bay today it is a good day to walk to school ride your bike or skateboard. It could also be a good day for hot chocolate."
Brentwood Elementary, Brentwood Bay

"Currently its -4, but sunny. The little bit of fog will burn off today. I overheard a grade one student tell his mom that it was another 'blue-tiful' day in Penticton!"
Wiltse Elementary, Penticton

"In our class we talk about air quality every morning and through out the day, and at home my mum and I talk about air quality, too."
Chase River Elementary, Nanaimo

NOTE: Two schools that committed to the program did not end up participating. One school sited capacity issues based on the teacher's personal circumstances (Lord Byng Elementary), and the other sited lack of classroom time (Barriere Elementary).

Phase Four – Evaluation

Program evaluation was designed to estimate changes in awareness and actions among participating schools through program surveying and "exit" phone interviews with teachers.

Overall, outdoor air quality was in the AQHI's low risk range in all communities throughout the program period limiting the ability to demonstrate air quality variation. However, the online survey questionnaire at the completion of the program, as well as the phone interviews, showed a positive response to the program. Evaluation is summarized in Appendix B.

Key learnings and recommendations

Key learnings

1) This program was successful in increasing awareness of air quality and its connection to health among those who were exposed to or participated in the program.
    a) It advanced awareness and understanding among target audiences that there are frequent good air days and occasional bad air days and that these should be considered when planning outdoor activities.
    b) It encouraged children to engage in outdoor activity while being mindful of their own sensitivities to air quality.

    Both of these successes were validated through surveys and exit interviews with participants in this pilot.
2) The pilot also identified a distinct challenge in that the lack of variation in the AQHI scale, and the infrequency in which the Index reports anything other than good air quality, made it challenging to sustain teacher and student interest. Sustained interest in the program, and action of displaying a coloured flag, required ongoing coordination and encouragement with schools and teachers.
3) The program aligned well with science, socials and math within the Grade 5 BC curriculum and teachers customized and modified classroom-based Air Quality Flag Program resources to fit within the classroom culture. Resources supported and reinforced learning related to air quality and health, regardless of the risk range being reported through the AQHI. One teacher in particular at Chase Elementary School,

is continuing to use the Flag Program blog with his students as part of their daily routine of checking air quality and discussing its impact.

4) Phone interviews with teachers at the end of the pilot indicated that teachers found comparing their community's air quality with other cities in other parts of the country and world had a positive impact on students' understanding of the topic. This kind of lesson suggestion should be incorporated into resources provided to teachers in future air quality school flag outreach.
5) A majority of teachers confirmed they would continue to use the air quality school flag resources in their classrooms.

Recommendations

1) The program may be more widely accepted and be considered as higher relevance to schools and teachers if it was modified to be an alert based program with outreach to teachers and schools limited to times when the AQHI reports moderate, high or very high risk range. Specifically, we recommend a set time period for the introduction of the program of 6-8 weeks, followed by an alert based process when changes occur in the Index. At such times, outreach could potentially align with public health and/or Ministry of Environment notifications and advisories.
2) Benefits of aligned curriculum were evident among teachers who seemed more interested in the program knowing that there were curriculum links to science. We believe there are further linkages that could be identified and formally established within provincial elementary school curriculum across the country in other subjects including socials,

math and English or French language studies. If this responsibility were taken on, we also believe there are benefits of looking at curriculum within a variety of grades, rather than focusing on Grade 5.

Appendix B:
Air Quality flag pilot program evaluation for elementary schools in British Columbia

2014

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With in-kind support from
Thompson Rivers University

THOMPSON RIVERS UNIVERSITY

AIR QUALITY FLAG PILOT PROGRAM EVALUATION FOR ELEMENTARY SCHOOLS IN BRITISH COLUMBIA

The Air Quality Flag Pilot Program was implemented January-March 2014. Teachers in 12 BC schools volunteered to participate and received education materials to enable students to raise a coloured flag (real and virtual) in response to outdoor air quality conditions. Overall, the outdoor air quality was reported as 'good' (blue flag) at all schools throughout the Program period thus limiting the ability to demonstrate air quality variation with school children. However, an online survey questionnaire and telephone interviews with teachers showed a positive response to the Program. At least 6 teachers reported during the interviews about becoming aware of the Air Quality and Health Index (AQHI), the relationship between air quality and health and that the Program was useful for managing outdoor activities with children. Results of the survey showed that all teachers self-reported behaviours that minimized their contribution to poor air quality (e.g. limit auto idling around the school). Most teachers agreed about the value of the Program and most teachers reported intentions to use the educational materials in future.

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Introduction

There is growing interest in Canada to provide outdoor air quality information to individuals, families and communities to help inform them about the relation between outdoor air quality and health. Such information is designed to enable citizens to manage their personal and family outdoor activities toward maintaining good health, engage in behaviours that minimize air pollution and possibly influence action toward sustaining healthy communities.

The rationale for this action is due to a growing body of evidence, for example, that links traffic-related air pollution (TRAP) with health effects, including cardiovascular disease and cardiovascular mortality, respiratory disease, adverse pregnancy outcomes and lung cancer (Brauer, Reynolds and Hystad, 2012). The following was expressed to describe the extent of TRAP in Canada.

> Approximately 10 million individuals (32% of the Canadian population) live within 100m of a major road or 500m of a highway. Of these, approximately 2 million individuals live within 50m of a major road. In addition, approximately one-third of Canadian urban elementary schools are located in zone of high traffic proximity. These individuals are at risk from the negative health effects association with traffic air pollution. Thus, while Canadian cities generally have relatively low levels of ambient background air pollution, the large number of individuals at risk from traffic-related air pollution indicates a significant public health concern in Canada (p.46).

The Air Quality Health Index (AQHI) was created to help citizens and health professionals manage personal health relative to outdoor air quality. Recent research suggested that AQHI communication was significantly associated with the use of asthma-related health services, thereby suggesting that timely AQHI health risk advisories with integrated risk reduction messages may reduce morbidity associated with air pollution in patients with asthma (To, Shen, Atenafu, Guan, McLimont, Stocks and Licskai 2013).

Given the utility of the AQHI and prevalence of TRAP near urban elementary schools, Communication Solutions Incorporated (CSI) secured funding to apply the Outdoor Air Quality Flag Program used in U.S. based elementary schools. Subsequently, the AQHI School Flag Program was introduced in British Columbia in January 2014.

Figure 1: Flag colours and associated air quality

	Fly a blue flag to tell your school it's a good air day for everyone to get active outside.
	A grey flag means it's a good air day for most people to get active.
	Fly a brown flag to tell your school it's an OK air day for some, but others might feel symptoms if they are getting active.
	A red flag means there is a lot of air pollution today. Everyone should take it easy.

The AQHI Flag Program was designed to engage children, their parents and the school community to learn about and use the AQHI as a health management tool within the school setting. Teachers of grade 5-6 students at select elementary schools in British Columbia agreed to participate in the program. Participating schools received:

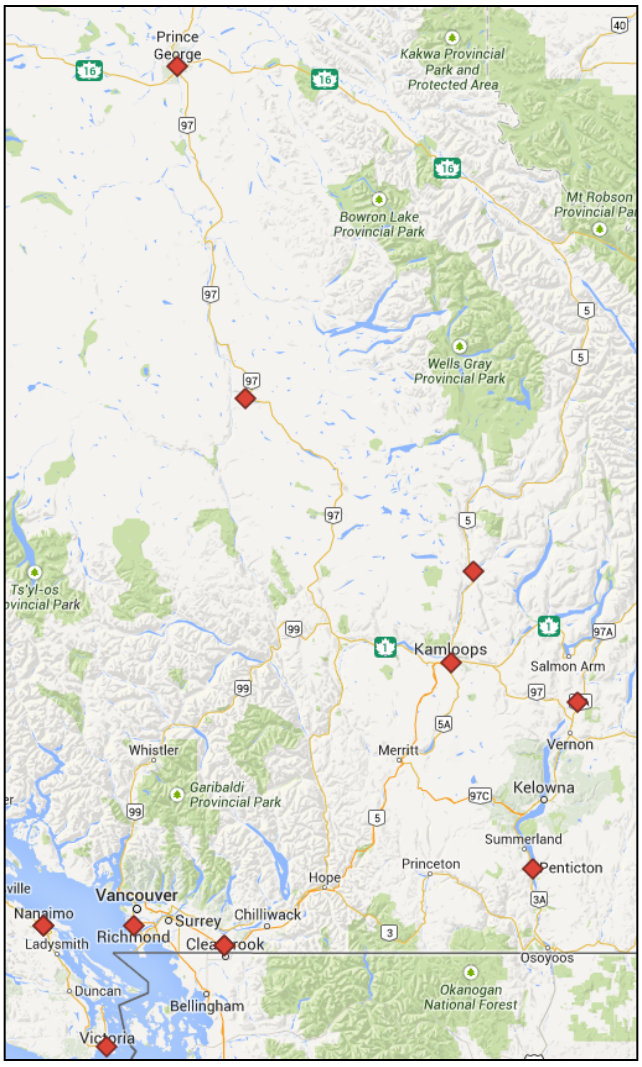
- An air quality flag web page where students and teachers could choose and "raise" the air quality flag for the day and write blog posts about their experiences participating in the program,
- Coloured flags to be erected each morning, and taken down each afternoon through a designated class or through individuals within your school (not all schools),
- Daily updates on the AQHI for their community,
- Air Quality Health Index curriculum linked lessons for Grades 5 and 6,
- An Air Quality Flag Program poster for classrooms and school, and
- A letter for parents and families inviting participation in the program.

An evaluation of the Flag Program was designed to estimate changes in awareness and air quality stewardship actions through pre and post program surveying for both teachers and parents of the elementary school student participants. A key assumption was that parents would become aware and informed about air quality and health via their children.

A Program blog was used at each school to enable questioning, learning and discussion about air quality and health. Also, teachers were interviewed post-program with questions about the value of the AQHI Flag Program, what worked and what did not work, and what they learned from the program.

The results included a log of outdoor air quality for each school (Appendix C). The blue flag was flown almost every day for each school thus indicating good air quality. A grey flag was flown the occasional day at some schools (no more than 10 times overall). The consistency in good outdoor air quality at all schools had its own implication described in the results section.

Figure 2: Map showing location of schools



Method

The research included 4 components:

1. A letter of invitation distributed to teachers and a parent/guardian for children in participating teachers' classes. Participating teachers and parents of students were subsequently able to respond to a survey during the second week of January 2014. The survey was designed to estimate awareness, beliefs and behaviours related to air quality and health at the start of the Flag Program.
2. A second invitation to respond to a similar survey at the end of the Program in March was distributed. The intention was to estimate changes in awareness, beliefs and behaviours related to air quality and health at the end of the Flag Program.
3. A third component reviewed a Flag Program blog accessed by participating teachers and children.
4. A fourth component invited each teacher to respond to questions about the program using an interview at the end of the pilot.

The pre-program questionnaire elicited responses from 11 teachers at the beginning of the Flag Program. Four responses were received from one school therefore responses were received from 8 schools. A small number of responses were received from parents of school children at 3 of the schools only. Despite multiple reminders (notes sent via their children), parents chose not to respond. The limited response demonstrated that the electronic survey was accessible. Possibly some parents did not have access to a home computer, there may have been technical issues depending on their internet browser, or there was simply not time or interest given the demands of family life.

Because of this, the original pre and post survey research design was abandoned for the parent group, but retained for the teacher survey. The post-program questionnaire for parents was redesigned to enable a post program evaluation.

Nine teachers responded to the post-program survey. The evaluation further included the blog, and teacher phone interviews.

Further examination of the pre and post surveys from the teachers showed another unanticipated problem. Each teacher was asked to enter a unique code in order to match the pre and post surveys to enable a pairwise comparison of responses for each teacher. The data revealed that pre and post codes were similar for only 4 of the teachers. Therefore, the technique to compare pre and post survey responses (pairwise comparison) was abandoned given that the sample. Results below are for the post program survey which was survey that asked questions about the effectiveness of the AQHI Air Quality Flag Program.

Survey Questionnaire

The survey questionnaire sought respondent views about air quality in relation to student outdoor activities and health, views on air quality where they lived, the Air Quality Health Index (AQHI), several daily activities that may involve maintaining air quality, views on the effect of the Flag Program, and information such as age and gender of the respondent. The questionnaire was designed specifically for this program evaluation, and did not include criteria from studies addressing air quality and health in the scientific literature.

Teacher Interviews

Interviews were conducted by telephone by the outreach program coordinator at CSI as follows:

1. How did the air quality flag program work in your school?
2. What worked best?
3. What didn't work or needed improvement?
4. What did you learn that you didn't know before?
5. Is there anything else that you would like to add?

Blog Conversations

The blog was examined to identify knowledge and understanding of air quality in relation to health, understanding of the Air Quality Health Index (AQHI), and individual and family behaviours that are related to maintaining air quality.

Results

Participating Schools and Respondent Characteristics

Twelve schools signed up for the program and 10 schools participated in it. At least one teacher on behalf of each of nine of the schools responded to the survey at the end of the program. Table 2 shows 6 women and 3 men; most teachers between 35 and 44 years of age; and all but one teacher were university graduates.

Table 1: Participating schools

	School	Community	Teacher response
1	Armstrong Elementary	Armstrong BC	✓
2	Arthur Stevenson Elementary	Kamloops BC	
3	Barriere Elementary	Barriere BC	
4	Brentwood Elementary	Saanich BC	✓
5	Chase River Elementary	Nanaimo BC	✓
6	Clearbrook Elementary	Abbotsford BC	✓
7	King Traditional Elementary	Abbotsford BC	✓
8	Lord Byng Elementary	Richmond BC	
9	Mountview Elementary	Williams Lake BC	✓
10	Pauline Haarer Elementary	Nanaimo BC	✓
11	Peden Hill Elementary	Prince George BC	✓
12	Wiltse Elementary	Penticton BC	✓

Table 2: Teacher characteristics

		Frequency	Percent
Gender	Male	3	33.3
	Female	6	66.7
Age	25 - 34	1	12.5
	35 - 44	5	62.5
	45 - 54	2	25.0
Education	College or trade school diploma or certificate	1	11.1
	University graduate	8	88.9

N = 9

Your Students and Air Quality

On average most students spend time outdoor everyday albeit two schools teachers reported 2-6 times per week. All but one teacher agreed that he/she is the aware of how air quality affects their student's health. One person was neutral.

Teachers reported that during the past year air quality never affected student's ability to participate in outdoor activities at 5 schools and sometimes at 4 schools. The air quality based on AQHI ratings was 'good' throughout the program period.

Table 3: Responses to statements and questions about students and air quality

	Strongly Disagree	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
I am aware of how air quality affects my student's health.			1	3	5
Outdoor air quality is not a concern at our elementary school.	2	2	1	4	
	Every day	**2-6 times a week**	**Once a week**	**Less often**	
On average, how often do your students spend time outdoors participating in outdoor activities such as sports & recreation at school?	6	2			
	Never	**Sometimes**	**Often**		
In the past year, has air quality affected any of your student's ability to participate in outdoor activities such as sports, recreation or leisure at school?	5	4			

N = 9

You and Air Quality

All teachers spend time outdoors for sports, recreation or leisure most every day. When asked about outdoor air quality in their neighborhood, 4 teachers 'strongly disagreed' and one 'disagreed' that air quality was not a concern, and 4 teachers were neutral. In other words 5 teachers rated air quality to be a concern and 4 teachers were unsure.

Only one teacher rated the air quality in his/her neighborhood as poor and 5 teachers rated the air quality good to excellent. This somewhat contradicts the question about air quality concern, and possibly the 'not' wording in the concern statement in Table 4 was missed by respondents. Six of the teachers now use the AQHI every day or weekly. Consistent with this number, six teachers view the AQHI as useful for maintaining family health.

Table 4: Teacher views on air quality

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Outdoor air quality is not a concern in my neighbourhood.	4	1	4		
	Every day	**2-6 times a week**	**Once a week**	**Less often**	
How often do you spend time outdoors participating in outdoor activities such as sports & recreation or leisure?	5	4			
	Poor	**Fair**	**Unsure**	**Good**	**Excellent**
On average, how do you rate the air quality in your community?	1	2	1	2	3

N = 9

Table 5: Utility of the Air Quality and Health Index (AQHI)

	Daily	Weekly	Radio and TV	News in summer	When AQ seems poor
How often do you look up the AQHI?	4	2	1	1	1
	Strongly Disagree	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
The Air Quality Health Index is useful for maintaining our family health.		1	2	6	

N = 9

Your Activities of Daily Living

Most if not all teacher respondents reported engaging in behaviour that limits contributing to poor air quality as shown in Table 6 below. Belonging to a clean air initiative in their community is a behaviour that most respondents have not thought about.

Table 6: Teacher behaviour related to maintaining good air quality

	I'm already doing this and I'll keep doing it	**I haven't thought about doing this**	**I don't want to do this**
Encourage students to walk to school and other activities	9		
Encourage students to bike to school and other activities	9		
Carpool to school and other activities	7	1	1
Limit idling my car around school	8	1	
Monitor and control my home heating system	9		
Turn home computers off when not in use	8		1
Belong to a clean air initiative in my community	2	5	2
Support education for clean air in my community	7	2	

N = 9

Air Quality School Flag Program

Seven teachers agreed that the flag program increased their awareness of air quality and health issues, and 8 teachers agreed that it increased student awareness. There was less agreement that the Program helps students make decisions about participating in the outdoor activities. Six teachers agreed that the program is useful to manage student activities, but were neutral on the program's effect on changing their own habits in support of clean air.

Table 7: Views on the effect of the Flag Program

The AQHI School Flag Program . . .	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
has made our family more aware of air quality and health issues			2	6	1
has made my students more aware of the quality of the air he/she breathes			1	5	3
helps my students make decisions about participating in outdoor activities			5	3	1
is not really necessary in our community	2	2	1	4	
is useful for teachers to manage student's outdoor school activities			3	6	
helped change my own habits in support of clean air (e.g. drive less often)		1	6	1	1

N = 9

The interview responses validated the above responses in support of the program. Seven teachers responded to the interview questions. The AQHI was new to at least six of the teachers therefore the program raised awareness of outdoor air quality and health. Further, teachers noted that they learned about the air quality in their school community and cities around the world. This appeared to be a most valuable aspect of the program.

Ultimately, raising awareness of outdoor air quality and its relation to health via the AQHI materials among elementary school teachers and their students was the primary goal of the project, and it appears to have achieved that goal for teachers, specifically. Teachers reported that they believe the same is true for their students.

Teachers, when interviewed, expressed interest to continue using the AQHI School Flag Program materials in future.

Discussion

The evaluation provided useful lessons for future evaluation of the AQHI School Flag Program. First, the AQHI rating for outdoor air quality at each school's community was mostly rated as 'good' throughout the Program period. While this is excellent for the elementary school children and the citizens of each community, it did not demonstrate any potential need for the Flag Program to assist with managing outdoor activities for health related concerns. Compared to other communities in more urban areas, possibly the communities selected for this study currently have no issues with air quality, at least relative to the AQHI measure taken to rate each community daily. Therefore, when selecting schools and communities for future research it would be useful to review the previous year's AQHI ratings and select locations that have variation in outdoor air quality. This would enable a more clear demonstration of use of the AQHI School Flag Program to assist with outdoor activity decisions.

Second, TRAP was shown to be an issue for 30% of elementary schools in urban areas in Canada (Brauer et. al., 2012). While the schools sampled for this study may be less urban than those sampled in earlier research, and each community in the present study mostly received an AQHI rating 'good', we ultimately cannot conclude that outdoor air quality is not an issue at the BC schools. TRAP may be an issue at certain times of the day and year given school proximity to high traffic areas. In other words, the community AQHI rating may not adequately represent an outdoor air quality issue evident at each school. An air quality reading at each school may strengthen the testing and effectiveness of Program interventions at schools.

Third, the Flag Program was implemented in schools across BC with a relatively small budget which required that the researcher and author of this report share research duties. The researcher designed the study and research tools; and AirShift Group members selected the sample, communicated with teachers throughout the pilot period encouraging participation and further outreach to the parents of school children. The quantitative evaluation design required that survey respondents be the same person (e.g. teacher) for both pre and post surveys. Each respondent was asked to enter a unique code to enable matching the pre and post surveys. The results showed different codes for pre and post survey for many of the teachers thus eliminating the ability to complete a pre to post comparison test. In future studies, clarity to qualify survey participants, more alignment between the program coordinator and the research evaluator and more effective communication with teachers and parents would correct this design error.

Fourth, future evaluation design may consider administering surveys to the school children versus using parents as an evaluation point to also demonstrate greater intergenerational uptake of knowledge and understanding of outdoor air quality and health, and behavioural outcomes aimed at minimizing TRAP for example. This would require considerable lead time to get the school permissions necessary to administer the survey questionnaires to the children (parental consent most likely). Goodwin et al (2010) provide an example of this approach.

Finally, engaging in behaviours that minimize contributions to poor air quality is likely a challenge for many people in Canadian society simply due to their dependency on the automobile, for example, to manage their lives efficiently. The evidence of TRAP in cities and in and around schools was highlighted in this report a Canadian air quality issue. Raising the

awareness among teachers and children today about the relation of outdoor air quality and health, and ways to monitor and manage both can only lead to helping maintain and sustain optimal health and healthy communities in the future.

References

Brauer, M., Reynolds, C. and Hystad, P. (2012). Traffic-related air pollution and health: A Canadian perspective on scientific evidence and potential exposure-mitigation strategies. Report prepared for Health Canada. Retrieved from http://circle.ubc.ca/handle/2429/41542

Dixon, J.K. (2002). Kids need clean air: Air pollution and children's health, *Family Community Health, 24*, 9-26.

Duvall, J. and Zint, M. (2007). A review of research on the effectiveness of environmental education in promoting intergenerational learning. The Journal of Environmental Education, 38, 14-24.

Goodwin, M., Greasley, S., John, J., and Richardson, L. (2010). Can we make environmental citizens? A randomized control trial of the effects of a school-based intervention on the attitudes and knowledge of young people. *Environmental Politics, 19*, 392-412.

Legault, L. and Pelletier, L.G. (2000). Impact of an Environmental Education Program on Students' and Parents' Attitudes, Motivation, and Behaviours. *Canadian Journal of Behavioural Science, 32*, 243-250.

Shendell, D., Rawling, M., Foster, C., Bohlke, A., Edwards, B., Rico, S., Felix, J., Eaton, S., Moen, S., Roberts, E., Love, M.B.(2007). The Outdoor Air Quality Flag Program in Central California: A school-based educational intervention to potentially help reduce children's exposure to environmental asthma triggers. *Journal of Environmental Health, 70*, 28-31.

To, T., Shen, S., Atenafu, E.G., Guan, J., McLimont, S., Stocks, B. and Licskai, C. (2013). The Air Quality Health Index and Asthma Morbidity: A Population-Based Study. Environmental *Health Perspectives, 121*, 46-52.

Appendix A – Invitation to Participate

BC Air Quality School Flag Program
Invitation to Participate

Dear Teacher;

We invite you to participate in the British Columbia (BC) Air Quality Flag Program. This interactive, free pilot program is being introduced in elementary schools in several communities across the province to increase awareness of air quality and its connection to health, and to learn about and use the Air Quality Health Index (AQHI) as a health management tool at school and at home.

As part of the program, teachers and parents/guardians are being invited to participate in two, short pre and post surveys (which will be anonymous) to help judge the effect of the Air Quality Flag Program.

The program and research surveys are described separately below.

The Air Quality Flag Program

At school, teachers will be provided teaching materials, flags and other resources to help students learn about air quality and its connection to health. The flags serve as a symbol and rating of the air quality for the day by colour---good (blue flag), moderate (grey flag), poor (brown flag), very poor (red flag); and are designed to raise awareness of air quality and its relation to health and maintaining a healthy community environment.

Flags and flag pole hardware will be provided and used at up to 10 elementary schools to indicate air quality (referencing the AQHI which is reported daily on a website). Also at school, a 'virtual' flag will be raised on an Air Quality Flag Program web page (password protected) that will be accessible from school computers. The program is designed to take only a few minutes a day.

At home, children will be able to share with parents and other family members, what they learn about air quality and the importance of air quality to personal health. In addition, children will have an opportunity to participate in an exclusive classroom blog to learn and share their own thoughts and questions about air quality. Children's identities will be protected as they do not have to add their first or last names to the blog. The blog may also enable families whose children manage health conditions such as asthma to connect with others and possibly build support networks. Further, children, families and teachers may learn about ways to contribute to maintaining good air quality through their actions at school and at home.

In summary, schools receive:

- Air Quality Flag Program posters for classrooms and school,
- Air Quality Health Index (AQHI) classroom lessons and activities for Grades 5 and 6,
- An Air Quality Flag web page for your school, where a virtual flag will be raised to note air quality daily,
- Coloured flags and flag pole equipment to fly a flag each day (up to 10 schools in the study),
- Flag bearer schedule,
- Numerous resources on air quality and air stewardship.

In summary, parents receive:

- Information that their children bring home from school,
- Access to resources,
- An opportunity to learn about air quality and first hand insights into their child's learning.

The Program starts January 9, 2014, and ends March 3, 2014, with a final report completed by March 31, 2014.

The Research Study

The research study includes 3 components:

5. A survey at the **beginning of the Program in January** administered to school teachers and one parent from each family with a child or children participating in the school program. For parents or teachers who do not wish to answer an electronic survey, paper copies can be made available. This survey is anonymous.
6. A survey at the **end of the Program in March** to the same teacher and parent who responded to the survey in January. For parents or teachers who do not wish to answer an electronic survey, paper copies can be made available. This survey is anonymous.
7. Analysis of the Program blog conversations among school teachers and school children. The blog will be active from the **beginning of January to the end of March**.

Survey Questionnaires

The survey questionnaires seek responses to questions about air quality in general, the Air Quality Health Index (AQHI), several daily activities that may involve maintaining air quality, and information such as age and gender of the respondent.

The questionnaires are available on-line, and accessed using any computer with an Internet browser. Each questionnaire will take approximately **10 minutes** to complete. You responses will be anonymous (no individual will be identified) and results of the questionnaire responses will be tallied to describe the average responses and range of responses, from participants (teachers and parents).

Ultimately, the January and March questionnaires will be combined to produce a report to illustrate the results of the study. The data from the survey will be analyzed by an independent researcher to ensure that anonymity is maintained and no individual can be identified in the final report.

Blog Conversations

The blog will be examined by an independent researcher to identify knowledge and understanding of air quality in relation to health, understanding of the Air Quality Health Index (AQHI), and individual and family behaviours that are related to maintaining air quality and a healthy environment.

The blog will not include students' names. The report itself will not identify any individual and will share project results by school and in general terms for the overall study.

Participation

Your participation in the Program and Research is strictly voluntary. You can withdraw from participating in the Program and/or Research at any time during the Program without any consequence. If you withdraw, previously collected survey responses will be destroyed and not included in the study. The amount of time dedicated to the Program will vary depending on your personal interest. The Surveys take about 10 minutes each for a total of 20 minutes. The information you provide is anonymous. By completing the questionnaires, you are consenting to participate in the study.

You can access the survey through the following link. **Please complete the survey by January 16, 2014.**

https://www.surveyfeedback.ca/surveys/wsb.dll/s/1g2f83

Thank-you for considering this invitation, and we welcome your input to the Program.

Rob Hood
Email rhood@tru.ca

Appendix B – Survey Questionnaire

Teacher Post Program Survey Questionnaire - BC Air Quality School Flag Program

Dear Teacher in the BC Air Quality Flag Program,

This program introduced at your school was designed to help your students learn about air quality, its relation to health and the Air Quality Health Index. As part of this program, this survey questionnaire helps us estimate your awareness about air quality in your community, your daily activities that may affect local air quality, and your thoughts about the School Flag Program.

While participation in the survey is voluntary, your responses are an important part of evaluating and improving this program. The survey takes 7 minutes to complete and is anonymous. Please respond to every question as honestly as possible but feel free to ignore any question you prefer not to answer. You may also opt out of the survey at any time.

Please contact Dr. Rob Hood at 250.271.5988 or rhood@tru.ca if you need further information before participating in the survey.

Please proceed to the next page to begin the survey.

Your Elementary School

1) Please select the name of your elementary school.

- ❍ Armstrong Elementary, Armstrong BC
- ❍ Arthur Stevenson Elementary, Kamloops BC
- ❍ Barriere Elementary, Barriere BC
- ❍ Brentwood Elementary, Saanich BC
- ❍ Chase River Elementary, Nanaimo BC
- ❍ Clearbrook Elementary , Abbotsford BC
- ❍ King Traditional Elementary, Abbotsford BC
- ❍ Lord Byng Elementary, Richmond BC
- ❍ Mountview Elementary, Williams Lake BC
- ❍ Pauline Haarer Elementary, Nanaimo BC
- ❍ Peden Hill Elementary, Prince George BC
- ❍ Wiltse Elementary, Penticton BC

Your Students and Air Quality

Please respond to the statements and questions below.

2) I am aware of how air quality affects my student's health.

- ❍ Strongly Disagree
- ❍ Disagree
- ❍ Neutral
- ❍ Agree
- ❍ Strongly Agree

3) Outdoor air quality is NOT a concern at our elementary school.

- ❍ Strongly Disagree
- ❍ Disagree
- ❍ Neutral
- ❍ Agree
- ❍ Strongly Agree

4) On average, how often do your students spend time outdoors participating in outdoor activities such as sports, recreation, or leisure at school?

- ❍ Everyday
- ❍ 2-6 times a week
- ❍ Once a week
- ❍ Less often/never

5) In the past year, has air quality affected any of your student's ability to participate in outdoor activities such as sports, recreation, or leisure at school?

- ❍ Never
- ❍ Sometimes
- ❍ Often

You and Air Quality

Please respond to the statements and questions below.

6) Outdoor air quality is NOT a concern in my neighbourhood.

- ❍ Strongly Disagree
- ❍ Disagree
- ❍ Neutral
- ❍ Agree
- ❍ Strongly Agree

7) How often do you spend time outdoors participating in outdoor activities such as sports, recreation, or leisure?

- ❍ Everyday
- ❍ 2-6 times a week
- ❍ Once a week
- ❍ Less often/never

8) On average, how do you rate the air quality in your community?

- ❍ Poor
- ❍ Fair
- ❍ Unsure
- ❍ Good
- ❍ Excellent

Air Quality Health Index (AQHI)

9) How often do you look up the AQHI?

- ❍ Daily
- ❍ Weekly
- ❍ Monthly
- ❍ Less than once a month
- ❍ Never
- ❍ Other (please specify)

If you selected other, please specify _____

10) The Air Quality Health Index is useful for maintaining our family health.

- ❍ Strongly Disagree
- ❍ Disagree
- ❍ Neutral
- ❍ Agree
- ❍ Strongly Agree

Your Activities of Daily Living

11) Please indicate if you do any of the following . . .

	I'm already doing this and I'll keep doing it	I haven't thought about doing this	I don't want to do this
Encourage students to walk to school and other activities	❍	❍	❍
Encourage students to bike to school and other activities	❍	❍	❍
Carpool to school and other activities	❍	❍	❍
Limit idling my car around school	❍	❍	❍
Monitor and control my home heating system	❍	❍	❍
Turn home computers off when not in use	❍	❍	❍
Belong to a clean air initiative in my community	❍	❍	❍
Support education for clean air in my community	❍	❍	❍

The Air Quality School Flag Program

12) Please indicate how strongly you agree or disagree with the statements below.

The Air Quality School Flag Program . . .

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
has made our family more aware of air quality and health issues.	❍	❍	❍	❍	❍
has made my students more aware of the quality of the air he/she breathes.	❍	❍	❍	❍	❍
helps my students make decisions about participating in outdoor activities.	❍	❍	❍	❍	❍
is not really necessary in our community.	❍	❍	❍	❍	❍
is useful for teachers to manage student's outdoor school activities.	❍	❍	❍	❍	❍
helped change my own habits in support of clean air (e.g. drive less often).	❍	❍	❍	❍	❍

Now some questions to help describe survey respondents.

13) Your gender is . . .

- ❍ Male
- ❍ Female

14) Your age category is . . .

- ❍ 18 - 24
- ❍ 25 - 34
- ❍ 35 - 44
- ❍ 45 - 54
- ❍ 55 - 64
- ❍ 65 or older

15) Your highest level of education is . . .

- ❍ Less than highschool
- ❍ Highschool diploma
- ❍ Some college or university
- ❍ College or trade school diploma or certificate
- ❍ University graduate
- ❍ Other (please specify)

If you selected other, please specify

_____

Finally, Your Survey Code.

16)
Please provide your four digit birth day and month. (e.g. 2209). This provides a unique code for your survey while maintaining your anonymity.

_____day (between 01-31) and month (between 01-12)

Upon submitting the completed survey, you are consenting to participate in the study.

Thank-you.