Life Expectancy and Access to Safe Water

Activity Time: One or Two Class Periods (70 minutes)

TEACHERS: Read "Boards of Health in Peel" on pages 53, 54 of The Peel Water Story book.

Objectives:

In this activity, students will use a set of data which is easy to understand and which has the potential to create awareness of an environmental issue. They will learn how to graph the data, will have to consider which mathematical model best fits the data, and use the data and resulting graph to interpolate and extrapolate from their findings. They will also become aware of the importance of readily available sources of safe water, and think about what the effects of water pollution might be.

Introduction:

"Water and Sanitation is one of the primary drivers of public health. I often refer to it as "Health 101", which means that once we can secure access to clean water and to adequate sanitation facilities for all people, irrespective of the difference in their living conditions, a huge battle against all kinds of diseases will be won."

Dr LEE Jong-wook, Director-General, World Health Organization.

Hand out the data table and discuss it briefly so that all students have a basic level of understanding of what the study is about. (Teachers may want to provide students with background reading about waterborne diseases, including pages 51-55 of the Peel Water Story book). Allow the students to discuss the data table in groups, looking for patterns or relationships while recording their observations.

"Globally, waterborne illnesses are the second leading cause of death for children under age five years." UNICEF, Tap Project: http://www.tapproject.org/

Materials:

- Student's Data Table (below)
- Student's blank graph (below)
- Teacher's completed graph (below)
- Additional support materials are available through the World Health Organization's "Water-related Disease" webpage: http://www.who.int/water_sanitation_health/diseases/en/

Procedure:

1. Provide groups of students with the data table and give a brief introduction.

2. Have the students discuss the data in groups, looking for patterns or relationships, and have them record their observations.

3. Look for different ways to graph these data. This can include just plotting points for a scatter graph, or looking for a curve of best fit. A completed scatter graph is provided in this package for the teacher's information, as well as a blank working sheet for students. Do not give it to the students immediately; instead have them try to come up with their own graphical representation first.

4. Use the graph to interpolate and/or extrapolate and to examine the correlation between the two variables being plotted. Wherever possible, relate this to mathematical concepts already under study, such as linear or non-linear relationships, relation VS. function, and direct or indirect variation.

5. Students should note that the data cannot be completely described by a mathematical model such as a linear relation.

6. A discussion of the importance of readily available safe water and the implications of water pollution should be encouraged following this activity, using the data and graphical interpretations as supporting evidence.

Giving Them Extra Information

1. Find the ten countries which have the lowest life expectancy. For each of these countries, find the mean (average) life expectancy and the mean percentage of people who have access to safe water.
2. Find the ten countries which have the highest life expectancy and do the same calculations.
3. State what differences you notice and try to give explanations for these differences.

Debrief:

Was it difficult to classify the plotted data using a single type of mathematical model?
Which type of mathematical model fit best?
Would a combination of models be better?

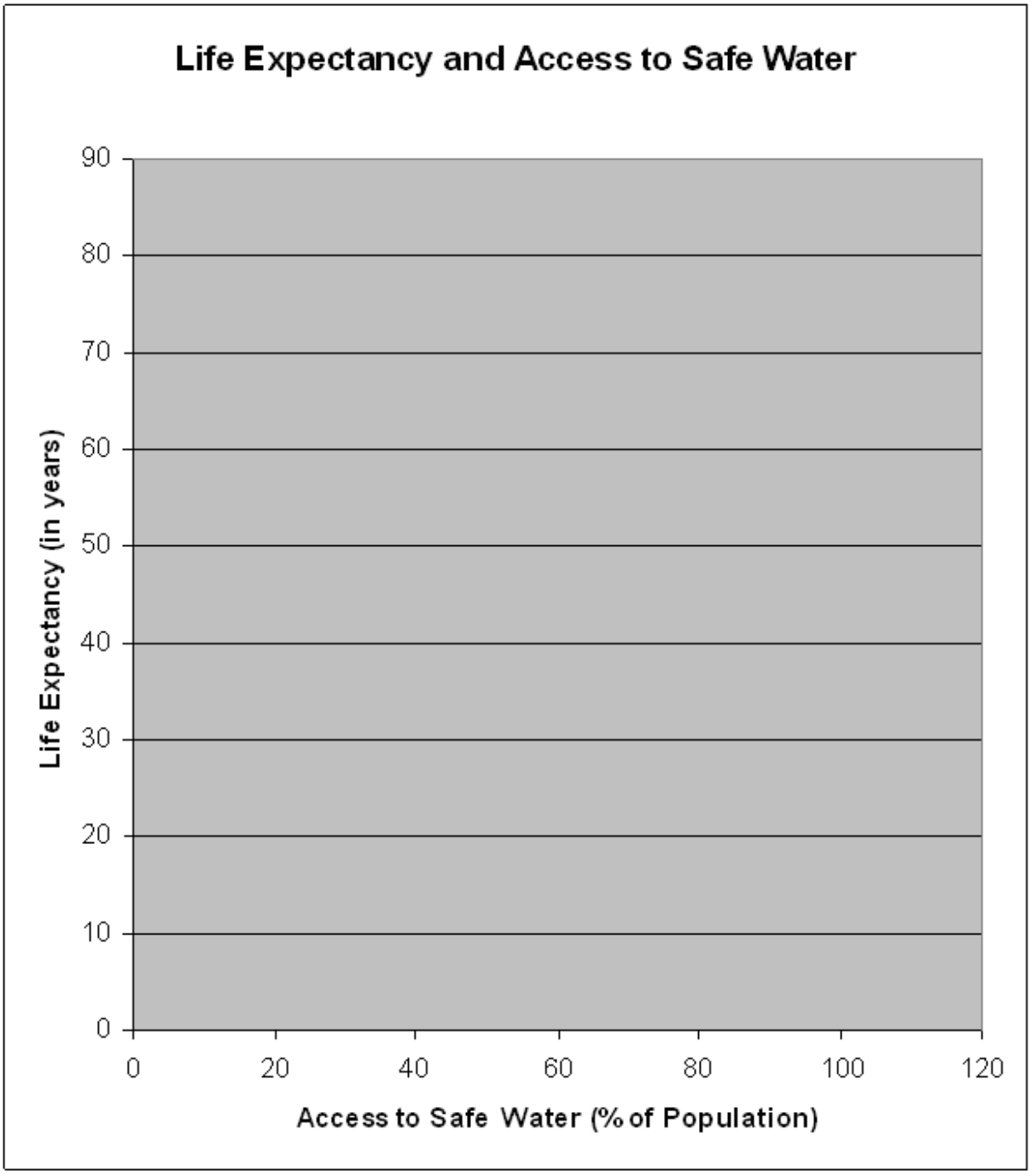
Source: Adapted from the Ontario Society for Environmental Education. "Towards an Ecozoic Curriculum".

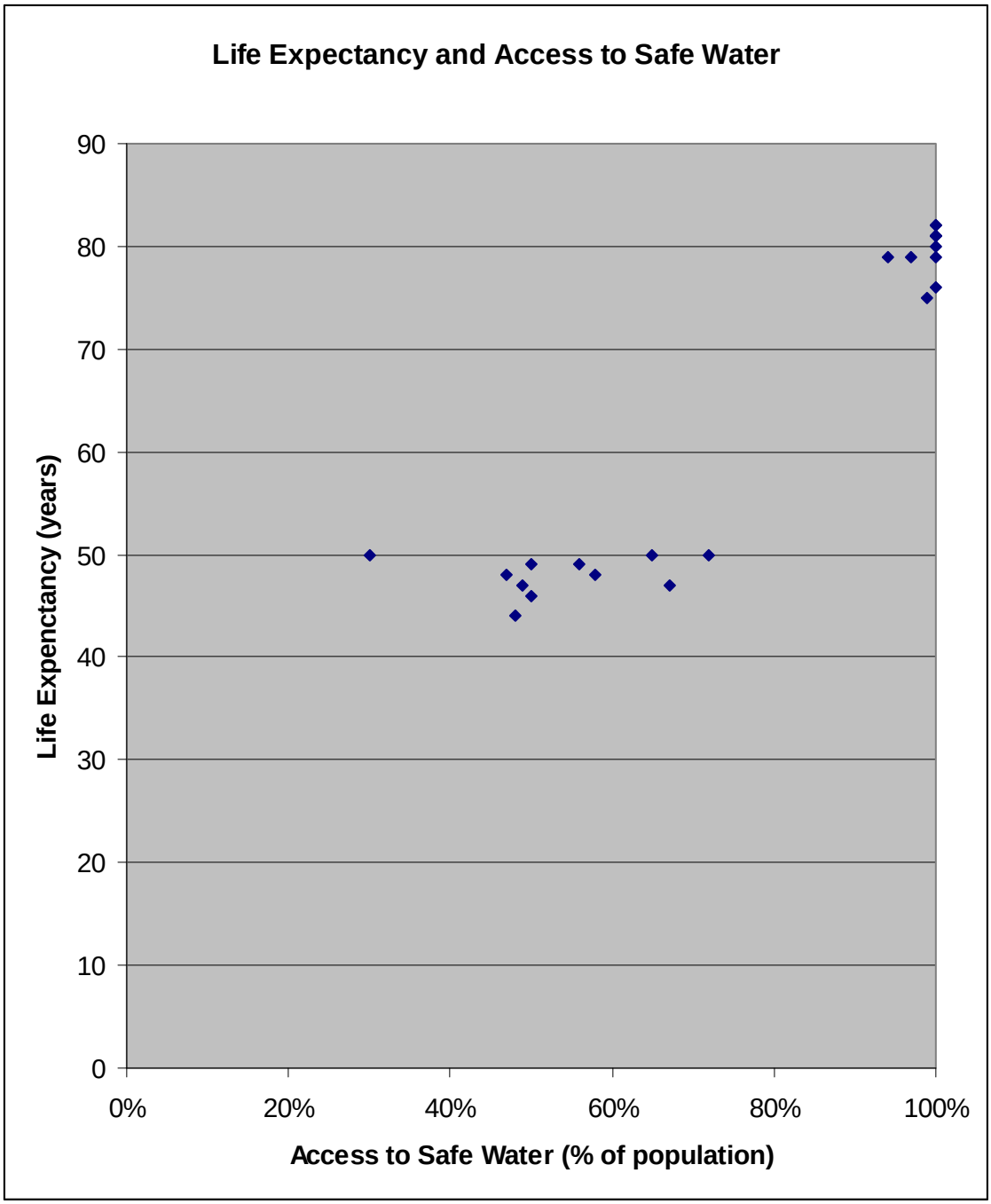
Life Expectancy and Access to Safe Water Data Table

The left hand column of each table gives average life expectancy – 50 years or younger in Table A, and 75 years or older in Table B. The right hand column of each table records the percentage of the population with access to safe water.

Table A			Table B		
Country	**Life Expectancy**	**Water**	**Country**	**Life Expectancy**	**Water**
Afghanistan	44	48%	Canada	81	100%
Angola	46	50%	France	81	100%
Burundi	50	72%	U.S.A	75	99%
Central African Rep.	47	67%	Germany	80	100%
Chad	49	50%	Poland	76	100%
Mali	49	56%	Costa Rica	79	97%
Mozambique	48	47%	United Kingdom	79	100%
Nigeria	48	58%	Switzerland	82	100%
Rwanda	50	65%	Israel	81	100%
Sierra Leone	47	49%	Japan	82	100%
Somalia	50	30%	Cuba	79	94%

Life expectancy data:
United Nations, Dept. of Economic and Social Affairs, Population Division, World Population Prospects: The 2008 Revision, New York, 2009 (advanced Excel tables). http://data.un.org
Access to safe water data:
World Health Organization & UNICEF, Progress on sanitation and drinking-water, 2010 update. http://www.who.int/water_sanitation_health/publications/9789241563956/en/index.html


Life Expectancy and Access to Safe Water
Life Expectancy (in years)
90
80
70
60
50
40
30
20
10
0
0
20
40
60
80
100
120
Access to Safe Water (% of Population)


Life Expectancy and Access to Safe Water
Life Expenctancy (years)
90
80
70
60
50
40
30
20
10
0
0%
20%
40%
60%
80%
100%
Access to Safe Water (% of population)