Final Report

A Review

of

Ecological Footprinting

in the

Formal Education Sector

Prepared for WWF UK

Prepared by

EcoLeaders Interpretation and Environmental Education

Final Report

A Review of Ecological Footprinting in the Formal Education Sector

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Introduction

This is the final report for *A Review of Ecological Footprinting in the Formal Education Sector* developed for WWF–UK.

This report looks at many of the agencies that deliver Ecological Footprint education to primary, secondary and post secondary education institutions.

The project terms of reference required that EcoLeaders develop a series of questions that would:

- identify schools and educational institutions around the world that practice ecological footprinting and compile contact details
- seek to understand the use (estate management, procurement, school build, curriculum, school- or community-based action, etc.)
- determine the value (economic, educational, environmental, etc.) of ecological footprinting to the schools and educational institutions
- seek to understand the scientific validity and/or accuracy of the ecological footprinting calculations used
- gauge the capacity of ecological footprinting to motivate informed action (student action, community action, as well as school or institutional action)
- look at ways schools and educational institutions address the sustainability elements not included in the Ecological Footprint model including:
  - social dimensions (justice, demographics and population, and qualities of lives)
  - biodiversity
- assess the capacity of ecological footprinting to sustain interest over time

Procedures

Selection of Programmes for Review

The initial searches identified around 25 ecological footprint programmes available on the internet. However many of these were very simple, incomplete or no longer available. Almost all use some form of calculator. See Appendix 2 for a listing of all ecological footprint education programmes identified in this study.

A key criterion for selection for review was that candidate programmes had to be easily accessible by teachers and students wishing to participate. Since most teachers use the world wide web, we selected programmes that were easily found using the following Google searches:

Search 1 key words:

- ecological footprint
  AND
- education

Search 2 key words:

- ecological footprint
  AND
- education
  AND
- calculator

Search 3 key words:

- ecological footprint
  AND
- whole school

Other criteria included:

- aimed primarily at students and teachers or not
- whether they illustrated some of the elements that we understood WWF to be interested in, e.g., CampusCalc has many limitations but does address a whole site
- credibility of the organizations behind them, e.g., Best Foot Forward
- wide range of educational options presented, so teachers can use the resources in different ways and in different subjects, or even several subjects at once
- level of support provided through background materials for students, teachers packages, context for using the calculator, etc
- presence of the criteria used to analyze them in the report, e.g., was biodiversity addressed?

Nine major Programmes were selected for review; the best of those most easily found. There were many other smaller, less sophisticated programmes that we looked at briefly but that would not have been useful to WWF to examine in detail within the limited budget available.

Four additional programmes were requested by WWF-UK for inclusion:

- the *Brechin Community Education Programme*
- *Future Steps*, an interactive CD for schools by Merseytravel's Travelwise
- *School Global Footprint*, an interactive CD and teacher guide by WWF–Scotland
- *Where's The Impact*, a Teacher-Led Programme from The Centre for Alternative Technology

A fifth programme, *Global Footprint* by Small Earth, a NGO in the Netherlands, was originally requested as well. However, this programme was dropped from the review (with approval) because its website appears to be in an early stage of construction and our company lacks the capacity to translate Dutch.

A Review of Ecological Footprinting in the Formal Education Sector

Contacts with Programmes Providers				
Programme				
	Questionnaire Returned	Email Contact	Telephone Contact	No Response to all Contact Attempts
1. Brechin Community Education Programme (Angus Council)		●		
2. Calculating the School 'Global Footprint' (Global Footprints)				●
3. CampusCalc (Best Foot Forward)		●		
4. Ecological Footprint (CELP)	●			
5. EcoLogic Online (PowerHouse Museum)		●		
6. Ecological Footprint Calculator (Education for a Sustainable Future)			●	
7. Eco'tude (PowerHouse Museum)		●		
8. EcoVoyageurs: Reducing Your Ecological Footprint (Lever Ponds/CoEd Communication)			●	
9. Future Steps (Merseytravel's Travelwise)		●		
10. Hurley Island: Learning for Sustainability (Learning for a Sustainable Future)			●	
11. EcoFootprint Calculator (Redefining Progress)	●			
12. School Global Footprint (WWF–Scotland)	●	●		
13. Where's The Impact (Centre for Alternative Technology)				●

Questionnaire

Based on the terms of reference, EcoLeaders developed a multi-page questionnaire to be distributed via email to the programme providers.

Initial contact with some of these agencies indicated that they had limited time to address all the questions and that they also expected EcoLeaders to have a good understanding of their products as offered through the internet. As a result EcoLeaders conducted a detailed review of materials available to teachers and students through the websites of selected programme providers. This material made it possible for us to revise the original questionnaire to greatly reduce the amount of information requested directly from ecological footprint education providers (see Appendix 3: The Questionnaire).

The revised questionnaire was sent as an email attachment to the providers of the thirteen selected ecological footprint education programmes in mid March 2005. A second request was sent in the second week of April to agencies that had not responded, and follow-up phone class were made to several at the end of the second week in April.

The questionnaires that were not returned were followed up by attempts to contact programme providers by email and telphone.

Analysis

Selected ecological footprint education programmes were reviewed in detail (see Appendix 1). Reviews included:

- testing on-line ecological footprint calculators
- downloading and running downloadable footprint calculators
- downloading and reviewing teacher and student materials and worksheets
- email conversations with some footprint providers

A preliminary report containing an overview of our initial findings was provided to WWF-UK in March 2005.

Findings

This report contains findings for the following programmes (listed alphabetically):

1. ***Brechin Community Education Programme***
   - Angus Council in partnership with Best Foot Forward
   - an attempt to gather household and community ecological footprint data using schools as the main conduit for distribution of a household ecofootprint calculator
   - public education was a secondary objective of this programme
2. ***Calculating the School 'Global Footprint'***
   - by Global Footprints, part of the Humanities Education Centre, based in Tower Hamlets, in the East End of London
   - a different approach to ecological footprinting using BARS-type questions and focusing more on social development
3. ***CampusCalc***
   - by Best Foot Forward, a UK-based company
   - based on a simple calculator developed by a company specializing in serving business and government
4. ***Ecological Footprint***
   - by the Canadian Environmental Literacy Project (CELP) Dalhousie University in Halifax, Nova Scotia, Canada
   - an education package for grade 9 teachers based on a simple calculator for computing an individual's Ecological Footprint
5. ***EcoLogic Online***
   - produced by the Powerhouse Museum, Sydney, Australia
   - a simple calculator for an individual's Ecological Footprint originally designed for a museum exhibit but also targeting individual students
6. ***Ecological Footprint Calculator:***
   - by Education for a Sustainable Future
   - based on a simple, downloadable calculator for an individual's Ecological Footprint
7. ***Eco'tude***
   - produced by the Powerhouse Museum, Sydney, Australia
   - based on a fairly complex calculator for an school's Ecological Footprint
8. ***EcoVoyageurs: Reducing Your Ecological Footprint***
   - produced by CoEd Communications, an education consulting company based in Toronto Ontario, Canada. Copyright for *EcoVoyageurs* is held by Lever Ponds, a subsidiary of the Unilever Corporation, the project's sponsor
   - a story/guided imagery approach targeting specific grade levels using a simple calculator that computes an individual's Ecological Footprint
9. ***Future Steps***
   - by Merseytravel's Travelwise
   - an interactive CD for schools
10. ***Hurley Island: Learning for Sustainability***
    - by Learning for a Sustainable Future, a non-profit Canadian organization created to implement sustainable development education into Canada's education system
    - eco footprinting is part of their broad education programmes for and about sustainability
    - based on a simple calculator for computing an individual's Ecological Footprint
    - part of a distance education credit course for high school students
11. ***Redefining Progress's EcoFootprint Calculator:***
    - part of Sustainability Education by Redefining Progress, a US group with offices in Oakland, California and Washington, DC
    - based on a simple calculator for computing an individual's Ecological Footprint
    - developed by an agency that specializes in sustainability research
12. ***School Global Footprint***
    - by WWF–Scotland
    - an interactive CD that includes a whole-school ecofootprint calculator
    - also includes a package for teachers that includes information about Scottish ecological footprint issues, outlines for numerous class-level activities and a general outline for a process for developing school-level activities
13. ***Where's The Impact***
    - a Teacher-Led Programme from The Centre for Alternative Technology
    - a project that does not use a calculator

Key Questions Addressed in this Review

As outlined in the project's terms of reference, the following questions were investigated:

- the value of value of ecological footprinting to participants
- how ecological footprint is used in the education programme
- the scientific validity and/or accuracy of the ecological footprinting calculations used
- the capacity of ecological footprinting to motivate informed action
- the ways that programmes address sustainability elements not included in the ecological footprint model
- social dimensions
- capacity of ecological footprinting to sustain interest over time

A Review of Ecological Footprinting in the Formal Education Sector

The Value of Ecological Footprinting to Participants

The materials (including ecological footprint calculators) available to teachers and students were reviewed to determine the values for each of the thirteen programmes. Table A summarizes our findings.

Table A: Key Values of Ecological Footprint Programmes to Participants

Key: ● = present ◉ = partly ◎ = absent **U** = Unknown

Programme	Whole School			Individual Student		
	Education	Economic	Environment	Education	Economic	Environment
1. Brechin Community Education Programme* (Angus Council)	U	U	U	◉	◉	◉
2. Calculating the School 'Global Footprint' (Global Footprints)	◎	◎	◎	●	◎	◎
3. CampusCalc (Best Foot Forward)	●	●	◉	◉	◎	◎
4. Ecological Footprint (CELP)	◎	◎	◎	●	◎	◎
5. EcoLogic Online (PowerHouse Museum)	◎	◎	◎	●	◎	◎
6. Ecological Footprint Calculator (Education for a Sustainable Future)	◎	◎	◎	●	◎	◎
7. Eco'tude (PowerHouse Museum)	●	●	◉	●	◎	◎
8. EcoVoyageurs: Reducing Your Ecological Footprint (Lever Ponds/CoEd Communication	◎	◎	◎	●	◎	◎
9. Future Steps (Merseytravel's Travelwise)	●†	●†	◉†	●†	●†	◉†
10. Hurley Island: Learning for Sustainability (Learning for a Sustainable Future)	◎	◎	◎	●	◎	◎
11. EcoFootprint Calculator (Redefining Progress)	◎	◎	◎	●	◉‡	◉‡
12. School Global Footprint (WWF–Scotland)	●[a]	●[a]	●[a]	●[a]	U	U
13. Where's The Impact (Centre for Alternative Technology)	◎	◎	◎	●	◎	◎

Definitions

Education Values: assist learning progression at the student or school level
Economic Values: reduce costs for the school or individual
Environmental Values: improve or maintain environmental quality

* The major purpose of this project was to gather house-hold level ecological footprint data for Brechin Council for planning and monitoring purposes

† Estimated from data available on their website—interactive software was not yet available

‡ If participant finds and uses the detailed downloadable Excel spreadsheet buried in the Frequently Asked Questions section of the website.

[a] Estimated from data available on their website—interactive software was not yet available

Key Points

- all had educational value for individual students
- only *Future Steps* stressed economic and environmental benefits for individual students
- only four programmes, *CampusCalc, Eco'tude, Future Steps* and *School Global Footprint* (WWF–Scotland), appear to address education economic and environmental factors at the whole-school level to some degree
  - only one of these (*Eco'tude*) provided concrete ideas for whole-school level projects

How Ecological Footprinting is Used

The project's terms of reference required that we identify the key ways that ecological footprinting was used.

Education

Education was a primary or secondary goal of all thirteen programmes reviewed.

Economic

Economic issue were addressed in only five of the thirteen programmes.

Environment

Environmental issues were addressed in only six of the thirteen programmes.

Support Community-based Action

The Brechin Community Education Programme had a goal of identifying household ecological footprints as a step toward promoting community action (reduce the size of their footprint). None of the other twelve had community-based action as an explicit goal. However, *Future Steps* and *School Global Footprint* (WWF–Scotland) are designed such that community action components could be chosen.

Estate Management and Procurement

The following programmes addressed this:

- *CampusCalc*
- *Eco'tude*
- *Future Steps*
- *School Global Footprint* (WWF–Scotland)

CampusCalc was a very bare bones programme, basically providing a detailed spreadsheet that could be used to calculate a base-line school-level ecological footprint and monitor subsequent changes over many years.

Eco'tude provided students with much more help in locating and calculating the components that make up a school's ecological footprint.

The level of detail and support for students and teachers could not be determined for the last two programmes listed because the calculators were not available.

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Scientific Validity and/or Accuracy of the Ecological Footprinting Calculations Used

Providers of ecological footprint education services face major challenges of choosing between providing simple, easily understood models and examples and providing scientifically and statistically accurate calculators.

Table B: Complexity of Ecological Footprint Calculators

Programme	Type of Calculator			
	No Calculator	Simple Calculator	Complex Calculator	
			Spreadsheet	Other
1. Brechin Community Education Programme* (Angus Council)				●[1]
2. Calculating the School 'Global Footprint' (Global Footprints)		●		
3. CampusCalc (Best Foot Forward)			●	
4. Ecological Footprint (CELP)		●		
5. EcoLogic Online (PowerHouse Museum)		●		
6. Ecological Footprint Calculator (Education for a Sustainable Future)		●		
7. Eco'tude (PowerHouse Museum)				●[2]
8. EcoVoyageurs: Reducing Your Ecological Footprint (Lever Ponds/CoEd Communication)		●		
9. Future Steps (Merseytravel's Travelwise)				●[3]
10. Hurley Island: Learning for Sustainability (Learning for a Sustainable Future)		●		
11. EcoFootprint Calculator (Redefining Progress)		●	●[4]	
12. School Global Footprint (WWF–Scotland)		●[5]		●[5]
13. Where's The Impact (Centre for Alternative Technology)	●			
Total	**1**	**8**	**2**	**4**

[1] A hybrid calculator in which participants could choose to enter detailed measurements or opt for simplified ball-park guesstimates.
[2] A detailed calculator with many hints on finding sources of information for specific measurements.
[3] Calculator not seen. Descriptions from website indicate a focus on transportation component only.
[4] Simple calculator is easily found on website. But an complex Excel spreadsheet buried in the Frequently Asked Questions section of the website.
[5] Calculator not seen. Descriptions from WWF–Scotland staff indicate the calculator has a complex and a simplified strand.
yet available

All but one provider used an ecological footprint calculator. They range from simple calculators that ask a small number of questions with multiple-choice answers to complex multi-question calculators including spreadsheets or other tools that require precise numbers (see Table B).

Simple Calculators*
Simple calculator were most popular. Eight of the thirteen providers in this review used simple calculators.

Complex Calculators*
Two providers used downloadable spreadsheets while four providers used complex calculators available on-line or on CD ROM.

No Calculators
The Centre for Alternative Technology chose not to use a calculator in their *Where's the Impact?* programme.

Interestingly, in our opinion this was one of the most educationally robust programmes reviewed.

*** Note**
Two programmes provided both simple and complex calculators:

11. *EcoFootprint Calculator* (Redefining Progress)
12. *School Global Footprint* (WWF–Scotland)

Scientific Validity

We believe that simple calculators by their very nature are less scientifically rigorous than the complex calculators. They rely on numerous assumptions that in most cases are hidden from the user, thus making them appear like magic black boxes into which students deposit minimal information and receive a symbolic product.

Most of the complex calculators have a black box aspect as well. Only the spreadsheets allow students and teachers to examine the underlying mathematics used in making the calculation. Even then, there is no real explanation as to how and why these equations were chosen.

Many providers indicate that they believe that the simple calculators are suitable for education purposes—e.g., communicating the concept of ecological footprints and introducing many related concepts and issues. However, the *Where's the Impact* programme introduced these concepts without using a calculator of any kind and we suggest that it does the best job.

Table C: Capacity to Motivate Informed Action

Key: ● = most likely to motivate ◉ = some ability to motivate ◎ = not addressed **U** = Unknown

Programme	Type of Action Motivated		
	Individual or Family	Whole School	Community
1. Brechin Community Education Programme* (Angus Council)	●	◎	◉
2. Calculating the School 'Global Footprint' (Global Footprints)	●	●	◎
3. CampusCalc (Best Foot Forward)	◉	●	◎
4. Ecological Footprint (CELP)	●	◎	◎
5. EcoLogic Online (PowerHouse Museum)	●	◎	◎
6. Ecological Footprint Calculator (Education for a Sustainable Future)	●	◎	◎
7. Eco'tude (PowerHouse Museum)	◉	●	◎
8. EcoVoyageurs: Reducing Your Ecological Footprint (Lever Ponds/CoEd Communication)	●	◎	◎
9. Future Steps (Merseytravel's Travelwise)	U*	U*	U*
10. Hurley Island: Learning for Sustainability (Learning for a Sustainable Future)	●	◎	◎
11. EcoFootprint Calculator (Redefining Progress)	●	◉	◎
12. School Global Footprint (WWF–Scotland)	U*	U*	U*
13. Where's The Impact (Centre for Alternative Technology)	●	◉	◎

* Calculator not available for assessment

Capacity of Ecological Footprinting to Motivate Informed Action

Determining the capacity of Ecological footprint education programmes to motivate informed action is very difficult. All providers that responded to questions about this indicated that they thought their programme did so. Most can provide anecdotal support but none have found a clear way of quantitatively measuring this.

Evaluation of this capacity is beyond the scope of this project. However, EcoLeaders has provided our general assessment of each programme's motivation potential (Table C) based on our background and experience.

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Sustainability Elements not Included in the Ecological Footprint Model

Critics and many supporters of the ecological footprint concept, acknowledge that it does not address all the issues of sustainable development.

Table D: Programmes that Address Non-Footprint Sustainability Issues

Key: ● = fully addressed ◉ = partly addressed ◎ = absent
U = Unknown

Programme	Social Dimensions			Ecology	
	Social Justice	Demographics	Quality of Life	Population	Biodiversity
1. Brechin Community Education Programme (Angus Council)	◉	◉	◉	◎	◎
2. Calculating the School 'Global Footprint'† (Global Footprints)	●	●	●	◉	◎
3. CampusCalc (Best Foot Forward)	◎	◎	◎	◎	◎
4. Ecological Footprint (CELP)	◉	◎	◎	◎	◉
5. EcoLogic Online (PowerHouse Museum)	●	◎	◎	◎	◉‡
6. Ecological Footprint Calculator (Education for a Sustainable Future)	◎	◎	◎	◎	◎
7. Eco'tude (PowerHouse Museum)	◎	◎	◎	◎	◉‡
8. EcoVoyageurs: Reducing Your Ecological Footprint (Lever Ponds/CoEd Communication)	◉	◎	◎	◎	◎
9. Future Steps (Merseytravel's Travelwise)	U*	U*	U*	U*	U*
10. Hurley Island: Learning for Sustainability (Learning for a Sustainable Future)	●	◎	◎	◎	●
11. EcoFootprint Calculator (Redefining Progress)	●	◎	◎	◎	◎
12. School Global Footprint (WWF–Scotland)	◉	U*	U*	U*	◉‡
13. Where's The Impact (Centre for Alternative Technology)	●	◉	◉	◉	◎

* Could not be assessed because only part of the programme was available.
† Social issues are a key component of the Global Footprint Programme.
‡ Biodiversity mentioned but plays a very minor role.

Table D summarizes how the programmes in this review deal with key sustainable development issues not addressed by ecological footprint.

No single programme based on ecological footprinting addressed all these issues.

Only social justice is covered by more than half (eight out of thirteen programmes).

Biodiversity is the second most covered non-ecofootprint topic with four programmes (note that three of these cover this important topic very superficially, however).

Demographics and quality of life are addressed in only three, while population issues (socially or ecologically) are covered only partially in two programmes.

Capacity of Ecological Footprinting to Sustain Interest Over Time

An important goal of education for sustainable development is to change student behaviours over the long term. Ideally, they will develop and/or reenforce a culture of wise use of renewable and non-renewable resources that will make it possible for people in their community, region, country and planet to live comfortably, safely and equitably together into the foreseeable future.

This is an important goal that is the core of most ecological footprint education programmes. But it is very difficult to determine if this long-term goal is being reached. A clear measure of success at the school level is that the schools set up and maintain a whole school ecofootprint monitoring programme and implement a series of planned efforts to reduce the size of some or all segments of their footprint. This could be an on-going project that takes place every year, ideally as a permanent component of curriculum through all grades and at every level of staff, teachers, students and volunteers.

Table E: Programmes Support for Long-Term Sustainability Projects for Students and Schools

Key: ● = present ◉ = partly addressed **U** = Unknown

Programme	Individual or Class Level			Whole School		
	Built-In	Built-In But Not Followed Up	Not Addressed	Built-In	Built-In But Not Followed Up	Not Addressed
1. Brechin Community Education Programme* (Angus Council)		●				●
2. Calculating the School 'Global Footprint'† (Global Footprints)			●			●
3. CampusCalc (Best Foot Forward)			●	◉*		
4. Ecological Footprint (CELP)			●			●
5. EcoLogic Online (PowerHouse Museum)			●			●
6. Ecological Footprint Calculator (Education for a Sustainable Future)			●			●
7. Eco'tude (PowerHouse Museum)			●		●	
8. EcoVoyageurs: Reducing Your Ecological Footprint (Lever Ponds/CoEd Communication)			●			●
9. Future Steps (Merseytravel's Travelwise)	Unknown†			Unknown†		
10. Hurley Island: Learning for Sustainability (Learning for a Sustainable Future)			●			●
11. EcoFootprint Calculator (Redefining Progress)			●			●
12. School Global Footprint (WWF–Scotland)	Unknown‡			Unknown‡		
13. Where's The Impact (Centre for Alternative Technology)	●					●

* Need for long-term projects was implied but not supported with detailed project information.
† Interactive software was not available at the time of this review.
‡ Project is in its pilot phase, long term information not available..

With the information gathered from websites, returned questionnaires and from email and telephone conversations with programme managers, it appears that none of the programmes have detailed information about this type of whole-school involvement and commitment resulting from participation in their programmes. It is difficult and costly to monitor long-term results and most organizations do not have the capacity to design and implement this type of evaluation.

However, we did review each programme to determine if efforts were made in the design of the programme to encourage students and teachers to develop long-term sustainability projects as a result of their participation. We were especially looking to see if programmes provided support for specific projects beyond general planning guidelines or suggested project topics (see Table E).

The results show that most of the programmes did not provide students and teachers with support for developing specific long term projects. The most support for individual projects came from *Where's The Impact,* and *Eco'tude* provided the strongest support for long-term whole school projects.

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Conclusions and Recommendations

Ecological Footprint Analysis

Ecological Footprint Analysis as a Tool for Sustainability

Ecological Footprint Analysis (EFA) measures the amount of renewable and non-renewable ecologically productive land area required to support the resource demands and absorb the wastes of a given population or specific activities.

From a sustainability perspective, when an individual's or community's footprint exceeds the amount of renewable biocapacity, more natural capital is consumed than is generated. This is unsustainable. Global Footprint accounts over the last forty years indicate a twenty-five year growth trend beyond the amount of renewable biocapacity. In short, humanity's ecological footprint appears to have breached ecological limits and is thus unsustainable.

Ecological footprint analysis looks in varying degrees of detail at the natural balance sheet of human consumption and the earth's capacity to provide both renewable and finite resources (materials, food, water, air and energy) and absorb and recycle our wastes.

Many agencies and governments have conducted ecological footprint analyses on institutions (businesses, schools etc.), communities, counties, states and provinces, countries and continents. Most of these involve complex calculators requiring highly detailed measurements, models and calculations.

EFAs are used to:

- provide base-line data
- identify areas where waste and overconsumption exist
- identify long-term and short-term trends in consumption, waste generation and land use
- motivate individuals and organizations to make changes
- monitor progress toward sustainability

Many EFAs have identified the importance of public education to inform, inspire and involve members of the community to become better environmental citizens by reducing their ecological footprint. Some groups, agencies and companies that conduct ecological footprint analyses have decided that the approaches and tools used in EFAs can be modified for education purposes.

Ecological Footprint and Education

Ecological footprint is used by educators for three main purposes:

- as an education/visualization tool to help students grasp the idea and visualize the concept of limited resources and personal impact
- as a persuasion tool to convince students to make changes in their behaviours toward a sustainable life-style
- as a monitoring tool to gauge the initial impact (baseline data) of their behaviours and life choices and monitor the results of changes they make and view their progress toward sustainability

Ecological Footprint as an Education/ Visualization Tool

All programmes reviewed here used ecological footprint as a tool to visualize the amount of land required to support the participant's life style, often shown in units such as hectares, acres or football fields. Many calculators showed images of the number of earths needed if the entire global population lived like the participant.

Ecological Footprint as a Persuasion Tool

Most programmes reviewed attempted to use ecological footprinting to motivate students to action. In our judgement none of them were particularly successful.

Two programme providers indicated that they had challenges in making the message of their ecological footprint a positive one:

> *The challenge in teaching the Footprint is in finding ways to discuss its message without it being all gloom and doom—giving students something they can do about it and tying that in to questions that go beyond individual actions to collective solutions.*
>
> Dahlia Chazan
> Co-Director
> Sustainability Indicators Programme
> Redefining Progress

Few programmes provided much support to assist students and teachers in developing positive projects.

Ecological Footprint programmes may not be the most effective way of motivating students to change behaviour. Education for sustainability providers may better approach this challenge using methods such as social marketing.

Ecological Footprint as a Monitoring Tool

Ecological footprint monitoring was an activity within some of the Programmes using their footprint calculators. Most were online calculators. A few were downloadable or available on CD ROM. We have divided them into two categories:

- simple calculators
  - few questions (13-20)
  - mostly multiple choice answers
- complex calculators
  - many questions (more than 20)
  - most require entry of real data gathered by the participant (e.g., household water use for one month from your water bill)

Simple Calculators

All programmes that included an ecological footprint calculator claimed that the calculator could be used to monitor participant's progress to sustainability. If students make changes in their lives and reenter the new data in the calculator, they can see the changes in the size of their ecological footprint. This is true; however, simple calculators the are very general and the calculations are hidden. The accuracy of these calculators is questionable even for tracking general trends.

Complex Calculators

Complex calculators were provided by:

- *Brechin Community Education Programme* (Angus Council)
- *CampusCalc* (Best Foot Forward)
- *Eco'tude* (PowerHouse Museum)
- *EcoFootprint Calculator* (Redefining Progress)
- *School Global Footprint* (WWF–Scotland)

The *Brechin Community Education Programme* was one of the most ambitious. One of its main goals was to gather accurate data for calculating accurate ecological footprints for the household within the county. Unfortunately, they found that the data collected from participants filling out an on-line questionnaire was not dependable enough for their calculation needs and the programme has been discontinued.

Eco'tude's on-line calculator provides students with the best support materials including downloadable audit sheets and numerous hints on where to find information and who to ask for it.

School Global Footprint (WWF–Scotland) contains another complex calculator. According to project coordinator Betsy King, it can perform simplified and complex calculations. Unfortunately, the calculator is still under development and we did not obtain a working version.

The challenge of complex calculators is that finding the accurate data for entry can be difficult and time consuming. Teachers and students may find that the acquisition of data is more bother than they are willing to engage in. Except for the Brechin project, none of the providers of complex calculators have conducted detailed evaluation of their programme with respect to how well teachers and students engage in the information collection, entry of data and use of their complex calculator. The Brechin project was discontinued due to concerns about data quality. We strongly recommend that a detailed evaluation of student and teacher responses be made during the pilot phase of the WWF–Scotland project.

The Ecological Footprint Calculator as a Mysterious Black Box that Gives Bad News

As we conducted this review, we became increasingly uncomfortable with most of the ecological footprint calculators. The simple on-line calculators induced the most discomfort. Simply put, students using these calculators are prompted to choose a short series of multiple choice answers and are then presented with the news that they are overusing the earth's resources. Most simple calculators should probably not be used as stand-alone education tools.

Many programmes do a good job preparing students to use and understand the underlying concepts, but the simple calculator remains a mysterious black box—the underlying thinking and mathematics are hidden from students and teachers. Learners are left at the data collection level, with little opportunity for application, analysis or evaluation.

The on-line complex calculators have the same problem, keeping the underlying mathematics hidden. However, with the spreadsheet calculators, curious people can view the calculations used to measure the ecological footprint. This may facilitate inquiry and critical thinking activities.

Alternatives to Footprint Calculators

We looked at one programme based on ecological footprinting that does not use a calculator; *Where's the Impact* (Centre for Alternative Technology). This was a simple activity-based programme that examined nearly all aspects of sustainable development including moral issues. It provided opportunities for students to use a variety of learner modes, and challenged them at all levels of Bloom's taxonomy of learning:

- Knowledge
- Comprehension
- Application
- Analysis
- Synthesis
- Evaluation

Among the programmes that we reviewed, this programme has strongest potential for teaching students the key concepts needed to live sustainably.

Recommendations

If WWF–UK were to consider providing Ecological Footprint Education as part of their suite of education for sustainability offerings, we recommend looking beyond the standard ecological footprint calculator and concentrate on activities that address a wide spectrum of student learning modes and incorporate all stages of Blooms Taxonomy.

Appendix 1:

Detailed Review of Thirteen Selected Ecological Footprint Education Programs

Sidebar 1a: Questions Used in the Brechin Community Ecological Footprint Calculator

By answering this questionnaire you will be able to find out what Brechin and area household's impact is on the environment. Your answers will help Brechin choose what environmental issues it will focus on, and help you better manage and improve your environment .

Your details will remain confidential and will not be used for any purpose other than to calculate the household ecological footprint of Brechin and area. Full confidentiality is assured in accordance with the UK Data Protection Act - your details will not be passed onto any other person and/or organization.

Information to parents

Best Foot Forward, who will be calculating the ecological footprint, can assure you that your children will not be identified or contacted in any way.

Your Details

- Your initials
- Your class name (If not at school, do not complete this request)
- The name of your school (If not at school, do not complete this request)
- How many people live in your household, for example, 3 or 5?

Travel

Cars

- How far does your family travel by car in a typical week?

I don't know
If you are unable to calculate how far your family travels in a week you can select one of the answers from below.
- Low (less than 230 km or less than or less than 145 miles)
- Average (between 230 and 280 km or between 145 and 174 miles)
- High (more than 280 km or more than 174 miles)

- Below is a list of fuels that are used to run cars. Select the fuel which is used in your main family car.
  petrol diesel gas other

Bus & Train

- How far does your family travel by bus each week?
- How far does your family travel by train each week?

I don't know
If you are unable to calculate how far your family travelled in a week you can select one of the answers from below. (combine your bus and train travel for this answer)
- Low (less than 28 km or less than or less than 18 miles)
- Average (between 28 and 34 km or between 18 and 21 miles)
- High (more than 34 km or more than 21 miles)

Walking & Cycling

- How far does your family walk or cycle each week?

I don't know
If you are unable to calculate how far your family travelled in a week you can select one of the answers from below.
- Low (less than 10 km or less than 6 miles)
- Average (between 10 and 12 km or between 6 and 8 miles)
- High (more than 12 km or more than 8 miles)

Holiday Travel

If your family went on an holiday trip in the past year, where did you go for your longest holiday?

- What was the main form of transport you used to get there?
  car bus train airplane ferry

Energy

Television

- How many hours of television does your family watch each week?
- How often do you leave the television on standby when you are not watching it?
  never sometimes always

Lights

- How many energy efficient light bulbs are you using in your home?
- How many ordinary (non-energy efficient) light bulbs are you using in your home?
- How often do you switch off unnecessary lights?
  never sometimes always

Heating

- How warm is your home?
  cool (less than 21°C) warm (21°C or 22°C) hot (more than 22°C)

Renewable Energy

- Does your family use renewable energy?
  yes no

Electrical Appliances

- How many hours does your family listen to a sound system or play computer games each week?
- How often do you turn off the sound system or computer when you are not using it?
  never sometimes always

Water

Washing

- If your family has a washing machine, how many times is it used each week?
- If your family has a dishwasher, how many times is it used each week?

Baths & Showers

- How many baths does your family have each week?
- How many showers does your family have each week?

Hosepipe

- How many hours a week does your family use a hose to wash the car or water the garden?

Toilets

- Do you have a low-flush toilet, a 'hippo' or other water-saving device in your toilet?
  yes no

Shopping

Magazines

- How many comics are bought by your family each month? For example, Beano
- How many magazines are bought by your family each month?
- How many newspapers are bought by your family each month?

Food

- Approximately what weight of food does your family eat each week that has come from the UK (Scotland, England, Wales, Northern Ireland and Ireland)? Do not include meat.

I don't know
If you are unable to calculate the weight of food eaten by your family in a week that has come from the UK, you can select one of the answers from below.
- Low (less than 4 kg or less than 9 pounds)
- Average (between 4 and 12 kg or

1. Brechin Community Education Programme: Angus Council

in Partnership with Best Foot Forward

Web Address:
www.angus.gov.uk/

Contact:
Rosie Manson
Project Officer (Environment Strategy)
Planning & Transport
Angus Council
St. James House
St James Road
FORFAR
DD8 2ZP
email: MansonRC@angus.gov.uk

The Calculator

Best Foot Forward developed a fairly complex hard-copy and online calculator for families to fill out for their households (see Sidebar 1a).

The Questionnaire

According to Angus Council, questions were intended to capture key aspects of personal consumption and behaviour which impact on the environment. It is also implicit that the project is also intended to increase citizen awareness and understanding of sustainability

between 9 and 26 pounds)
- High (more than 12 kg or more than 26 pounds)

• Approximately what weight of food does your family eat each week that has come from overseas (Africa, the America's, Asia and Australasia and Europe)? Do not include meat.

I don't know
If you are unable to calculate the weight of food eaten by your family in a week that has come from overseas, you can select one of the answers from below.
- Low (less than 27 kg or less than 60 pounds)
- Average (between 27 and 35 kg or between 60 and 78 pounds)
- High (more than 35 kg or more than 78 pounds)

• Approximately what weight of meat does your family eat each week?

I don't know
If you are unable to calculate the weight of meat eaten by your family in a week, you can select one of the answers from below.
- Low (less than 4 kg or less than 9 pounds)
- Average (between 4 and 6 kg or between 9 and 14 pounds)
- High (more than 6 kg or more than 14 pounds)

Waste

Waste

• How many paper items (newspapers, magazines etc) does your family throw away each week?
• How many glass items (bottles and jars) does your family throw away each week?
• How many plastic items (bottles and packaging) does your family throw away each week?
• How many aluminium cans does your family throw away each week?
• How many steel cans does your family throw away each week?
• What weight of other waste (not food, or any of the above) does your family throw away each week?

I don't know
If you are unable to calculate the weight of waste (not food) thrown away by your family in a week, you can select one of the answers from below.
- Low (less than 5 kg or less than 12 pounds)
- Average (between 5 and 9 kg or between 12 and 19 pounds)
- High (more than 9 kg or more than 19 pounds)

Recycling

• How many paper items (newspapers, magazines etc) does your family recycle each week?
• How many glass items (bottles and jars) does your family recycle each week?
• How many plastic items (bottles and packaging) does your family recycle each week?
• How many aluminium cans does your family recycle each week?
• How many steel cans does your family recycle each week?

Composting

• Approximately, what weight of food waste does your family compost each week?
• Approximately, what weight of food waste does your family throw away each week?

I don't know
If you are unable to calculate the weight of food waste your family throw away each week, you can select one of the answers from below.
- Low (less than 1 kg or less than 2 pounds)
- Average (between 5 and 9 kg or between 12 and 19 pounds)
- High (more than 9 kg or more than 19 pounds)

Local Environment

Your Garden

• What is the total area of your garden (include paths, sheds and patios)?
• What area of your garden is used for growing vegetables or set aside for wild plants and wildlife?
a quarter a half more than half None
• How much peat does your family use in the garden each year? litres

Class Footprint

• Would you like your class' footprint calculated?
Yes No

A Review of Ecological Footprinting in the Formal Education Sector

Table 1: Key Features of the Brechin Household Ecological Footprint Project[#]

Key: ● = present ◉ = partly ◎ = absent

Designed To Contribute to Curriculum	Specific Curricula Identified	
	General Areas Identified	
	None Identified	●
Designed To Stimulate Action	In Individuals	◉
	Class-based	◎
	School-based	◎
	Community-based	◎
Value to Participating Schools	Economic	◎
	Educational	◎
	Environmental	◎
Scientific Validity And Accuracy of the Ecological Footprinting Calculations	Simple/Short Questions Usually Multiple Choice Answers	◎
	Detailed Questionnaire	◉
	Students Required to do Extensive Research	◉*
	Tools and Recommended Information Sources Supplied to Students	◉*
	Information Supplied to Students	◉*
Capacity To Motivate Informed Action	Student Level	◉**
	School Or Institutional Level	◉**
	Community Level	◉**
Addressing Sustainability Elements Outside The Ecological Footprint Model	Social Dimensions (Justice, Demographics and Population, and Qualities Of Lives)	◉
	Biodiversity	◎
Capacity Of Programme To Sustain Interest And Commitment Over Time	Built-In and Demonstrated Over Many Years	◎
	Built-In but Not Followed Up	◉
	Not Addressed	◎

[#]This was not a formal education project

[*]Some information was provided to participants in the on-line questionnaire/calculator

[**]The questionnaire was designed to generate data about the ecological footprint of households in Brechin and to increase awareness of local sustainability issues. Motivation to action was not a stated objective of this project.

issues, to encourage informed action on reducing household ecological impact, and to encourage sustainable behaviour.

The questionnaire was available as hardcopy and on-line. The paper questionnaire was sent home with schoolchildren so that their families could help them to complete it. People were also encouraged to complete the questionnaire on-line at Best Foot Forward's website (www.bestfootforward.com/brechin/brechincitylimits.htm). Most of the schools had the children complete their questionnaires on-line and the website also included a facility for teachers to request an eco footprint for their class.

The hard copy questionnaire also contained an insert page giving "Footprint Tips" on how to reduce the size of a household's footprint. The schools also received a "Footprint Challenge" leaflet giving numerous ideas for projects and offering prizes for the best ones.

Programme Description:

The Brechin project was not a formal ecological footprint education programme. Instead, schools were used as a major community outreach conduit.

In 2003, Angus Council was seeking methods of determining a local community's ecological footprint and engaging with the community to raise awareness of and instigate action in relation to Local Agenda 21 issues. Council carried out an broad-based ecological footprinting project. Its aim was to promote sustainable development as a means of improving local quality of life and at the same time make a contribution to tackling global problems, and ensure that the quality of life of future generations is also safeguarded. The first step was to carry out a survey of households in the Brechin area to determine the size of the average household's ecological footprint. This was the first community based footprint project in Scotland.

In this project the community itself was involved in gathering the information to formulate the average size of a household's ecological footprint. Local people were invited to complete a questionnaire regarding their lifestyles including travel, energy use, water, shopping, waste and the local environment (see Sidebar 10a). The responses were analysed and reported back to the community (*Brechin & Surrounds Household Footprint Survey* a PDF file dowloadable from: www.angus.gov.uk/localagenda21/).

Questionnaires were given out through:

2. Calculating the School 'Global Footprint'

by Global Footprints

Web Address:
www.globalfootprints.org/

Contact:
Margaret Burr
Humanities Education Centre
Tower Hamlets Professional Development Centre
English Street, London
E3 4TA
Telephone: (++44) 020 7364 6405 Fax: (++44) 020 7364 6422
E-mail: hec@gn.apc.org

Other Contacts
The Global Footprint programme is also promoted and delivered in other centres including:

- Humanities Education Centre London
- Global Connections Wales
- GLOSDEC Cheltenham
- Highland One World Group, Scotland
- Lancashire Global Education Centre
- LEEDS Development Education Centre

The Calculator

This online calculator is available on the Global Footprints website (www.globalfootprints.org/issues/footprint/councquiz1_ns.htm#glosch).
The calculator differs from many on the web in that it focuses on many new areas including the school's:

- Social Impact
- Global Impact
- Ecological Impact

It also differs from in that the multiple choice answers are sets of complete sentences similar to Behaviorally Articulated Rating Scale (BARS)–see Sidebar 2a.

After completing the questionnaire, the students press a calculate button. The calculator produces a simple number between 0 and 100. Students then read the following rating scale:

Score 76 or more: Tiny footprint.
Your school has a truly global perspective and actively promotes global citizenship. The school offers opportunities and strategies for action to reduce or improve the social, global and ecological impacts the school community has on the world. Sustain your sustainable development agenda! It is clearly at the heart of all you and your school community does!

Score 64 - 75: Small footprint.
Your school has a series of effective strategies in place for generating awareness of global citizenship and sustainable development. There may be a few issues identified by this quiz which the school could address to turn awareness into more active global citizenship.

Score 24 - 63: Medium footprint.
Your school has its heart firmly set on its footprint, but you will probably be aware from completing this quiz that there are areas which the school needs to address to further promote a global perspective, sustainable development and active citizenship.

Score 9 - 23: Large footprint.
Your school is failing to create much awareness of global citizenship or sustainable development beyond the basic minimum requirements of the National Curriculum. There are precious few opportunities for those in the school community to reduce or improve their social, global or ecological impact.

Score 0 - 8: Giant footprint.
Your school is a walking (stomping) disaster! Pupils and the school community will have to learn how to become active global citizens elsewhere.

Programme Description:

Global Footprints aims to establish global citizenship education as central to the curriculum and ethos of the school.

Its goals are to :

- promote an understanding of how young people can help improve environmental sustainability and become active global citizens
- encourage the inclusion of global citizenship in the school development plan and schemes of work
- provide meaningful real world contexts for delivery of the curriculum, particularly in numeracy and literacy initiatives
- provide opportunities for students to make practical contributions to school policy and practice

Three modules are available:

1. Introduction to concept of the footprint
   - Mid-upper primary Geography
2. What is the global footprint?
   - Upper Primary Geography, Sustainable Development.
3. Global Footprints Quiz Extension Activity
   - Year 5 ICT & Geography

Sidebar 2a: Questions Used in the Global Footprints Calculator

Social

Relates to the social impact the school is having both within the school community and the local community.

1. Valuing the individual
   - The school has a policy, regularly monitored and reviewed, of ensuring that each child is valued for him or herself, regardless of race, culture, class, ability or disability. Disabled pupils are integrated into school life
   - Staff actively try to nurture the abilities and bring out the talents of each child
   - Children are encouraged to conform to social and academic norms of school
   - Only the bright and well-behaved are valued
2. Multiculturalism and awareness of diversity
   - The school recognizes and respects the festivals, beliefs and customs of a wide range of cultures and religions and celebrates them as appropriate within the life of the school
   - The school ensures that the festivals, beliefs and customs of all the cultures and religions represented in the school are recognized
   - Children are encouraged to conform to social and academic norms of school
   - There is no acknowledgement or celebration of cultural diversity in the school
3. Anti-prejudice
   - We have a school policy on Equal Opportunities which is regularly monitored and reviewed. We teach the children about prejudice and its effects, both individual and institutional and help them develop skills to challenge their own and other people's prejudice.
   - We try and teach the children about prejudice and its effects. We have a school policy on Equal Opportunities
   - We deal with situations involving prejudice of whatever form as and when they arise
   - No one in our school is prejudiced, so no one suffers
4. 'Positive behaviour management' policy
   - A positive behaviour management policy, which aims to raise self-esteem and encourage self-discipline and conflict resolution through a democratic group process such as Circle Time, is central to the school ethos
   - The school has a behaviour management policy that the whole school community is fully aware of and which clearly identifies rules and sanctions that work to encourage positive behaviour
   - The school has a firm discipline policy: children and staff understand clearly the rules and children know they will be punished if they break them
   - The school does not need a behaviour management policy; our children behave well through fear of the consequences
5. Involvement in local community projects and local community involvement in the school
   - Regular exchange of communication and information between local projects or outside agencies and school
   - Link with projects or agencies established but little exchange of communication or information occurs
   - Links/ link currently being explored with local community groups or agencies
   - No link with local community and no link planned
6. Participation of children in decision making
   - An effective School Council, known and recognized by the whole school community, is involved in policy decisions and often discusses global, social and environmental issues relevant to the school and local community
   - A school council or similar process of pupil representation and participation exists and is recognized by the whole community
   - No school council, but the school believes that children should have a voice in the school
   - Pupils do not need representation
7. Health promotion
   - A wide ranging health education programme is offered including education on sex, drugs and healthy food which has a social, global and environmental dimension, e.g. considerations of where our food comes from, the health and quality of life of producer communities, organic foods versus conventional
   - The school has a wide ranging health education policy, but this does not include a global dimension
   - Health education is limited to science and PHSE
   - The school has no health education programme and it is not considered a priority

Global

Relates to the impact the school is having at a global level both on the global environment and on communities in the south

8. Global citizenship across the school curriculum
   - Global citizenship is a fundamental part of the school ethos and permeates all areas of the curriculum including literacy and numeracy
   - Global issues and teaching about sustainable development are central to the geography curriculum and are taught to varying degrees through other areas of the curriculum
   - Assemblies and PSHE often include a global dimension
   - Children need to think about their own locality only. Global perspectives can wait until they are older
9. Link with project or school in a developing country
   - Regular exchange of communication and information with project or school in developing country
   - Link with school or project established but little exchange of communication or information
   - Interest in developing links/ link currently being explored
   - No link with project or school in developing country and no link planned
   - NB For some rural or virtually all white schools, a link with a school in a more ethnically varied area within the UK may be a wise and useful first step. Rural White schools who have made such a link should click on the second option to gain a score of 3.
10. Fair Trade tea and coffee
    - All tea and coffee in the staff room is fairly traded and staff are fully aware of the benefits to Third World producers of Fair Trade products
    - choose if they want Fair Trade tea and coffee

continued on following page

foundation for the conclusions and ratings provided by the calculator
- most aspects of biodiversity not addressed
- little indication of a mechanism to encourage sustained student interest and commitment
  - few concrete school-level activities beyond encouraging students to promote the concept in their communities
  - no projects or guidelines for developing mechanisms within the school for reducing consumption and waste etc

Conclusions

Global Footprints approaches footprinting and the Ecological Footprint calculator in a significantly different way than most other education groups. Their emphasis is on social issues, global citizenship and some environmental/social issues. Few questions are about how much food and energy students consume. Instead the quiz probes to see if the school has a culture of tolerance and conservation.

Global Footprints looks at the calculator as a conceptual tool for developing understanding and commitment to sustainability, not as a device for measurement of progress toward sustainability.

3. *CampusCalc*

by Best Foot Forward

Web Address:
www.bestfootforward.com/campuscalc.html

The Calculator

This calculator is for sale. A UK site license costs £200. Prices for international versions are available on request. A demonstration version of the calculator is available at: www.bestfootforward.com/download_campus.htm. The demo version consists of (see Sidebar 3a). Its key features include:

- an Excel Spreadsheet
- designed to measure the environmental impact of a university or college campus
- calculator is made up of sections on Travel, Energy, Paper, Waste and Water
- users decide which elements are to be addressed
- for each section the user fills in the appropriate data
- some research required to make most entries
- the Ecological Footprint for each activity and section is shown in the right hand boxes as a hectare value
- performance indicators i.e. Ecological Footprint values per member/student (in hectares) or unit of income are given at the bottom of the calculator page

Sidebar 3a: Overview of the *CampusCalc* Questions by Best Foot Forward

Number of Staff
Income

Travel
Train journeys – annual passenger km
Bus Journeys - annual passenger km
Car journeys – annual km
Air Journeys - annual air passenger km
Mini-bus -
Travel Footprint

Electricity and Power
Calculated for each building on campus
Annual Grid Electricity Consumption - kWh
Annual Gas consumption -Therms
Annual Heating Oil consumption - litres
Energy Footprint

Paper Usage
Newspapers on Campus - kg per year
Books - number per year
Magazines and journals - number per year
Printing/copier paper - virgin - kg per year
Printing/copier paper - recycled - kg per year
Total
Paper Footprint

Waste
Waste to landfill - tonnes per year
Glass
Plastic
Aluminium
Steel
Other
Total

Waste recycled - tonnes per year
Glass
Plastic
Aluminium
Steel
Other
Total
Waste Footprint

Water
Calculated for each building on campus
Total
Water Footprint

Total Ecological Footprint
Footprint per member
Footprint per £1000 income

4. Ecological Footprint Module

by the Canadian Environmental Literacy Project (CELP)

Web Address:
celp.ucis.dal.ca/index.htm

Contact:
Susan Bone
Canadian Environmental Literacy Project Coordinator
c/o Biology Department
rm. 7050 Dalhousie University
Halifax, NS, B3H 4J1
Canada
Telephone: (902) 494-3737
Email: sbone@dal.ca

The Calculator

The calculator used in this module is a simple on-line quiz available on the Mountain Equipment Co-op website (www.mec.ca/Apps/ecoCalc/ecoCalc.jsp). It consists of 13 questions with multiple choice answers (see Sidebar 4a). Many of these questions are significantly different than for many other simple calculators.

Sidebar 4a: The Mountain Equipment Co-op Footprint Calculator Questions

Note: Almost every question is prefaced with a paragraph that puts the question in context.

Section 1.
Food

1. How often do you eat animal-based products (incl. meats, eggs, dairy and fish)?
2. Food Intake
   How would you describe your average daily food intake?
   Calorie counter (compare your daily calorie intake to your daily calorie requirement) To maintain a person, it takes 26 kcal a day per kg of body weight, 33 if you are active:
   Enter your weight in kg.
   Physically active (y / n):
   Result: Your basic daily requirement is about __ kcal.
3. Food Waste
   How much of your purchased food is thrown out rather than eaten?
4. Locally Grown Food
   How much of the food that you eat is locally grown, unprocessed and in-season?

Section 2. Transport

5. Kilometres Driven by Car per Year
   How much do you drive each year, on average (either as driver or passenger)?
6. Ride Sharing
   On average, how often do you drive with someone else (either in your car or theirs)?
7. Fuel Efficiency
   What kind of fuel efficiency does your car
8. Public Transportation
   On average, how many Kilometres do you travel on public transportation (bus, rail) each week?
9. Air Travel
   How many hours each year do you spend flying?
10. How many people live in your home?
11. House or Apartment Size
    How big is your home?
12. Does your home use electricity from a "green" electricity provider?
    (e.g., solar, wind, micro-hydro)
13. Do you use energy-efficient appliances and light bulbs?

Your Ecological Footprint Results

Food Footprint _____
Transportation Footprint _____
Housing Footprint _____
Other Footprint _____
Your Total Footprint is _____
North American Footprint _____
Component Averages In Comparison _____

Now choose. How much of the biosphere should be set aside for other species?
Your choice means the following: You believe that every person should be able to live a satisfying life within an average of ___ hectares.
Worldwide, the biologically productive space available per person is ___ hectares.
Hence, it requires ___ Earths to support each member of the present human population at your standard of living.

What about population?

5. EcoLogic Online

by the Powerhouse Museum, Sydney, Australia

Web Address:
projects.powerhousemuseum.com/ecologic/games.htm

Contact
Helen Whitty
Education coordinator
PowerHouse Museum
HelenW@PHM.GOV.AU

Calculator:
Bigfoot Interactive, EcoLogic's ecological footprint calculator is available both as an on-site interactive touch-screen exhibit at the museum and as an online calculator available on the Powerhouse Museum website.

- estimates the size of an individual's Ecological Footprint from their answers to 17 simple questions (see Sidebar 5a) with multiple choice answers
- the site claims to be the first Ecological Footprint calculator to use Australian data and terminology
- supported by a downloadable Ecological Footprint essay

This calculator has a multimedia interface with a moving pictures and music and voice-over text prompts. The theme and atmosphere is that of a fast-paced game show.

Programme Description:

EcoLogic is an exhibition at Sydney's Power House Museum. *EcoLogic Online* is it's online counterpart. Established in 2002, *Ecologic* consists of multi-layered interactive exhibits that includes objects, graphics, sculpture, artworks, videos, film and soundscapes. The exhibit looks at sustainability in terms of creating a sustainable future in Australia.

Originally developed to promote the on-site exhibition, *EcoLogic Online* now provides many services to teachers and students (see Sidebar 5b) including:

- curriculum connections (see Sidebar 5c)
- two online games
- information and support materials for teachers (see Sidebar 5c) who wish to visit the exhibit and integrate the on-line tools into their curricula
- a very extensive resource base (see Sidebar 5d)

Target Audiences:

- local to national visitors
- local to national students and teachers

Sidebar 3d: EcoLogic Online—Materials for Teachers and Students

The website provides information on:

- EcoLogic and relevance to the curriculum
  - connections to the Australian government's New Environmental Education Policy released in June 2001
    - shifts from student taking personal responsibility for the environment to students taking local action in the context of global responsibility
    - a whole school approach to environmental education
    - the need for the entire school community to incorporate the principles of ecologically sustainable development (ESD) into a School Environmental Management Plan
  - relevant to main curriculum areas (see Sidebar 3c)
- Print Material (pdf documents for download
  - EcoLogic Teachers exhibition notes
  - Science theme trail
  - Primary trail including Task cards
  - K-2 trail
  - Design and technology theme trail
  - Geography theme trail
  - Life cycle analysis
  - Indicators of sustainability
  - Design for the environment
  - ***Ecological footprint***
  - Products and services used in the exhibition Ecologic
- Other Materials for Younger Students
- Classroom Activities
- Young Designer
  - a series of pages for design and technology students and those interested in design for the environment
- Glossary

Key Messages:

- a sustainable future depends upon the choices we make today and every day
- making those choices isn't always obvious or easy
- there are new ideas and technologies that can reduce our individual and collective impact on the planet

EcoLogic focuses on what can be done in Australia and looks at rural and coastal Australia and focuses on real and potential soil and water crises threatening food supplies.

The Place and Importance of Ecological Footprinting in the Agency's Programme

EcoLogic was the first time a gallery at the PowerHouse Museum was conceived and supported as more than an exhibition. The initial website was essentially a promotional tool for the exhibition but it did put two of the exhibition interactives out there as well, including *Bigfoot* calculator.

A Review of Ecological Footprinting in the Formal Education Sector

6. Ecological Footprint Calculator:

by Education for a Sustainable Future

Web Address:
csf.concord.org/esf/index.php?module=htmlpages&func=display&pid=11#HowWhy

Sidebar 6a: Eco Footprint Calculator Questions: Education for a Sustainable Future

Food

1. How often do you eat animal-base products (including meat, eggs, dairy and fish)?
2. How would you describe your average daily food intake?
3. How much of your purchased food is thrown out rather than eaten?
4. How much of the food that you eat is locally grown, unprocessed and in-season?

Transportation

5. How much do you travel by car each year, on average? (either as driver or passenger)
6. On average, how often do you drive with someone else (either your car or theirs)?
7. How many miles per gallon does your car get?
8. On average, how many miles do you travel on public transportation (bus, rail) each week?
9. How many hours each year do you spend flying?

Housing

10. How many people live in your home?
11. How big is your home?
12. Does your home purchase electricity from a green electricity provider?
13. Do you use energy efficient appliances and light bulbs?

Sidebar 6b: Education for a Sustainable Future—teacher background materials

Section A:
Important ideas and questions that will shape the outcomes for student learning about Designing Sustainable Communities

Section B:
Important topics and key concepts that will shape the outcomes for learning about the subject of Designing Sustainable Communities.

Section C:

Chapter One: Why are we worried about sustainability?

1.1 Preventing the tragedy of the commons.
1.2 Statistics, growth, project to future, looking at trends.
1.3 Context
1.3 Equity, fairness. Environment, Economy
1.4 Trigger events: worried about global issues, focus on local ways to make a difference
1.5 Historical and contemporary perspective of civilizations and communities, successes and failures- case studies.

Chapter Two - What is a community?

2.1 Definitions, different kinds of communities
2.2 Size of community.
2.3 Culture and community.
2.4 Community and place vs. virtual communities.
2.5 Components of a community. Social, physical, spiritual dimensions.
2.6 How community is formed and maintained.
2.7 Choosing a community (e.g., people choose where to live based on school systems)

Chapter 3 - Community as a system.

3.1 Understanding systems - systems thinking
3.1 Social systems: diversity, cultural, economic, regulatory (governance), support, health
3.2 Physical systems: (natural environment) local geology, environment, climate

Chapter Four - Designing Sustainable Communities

4.1 Exercises in modeling, using modeling software, applying knowledge to design
4.1.1 Ecological footprint - awareness, provocative model
4.2 Indicators, understanding essentials. Scenario analysis, what-if experiments, proposals for change.

Chapter Five - Opportunities for Interaction/Improving Your Community

5.1 Communication
5.2 Participation
5.3 Opportunities for interaction and engagement
5.4 Decision-making process for your local community
5.6 Conflict resolution - non-litigatious problem-solving - negotiation
5.7 Constant learning - formal/informal

7. Eco'tude

by the Powerhouse Museum, Sydney, Australia

Web Address:
www.powerhousemuseum.com/ecotude/

Eco'tude and Bigfoot Interactive (programme 5) are delivered by the PowerHouse Museum. Bigfoot Interactive was developed first as part of EcoLogic, an on-site museum exhibit. Museum staff converted Bigfoot Interactive into an on-line component of their website and provided it, plus additional support materials to schools in the Sydney area. According to museum education staff, this became popular and many schools asked for a school-level calculator. Eco'tude is the school calculator they developed to meet this demand.

Contact Information
Helen Witty
Education Coordinator
PowerHouse Museum
email: HelenW@PHM.GOV.AU

Calculator:

Eco'tude features an online calculator available on their website (see Sidebar 7a)

- focused on calculating the Ecological Footprint of any school in Australia
- a detailed calculator consisting of 37 questions covering:
  - latitude of school
  - school population (includes day students, resident students, staff, visitors)
  - size of property and buildings
    - building materials used
    - condition of grounds (paved–native vegetation)
  - food, energy, water, materials (paper etc.) used, wastes generated
- calculator provides tips on who students could contact to gather accurate information
- calculator identifies key support materials (audit sheets) students can use to gather, tabulate and record information needed to answer calculator questions (see Sidebar 7a)

Sidebar 7a continued**: Eco'tude Calculator Questions**

Water Use

37. What percentage of the private vehicles used to travel to school have an engine capacity of more than 2 litres?*

Summary of Travel

Your Travel Footprint

Tips on improving water use footprint.
Includes a series of hands-on class activities to make changes in travel

School Ecological Footprint

* Includes hints for students for finding answers, often suggesting sources of information plus connections to download audit sheets that students can use to gather and compute an entry.

** Connections to download audit sheets that students can use to gather and compute an entry.

Sidebar 7b: the Eco'tude Audit Toolkit

The toolkit makes it possible for students to use the eco'tude calculator to come up with the best possible estimate of their school's ecological footprint. It also assists students to identify, measure and understand what is happening within their school. The audits in the Toolkit fall into three categories:

1. Historical Audits
- involve the collection of data from sources such as bills, invoices and records
- commonly used to measure water and energy usage
- also used to analyses school population trends and to monitor purchasing
- provide baseline data to measure improvements

2. Student and Staff Interviews/Surveys
- provide information about personal consumption choices that people make

3. Walkthrough Audits
- students physically walk around the school inspecting all areas noting down the condition of items, their inefficiencies and when possible suggesting ideas for improvements

Key Audit Sheets

Eco'tude provides students with audit sheets (Adobe Acrobat files) for download from their website and directly from their Ecological Footprint calculator. These include:
- Student/Staff Survey
- School Population Audit
- Building Walkthrough Audit
- Energy Walkthrough Audit
- Solid Waste Disposal Audit
- Leaking Tap Audit
- Meter Audits
- Solid Waste Component Audit
- Illumination Audit

The information gathered in these audits is used by students to answer the questions in the eco'tude Ecological Footprint calculator.

- the calculator computes the school's Ecological Footprint in units based on the size of the school (e.g., the overall Ecological Footprint of the school is 35 times the area of your school's site):
  - the school's overall EF
  - land use footprint
  - building construction footprint
  - energy use footprint
  - water use footprint
  - food footprint
  - land use footprint

8. *EcoVoyageurs: Reducing Your Ecological Footprint*

by CoEd Communications, a Toronto-based education consulting company. Copyright for *EcoVoyageurs* is held by Lever Ponds, a subsidiary of the Unilever Corporation, the project's sponsor.

Web Address:
www.ecovoyageurs.com/

Contact:
Jeffrey Mitchell
CoEd Communications Inc.
66 George Street
Toronto, Ontario, Canada M5A 4K8
email: ccmail@sympatico.ca
telephone: 416-955-9526 fax: 416-955-0815

Calculator:

The calculator consists of 18 simple questions (see Sidebar 8a).

- most are multiple choice
- the questions relate to individuals student's actions in past 1–3 days

Programme Description:

The makers of *EcoVoyageurs* bill the package as a holistic framework for Grades 6–9 science, social studies, English language arts, and mathematics. The materials were developed by a teaching team in the province of Manitoba and claims to based on *Our Ecological Footprint, Reducing Our Human Impact on the Earth*, by Mathis Wackernagel & William Rees. *EcoVoyageurs* has been designed as a multi-disciplinary project. It provides a holistic framework for Grades 6–9 science, social studies, English language arts and mathematics. Students must engage in the *EcoVoyageurs* story of three friends who undertake a journey to save Solana, the Tree of Life by deciphering codes, stumbling over clues and enlisting the aid of unusual companions.

Students in the classroom parallel the friends' quest and find ways to reduce their own Ecological Footprints. Specific core curriculum skills are developed and exercised within an evolving problem solving, decision making context. The activities, data gathering and research surrounding the stories reinforce the concepts presented in the *chronicles* and invite students to take a hands on approach to the environment. The EcoVoyage is finished when students generate and complete their own EcoPlans—local projects designed to transform attitudes and beliefs into changed behaviours needed to reduce their Ecological Footprints.

The EcoGuardian Portfolio is the journal of the student's progress in their voyage. It encompasses working notes, data collection, research, graphs, analysis, questions and answers, and all other information accumulated during the project. It is the source of insight for each student EcoGuardian and provides the base for the EcoPlan.

The website indicates that the programme has been field tested in 500 schools in four Canadian Provinces:

- British Columbia
- Alberta
- Ontario
- Nova Scotia

The website claims that *EcoVoyageurs* is a thoroughly tested, integrated curriculum for 5–15 hours teaching at a grade 6–8 level and incorporates science, social studies, geography,

Sidebar 8c: Table of Contents: Teacher's Guide

9. *Future Steps: An Interactive CD for Schools*

by Merseytravel's Travelwise

Note:
Little information was available from TravelWise about their proposed ecological footprint education initiative, *Future Steps*. The following is a brief outline of what we have been able to learn of the programme.

Web Address:
www.gotravelwise.com

Contact:
Sarah Dewar
TravelWise Co-ordinator
Merseyside TravelWise Team
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Liverpool
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email: sarah.dewar@merseytravel.gov.uk

The Calculator

Details about the calculator to be used in Future Steps were not available.

Programme Description:

Merseytravel is concerned about the environmental and potential health impacts of transport in Merseyside. To assist in the understanding of sustainable transport issues, Merseytravel commissioned Stockholm Environment Institute and Sustainable Steps Environmental Consultants to undertake research into the potential for using ecological footprinting focused solely on transport. Here, the footprint is expressed by the area of land that would need to be planted with trees to negate the CO2 produced from our transport requirements. The results of the research are available as *The Ecological Footprint of Passenger Transport in Merseyside* by John Barrett, Anthony Scott and Harry Vallack. (2001) from their website (www.merseytravel.gov.uk/info_environment.html). Part of this report indicates that education in schools is an important option to reduce carbon emissions and other aspects of ecological footprint related to transport.

Merseytravel together with Merseyside TravelWise hope to use the ecological footprint as a promotional tool with schools to highlight how small changes either in mode of transport or type of vehicle used can reduce our ecological footprint. To date it has been piloted at a number of schools and organizations working with TravelWise. According to TravelWise's website, the software will be available for download soon. And according to Sarah Dewar, TravelWise Co-ordinator, Merseyside TravelWise Team, an interactive CD version of *Future Steps* "is very near completion and we will be likely to distribute outside Merseyside for a small charge."

The Place and Importance of Ecological Footprinting in the Agency's Programme

Public education is important to Merseytravel. TravelWise is its main communication arm which provides information about transportation services and issues. Ecological footprinting is a small part of the agency's focus, but it appears to be the centre point for its formal education efforts.

Evaluation

Future Steps has not been released for general use by teachers and a copy was not available for review. No evaluation was possible.

Sidebar 10a: The ICLEI Footprint Questions Used in the Hurley Island Project

Food
- How many servings of each type of food do you eat per week?
- Fruit and vegetables (250 g servings)
- Meat (250 g servings)
- Milk products (250 ml or 6 oz servings)
- Sugar (teaspoons)
- Juice (250 ml or 6 oz servings)
- Alcoholic beverages
- Tea/Coffee (8 oz cups)
- Eggs

Transportation
- What is the daily distance traveled between home and work (i.e. a round trip)?
- What is the average daily distance traveled over and above work?
- What is the distance traveled on the weekend?
- What was the approximate distance traveled during vacation (i.e. annually)?
- Mode of transport Used
  - % automobile (1 person)
  - % automobile (3+ people)
  - % bus
  - % commuter train or intercity train
  - % subway
  - % streetcar/tram
  - % walking
  - % bicycling
  - % taxi
  - % airplane

Products and Services
- Estimate your monthly purchases/use of services on the following items:
  - Clothes and shoes?
  - Paper products (Books and magazines)?
  - Plastic Products?
  - Medicine?
  - Hygienic products?
  - Telephone?
  - Entertainment (movies, concerts etc.)?
  - Education?
  - Furniture, carpets, household equipment?
  - Jewelry?
  - Recreational equipment?
  - Hotels/camping?
  - Cleaning products?

Waste
- What is the approximate weight of your garbage per week?
- What is the approximate weight of your cans and bottles which are placed curbside for collection per week?
- What is the approximate weight per week of your paper recyclables?

Housing
- What is the area of your living space?
- How many people do you live with?
- How much water do you consume on a "typical" day?
- How much do you spend on natural gas to heat your home?
- How much do you spend on heating oil to heat your home?
- How electricity do you use?
- How much have you spent on home improvement materials over the past year?

10. Hurley Island: Learning for Sustainability

by Learning for a Sustainable Future

Web Address:
www.lsf-lst.ca/en/hurley/index.php

Contact:
Pam Schwartzburg
Programme Director
Learning for a Sustainable Future
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York University
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Telephone: (877) 250-8201 Fax: (416) 736-5837
E-mail: pams@yorku.ca

The Calculator

A Ecological Footprint calculator is used for one part of the Environmental Geography course (see course description below). It is an on-line calculator sponsored by the International Council for Local Environmental Initiatives (ICLEI)-Local Governments for Sustainability (www.iclei.org/ICLEI/ECOFOOTQ.HTM) (see Sidebar 10a to view questions).

Programme Description:

The Hurley Island Project–Pathways to Sustainability is an on-line environmental geography course package for senior secondary students from across Canada and around the world to address problems and issues related to sustainability. This course assists in developing the technical, collaborative and communicative skills needed by citizens to help implement sustainable solutions.

This is a credit course developed and delivered by Learning for a Sustainable Future with the support of the Ontario Ministry of Education's Independent Learning Centre and local school boards.

Teaching is provided by:
- experienced on-line educators
- expert mentors from a variety of fields
- peer mentors assist students in understanding and completing course requirements
- all teachers are provided with a Teacher's Guide (see sample in Sidebar 10b)

11. Redefining Progress's Ecological Footprint Education:

by Redefining Progress

Web Address:
www.redefiningprogress.org/newprojects/ecolFoot.shtml:

Contact Informations:
Dahlia Chazan, Co-Director
Sustainability Indicators Programme, Redefining Progress
1904 Franklin Street, 6th Floor
Oakland, CA 94612
telephone: 510-444-3041x317 fax: 510-444-3191

The Calculator

The on-line *Ecofootprint Calculator* is part of the Sustainable Education Programme offered by Redefining Progress. It consists of three initial questions and 14 main questions (see Sidebar 11a).

- almost all are simple with multiple choice answers
- Ecological Footprint is calculated in hectares
- follow-up actions and further information are incorporated into the final screen of the on-line quiz (see Sidebar 11b)

Note that a detailed Excel spreadsheet calculator for a household Ecological Footprint can be downloaded by entering the Frequently Asked Questions (FAQ) webpage (www.rprogress.org/newprojects/ecolFoot/faq/) and clicking on the question:

"Is there a more precise calculator?"

Programme Description:

This programme is a full-day teacher training module with a guide for teacher-trainers to run workshops. The workshop aims to give participating educators the background and skills they need to:

- integrate the Footprint into their teaching
- develop ideas for linking Footprint instruction to community activities within schools in their communities
- use the lesson plans and multi-media applications produced by Redesigning Progress.

The agency also produces Footprint-based lesson plans, supporting materials, and teacher training materials:

- at national education conferences
- through the Internet
- through partners' existing networks

Four teacher-educators deliver teacher training.

Redefining progress supports participant educators via an online community.

Sidebar 11a: Redesigning Progress: Ecological Footprint Calculator Questions

Initial Questions
How old are you?
How big is the city, town, or place where you live?
What city has the most similar weather to yours?

Food Footprint
1. How often do you eat animal based products? (beef, pork, chicken, fish, eggs, dairy products)
2. How much of the food that you eat is processed, packaged and imported?

Goods Footprint
3. Compared to people in your neighborhood, how much waste do you

Shelter Footprint
4. How many people live in your household?
5. What is the size of your home?
6. Which housing type best describes your home?
7. Do you have electricity in your home?

Mobility Footprint
8. On average, how far do you travel on public transportation each week (bus, train, subway or ferry) ?
9. On average, how far do you go by motorbike each week (as a driver or passenger)?
10. On average, how far do you go by car each week (as a driver or passenger)?
11. Do you bicycle, walk, or use animal power to get around?
12. Approximately how many hours do you spend flying each year?
13. How many liters per 100 kilometers does your car consume? Fewer than 4.5 litres per 100 km
14. How often do you drive in a car with someone else, rather than alone?

The quiz generates a product in hectares, compares your Ecological Footprint with that of your country and identifies the biologically productive hecatares/person on the planet and states how many planets needed to support your level of lifestyle.

The quiz also has areas to access more information and to take action.

Information
- Join the Campaign
- Who we Are
- About the Footprint Quiz
- *Contact Redefining Progress*

Take Action: What You Can Do
- Individuals
- Community Members and City Officials
- Businesses
- Nation
- Schools and Campuses

Other Information
- Frequently Asked Questions
- What about other Species?