

# Sustainable Development

## Teachers' guide



### Transport: Background Information

To many people the word 'transport' means the same as 'traffic'. However, 'transport' actually covers a wide range of issues from local to global. One key concern is the growth over the last few decades in numbers and use of private cars.

The private car has many benefits in terms of personal mobility for those people that own them, but also has several side effects. In many towns and cities across the world car use is influencing the design of towns, with more 'edge of town' shopping centres designed to suit the car owner. Growth in car numbers is an important factor in the increased air pollution-affecting people's health.

In the UK there has been a trend for more children to be driven to school, making the roads around the school congested with traffic and the air around the school more polluted.

Road transport is the single largest source of air pollution in the UK.

Ninety percent of the carbon dioxide (CO<sub>2</sub>) emissions in the UK come from road transport. CO<sub>2</sub> is one of the main greenhouse gases. Greenhouse gases trap heat and stop it radiating back into space. Over time the trapped heat can raise the temperature of the planet and could change the weather, global water circulation, local ecosystems, and even the shape of our country as water levels rise.

Nitrogen oxides (NO<sub>x</sub>) and carbon monoxide (CO), which are released as we burn fuel in our cars, also increase air pollution. Road transport contributes 49% of the nitrogen dioxide emissions in the UK.

Nitrogen oxides and sulphur oxides also contribute to 'acid rain'. Rain becomes abnormally acidic when it absorbs gases such as sulphur dioxide and nitrogen oxides. Acid rain alters the pH balance of watercourses like lakes and rivers. It upsets the natural populations living in the water. Acid rain can also dissolve harmful metals, such as aluminium, lead and mercury from soil, this polluted water then joins watercourses and causes further problems. For example, aluminium dissolved in acidic water can affect the gills of fish and stop them absorbing oxygen. In the soil the increased acidity and aluminium ions may attack tree roots causing the trees to die back.

A key concern over the last few decades has been the growth in the number of private cars being used. The private car has many benefits in terms of personal mobility but it has many side effects. In addition to the environmental effects described above there may be a link between vehicle emissions and higher levels of asthma.

Transport can also have a physical impact on wildlife. Frogs, toads and newts are particularly vulnerable as they cross roads to get to their breeding grounds in the spring.

### National Curriculum Overview

**Activity 1** Mainly a Maths project but also part of a Geography module about the local area.

**Activity 2** can be used to look at metric conversion skills (Maths), map reading skills (Geography) or as part of the Year 3 QCA Unit 6: Investigating our local area in Geography. The activity looks at our impact on the environment and addresses several issues in Key Stage 3 Geography.

**Activity 3** can be used as part of the Numeracy Strategy in Year 6. It can also be used as part of Handling Data projects.

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## GLOBE Transport Activities

### Activity 1. Getting to School 1

Pupils survey their classmates and find out the mode of transport that each person used to come to school. This starts pupils thinking about their travel and encourages them to talk to each other. The activity would work well with a new class at the start of the school year. Pupils can compare their journeys and work out if there are parts of the trip they could make together.

**Preparation:** Decide whether the group will work together or separately.  
Copy the 'Getting to School' Activity 1 data sheet.

#### The activity:

1. Pupils choose the one type of transport they use for the longest part of their journey.
2. Complete the survey sheet and work out the totals for each type of transport.
3. Enter the results onto the GLOBE sustainable development database.

**Follow up:** Draw graphs to display the data.  
Discuss sustainable forms of transport and find out if any pupils can travel together.  
Survey the rest of the school and add their results to your graphs.  
Repeat the activity at the end of the year and see if anything has changed.  
Do the 'Getting to School 2' activity.

### National Curriculum

#### Mathematics

Key Stage 2	Ma4.1a	Select and use handling data skills.
	Ma4.1f	Decide how best to organise and present findings.
	Ma4.2c	Represent and interpret discrete data.
Key Stage 3	Ma4.1a.ii	Collect data from surveys.
	Ma4.1f	Communicate mathematically, use diagrams and text.
	Ma4.2a	Collect discrete data, using observation and controlled experiments.
	Ma4.2c	Design and use two way tables.
Ma4 Level 3		Construct bar charts and pictograms to communicate info they have gathered.
Ma4 Level 4		Collect and record discrete data. Use mode.

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## Activity 2. Getting to School 2

Pupils examine the forms of transport used by pupils in the class. They work out the distances travelled using each mode of transport in meters. This encourages pupils to think about their means of transport and question whether they could improve their fitness or their impact on the environment by adopting a more sustainable (and healthy) means of transport.

**Preparation:** You will need local maps and pieces of string or access to the Internet.

Copy the 'Getting to School 2' data sheet.

### The activity:

1. First pupils work out every form of transport they use to get to school.
2. Next they need to work out how far they came using each form. There are several ways to do this... (pupils may need extra support to complete this activity)
3. Using large scale local maps and a piece of string pupils lay out the string along their route and then use the scale conversion to work out the distance they walked / drove / rode.
4. If children come by car or by bus, they can ask the driver to note the distance from the mileometer and then convert into meters.
5. Pupils can use a route finder programme or web sites like [www.mapquest.co.uk](http://www.mapquest.co.uk) and search for driving directions, the site will give them their distance travelled.
6. Enter the totals for each form of transport onto the GLOBE database.

**Follow up:** Who travels the furthest?

What is the average distance travelled by pupils in the group?

Repeat later in the year and check if things have improved.

Encourage pupils to talk about sustainable methods of getting to school.

Can some pupils travel together?

Draw a map of the area and mark on the routes and methods taken to get to school.

## National Curriculum

### Mathematics

Key Stage 2	Ma4.1a	Select and use handling data skills.
	Ma4.1f	Decide how best to organise and present findings.
	Ma4.2c	Represent and interpret discrete data.
Key Stage 3	Ma2.4a	Use a range of measures and convert between units
	Ma3.4a	Convert measurements from one unit to another
	Ma4.1a.ii	Collect data from surveys.
	Ma4.1f	Communicate mathematically, use diagrams and text.
	Ma4.2a	Collect discrete data, using observation
	Ma4.2c	Design and use two way tables.

### Geography:

Key Stage 2	Year 3 QCA Unit 6: Investigating our local area.
	2c Use maps and plans at a range of scales.
Key Stage 3	2c Use OS maps including 1:25,000 and 1:50,000
	2e Draw maps and plans using a variety of scales.
	3e explain how places are interdependent and explore global citizenship.
	4b Identify, describe explain human processes and impact on the environment.
	5b explore the idea of sustainable living, recognise implications for their lives.

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## Activity 3. Traffic Survey

Pupils carry out a traffic survey around the school or local area. It gives them an idea of how many vehicles there are on our roads and how much we rely on them. Pupils can present their findings and compare them with those of other schools.

**Preparation:** You will need Traffic Survey Data Collection Sheets (optional)  
Local map and GPS

Decide whether you want your pupils to use the data collection sheet provided. Look at the local area map and choose observation points on different roads if possible so that the data can be compared. Alternatively make observations from one point at different times of day. Take GPS readings at the observation point(s).

**Required knowledge:** Pupils need to know how to draw and fill in a tally chart.

### The activity:

1. Discuss as a class how the frequency of traffic might change at the different observation points or at different times of day. Ask pupils to write predictions/hypotheses for the general results they expect from their survey. Talk about the categories of traffic pupils might see: car, bicycle, motorbike, van, lorry, pedestrian, etc, etc.
2. Break the class into groups and assign observation points/observation times.
3. Hand out the data collection sheet or get pupils to design their own.
4. Carry out the survey using tally charts.
5. Collate the data from all the surveys into a simple class database on the board.

Examples of simple databases:

	Point 1	Point 2	Point 3
Bicycle			
Car			
Lorry			

	08:30	12:00	15:00
Bicycle			
Car			
Lorry			

6. Discuss the results. Are there any surprises? Review the predictions.
7. Present the results using a bar chart or line chart and explain what was done.
8. Find the modal type of traffic for each point
9. Enter the data onto the GLOBE website at [www.globe.org.uk](http://www.globe.org.uk)

## National Curriculum

**Numeracy** Strategy Year 6: Handling Data: Traffic Survey.

Pupils should learn to solve problems by collecting, organising, representing, extracting and interpreting data in tables, graphs and charts.

- to use, read, write and spell the vocabulary: statistics, average, distribution, mode
- to test hypothesis by drawing and discussing bar charts where discrete data are grouped, to check predictions of the most common number.

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### Research links and project ideas

- Discuss the pros and cons of each method of transport, for humans, wildlife and the environment.
- Encourage students to discuss why they travel to school in the way they do. What would make them choose a more sustainable method of transport? Repeat the activities at the end of the school year and examine the results; has anything changed?
- Comparisons with other countries should provide interesting results. Contact schools with very different data to find out why they choose to travel in a particular way.
- Examine the chemical changes that take place in the soil, in a food chain or in an ecosystem after input of acid rain. How do the habitats and biodiversity change?
- Work out the emissions from each student's route to school. Work out an average per Km value.

### Useful contacts

#### **Sustrans**

Sustrans is a charity promoting sustainable transport. It plans, builds and maintains safe non-motor routes for walkers and cyclists. It lobbies for sustainable forms of transport.

[www.sustrans.org.uk](http://www.sustrans.org.uk)

and Sustrans second website [www.saferoutestoschool.org.uk](http://www.saferoutestoschool.org.uk)

#### **Community car share network**

This organisation helps car-clubs and car share schemes in cities and rural areas.

[www.carshareclubs.org.uk](http://www.carshareclubs.org.uk)

#### **Environmental Transport Association**

The ETA is a motoring organisation providing a more environmentally friendly service, and campaigning for a sound and sustainable transport system. Links to Green Transport Week (7-15<sup>th</sup> June 2003) and National Car Free Day (22 September 2003)

[www.eta.co.uk](http://www.eta.co.uk)

#### **Young Transnet**

Collects data about how children travel to school.

[www.youngtransnet.org.uk](http://www.youngtransnet.org.uk)

#### **Living Streets**

A practical project creating healthy safe streets for all.

[www.livingstreets.org.uk](http://www.livingstreets.org.uk)