Conservation Education

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Experience nature in close-up on one of our Environmental Discovery Courses

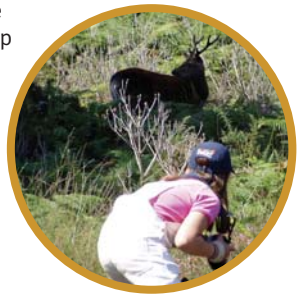
The Young People's Trust for the Environment is delighted to announce that its residential Environmental Discovery Courses will be available in 2006 in the Lake District. During 2001-2004, over 4,500 young people had the chance to learn about the natural world on one of our courses.

We aim to provide excellent value for money, and give school children an experience which has been designed to be educational and enjoyable. Courses are available for young people aged 8-13. They offer excellent tuition, a secure environment with experienced and attentive tutors, and can make a valuable contribution to curriculum learning.

The tutors are genuinely enthusiastic about the natural world. This helps create a unique experience which can have a real and deep-rooted impact on attitudes, interest and awareness. Our courses encourage understanding of how people can damage or improve the environment, and how changes to places can affect the future quality of people's lives.

Our Lake District courses are based around the water cycle, and explore the ecology of rivers from the source to the sea, and the natural beauty of the lakes themselves. Habitats encountered include streams, rivers, mountains, lakes, islands, sand dunes and sandy beaches.

For activities in the field, parties are split into groups with a maximum group size of 15, and rotate around a programme of activities. YPTE provides one tutor per group, and there should be one adult per group provided by the school, giving a very safe ratio in the field of 1:7.5



A typical Lake District programme might include:

- A pond ecology day
- A river study day, following the River Duddon from source to the sea
- A trip to the spectacular sand dunes and nature reserve at Sandscale Haws
- A lake and island exploration day around Lake Coniston
- A visit to the Aquarium of the Lakes, looking at underwater life from the source of a river to the sea
- A town study in Broughton-in-Furness
- An evening of local ghost stories

An all-inclusive experience

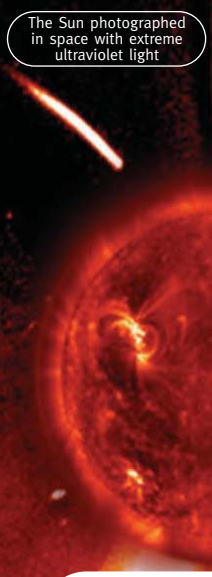
Each course runs from Monday to Friday to allow travelling time within the normal school week. Our course prices are very competitive, and include everything except transfer costs. We give you:

- Full programme of daytime and evening activities
- Code of Practice based on risk assessments and sound operating procedures which are reviewed regularly
- Safety, care and security
- Huge experience
- Secure accommodation
- Qualified, trained and monitored staff

Continued on back cover page

Energy

Energy is vital for life - without it there would be nothing. What a thought! So what is it? No one really knows exactly. The word 'energy' is from the Greek words for 'the work within' and it is what everything needs to survive and function. It is something that cannot be created or destroyed but it can be changed from one form to another. We all use energy in some form every day and nearly all the energy on Earth originally comes from the sun. Let's investigate where it comes from, how we use it and how we can make sure there will be plenty for us all in the future.



The Sun photographed in space with extreme ultraviolet light

3000 BC - Energy Then


the sun


using the wind


using fire


using animals

2005 AD - Energy Now


the sun


using the wind


using electricity


using the combustion engine

The way we use energy has changed drastically over the last few thousand years. Many countries in the world now rely on electricity and engines, which use fuel to create the energy to make the cars, planes, lights, cookers, TVs, computers etc work. There are a number of ways this could happen, but the most common is by burning fossil fuels.

Fossil Fuels

Coal, oil and natural gas are fossil fuels. Approximately 300 million years ago the land was covered in many swampy forests and the oceans were full of millions of tiny organisms called plankton and algae. When these plants and animals died, they slowly became buried under many layers of mud and silt. Eventually they became so squashed and buried over the next few million years that the trees turned to fossils we now call coal and the sea organisms turned into oil and gas!

Coal

What?:	Fossilized trees from swampy forests 345m yrs ago
Use:	Power stations, domestic fireplaces
World Consumption:	2.2 billion tonnes/yr
Time left before it runs out?:	Approx. 300 yrs
CO2 emmision:	900kgs/mw/hr

Oil

What?:	Fossilized tiny ocean organisms - 300m yrs ago
Use:	Petrol in engines (cars/planes etc), making plastic, lubricants, medicines, power stations
World Consumption:	3 billion tonnes/yr
Time left before it runs out?:	Approx. 45 yrs
CO2 emmision:	675kgs/mw/hr

Gas

What?:	Fossilized tiny ocean organisms - 300m yrs ago
Use:	Domestic cooking and heating, power stations
World Consumption:	1.9 billion tonnes/yr
Time left before it runs out?:	Approx. 60 yrs
CO2 emmision:	425kgs/mw/hr

Climate Change

So how does burning fossil fuels affect the environment?

When plants are growing, they take in carbon dioxide (CO_2) from the air, and when the trees in the swampy forests died and sank underground all those millions of years ago, they took lots of this carbon with them. The ancient ocean creatures that form oil and gas had lots of carbon in their tiny shells and bones, which has also been trapped underground for millions of years. Carbon burns easily, which means that we now dig up these trees and sea creatures, which have fossilized into coal, oil and gas, and burn them as fuel in our homes, in electricity power stations and factories. We also burn oil as petrol or diesel in our cars, lorries, trains, boats and planes and we use oil to make plastics, synthetic fabrics, chemicals and medicines.

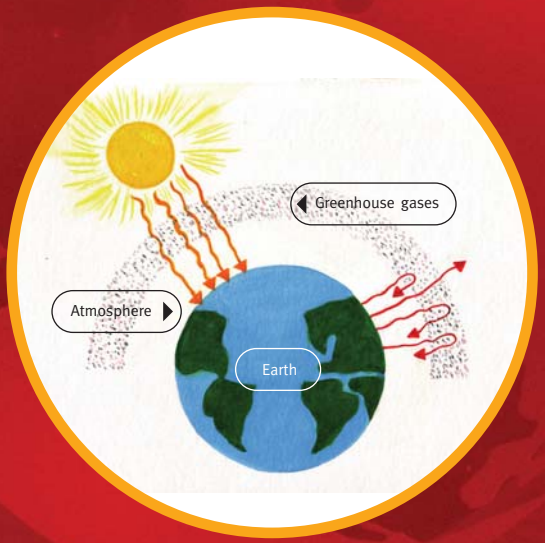
We are therefore using up fossil fuels faster than they can be replaced. This means that they are going to run out eventually (see fact files, left). Also, burning fossil fuels releases the carbon dioxide and other gases back into the air, causing visible pollution like smoke and smog as well as invisible problems like acid rain and global warming.

Los Angeles in the USA and Mexico City in South America are examples of cities that suffer from dirty smog from all the cars' exhausts. This not only looks horrible, but it can cause breathing problems like asthma and can irritate peoples' eyes. Acid rain occurs when the acidic CO_2 in the smoke mixes with the water vapour in the air and falls as rain that is harmful to plants and fish.

The Earth has a natural layer of greenhouse gases surrounding it - including water vapour, carbon dioxide, methane and nitrous oxide - rather like a blanket wrapped around the globe. If these gases weren't there, it would be far too cold for life to survive on Earth so they are essential in certain quantities. The climate has warmed and cooled naturally and regularly over the last few million years. However, it is now almost certain that the burning of fossil fuels is upsetting the natural balance of gases in the atmosphere, causing serious, unnaturally extreme changes in the climate, often called global warming.

The Greenhouse Effect and Global Warming

This is very much like returning to a car parked on a hot day with the windows closed. The sunlight has got in and warmed the car up but the heat could not escape, making it very hot inside – like a greenhouse. The greenhouse gases that human activities are producing are believed to be trapping the heat reaching the Earth, causing the temperatures all over the world to gradually warm up.



Activities that release greenhouse gases include:

- **Burning of fossil fuels in engines, power stations and factories.**
- **Forest fires – deliberate ones such as rainforest clearance as well as accidental ones.**
- **Landfill sites and sewage – rotting waste gives off methane.**
- **Old Fridges – the coolants in the equipment including CFCs (chlorofluorocarbons).**
- **Fertilisers – these often contain nitrous oxide.**
- **Rice paddy fields and livestock – these give off lots of methane.**

Warmer, drier, wetter and windier: What's the result of the greenhouse effect?

- **Countries all over the world are experiencing more extreme weather such as floods, hurricanes, drought and heat waves.**
- **The ice caps at the North and South Poles (as well as glaciers in mountain regions) are slowly but surely melting.**
- **Sea levels are beginning to rise: as seawater warms up it expands, and as the ice sheets and glaciers melt they add to the water in the oceans. Low lying cities and even whole islands and countries are at risk of being slowly swamped by the rising sea levels.**
- **Animals such as Polar bears and penguins are losing their icy habitats; other animals and plants are struggling to adapt quickly enough to the changes in their climate.**
- **Farmland in places like Africa is becoming even drier and the crops are failing, causing serious famine in some countries.**
- **Some diseases are spreading, such as malaria. This is carried by mosquitoes (in hot countries) and they are now found in new places where before it was too cold for them.**

Energy Eco-Facts

Household low energy light bulb

- There is nearly 1/3rd more CO_2 in the atmosphere than there was 200 years ago
- 1998 was the hottest year since records began 150 years ago
- Temperatures may rise by up to 5.8°C in the next 100 years
- Sea levels could rise by 80cm in the next 100 years
- 25% of all CO_2 emissions come from households.
- 1 cow belches 500 litres of methane every day – yes, 500 litres!
- Glacier National Park in Canada may have lost all its glaciers by 2030
- Siberian houses are beginning to sink as the frozen ground they were built on begins to thaw
- If just 1% of homes in the USA replaced their 'normal' light bulbs with low-energy ones, they would save: $800 million (£437 million) in electricity costs; 2.5 billion kg of coal; 8 billion kg CO_2 emissions and enough energy to light 300,000 homes
- More than 1,000,000 tonnes of fossil fuels are burnt every hour around the world
- It takes 50 times more energy to make a battery than the battery will ever produce
- Every day the number of people in the world increases by 200,000

Oh dear. So is it all doom and gloom? Not necessarily. We don't have to burn fossil fuels for all our energy needs. There are other fuels we can use in cars and power stations. At the moment most of our electricity power stations burn the fuel to boil water to create steam. This steam is pushed through a turbine that sends power to a generator; here the power is converted to electricity, which is then transported to our homes, schools, offices and factories.

The good news is that there are already alternative sources of fuel being used to operate the turbines, as well as lots of research into future car fuels and energy supplies. Let's take a look at some of them:

Nuclear Power

Nuclear power works by using a process called nuclear fission. The fuel used is called uranium. Each tiny particle, or atom of uranium, has a nucleus made up of protons and neutrons. Scientists aim a spare neutron at the nucleus and the collision causes the nucleus to split into the protons and neutrons. This split releases masses of energy, and all the extra neutrons then crash into more nuclei, causing more splits and so on. This is a continuous process that keeps going releasing huge amounts of heat that is then used to boil water in the power station, or to power space probes and submarines.

Nuclear Power Station

Solar Power – Energy from the Sun!

The sun releases 4 million tonnes of energy every second; more energy is sent to Earth from the sun in one hour than is consumed in the whole world in a year! Is it the most obvious alternative source of energy?

Electricity power stations

There are already several solar power stations in the world. The largest one is Solar One Power Station in the Mohave Desert, California, USA. There are 1818 mirrors, each one 7m wide and 7m high, which rotate to follow the sun during the day. They reflect the sunlight onto a tower 91m high. On top of the tower is a boiler containing oil that heats up in the sun. The oil is then piped away and used to heat water to create steam for a turbine.

Small Solar Panels (or photovoltaic cells) for domestic use

These act like man-made leaves; using the sun to make energy. Sometimes they are placed in a tank of water, which heats up and is then pumped round a house for washing and heating. Others are designed to turn the sunlight into electricity that powers small appliances, such as calculators, radios and refrigerators in remote areas. They have also been used to power space probes, cars and even aeroplanes!

Solar panels and the sun from space

Wind Power

Wind power is one of the most popular forms of alternative energy. Wind comes indirectly from the sun, as it is the heating of the earth that causes the air to warm up and move around, creating wind.

How does it work?
A wind turbine normally consists of 2 or 3 'blades' on the top of a tall pole, which can be turned to face into the wind. Behind the blades is a turbine, which is operated when the blades spin round in the wind. The blade tip can be travelling at over 100mph! The turbine is connected to a generator and electricity is created.

Where are they built?
Wind turbines are normally built where there is a lot of wind and the site is often exposed and / or high up. They are often placed on hill tops or wide open spaces where there is little shelter. Some wind farms are built out to sea where they produce 50% more power (but are more expensive).

There are new, more efficient designs being tested, such as the vertical axis turbine and the Darrieus type. These rotate on their own as the wind changes direction. One type, the Gyromill is tethered to a cable above the ground, like a kite. It rises up and down to reach the best wind conditions and can be withdrawn in calm periods and for maintenance.

Wind Turbines

Biogas

This uses animal and plant waste (poo and compost!) to create energy by allowing it to rot in a sealed container. As it rots, the bacteria give off lots of gas, which is mainly methane. Methane burns well and is used in power stations or for small household uses like cooking and heating.

- **A power station in Suffolk, England, uses chicken droppings to make electricity!**
- **Methane from cattle dung is used for cooking in remote parts of India and in Africa.**
- **In Brazil they use the waste from farmed sugar cane. This produces ethanol, which can be used in cars.**
- **Rotting rubbish in landfill sites give off methane. Removing it for fuel makes the area safer.**
- **Wood chips from fast growing trees can be rotted down (fermented) to produce gas.**
- **There's a car in the USA that runs off used vegetable oil from a chip shop!**

Water Power

Hydro-electric power (HEP) dams
These work by blocking rivers to create lakes behind them. The water is released through pipes and turbines. e.g. the Taipu Dam in Brazil (the world's most powerful dam) and the Three Gorges Dam on the Yangtze River in China, which, when it is completed, will be the largest HEP scheme in the world.

HEP dam

Tidal Power
The sea is powerful and one way of using it is to trap and hold the tide water behind a barrier as it comes in. When the tide is released again, the water rushes back out through turbines in the barrier. There are very few tidal barrages in the world. One example is La Rance, in France.

Wave Power
Waves have huge amounts of energy in them and a British designer devised the 'Salter Duck' to make electricity. These nodding devices bob back and forwards with the waves, turning mini-turbines.

Did You Know!

- **Camels in the Sahara desert, Africa sometimes carry solar-powered fridges. Inside are important medicines that need to be kept cool.**
- **Many remote areas in places like Africa and Asia use solar panels to power water pumps and TVs. It is easier than getting electric cables to them.**
- **A car has been designed to run on solar power. It is one of the 'Helios' series and has solar panels all down the top. Only one person can fit in it, though – the driver!**
- **In 1981 a solar powered plane flew from Britain to Paris in 5 hrs. It had 16,000 photo-voltaic cells on its wings and tail.**

Geothermal Energy

Beneath the Earth's crust lies very hot, molten (melted) rock. In some countries the Earth's crust is very thin and this heat is very close to the surface. This makes it an ideal source of heat for boiling water in a power station. Countries that use geothermal power include: Iceland, New Zealand, The Philippines, the USA and Mexico.

Liquid Hydrogen

Some cars, vans and buses already run off liquid hydrogen, or a mixture of petrol and hydrogen (hybrid cars). This seems like the most likely future fuel for all cars, instead of petrol. Electricity is passed through water to create liquid hydrogen. It is ideal when the electricity needed to make the hydrogen is produced from solar power, as in cities like Hamburg, Amsterdam and Stockholm.
Is this the answer for our transport fuel of the future?

Which Energy Source?
The Pros & Cons...

Type of Energy	✔ The Good Things ('Pros')	✖ The Bad Things ('Cons')
Nuclear Power	Very efficient – a lump of uranium releases 2 million times more power than a lump of coal the same size. It does not release greenhouse gases.	The process of nuclear fission produces radioactive waste, which can cause serious health problems. At the moment it is buried in the sea in sealed glass cases. Nuclear fission is highly explosive and accidents are a major concern, (e.g. in 1986 a nuclear reactor exploded in Chernobyl, Ukraine). It is very expensive to keep safe. Uranium may run out as early as 2060.
Solar Power	It is renewable. It does not produce greenhouse gases. Solar panels are easy to maintain and they last a long time. They are good in remote areas where it is difficult to get electricity. Small panels are easily transportable.	It is not very efficient yet – a solar power station the size of a city is needed to power a city. It is difficult to store. The materials used (e.g. silicon) are expensive to mine and environmental damage is caused. The sun does not shine enough in a lot of places. In many countries it is often cloudy or days are very short – especially in winter – when the power is needed most.
Wind Power	It is renewable. It is clean. The wind is fairly evenly distributed. The turbines are low-maintenance.	Some people think the wind turbines are ugly and spoil the landscape. Some people find them too noisy. They are not particularly efficient yet. They sometimes take up farmland space.
Hydro-Electric Power	Water is renewable. There is no air pollution created. It is reasonably efficient. Once built, the dams are fairly trouble-free and easy to maintain.	Land, including farmland and houses is flooded when the river is dammed. The natural flow of the river is disrupted. This can cause plants and animals to die. Animals e.g. salmon can't get upstream to breed. HEP dams are very expensive to build.
Tidal Power	This kind of power is renewable, clean and predictable and the barriers last a long time.	Huge long barriers are required and these are expensive, complicated and they spoil the natural environment.
Wave Power	It is renewable, regular, clean energy and there is plenty of it!	The barrages are complicated and expensive to build as they need to be very strong.
Biogas	Biogas is cheap, easy to produce and uses up waste from farming.	CO_2 can be released into the atmosphere and methane is explosive.
Liquid Hydrogen	It is clean, renewable and very effective.	Electricity is required to make it.

The Energy Crystal Ball

So which is the best way of making enough clean and renewable energy to meet our ever-increasing needs? Of all the techniques on the left, solar power seems to be the most powerful and everlasting fuel, and wind farms the most popular at the moment. Hydrogen buses are becoming a common sight in countries like Germany. But what will our main source of electricity be in 100 years' time? Let's take a peek into the future...

Power Stations in Space

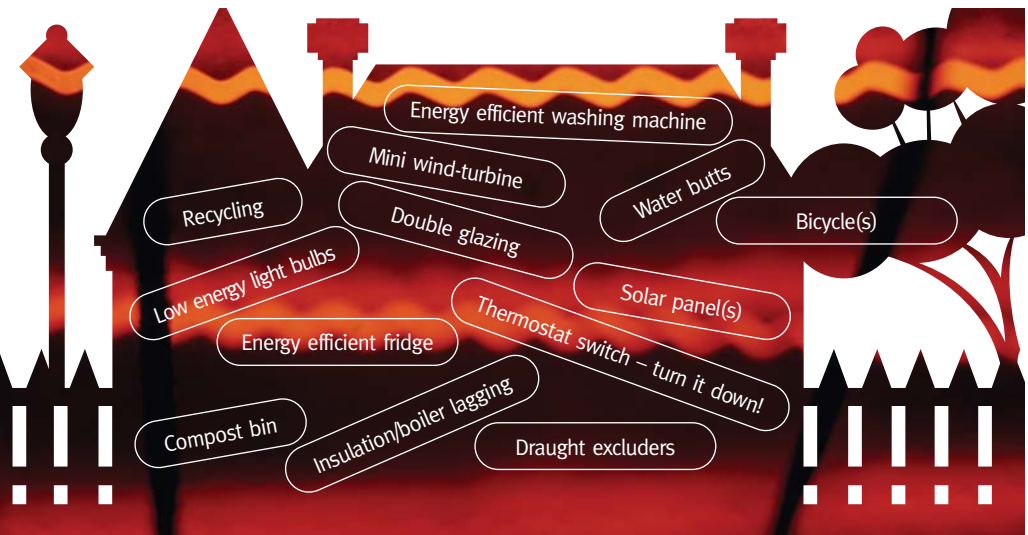
Scientists are trying to work out how to build solar power stations in space! These could potentially provide the whole world with renewable energy without harming the atmosphere. They could have direct, close contact with the sun's rays and would need lots of massive solar panels. The main problem would be how to get the power to Earth, perhaps in the form of microwaves (not the ovens but the type of energy rays!), which would be focused onto a device on the earth's surface that converts the rays into electricity for our houses. Careful research is still needed to find a safe way of doing it.

Nuclear Fusion

This is the reaction that constantly occurs in the sun to provide the huge amounts of light and heat that come from it. It is the opposite of nuclear fission. Rather than splitting the nucleus to create energy, scientists are trying to safely join, or bond, hydrogen nuclei to create energy. The biggest problem with this process is that it requires 100,000,000°C temperatures to be reached in the reactor (called a 'tokomak' reactor). It gets so hot that the hydrogen gas turns to plasma! This heat is very difficult to recreate in a safe and controlled manner, and at the moment, more energy is used to make the process safe than is produced, but scientists are working on it. It is also extremely expensive. A current research project is expected to cost £6billion to complete.

So what can we all do to help?

While all those scientists are trying to find us renewable and clean forms of electricity and fuel for our cars, we can all help to reduce carbon dioxide emissions, the problems of climate change and our energy consumption. As a family, you can do a lot of little things that all add up to make a big difference – have a look at the house below and see how many of the ideas you already do. Then ask your family if you could try to bring in more of the ideas to your home! Some of them are easy; others are a little harder to do.



Other Ideas?

- Try to **reduce** the overall amount of electricity, packaging and petrol you use.
- **Re-use** things like plastic bags, glass jars, plastic containers, envelopes and paper.
- Buy **recycled** products like paper, loo roll, kitchen towel etc. If you don't buy recycled products, you're not really recycling!
- Choose the most 'green' energy supplier in your area.
- Create a poster for your school to encourage everyone to save energy and 'go green'!
- Write to your MP expressing your concerns and request that they put it towards the top of their priority list and raise the issue in Parliament.

Some scientists believe that we are running out of our clean, balanced atmosphere faster than we are running out of fossil fuels. It's an urgent problem that needs action now. So let's all do the 3 R's:

Reduce, Re-use, Recycle!

Continued from front cover page

Safe, secure and exciting
Safety is a key priority for any provider of residential courses for children. Since its foundation in 1982, thousands of young people have benefited from YPTE's Environmental Discovery Courses. YPTE works in partnership with the Kepplewray Centre in Broughton-in-Furness to provide courses which are busy, challenging, exciting and fun. You can be assured that safety is built into everything we do.

What to do next
If you are interested in making a booking or finding out more about Environmental Discovery Courses, call YPTE now on **01483 539600** or email **info@yptenc.org.uk** Discounts are available for larger groups (max. group size 45 young people).

Get online to find out more about YPTE

For full details of our services and free resources for young people and schools, see our website: www.yptenc.org.uk
You can book a free school talk online if your school is within 100 miles of our school speakers, based in Guildford

Calling all member schools: Help us to help you!

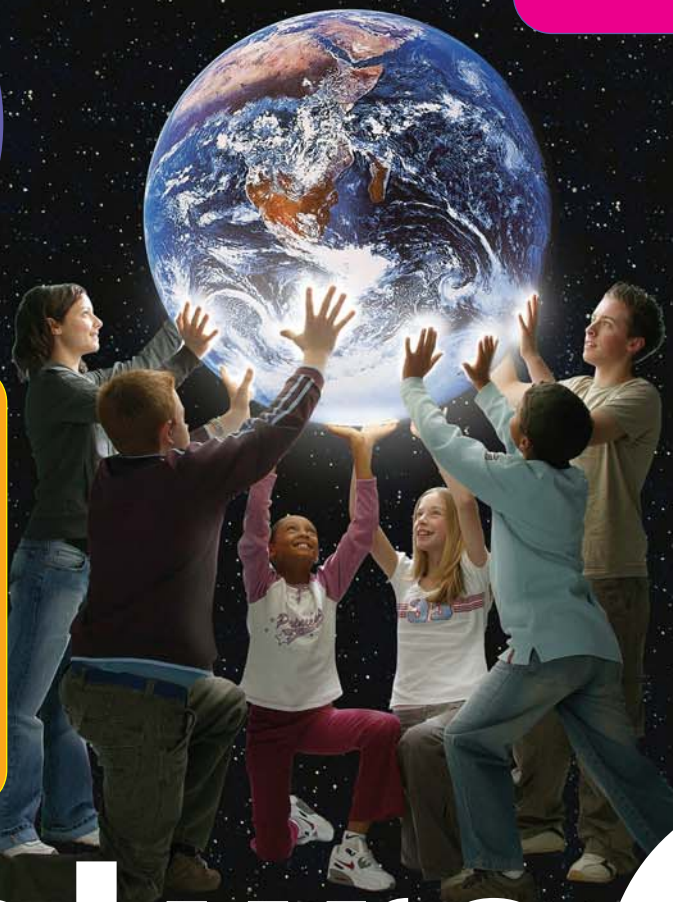
The Young People's Trust for the Environment provides a range of educational services free of charge to young people and schools including free school talks, information services, our website and news page, and of course, the free provision of Conservation Education to our member schools. We would also like to continue to provide subsidised residential courses for young people from disadvantaged areas. However, all of our services require funding and we are asking our member schools to help us achieve our goals.

Why not hold a MUFTI day at school in aid of YPTE? Perhaps the pupils could wear at least one 'recycled' item of clothing or an accessory? You could also hold a bring and buy sale or a sponsored walk, run or silence? All the funds raised will be used to help support our vital environmental education work.

Young people are our planet's future, and to ensure the viability of that future, we need the next generation of adults to be better informed and more environmentally responsible than their parents. Please help us to make this vision into reality.

Conservation Education Goes Electronic!

In an effort to reduce our paper usage, from January 2006, Conservation Education will become an e-bulletin and we will no longer produce printed copies. To ensure that you continue to receive your copy of Conservation Education via email, please send an email with the subject 'Con Ed Yes' to info@yptenc.org.uk giving us details of your name and school/organisation address.



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