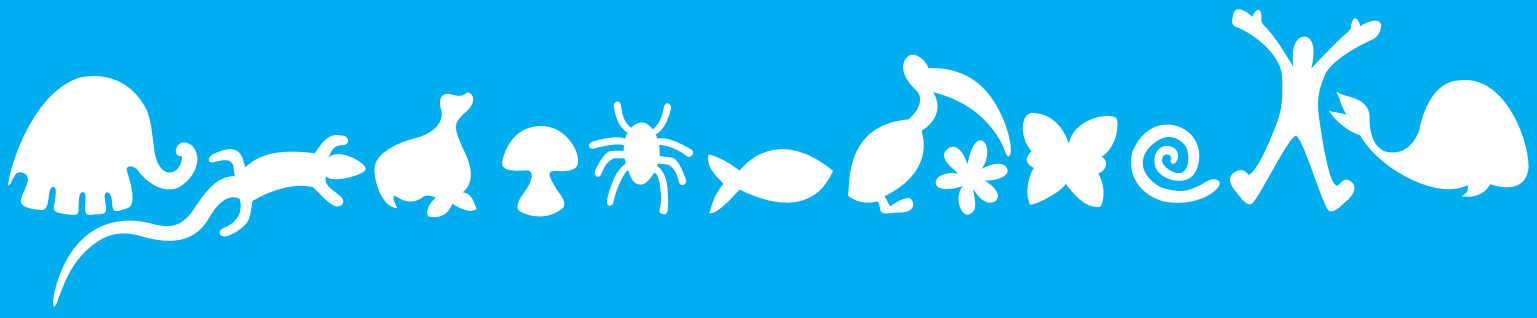
Food and Agriculture Organization of the United Nations

MAKING IT COUNT

INCREASING THE IMPACT OF CLIMATE CHANGE AND FOOD SECURITY EDUCATION PROGRAMMES



MAKING IT COUNT

INCREASING THE IMPACT OF CLIMATE CHANGE AND FOOD SECURITY EDUCATION PROGRAMMES

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Executive summary

HUMAN BEHAVIOUR: THE PROBLEM *AND* THE SOLUTION

Human beings are altering their environment in unprecedented ways. The Earth has warmed by 1 °C in the last 100 years. The effects on natural systems are already being felt – sea levels have risen 150 mm over the same period; in just a few years the Arctic may be ice-free in summer; extreme weather events like floods, droughts and cyclones are more frequent; biodiversity is being lost (IPCC, 2007).

As human behaviour – through burning fossil fuels, excessive consumption of natural resources and destruction of natural habitats – is causing these problems, changing human behaviour must be part of the solution. Individuals must make changes to their daily lives to create a cumulative effect that will limit greenhouse gas emissions and stabilize the climate.

BEHAVIOUR CHANGE IS HARD

However, changing behaviour is notoriously difficult. Humans are creatures of habit and tend to take the easy option, which usually means continuing to do what they have always done. Changing human behaviour on such a massive scale will require coordinated efforts including policy change, government-led directives and infrastructure change. Governments must use laws, regulations and incentives to oblige people to comply, but education also has a crucial role to play in promoting voluntary action and helping people through the transition so they understand and accept the changes.

ACTIVE CITIZENSHIP IS VITAL

Only around one-third of greenhouse gas emissions are caused by individuals and individual behaviour. The other two-thirds are generated by government infrastructure and industry (Gardner and Stern, 1996a). Therefore, education must also empower people to become active citizens, vote, use their power as consumers to demand more sustainable choices, pressure governments and industry to take responsibility for their share of the changes, participate in the debate and help to shape the world of the future.

CURRENT EDUCATION POLICY IS NOT WORKING

The importance of educating people about the environment has been central to UN policy since the 1970s, but the progress made is a 'drop in the ocean' compared with what must be achieved. Despite the fact that we are at the end of a UN designated 'Decade of Education for Sustainable Development' (2005–2014) there has been little discernible change in global behaviour and attitudes. Unsustainable attitudes and behaviour are fuelling conflict and social unrest – for the first time ever, military officials joined a recent education policy meeting as the issues become more charged and urgent (Calame *et al.*, 2012).

AN EVIDENCE-BASED APPROACH

Clearly, a different approach is needed. So what is the most effective way to educate people about climate change? More importantly, how can we use education so that we change not only knowledge and attitudes but behaviour too – this is the biggest challenge of all but ultimately this is the real end-goal we need to achieve.

WHAT EDUCATION CAN AND CANNOT ACHIEVE

Education must be central to all efforts to change behaviour, but making the most effective use of education also means accepting its weaknesses. History shows that education for environmentally responsible behaviour can:

- trigger easy or low-cost behaviour changes;
- provide the opportunity to practise relevant skills and develop strategies to overcome barriers to action;
- have an important, indirect long-term effect on changing the social norm and peoples values and beliefs;

- encourage political and civic action on environmental issues;
- provide information and help gain public support for policy changes.

However, education works best when it is part of a holistic approach that combines other strategies, e.g. smoking has declined because education was used alongside policy change (taxation, age restrictions, bans on smoking in public places, etc.) and a changing social norm.

RAISING AWARENESS DOES NOT CHANGE BEHAVIOUR

The traditional view that increasing knowledge changes attitudes and therefore changes behaviour is plainly not true for the majority of people. We know more about environmental issues than ever before, but continue to behave in unsustainable ways. Recent studies show that other factors such as perceived barriers to change, personal relevance and the social norm are more important predictors of behaviour than knowledge (Kollmuss and Agyeman, 2002; Bamberg and Moser, 2007; National Research Council, 2011).

This report reviews the evidence base to establish which educational methods are proven to have an impact on behaviour. The research is summarized and evaluated to develop a set of recommendations on how to better focus educational activities for maximum impact on individuals, local communities and the wider world. The challenge for educators now is to turn this evidence into reality; to develop and deliver educational resources and experiences that trigger long-term behaviour change.

KEY RECOMMENDATIONS

The evidence is clear: to change behaviour 'environmental education' needs to change its focus – with less emphasis on knowledge and raising awareness (although still needed) and more on competency, action skills and problem solving (Marcinkowski, 2010). Based on the educational and psychological research reviewed in this report, the following key objectives are proposed for planning or evaluating educational programmes designed at achieving behaviour change.

To maximize their impact, programmes aimed at creating pro-environmental behaviour change should have the following nine objectives.

FOCUS ON SPECIFIC ACHIEVABLE BEHAVIOURAL CHANGES

Often environmental education programmes make broad pleas to 'save water' or 'reduce greenhouse gas emissions' but this can leave people feeling overwhelmed and helpless. Interventions that target specific achievable steps, e.g. 'turn off the tap when brushing your teeth' or 'switch off the lights when you leave a room', are more likely to be successful.

ENCOURAGE ACTION PLANNING AND EMPOWERMENT

Many people intend to behave in a pro-environmental way, but never get around to it. Perhaps this is because they have not really accepted responsibility for an issue, or maybe they just do not know what to do or do not believe they will be successful. Breaking an issue down into manageable steps with an achievable plan promotes ownership of the issue and a sense of empowerment and self-belief, which is more likely to lead to action.

EVALUATE AND CHALLENGE CURRENT SYSTEMS/BEHAVIOUR

Caught up in bustle of everyday life, few people stop and think about their behaviour and its consequences for themselves, others or the environment. Challenging people to really look at the way they currently do things and how they could change has been shown to be one of the most powerful techniques for achieving change.

IDENTIFY AND TACKLE BARRIERS TO ACTION

Everyone has excuses for why they do not behave in a particular way: lack of time, lack of money, not knowing what to do…the list goes on. Even people who really care about the environment still fly and drive cars. One of the most important things education can do is help overcome these barriers by providing instruction, information, coping strategies, etc.

DEVELOP AND PRACTISE RELEVANT ACTION SKILLS

If not knowing what to do is a barrier to action, then having the opportunity to practise the relevant behaviour is an important step. It is not enough to tell people what to do; they need the opportunity to try it out for themselves with someone on hand to offer advice. Learning to drive or play the piano takes practice, learning pro-environmental behaviour or building the confidence to take civic or political action takes practice too.

ENCOURAGE CONNECTEDNESS WITH NATURE

No one is going to look after something they do not care about. Time spent in natural environments – whether that is the local park or a pristine wilderness – encourages an emotional connection with the natural world that is proven to lead to more pro-environmental behaviour.

PROMOTE PUBLIC COMMITMENT TO TAKING ACTION

Several studies have shown that if people make a verbal or written commitment in front of witnesses they are more likely to follow through with that behaviour change. This draws on the fact that feelings of guilt and personal responsibility for an issue are important predictors of behaviour.

ENCOURAGE DISSEMINATION WITHIN COMMUNITIES OR SOCIAL NETWORKS

The social norm is an incredibly important predictor of behaviour. People are also more likely to believe and take advice from a friend or neighbour than a politician or official. Peer pressure and the desire to conform drive both sustainable and unsustainable behaviour. Some of the most effective educational interventions have involved entire communities in a programme of pro-environmental activity.

MONITOR BEHAVIOUR CHANGE AND CELEBRATE SUCCESS

Behaviour change is hard work and without monitoring and prompting most people will quickly revert to their old habits. Achieving sustained behaviour change needs ongoing monitoring, reminders and prompts. People also need to be rewarded for their continued efforts. These rewards could be financial (e.g. reduced fuel bills), symbolic (certificates or awards) or simply feedback that highlights their achievements. Monitoring and reward provide the incentive to continue with the desired behaviour change until it becomes habit.

A NEW FOCUS ON EVALUATION IS NEEDED

Despite the vast sums of money that have been spent on environmental and climate change education initiatives impact evaluations are infrequent, inconsistent and often anecdotal. It is essential that future programmes include well planned, evidence-based evaluations that focus on achieving behaviour change. This was identified as a key recommendation in the UNFCCC 2012 Review of the New Delhi work programme.

Impact is the priority: good intentions and anecdotes will not stabilize greenhouse gas emissions, reduce consumption or slow population growth. Honest and thoughtful evaluation, highlighting what does not work, as well as what does, will help focus efforts and maximize impact in the future.

1. Introduction

We all share the same planet and will share the same climate future so it is in everyone's interest to share evaluations and share knowledge so that every intervention counts.

For two million years humans have used the natural resources provided by the Earth, but in the last 200 years things have changed. Since the industrial revolution we have seen:

- increased burning of fossil fuels for heat, electricity and transport;
- the birth of the chemical industry and mass manufacturing;
- improved education, health and social care;
- the growth of intensive and unsustainable agriculture.

These changes have transformed human quality of life – we live longer, fewer children die in infancy, we have safer and more comfortable homes, we have more, better quality food. However, they have also led to rapidly rising greenhouse gas levels in the atmosphere, a widening gap between the rich and poor, landfill sites full of non-biodegradable waste and habitats destroyed by human greed and carelessness.

The cracks are beginning to show. Many countries are beginning to see the impacts of climate change: rising sea levels, record-breaking heatwaves, increasingly unpredictable weather, crop failure, water shortages….the list goes on. Climate-related natural disasters such as floods and droughts are increasing. 'Slow-moving' natural disasters such as desertification and rising sea levels threaten homes and livelihoods. Developing countries will be hardest hit as existing poverty, weak governance and poor education systems will make it difficult to cope and adapt to these changes (Anderson, 2010).

In a world where there are already 1 billion people going hungry, one of the most worrying impacts of climate change is on food security. Unpredictable rainfall, droughts and floods are already affecting food prices worldwide – in July 2012 cereal prices leapt 17 percent in just one month (FAO, 2012). The Earth's population is on course to reach 9 billion by 2050, so we will have another 2 billion mouths to feed with no additional farmland. This might be possible if everyone was vegetarian, but as the world's poorest nations rise out of poverty their people want to eat more meat, which requires far more land and resources than crop production (Power, 2012). Food is set to be an emotionally-charged battleground and, as ever, the poorest and most food insecure people will suffer the most (McDairmid, 2008; Save the Children, 2007).

1.1 HUMAN BEHAVIOUR: THE PROBLEM AND THE SOLUTION

Many current environmental problems are caused by particular behaviours, which in themselves are not that harmful, but when repeated over and over by enough individuals ultimately prove disastrous. For example, in many parts of the world overfishing has led to massive slumps in fish stocks and even extinctions. Many small-scale fishers only take enough fish to make a living, to support themselves and their family. They might be aware that fish stocks are dwindling but, if they take fewer fish, they will not make enough money and any fish they leave will just be taken by others, perhaps large commercial fishing operations. So they continue, thinking that their actions are too small and insignificant to make a difference. The other fishers think the same way and continue fishing. Eventually there are no fish left and everyone is unemployed and hungry (Gardner and Stern, 1996b).

1.1.1 THE TRAGEDY OF THE COMMONS

This conundrum is called a 'tragedy of the commons', a phrase coined by Garret Hardin in 1968, and is at the root of many environmental problems (Hardin, 1968). Many of the Earth's resources are finite – animals can be hunted to extinction, fossil fuels will run out, there is only so much habitable land, only so much fertile farmland. It is estimated that if everyone on Earth had the same lifestyle as someone in the United States of America we would need five planets to support us (Centre for Sustainable Economy, 2012).

In a world of more than 7 billion souls it is impossible to allow each individual to generate as much waste and release as many greenhouse gases as they wish. Someone who takes more than their fair share

of money by robbing a bank is committing an act that everyone agrees is socially unacceptable and is punished by law. Perhaps in the future, overexploitation of natural resources will become equally unacceptable.

1.2 WHAT IS THE GOAL?

If human behaviour is the problem, then changing human behaviour must also be part of the solution. So what is the ultimate goal? Perhaps we might envisage a world with a stable and habitable climate, where everyone has water, food, shelter and is able to make a living in a way which does not jeopardize the health of the planet and its inhabitants. In other words, environmentally responsible citizens living sustainably every day.

1.2.1 LIVING SUSTAINABLY EVERY DAY

An 'environmentally responsible' citizen might be considered to be one who has developed the following attributes (Hungerford and Volk, 1990):

1. an awareness of and sensitivity for the environment;
2. some understanding of the basis of environmental problems;
3. feelings of concern for the environment and motivation to take action;
4. skills for identifying and solving environmental problems;
5. active participation in resolving environmental problems.

These environmentally responsible citizens need to have the knowledge, confidence and motivation to be able to both reduce their current impact (mitigation) and deal with the challenges that the future might bring (adaptation).

1.2.2 MITIGATION

Taking steps to stabilize atmospheric levels of greenhouse gases and reducing emissions is called 'mitigation'. For individuals, mitigating climate change means identifying personal sources of greenhouse gases and taking steps to lower their emissions, e.g. taking public transport instead of driving. For organizations, mitigation might mean switching to renewable energy or improving the efficiency of a production process.

On a day-to-day basis pro-environmental or environmentally responsible behaviour is when a person or organization consciously tries to minimize the negative effects of their actions on their surroundings by minimizing resource and energy use or reducing waste production (Kollmuss and Agyeman, 2002). This type of mitigating behaviour needs to become the norm, the default setting, for everyone.

1.2.3 ADAPTATION

Even slashing greenhouse gas emissions will not be enough to avoid all consequences. The Earth has already warmed by 1 °C and even the 'best-case scenario' predictions anticipate at least another 1°C rise over the next 50–100 years (IPCC, 2007). Therefore it is also crucial that individuals and society have sufficient adaptive capacity to cope with environmental change in a way that preserves human life and quality of life without having a detrimental impact on the environment. We must be able to adapt to our changing world.

Adaptation is about teaching people how to cope with the changes that this will bring. A key challenge for this approach is that the changes to come are uncertain, so as well as preparing for known hazards, it also requires building adaptive capacity for the unknown (Anderson, 2010).

1.2.4 INDIVIDUAL BEHAVIOUR CHANGE IS NOT ENOUGH

The fifth characteristic (see 2.2.1 above) of an environmentally responsible citizen is to be an active participant in the resolution of environmental problems. This means taking and interest in what happens in the wider world.

Private sphere behaviour changes, via individual home and lifestyle choices, are incredibly important. However, private energy use only accounts for a small proportion (one-third in the United States of America) of the total – with the remainder falling to government, industry and business (Gardner and

Stern, 1996a). Therefore, even if every individual and household halved their consumption, it might only lead to a 15 percent drop in emissions. While this would make an important contribution, scientists at the National Centre for Atmospheric Research have calculated that cuts of 70 percent might be necessary to stabilize global temperatures (Washington *et al.,* 2009).

1.2.5 ACTIVE CITIZENS CAN HAVE EVEN MORE IMPACT

Ordinary people, as voters and consumers, can maximize their impact by demanding that governments and businesses take their climate responsibilities seriously (Chawla and Flanders Cushing, 2007; Gardner and Stern, 1996a).

Active citizenship is such an important goal because it is impossible, for example, to take public transport or buy electric cars, unless businesses and government make these options available. To truly tackle climate change, citizens should be empowered to make wiser consumer choices, vote, inspire others, demand change and challenge unsustainable behaviour by governments and industry.

1.3 HOW CAN EDUCATION HELP ACHEIVE THIS GOAL?

Actions that damage the environment or use up more than a fair share of resources can be considered 'socially unacceptable behaviour'. Throughout history, human society has only devised four main means for altering socially unacceptable behaviour (Gardner and Stern, 1996b).

1. laws, regulations and incentives;
2. education programmes;
3. informal social processes in small social/community groups;
4. moral, ethical or religious appeals.

None of these four strategies works in isolation for any issue. In recent years, campaigns to reduce smoking and drink-driving and increase the use of seatbelts have succeeded thanks to a combination of legislation, taxation, education and a changing social norm. Climate change is a more complex and more contentious issue than smoking or drink-driving so the solutions will need to be more creative and wide-ranging.

1.3.1 WHY COMBAT CLIMATE CHANGE WITH EDUCATION?

Education has been used over millennia as a strategy for encouraging behaviour change. Mitigating and adapting to climate change is all about behaviour change. Education also empowers people, improving their self-confidence, making them feel in control of their lives and their destiny. Better educated people have better job prospects, better health, greater food security, better coping mechanisms and greater resilience in the face of adversity (Gasperini and Acker, 2009). There is also a clear link between food security and education: the world's poorest and hungriest people are also the least educated (De Muro and Burchi, 2007).

1.3.2 EDUCATION IS COST-EFFECTIVE

Education is one of the most cost-effective interventions. For example, recent research in Nicaragua, where temperature increases have seen crop failures and food shortages, shows that education is the most effective means of reducing vulnerability to food insecurity (Kafarkis *et al*., 2011). Studies by the World Bank and Centre for Global Development have found that educating women and girls is one of the best, and most cost effective, ways of enabling communities to adapt to climate change. The UNDP estimates that every USD 1 spent on disaster risk management in vulnerable areas can prevent USD 7 of losses when disaster strikes (Watkins, 2008). A water-efficiency education programme in Canada gave savings of USD 12 per USD 1 invested (McKenzie-Mohr, 2000).

1.3.3 EDUCATION REDUCES VULNERABILITY TO CLIMATE SHOCKS

A key aim of climate change education programmes is to reduce vulnerability and enhance adaptability to protect life and livelihoods as climate change bites. Research shows that countries with higher levels of education suffer fewer human and economic losses (compared with other countries with similar per capita GDP) when natural disasters strike (Toya and Skidmore, 2007).

1.3.4 ENVIRONMENTAL EDUCATION IS ALREADY COMMONPLACE

Education is clearly a worthwhile component of any plan to tackle climate change. Indeed, environmental education has been a UN priority for a number of years (UNESCO, 1978) and UNESCO has designated 2005–2014 as the UN Decade of Education for Sustainable Development, recognizing the important role education has to play in major sustainability challenges like climate change, biodiversity, disaster risk reduction and urbanization (UNESCO, 2012a). In most developed countries and an increasing number of developing countries, climate change is part of the official school curriculum. A wealth of educational materials, including multi-media resources, has been developed (UNFCCC, 2012).

1.3.5 ARE ENVIRONMENTAL EDUCATION PROGRAMMES WORKING?

While the importance of education in tackling climate change is widely recognized, can we really say environmental education is working? Environmental education programmes have been running since the 1970s, but there has been no dramatic shift in human behaviour. In fact pro-environmental attitudes among young people (in the United States of America) have been in steady decline for the past 30 years (Wray-Lake, Flanagan and Osgood, 2008).

Clearly, these education programmes are missing the mark. Within formal education, environmental programmes are often sporadic, not embedded into the curriculum and low priority compared with core subjects like literacy and numeracy. Informal mass media campaigns often fail to deliver the practical skills people need to make changes. Most success stories are issue-specific, e.g. recycling, but do not develop transferable skills to enable environmentally responsible behaviour in day-to-day lives.

1.3.6 THERE IS MUCH ROOM FOR IMPROVEMENT

National and international policies on climate change education are disjointed and extremely variable. Policy is largely focused on GHG emissions, whereas disaster risk management usually extends to dealing with emergencies rather than long-term planning and development practices (Anderson, 2010).

In some (mainly developing) countries, despite efforts to raise public awareness, the majority of the population is not aware of, or has limited knowledge of, climate change. Worryingly, this includes journalists and politicians. In Africa, Asia and the Pacific, Latin America and the Caribbean, less than 50 percent of people are aware of climate change issues, compared to 99 percent in Sweden. Many countries report that information on climate change is insufficient or hard to obtain, there are few resources available in local languages, Web sites can be poor quality or unreliable and a lack of staff or infrastructure may make it difficult to collect and disseminate materials (UNFCCC, 2012).

In developing countries, barriers to awareness raising campaigns include inadequate financial and human resources, inadequate expertise, lack of a national programme on climate change, low priority given to these issues in the development agenda and a gap between the focus of donor agencies and the needs of countries (UNFCCC, 2012).

Teacher training and coordination of activities between formal and non-formal education and regional and national stakeholders remains a problem. In developing countries funding, materials and teacher training may be in critically short supply. There is no consistent methodology for developing or evaluating the effectiveness of climate change education activities and, at a recent UN conference, only one country reported having assessed the effectiveness of government programmes in environmental education (UNFCCC, 2012).

1.3.7 TOWARDS 'EDUCATION FOR BEHAVIOUR CHANGE'

In addition to the challenges highlighted above, many climate change education programmes simply seek to raise awareness of issues in the hope that this will motivate people to change their behaviour. As will be addressed in the next section, simply increasing knowledge does not lead to behaviour change, especially if the person concerned lacks the confidence, ability or will to take the necessary steps.

1.3.8 AN EVIDENCE-BASED APPROACH

This report draws from a variety of evidence bases, including research into what promotes environmentally responsible behaviour and the psychology of behaviour change to synthesize a set of criteria for designing effective climate change education programmes.

Section 3 provides an overview of the latest research into what drives behaviour and how these factors can be influenced and changed. Then section 4 outlines the evidence for what works when targeting different audiences such as young people and the general public. Then section 6 provides a series of recommendations, a step-by-step guide, to planning and executing a high-impact education programme. Section 6 discusses some of the issues and strategies for working effectively with young people. Section 7 highlights some of the remaining challenges and the importance of evaluation and continuous improvement for making every educational intervention count. Finally, section 8 summarizes the key recommendations.

2. Understanding behaviour

Key points

- Enhancing knowledge does not lead to behaviour change.
- Changing attitudes rarely leads to behaviour change.
- Motivation for change and barriers to change must be addressed.
- The social and moral norms are important predictors of behaviour.
- To accept personal responsibility for change people must attach value to the environment.
- Financial incentives can be motivating.

2.1 BEHAVIOUR CHANGE IS HARD

It is an eternal problem that has faced human society for millennia: how do you persuade individuals to act in a way that benefits, or at least does not harm, wider society? This is a dilemma relevant not just to climate change but also to other public policies like criminal behaviour and health promotion. Indeed, the main role of governments and its agencies is to coordinate behaviour for the common good (Gardner and Stern, 1996b).

Traditional (rationalist) thinking suggests that if people know more about something this will change their attitudes and hence their behaviour (see Figure 1). Research into environmentally responsible behaviour has shown that this is not the case – many environmental education programmes have had little or no impact on behaviour (McKenzie-Mohr, 2000). For example:

- Participants in a workshop on household energy efficiency demonstrated knowledge, understanding and changed attitudes but no change in behaviour.
- A ten-week information campaign and study on water conservation had no impact on consumption.
- In interviews, 94 percent of people accepted responsibility for picking up litter but, when leaving the interview, only 2 percent picked up litter that had been planted by the researcher.
- A study of children found significant changes in environmental attitudes after a week-long nature experience, however there was no appreciable change in their behaviour (Evans *et al.*, 2007).

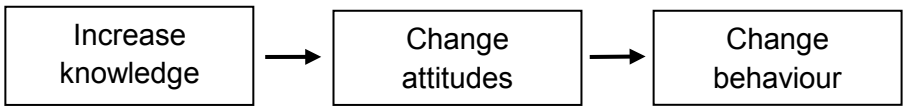

Figure 1: The flawed deficit model of behaviour modification
(adapted from Hungerford and Volk, 1990)

For the majority of people, increased awareness of environmental issues does not lead to pro-environmental behaviour (Kollmuss and Agyeman, 2002; National Research Council, 2011). Human behaviour is often irrational and is influenced by a myriad of factors. There is an assumption that, because advertising campaigns can persuade consumers to change from one brand to another, they will be effective in changing environmentally significant consumption habits and many organizations still base their communication strategies on this flawed premise (Kollmuss and Agyeman, 2002). However, buying a different brand of toothpaste does not require much expense, effort or change in lifestyle. It also provides an immediate reward. Asking someone to give up their car presents many more challenges, barriers to change and few tangible rewards, just inconvenience (McKenzie-Mohr, 2000).

2.1.1 WHY IS BEHAVIOUR CHANGE SO HARD?

Behaviour can be considered a series of mastered skills that become habits, embedded in routine and performed with little conscious thought. Changing behaviour means learning new skills and changing routines. Humans are innately resistant to change even if they accept it is required (which is why so many New Year's resolutions are forgotten by February!).

It is also easier to trigger a one-time behaviour change than it is to maintain repetitive behaviour changes, so while someone might be persuaded to cycle to work once, getting them to do it every day is the real challenge!

2.1.2 CHANGING ATTITUDES IS NOT ENOUGH

Many studies and evaluations report that the participants changed their attitudes as a result of an intervention. However, while attitude is a good predictor of intention to act, it is a poor predictor of actual behaviour. Attitude is only a reliable predictor of behaviour for 'low-cost' actions ('low-cost' being behaviour that is quick and easy, as well as cheap, like recycling) but is less reliable for activities that are more costly or inconvenient like driving or flying less (Kollmuss and Agyeman, 2002). In fact, the same behaviour can take place for different reasons and the same attitudes can lead to different behaviour (Anable, Land and Kelay, 2006).

So while education can enhance knowledge and change attitudes, to change behaviour you also need to address the motivation for, and barriers to, change. There have been many studies and many different models proposed to try and explain the gap between knowledge and behaviour and although there are no definitive answers there are some useful models and trends (Kollmuss and Agyeman, 2002).

2.2 WHAT MOTIVATES BEHAVIOUR CHANGE?

Environmentally-responsible behaviour generally arises from a mixture of self-interest/preservation and concern for others/the next generation. Education programmes generally address problem awareness in the hope of changing attitude and then behaviour, but as the diagram in Figure 2 shows there are many other factors influencing whether or not a greater awareness of the issue will lead to a change in behaviour.

The model in Figure 2 was developed following a meta-analysis of 46 studies on pro-environmental behaviour (Bamberg and Moser, 2007). Attitudes do not determine behaviour directly, but they do influence intentions. Intention to act was found to be the only clear predictor of pro-environmental behaviour. They identified three factors, attitude, moral norm and perceived behaviour control (feeling able or empowered to take action), which were strong predictors of the intention to act. In other words,

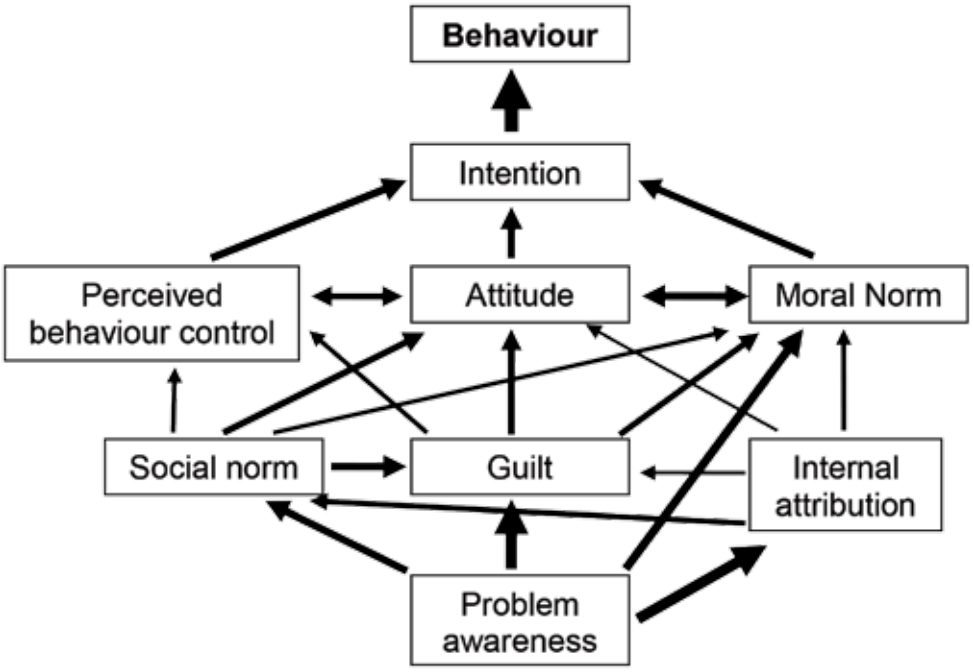

Figure 2: New model of the factors influencing environmentally-responsible behaviour
(adapted from Bamberg and Moser, 2007)
Thickness of arrow represents the extent to which this factor influences the other, thicker arrow = bigger influence, 'Internal attribution' means accepting that you are responsible for the problem, 'Perceived behaviour control' is feeling able/empowered to take action and knowing what to do and how to do it.

before deciding to act a person might ask themselves three questions: 'What are the positive/negative consequences of this action?' (attitude), 'How difficult will it be?' (perceived behaviour control), 'Do I have a moral obligation to do this?' (moral norm).

These three predictors of intention to act are further influenced by social norm, guilt, internal attribution (accepting responsibility for a problem) and problem awareness (knowledge). These four factors are particularly significant influencers of the moral norm, i.e. if a person knows about a problem, accepts responsibility for it and sees others taking action, they are more likely to feel morally obliged to take action themselves. Social norm (peer pressure) is an important predictor of attitude and perceived behaviour control, i.e. if someone sees all their peers recycling it will seem an easier and more attractive option.

Education programmes often focus on simply raising awareness of a problem. As the thick arrows on the diagram show, knowledge (problem awareness) has a powerful effect on the social and moral norm, internal attribution and guilt, but it is not a direct predictor of behaviour. It is particularly important that education programmes focus on the benefits of a particular behaviour (attitude) and removing any physical, financial or psychological barriers (perceived behaviour control) to maximize impact.

2.3 BARRIERS TO CHANGE (PERCEIVED BEHAVIOUR CONTROL)

So why do people who value the environment fail to take action to protect it? Even people who really care about the environment and climate change drive cars and take aeroplanes (Kollmuss and Agyeman, 2002; Anable, Land and Kelay, 2006).

The answer is invariably some kind of 'barrier to change'. These barriers can be physical, financial or psychological. And the more difficult or expensive a change the fewer people will do it, regardless of their attitude. A 1989 study on recycling in Ann Arbor, Michigan, United States of America, found only marginal differences in the attitudes of recyclers and non-recyclers, but major differences in their beliefs about barriers to/difficulties of recycling (Gardner and Stern, 1996c).

2.3.1 A LONG LIST OF EXCUSES

People's excuses for not behaving in a pro-environmental way include not having the time or not knowing what to do (Anable, Land and Kelay, 2006). People will also shun long-term gain if it means short-term pain, e.g. when offered free loft insulation, which would reduce energy bills for years to come, people declined due to the hassle of clearing out the loft (Behavioural Insights Team, 2011). Environmental concerns are lost among the worries of daily life like unemployment or illness (National Research Council, 2011). Also, climate change is often perceived as being too big a problem to deal with – how can one person really make any difference? (Ellison and Satara, 2009).

2.3.2 INDIVIDUAL BARRIERS

Barriers to action might be categorized as individual responsibility and practical. Individual barriers are personal attributes, e.g. laziness, lack of interest, perceived lack of skill. Even people who are concerned about climate change might have conflicting desires or needs, e.g. a climate researcher taking a long flight to attend a climate change conference (Kollmuss and Agyeman, 2002).

2.3.3 RESPONSIBILITY BARRIERS

Responsibility barriers relate to feelings of control over a situation. These control issues range from someone who cannot put in loft insulation because they are renting, to those who do not trust in government or who feel their actions will not make any difference (Kollmuss and Agyeman, 2002).

2.3.4 PRACTICAL BARRIERS

Practical barriers are social or physical limitations, e.g. lack of time, money or space, not knowing what to do (Kollmuss and Agyeman, 2002). If infrastructure (e.g. public transport or recycling facilities) is not in place or is of poor quality, this is a major barrier to change. It is impossible for individuals to make pro-environmental choices if the options just are not available. Economic factors are also important: if fossil fuels are cheap and the alternatives are expensive, there is little motivation to save energy or convert to renewables (Kollmuss and Agyeman, 2002).

2.3.5 THE PARADOX OF CHOICE

Too much choice can also be a barrier as it allows procrastination and, particularly with a complex issue such as this, can create confusion. Even very knowledgeable people can struggle to decide whether, for example, locally grown non-organic food is a better choice than imported organic food (Science for Environment Policy, 2012).

2.3.6 DIFFERENT BARRIERS TO DIFFERENT BEHAVIOURS

Any individual may have different barriers to different behaviour, e.g. the same person might say they cannot walk to work because it is too far, but do not recycle because they do not have space for a recycling bin (McKenzie-Mohr, 2000).

2.4 THE SOCIAL NORM

Behaviour is highly influenced by what family, friends and neighbours are doing – in other words, the behaviour that is considered to be the 'social norm'. The increased use of seatbelts in cars is more to do with social norm (and fines) than laws or the perceived risk of accident (Gardner and Stern, 1996d).

Recycling, like many of the behavioural changes prescribed to mitigate climate change, benefits society, but gives little or no benefit to the individual. In fact, when you factor in the space needed for different bins and the time taken sorting waste, it can be a considerable inconvenience. Researchers in the United States of America have found that most people who recycle do not do it out of concern for the environment; they do it because it is socially acceptable – it is the 'social norm' (Schultz, 2002).

2.4.1 PEER PRESSURE

This desire to conform is particularly strong for behaviour that is visible to others, e.g. putting out the recycling bin or driving a smaller car, but makes less difference to non-visible behaviour like turning the heating down. Circulating information about climate-smart behaviour within a particular local area can have a dramatic effect (Schultz, 2002). US energy company Opower found that sending monthly statements comparing the residents energy use with that of their neighbours led to overall reductions, especially among high users (Behavioural Insights Team, 2011).

Even subtle reminders of the social norm can work. The Opower study mentioned above also used smiley or sad face icons to subtly reinforce the social norm (Behavioural Insights Team, 2011). In a 1991 study on littering, people had a flyer placed on their car and, as they crossed the car park, they passed someone else either putting their own litter in a bin, dropping litter or picking up someone else's litter. Littering the flyer on their car was most common if they had just seen someone else littering and lowest if they had seen litter being cleared. Seeing someone picking up litter clearly sent a subtle and subconscious message that 'littering is not acceptable here' (Gardner and Stern, 1996c).

2.4.2 LEADING BY EXAMPLE

Community activists, people who lead by example, encourage others and provide practical assistance can also be particularly influential (Schultz, 2002). People will also consider someone they know or who is part of their community to be a more credible source of information. With the growth of the Internet and social networking, this 'community' need not be a geographical one – people will align themselves with the behaviour of a group of people they feel a connection with (Robelia, Greenhow amd Burton 2011).

2.4.3 POLICY CAN RAPIDLY CHANGE THE SOCIAL NORM

Education is important for justifying, ensuring acceptance and promoting implementation of new policies. It can also help to change perceived social norms as can the implementation of government policies (OECD, 2011). Recent smoking bans in public places demonstrate how policy can rapidly change a social norm (Koh, Joossen and Connolly 2007).

2.5 THE MORAL NORM

Like the social norm, people's general system of values, or 'moral norm', is most influenced by the people closest to them, e.g. family, social groups, communities, then to a lesser extent by the media and the prevailing culture in their country (Kollmuss and Agyeman, 2002).

2.5.1 MORAL NORM IS ALIGNED WITH GENERAL WORLD VIEW

Among many people their religious and societal world view places human beings above nature and, therefore, entitled to exploit nature for their own ends (Gardner and Stern, 1996e). However, surveys consistently show that concern for the environment and support for green issues in the general population has steadily grown over the last 30 years (Gardner and Stern, 1996e). Research among adults shows that those with higher educational attainment, more politically liberal, less religious fundamentalist and more feminist beliefs tend to also hold more pro-environmental beliefs (Gardner and Stern, 1996e). People who believe that science and technology will solve environmental problems are less likely to accept personal sacrifices (Kollmuss and Agyeman, 2002).

2.5.2 EVERYONE CARES ABOUT THE ENVIRONMENT

It has been proposed that only affluent, well-educated people care about the environment, but if people are asked to rank the severity of different problems, the environment is always rated highly no matter what their background, social group, ethnicity or gender. Indeed, there is evidence to suggest that a pro-ecological mind set is actually more prevalent in less-developed countries where humans are more likely to be seen as part of nature (Larson, Whiting and Green 2011). However, values and beliefs do not consistently predict behaviour. They influence the intention to behave in a particular way, but do not necessarily help them overcome barriers to action (Gardner and Stern, 1996e).

2.5.3 FAMILY AND IMMEDIATE NEEDS TAKE PRIORITY

When asked what is the most pressing problem the world faces, poorer people/countries, faced with scarce resources, will rank issues such as poverty, employment, education, or healthcare more highly than environment (Kollmuss and Agyeman, 2002; Anable, Lane and Kelay, 2007). Understandably, people will prioritize their own family and personal responsibilities over environmental concerns. If a pro-environmental behaviour change fits with their own priorities they are likely to do it (e.g. buying organic food to protect young children), but if it contradicts their values, needs or wants they will ignore the advice.(Kollmuss and Agyeman, 2002).

2.6 RISK PERCEPTION

Human beings evaluate risk every day without thinking much about it – even to accomplish a simple action like crossing the road we need to weigh up the pros and cons and decide whether the benefit is worth the risk, often subconsciously. Despite the fact that we do it all the time, human beings are not very good at accurately predicting the risk of a particular behaviour. More people are scared of flying than driving in a car even though flying is statistically much safer than car travel (European Commission, 2012). Some degree of 'under-reaction' to hazards seems to be a hereditary trait that has evolved to allow humans to go about their everyday lives without being in a constant state of panic and worry (Gardner and Stern, 1996d).

2.6.1 HUMANS CANNOT PERCEIVE 'SLOW-MOTION' DISASTERS

The same is true when it comes to evaluating the severity of an environmental problem. People tend to underestimate the severity of an environmental hazard that they have not personally experienced. In addition, humans cannot perceive 'slow-motion disasters' such as gradual climate change. Often we only notice a problem when it is too late and the damage has already been done (Gardener and Stern, 1996d; Kollmuss and Agyeman, 2002).

2.6.2 SCIENTIFIC DATA DO NOT MAKE AN EMOTIONAL CONNECTION

Because the changes in our climate, such as temperature or CO_2 concentration, cannot be perceived, they are often represented in the form of data or graphs. This makes the information intellectually comprehensible, but does not engage the emotions, making it easier to ignore. Campaigns to save large mammals such as polar bears or pandas (dubbed 'charismatic mega-fauna') have more of an emotional impact so have more public support than 'invisible' issues such as climate change (Kollmuss and Agyeman, 2002).

2.6.3 PERSONAL RELEVANCE

When appraising risk, humans weigh up the severity of the hazard against the likelihood that they will be affected by it. Even if a person does acknowledge a problem exists, they will not change their behaviour unless they feel endangered by it or something/someone they value is threatened.

2.6.4 COPING STRATEGIES

If a threat is acknowledged and action is required, then a coping strategy is selected. If people do not know or do not feel able to carry out a coping strategy, they resort to avoidance, denial, wishful thinking, religious faith or fatalism (Gardner and Stern, 1996d). For example, someone might acknowledge that they need to cut their carbon footprint, but if doing this requires they miss out on a much anticipated overseas holiday they will simply ignore it.

Clearly education has a role to play in helping people to both perceive and acknowledge environmental hazards and also to equip them with effective 'coping strategies' – actions they can take to minimize their impact.

2.7 INTERNAL ATTRIBUTION AND GUILT

Engaging with an issue – knowing about it, accepting personal responsibility for it and feeling guilty about it – are important predictors of attitude, social and moral norm and, therefore, pro-environmental behaviour. 'Environmental sensitivity' is the major 'entry level' variable that determines whether or not an individual is receptive to messages about conservation and sustainability (Hungerford and Volk, 1990).

2.7.1 VALUING THE NATURAL WORLD

It seems that environmental sensitivity is primarily determined by an individual's personal exposure to the outdoors/natural environment. A study of professional environmentalists in the United States of America and Norway found that they cited childhood experiences in nature, personal experiences of environmental degradation or role models within their family or social networks as being most influential on their decision to choose this career (Chawla, 1999). Other studies of professionals and activists around the world have given similar results (Chawla and Flanders Cushing, 2007).

2.7.2 DIRECT EXPERIENCE OF NATURE LEADS TO EMOTIONAL ATTACHMENT

Young people who had made repeated visits to a nature reserve as part of a youth work programme were more likely to engage in behaviour like recycling and conserving water (Vaske and Kobrin, 2001). Another study of adult visitors to United States state parks also showed that those who regularly participated in outdoor recreation had more pro-environmental values and behaviours (Larson, Whiting and Green, 2011). It is clear that experience of, and emotional attachment to, natural environments are vital and direct experiences have a greater impact on people's behaviour than indirect experiences, e.g. experiencing a natural disaster (direct) is more likely to change behaviour than learning about something in school (indirect) (Kollmuss and Agyeman, 2002).

2.7.3 DEFENCE MECHANISMS CREATE PSYCHOLOGICAL BARRIERS

However, strong emotions combined with a feeling of helplessness will not lead to action. If experience of environmental degradation triggers feelings of fear, sadness or guilt, defence mechanisms limit effective action. These defence mechanisms include denial, rational distancing, apathy and delegation.

Some climate sceptics simply deny climate change, because it does not fit with their world view. Rational distancing can occur in people like scientists who are frequently exposed to depressing environmental information – they are aware of the problem, but they no longer have any emotions towards it. Apathy occurs when people feel they cannot do anything to change the situation. Delegation is a means of transferring guilt by blaming industry, the government, etc. for environmental degradation. These defence mechanisms act as psychological barriers to action and those affected are unlikely to make any personal sacrifices. (Kollmuss and Agyeman, 2002).

2.8 INCENTIVES

Incentives (especially financial) can motivate people to act in a pro-environmental way, even though they may not be motivated by environmental concern. People tend to drive less in countries with high taxes on petrol and recent falls in car use have been attributed to rising fuel and insurance costs rather than environmental concerns (OECD, 2011; Kollmuss and Agyeman, 2002). Houses that have metered water consume around 20 percent less water than those that pay a flat fee and are more likely to install water-saving equipment. Similarly, charging households for landfill waste increases recycling rates, as does a returnable deposit on drinks bottles (Gardner and Stern, 1996d; OECD, 2011).

2.8.1 LOSS HURTS

Emphasizing 'money wasted' is shown to be more effective than 'money saved' as people are more sensitive to losing something than gaining something of equal value. For example, 5 percent tax on an environmentally-harmful product will have a greater impact on consumer behaviour than a 5 percent saving on a greener product (Science for Environment Policy, 2012). Efficiency is more palatable than conservation as conservation is perceived as a sacrifice (Gardner and Stern, 1996c).

Another statistic that confounds the stereotype that only the affluent care about the environment is that young people from disadvantaged backgrounds are more likely to get involved with behaviour that saves or makes money (Chawla and Flanders Cushing, 2007). Despite the fact that they are likely more interested in the financial benefits than the environmental ones, it does show that emphasizing cost savings can be an effective strategy.

2.8.2 MOST PEOPLE DO NOT CARE ENOUGH TO PAY MORE

By contrast, while saving money can be a motivator, paying more for a greener world is not. Most people are not sufficiently environmentally conscious to be willing to pay a large premium for 'green' electricity or organic food (OECD, 2011).

3. Evidence that works

Key points

- To change behaviour, education must empower people to take action.
- The easiest behaviour changes generally require least engagement/intervention and are often the most successful.
- Challenging existing behaviour is one of the most powerful strategies.
- Combining approaches to suit a particular problem within a particular community can be a very effective approach (community social marketing).
- Programmes for young people need to promote action skills, environmental empathy and empowerment as well as building knowledge.

3.1 WHAT WORKS WITH THE GENERAL PUBLIC?

A recent meta-analysis (Osbaldiston and Schott, 2012) attempted to establish conclusively which interventions are most effective. They analysed 87 studies that had used various methods to incite behaviour change. As they only used studies with a valid control group and where the outcomes could be independently measured (rather than relying on self-reported behaviour), they were limited to studies on recycling, water, and energy and fuel conservation.

They identified ten different techniques employed for changing behaviour:

- Making it easy: making it easy to do the behaviour by, for example, providing conveniently located recycling bins.
- Prompts: reminders like 'turn out the lights' signs.
- Justifications: giving reasons for the behaviour, e.g. data on rubbish sent to landfill.
- Instructions: information on how to do something, e.g. how to sort waste.
- Rewards: incentives including cash, rebates, coupons, prizes, etc.
- Feedback: appraisal of their performance like a statement of water use in the previous month.
- Social modelling: any kind of person-to-person interaction such as demonstrations, discussions, community leadership, etc.
- Cognitive dissonance: challenging existing behaviour or preconceptions.
- Commitment: making a public declaration to change behaviour.
- Goal setting: agreeing a specific target, e.g. using 10 percent less fuel.

They found that recycling in public places was the easiest behaviour to modify (highlighting the importance of the social norm), and home energy conservation or adoption of new technologies was the most difficult. When the data are summarized, it appears that cognitive dissonance (challenging preconceptions or existing behaviour patterns) was the most powerful technique followed by setting goals, social modelling and prompts. However, this pattern was not true for every situation – different techniques were most effective in different situations (the most effective for each is highlighted in bold in the table. Generally the interventions that required less engagement by the individual worked for activities that required the least effort (see Table 1).

3.2 WHAT WORKS WITH COMMUNITIES?

Community-based social marketing is an approach that draws on behavioural and environmental psychology and can be an effective strategy for change. It is a process that utilizes all of the strategies identified by Osbaldiston and Schott (2012), but combines them in different ways to suit the situation.

It has four steps:

1. uncover barriers to the desired behaviour in the target group;
2. design a programme to overcome the barriers;
3. pilot and evaluate the programme;
4. implement on a wide-scale and continue to evaluate.

Table 1: The impact of various intervention strategies in promoting pro-environmental behaviour
(adapted from Osbaldiston and Schott, 2012)
Figures show the weighted average effect size; larger number = greater effect

		least personal engagement → most personal engagement										
		Making it Easy	Prompts	Justification	Instructions	Rewards	Social modelling	Cognitive dissonance	Feedback	Commitment	Goal setting	**Total**
Least effort	Recycling in public places	1.46	0.95	**1.71**		0.73	0.93	1.09	0.48	1.08		**1.05**
	Energy conservation in public places	**2.88**	0.54	1.63	0.25		0.25		0.38			0.44
	Water conservation	0.31	0.56	0.21	0.18	0.2	**1.15**	0.52	0.18	0.41		0.39
	Kerbside recycling	**2.33**	0.17	0.29	0.37	0.62	0.57	0.59	0.36	0.3		0.3
	Central location recycling				**2.88**	0.61	0.28		0.26	0.14	0.5	0.49
	Home energy conservation		0.00	0.17	0.17	0.45	**0.74**	0.29	0.28	0.55	0.31	0.26
	Adopting new home energy technology	0.01		**0.14**								0.03
Most effort	Petrol conservation	**2.24**			2.23	0.43				2.04	2.23	0.47
	Total	0.49	0.62	0.43	0.31	0.46	0.63	**0.94**	0.31	0.4	0.64	0.45

In order to be effective it must target specific actions and it is necessary to identify the difference between people who do and do not engage to establish the barriers (McKenzie-Mohr, 2000).

In Canada, as part of a pilot programme to reduce lawn watering, householders were visited by a representative (on a bicycle so leading by example) who gave them a water gauge, discussed water conservation and asked them to sign a pledge. A control group received information only. There was a fall of 54 percent in the 'visit' group, compared with a rise of 15 percent in the 'information' group. The programme was rolled out and although it cost USD 80 000 to deliver it meant a smaller water processing plant was needed, saving USD 945 000 (McKenzie-Mohr, 2000).

In Denver, United States of America, a recycling study split householders into four groups – group 1 got information only, group 2 got information and a bright yellow reminder flyer 1–3 days before the collection day, group 3 got the information, the flyer and contact from a block leader, group 4, the control, got nothing. Group 3 recycled the most followed by group 2, then group 1, then 4. The barriers to recycling were lack of information and forgetting which were overcome by the leaflet and flyer. The block leader created perceived social pressure that recycling was the expected norm. This was confirmed by surveys where group 3 reported feeling the most social pressure and individual responsibility for recycling (Gardner and Stern, 1996c).

Community social marketing strategies have been used successfully to achieve behaviour change in health, hygiene and nutrition programmes in countries including Egypt, Bangladesh and the Dominican Republic (Nederveen, 2012).

3.3 WHAT WORKS WITH CHILDREN AND YOUNG PEOPLE?

As will be outlined in section 6, young people are an obvious target for climate change education programmes. As future custodians of the Earth their attitudes, behaviour and social norms will become the predominant patterns in years to come. However, many education programmes (particularly school curricula) are very knowledge-focused, meaning young people are well informed, but not proactive environmentalists.

As previously stated, environmental education programmes should have two goals: to promote both responsible environmental behaviour and civic action. Many of the techniques proven to be effective for inciting behaviour change among the general public can also be modified for a school or youth group situation. Table 2 lists the factors proven to promote either pro-environmental behaviour or civic action among young people.

Table 2: Factors proven to contribute to responsible environmental behaviour and civic action
(adapted from Chawla and Flanders Cushing, 2007)
Figures show the weighted average effect size; larger number = greater effect

	Responsible environmental behaviour	Civic action
Role models and mentors	• Parents, family members, teachers and friends	• Parents and other adults
Everyday life experiences	• Positive experiences of nature • Destruction of valued places • Learning about nature or the environment	• Confronting social inequalities and environmental problems • Opportunities for collaborative decision making from early childhood • Community service opportunities
Participation in organisations	• Participation in environmental clubs or outdoor activity groups, often over an extended period of time	• Participation in school councils, youth boards, model UN and service organisations
Discussion		• Discussion of civic issues, conflict resolution
Achieving success	• Positive feedback	• Opportunities to see meaningful gains from collective action
Social network	• Normalising pro-environmental behaviour, being with friends and having fun	• Connecting with and getting support from like-minded people
Education	• Knowledge about environmental issues	• Knowledge about public issues and how government works
Developing action skills	• Practising environmental action skills	• Practising activism
Personal significance	• Taking ownership of environmental issues	• Developing a civic identity

A particularly useful teaching model for changing behaviour is the 'issue investigation and action model'. Students choose a topic of interest to investigate; they collect evidence, evaluate that evidence then create and carry out an action plan (Hungerford and Volk, 1990).

3.4 WHAT WORKS IN OTHER SECTORS?

Climate change is not the only area where education has been used to try and achieve behaviour change. Much can be learned from other situations such as public health programme to reduce smoking, AIDS awareness, healthy lifestyles, etc.

Sex and HIV education programmes aim to change young people's sexual behaviour, for example, increasing condom use, reducing risky sexual behaviour and delaying the onset of sexual activity. A review of 83 curriculum or group-based sex education programmes around the world found certain characteristics that were shared by the most successful programmes (i.e. those that had the greatest positive impact on sexual behaviour) (Kirkby, Laris and Rolleri, 2007). These characteristics are summarized in Table 3. They found that skills-based programmes were more effective than knowledge-based at changing behaviour. The patterns of their findings were similar in both developed and developing countries.

Table 3: Characteristics of effective sex education programmes
(adapted from Kirkby, Laris and Rolleri, 2007)

Curriculum development	Curriculum content	Curriculum delivery
1. Involved a variety of interested parties with different areas of expertise 2. assessed the needs of the target group 3. developed the programme with clear behaviour changes in mind 4. designed a programme consistent with community values and available resources 5. pilot-tested the programme	6. focussed on clear goals *e.g.* prevention of HIV or pregnancy 7. focussed on specific relevant behaviours e.g. condom use 8. addressed multiple behaviour determining factors (e.g. knowledge, values, attitudes, norms, self-efficacy) 9. created a safe, social environment 10. used active teaching methods 11. used activities and messages that were appropriate to the participants' culture, age and experience 12. covered topics in a logical sequence	13. had support of appropriate authorities *e.g.* ministry of health, school districts or community organisations 14. Trained, monitored and supported the educators 15. If necessary took steps to overcome barriers to participation (*e.g.* publicised the programme, offered food)

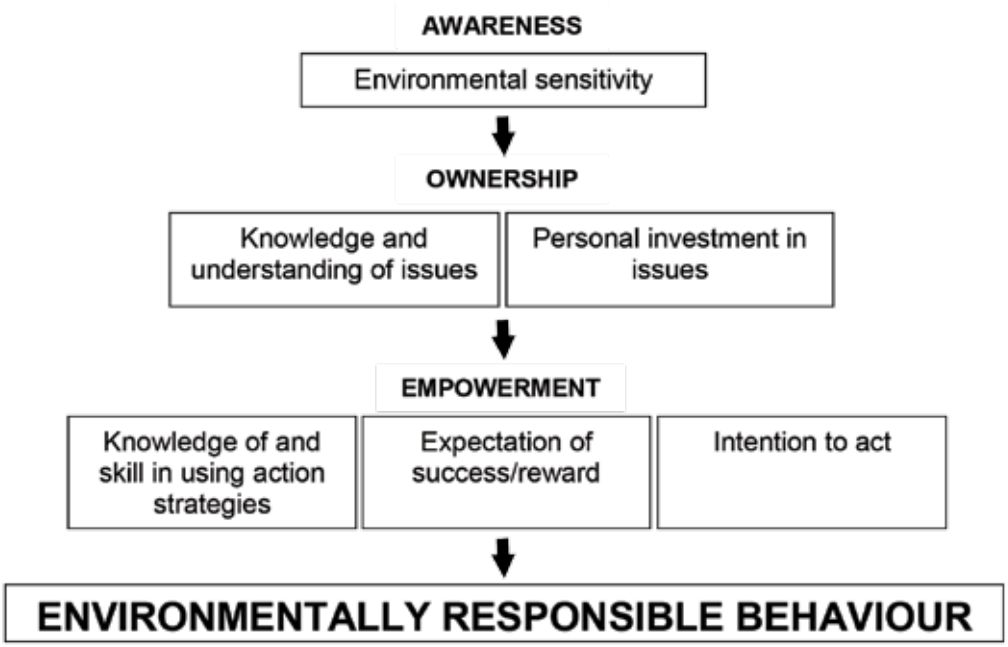

Figure 3: Summarised 'Education for Environmentally Responsible Behaviour' Model which emphasises the major (but not only) variables in predicting environmentally responsible behaviour (adapted from Hungerford and Volk, 1990)

The main thing that this research shows is that educational programmes need to be carefully designed, with specific behaviour changes in mind from the outset. They must address the numerous psychological and physical barriers to behaviour change and be delivered in a way that is appropriate and interactive. It is worth the effort to get it right – researchers found that an effective programme is likely to remain effective when it is implemented within a different community provided that it is in a similar setting (e.g. programmes designed for school situations may not work well with a youth group) (Kirkby, Laris and Rolleri, 2007).

3.5 A BASIC MODEL FOR MORE EFFECTIVE EDUCATION

Summarizing this research into effective environmental education programmes shows that in order to change behaviour activities need to develop not just awareness, but also ownership and empowerment (Figure 3) (Hungerford and Volk, 1990).

3.5.1 STEP 1: AWARENESS

Environmental sensitivity appears to be the key prerequisite for pro-environment behaviour. Environmental sensitivity is empathy towards the environment, caring about nature and seeing it as something that needs to be preserved, cared for or respected. In other words, no-one is going to waste time and effort in trying to conserve something they do not care about.

3.5.2 STEP 2: OWNERSHIP

Once a general empathy for the environment is established, learners need to take ownership of the issue by learning more about the problem and how it relates to them. This is very much the realm of 'traditional' education, providing information with the aim of changing attitudes. However, it is not enough to stop here – in order to change behaviour, ownership must lead to empowerment.

3.5.3 STEP 3: EMPOWERMENT

Empowerment is about providing action strategies and overcoming any barriers to these actions. It is also about making learners feel that they will be successful or that they will get positive benefits from their actions. Perceived skill in using action strategies is one of the best predictors of behaviour (Hungerford and Volk, 1990).

3.5.4 TAILORING THE MODEL TO DIFFERENT LEARNERS

Depending on the learners involved, the situation and the behaviour change targeted different parts of this model might need to be emphasized. Reaching adult consumers presents a very different challenge from targeting young school children, as the following studies show. However, it provides a toolkit and the basis for designing effective interventions.

Having established what climate change education programmes must achieve, the next challenge is how to make that happen. The evidence is clear: to change behaviour 'environmental education' needs to change its focus – away from knowledge and raising awareness and towards competency, action skills and problem solving (Marcinkowski, 2010).

Based on the educational and psychological research that has been presented so far, the following set of key criteria is proposed as a means of planning or evaluating educational programmes designed at achieving behaviour change.

4. Designing a high impact education programme

Key points

- Focus on specific, achievable behavioural changes.
- Encourage action planning and empowerment.
- Evaluate and challenge current systems/behaviour.
- Identify and tackle barriers to action.
- Develop and practise relevant action skills.
- Foster a connection with nature.
- Promote public commitment to taking action.
- Encourage dissemination within communities or social networks.
- Monitor behaviour change and celebrate success.

4.1 A STEP-BY-STEP APPROACH TO PROGRAMME DESIGN

It is more important than ever that climate change education programmes lead to significant shifts in behaviour. Based on the evidence base for what does and does not work, the step-by-step approach (outlined above) to designing an education programme is proposed.

It is not necessary (or perhaps even possible) for every education programme to tackle every one of these key objectives. Indeed, worthwhile activities might only tick a few of these boxes but, if the goal is behaviour change, then these issues must be addressed as often as practicable. In particular programmes that only provide information, foster awareness or encourage 'blue-sky' thinking will have little effect on behaviour change. Programmes that are too broad (e.g. 'Save the Planet') are also ineffective.

4.1.1 FOCUS ON SPECIFIC ACHIEVABLE BEHAVIOURAL CHANGES

Climate change and food security are big problems that require complex solutions, compounded by a sense that time is running out. There is a temptation to try and do too much at once and expect people to change their entire lifestyle through one educational programme. However, a lack of focus leads to confused learners who will be so overwhelmed by the enormity of the task that they will instead do nothing.

Programmes that focus on specific easy changes have the greatest chance of success (Osbaldiston and Schott, 2012). So, for example, if the goal is to save energy, focus on switching off appliances instead of leaving them on standby.

Work backwards from the desired behaviour change

Once the desired behaviour change has been identified, work backwards, identifying the barriers then developing strategies to overcome them (McKenzie-Mohr, 2000). For example, students might identify that they want to reduce energy use in the school. They would interview teachers and students to identify the barriers and develop strategies to overcome them, perhaps putting up prompts to turn off the lights and computers. They would trial their ideas in a few classrooms, monitor the electricity use, change the strategies if required then roll the programme out across the whole school.

4.1.2 ENCOURAGE ACTION PLANNING AND EMPOWERMENT

Many people intend to behave in a pro-environmental way, but never get around to it. Perhaps this is because they have not really accepted responsibility for an issue, or maybe they just do not know what to do or do not believe they will be successful or make a difference (perceived behaviour control). Identifying realistic goals is one step, but planning how that goal will be achieved by breaking it down into manageable steps with an achievable plan promotes ownership of the issue and a sense of empowerment, competence and self-belief that is more likely to lead to action.

Allow people to follow their own interests

Another factor that promotes empowerment is allowing people to follow their own interests and define their own, personally meaningful, goals. As outline in 3.5 and 3.6, people are more engaged with an issue if they feel personally affected by it.

Hungerford and Volk (1990) advocate the issue investigation and action model, which has been found to be effective in a number of studies. In this model following a general introduction to environmental concepts, issues and problems and research methods students choose a topic that interests them to study in more depth. After presenting their findings they develop and evaluate an action plan. Finally, they put their plans into action. This model is more effective for self-led, rather than tutor-led, tasks.

4.1.3 EVALUATE AND CHALLENGE CURRENT SYSTEMS/BEHAVIOUR

Caught up in the bustle of everyday life, few people stop and think about their behaviour and its consequences for themselves, others or the environment. Highlighting conflicts or inconsistencies between what people believe and the way they act can be a very powerful means of creating behaviour change (Osbaldiston and Schott, 2012). Known as 'cognitive dissonance', this discomfort can highlight the social or moral norm and induce the feelings of personal attribution and guilt that can push people into action (Bamberg and Moser, 2007). For example, someone might express concern for the environment, but be unwilling to give up driving. Focusing on the problems associated with driving like rising fuel costs, congestion and parking problems might prompt them to reassess (Science for Environment Policy, 2012).

4.1.4 IDENTIFY AND TACKLE BARRIERS TO ACTION

Everyone has excuses for why they do not behave in a particular way: lack of time, lack of money, not knowing what to do…the list goes on. Even people who really care about the environment still fly and drive cars. One of the most important things education can do is help overcome these barriers by providing instruction, information, coping strategies, etc.

Providing information and instruction is more likely to result in behaviour change when barriers are low (the changes required are inexpensive or easy) or when concrete support is given. For example, the most effective intervention in a United States energy-saving programme was low-flow shower heads that were given out free of charge and demonstrated (Gardner and Stern, 1996c).

The barriers to buying recycled products in Washington State, United States of America, were found to be low awareness and difficulty in identifying products quickly when shopping. A simple shelf-prompt led to a 27 percent increase in purchases (McKenzie-Mohr, 2000). Similarly, when Tesco integrated organic produce, rather than having it in a special section, it led to a 35 percent increase in sales (Southerton, McMeekin and Evans, 2011).

The TravelSmart programme in Western Australia used 'personalized marketing' to reduce car use. People were given tailored timetables, walking or cycling maps and information about public transport specific to that individual's journey. Results suggest there has been a 15–20 percent reduction in car journeys among the 15 000 households targeted (Southerton, McMeekin and Evans, 2011).

4.1.5 DEVELOP AND PRACTISE RELEVANT ACTION SKILLS

If not knowing what to do is a barrier to action, then having the opportunity to practise the relevant behaviour is an important step. It is not enough to tell people what to do; they need the opportunity to try it out for themselves with someone on hand to offer advice. Learning to drive or play the piano takes practice, learning pro-environmental behaviour or building the confidence to take civic or political action takes practice too.

A demonstration of how to do a particular action delivered by someone the audience can relate to can be very effective, for example a video and demonstration on cutting air conditioner use in Virginia led to cuts in electricity use of up to 20 percent (Gardner and Stern, 1996c).

Practising and gaining mastery in skills should begin with guided practice as learners gain experience and try out their new skills then progress to transfer training as they learn to apply their skills in new and increasingly difficult situations. The sheer scale of environmental problems can be overwhelming and disempowering for individuals so working with others can help developed a sense of collective

achievement. The interaction and fostering of friendships in these group situations is motivating in itself (Chawla and Flanders Cushing, 2007).

4.1.6 FOSTER A CONNECTION WITH NATURE

No one is going to look after something they do not care about. Time spent in natural environments – whether that is a school garden, the local park or a pristine wilderness – encourages an emotional connection with the natural world which is proven to lead to more pro-environmental behaviour (Chawla and Flanders Cushing, 2007). Personal experience of environmental degradation can also be very powerful.

A study of people with careers in environmentalism showed that their childhood experiences were key to their life choices. The three most commonly cited inspirations were time spent in natural environments (especially as a child), family role models and membership of organizations such as environmental pressure groups or the Scouts and Guides (Chawla, 1999). Other evidence shows that children who participate in 'wild-nature' recreational activities (e.g. camping or hiking) grow up to be more environmentally conscious adults (Larson, Whiting and Green, 2011).

4.1.7 PROMOTE PUBLIC COMMITMENT TO TAKING ACTION

Several studies have shown that if people make a verbal or written commitment in front of witnesses they are more likely to follow through with that behaviour change. This draws on the fact that feelings of guilt and personal responsibility for an issue are important predictors of behaviour (Bamberg and Moser, 2007).

In a 1984 study in Oregon, United States of America, those who were asked to make either a written or verbal commitment recycled more and for longer than groups who received information only. In addition those who made the written, rather than verbal commitment, recycled the most (Gardner and Stern, 1996c). Osbaldiston and Schott (2012) also found this technique worked particularly well in studies on recycling and saving petrol.

4.1.8 ENCOURAGE DISSEMINATION WITHIN COMMUNITIES OR SOCIAL NETWORKS

The social norm is an incredibly important predictor of behaviour. People are also more likely to believe and take advice from a friend or neighbour than a politician or official. Peer pressure and the desire to conform drive both sustainable and unsustainable behaviour. Some of the most effective educational interventions have involved entire communities in a programme of pro-environmental activity.

For example, a utility company in Minnesota offered energy audits, but only had uptake of 4 percent. When they recruited local community groups to do them they reached 13 percent of households for a third of the cost. Community groups are known and trusted locally and committed to helping their neighbours so will work hard for something they believe in (Gardner and Stern, 1996c).

In another study in Nova Scotia, people who were already composting were encouraged to put a sign on their bin to make it more visible and talk to their neighbours to dispel myths about it. Seven months later the non-composters were re-interviewed and 80 percent had begun to compost their waste (Southerton, McMeekin and Evans, 2011).

4.1.9 MONITOR BEHAVIOUR CHANGE AND CELEBRATE SUCCESS

Behaviour change is hard work and without monitoring and prompting most people will quickly revert to their old habits. Achieving sustained behaviour change needs ongoing monitoring, reminders and prompts. People also need to be rewarded for their continued efforts. These rewards could be financial (e.g. reduced fuel bills), symbolic (certificates or awards) or simply feedback that highlights their achievements. Monitoring and reward provide the incentive to continue with the desired behaviour change until it becomes habit.

People tend to resist change and revert to their old habits so reminders or prompts that are close in space or time to the desired behaviour can be very effective in overcoming laziness and behavioural inertia. A doorstep recycling programme in Florida, United States of America, had an initial uptake of 25 percent. A reminder flyer 4–6 weeks later led to immediate increase of 10–12 percent (Gardner and Stern, 1996c).

Interventions must also continue over a period of time. In a study where researchers revisited a group of students three years after the original investigation they were still exhibiting the desired change, but to a much diminished degree (Hungerford and Volk, 1990).

4.2 DOING EVEN MORE

In addition to the key objectives identified above, the following principles could help to make programmes even more effective:

- Where possible make programmes available in local languages and different formats (e.g. paper versions for those without Internet access).
- Initial research into the target group, their needs/interests and barriers to change should inform planning.
- Pilot the programme, evaluate and change it if necessary before implementing on a wider scale.
- Interventions should continue over an extended period of time with regular prompting.
- Encourage local action for local problems.
- Promote political activism where appropriate.
- Make the invisible visible and emotionally engaging.
- Encourage better coordination of programmes.
- Obtain the support of the local community, government or ministries of education.
- Evaluate impartially and share information honestly about what works and what does not.

Although strategies like identifying barriers, piloting and evaluating programmes add considerably to both the cost and the time required for an educational intervention, they also dramatically increase the chances of success (McKenzie-Mohr, 2000).

4.3 CASE STUDIES OF EFFECTIVE PROGRAMMES

So what does an effective programme actually look like? These case studies highlight some programmes that include many or all of the key objectives.

4.3.1 DISASTER RISK REDUCTION (DRR)

Many humanitarian organisations run disaster risk reduction programmes in vulnerable communities. These programmes focus on simple strategies such as early warning systems and emergency drills, but they can dramatically improve survival rates if disaster strikes (McDairmid, 2008). Using child-centred approaches and drama, art and music can help prevent panic and empower children to feel in control.

A programme for young people in the Philippines has already saved lives. Coordinated by Plan and working with the Department of Education and local communities the children learned about weather monitoring, first aid and water safety then practised their skills through disaster simulations and drills. They then shared what they had learned with their communities through theatre and music activities. The students at Santa Paz National High School, in a landslide-prone area, put what they had learned into practice when they noticed mud and rocks falling from an unstable mountain behind their school. They voted to evacuate the school, despite community protests, and are now in a new school building in a safer area (Gershon, 2008).

If, as the case studies suggest, these programmes are encouraging specific, locally relevant, behaviour change with dissemination amongst the local community, they are perhaps the best example of educational and behavioural theory in practice addressing all of the key questions. Clearly though in these life-or-death situations the motivation for behaviour change is particularly high.

Disaster risk reduction (DRR)	Yes/No?
Focuses on specific achievable behavioural changes	Yes
Action planning and empowerment	Yes
Evaluates and challenges current systems/behaviour	Yes
Identifies and tackles barriers to action	Yes
Develop and practises relevant action skills	Yes
Fosters a connection with nature	Yes
Promotes public commitment to taking action	Yes
Encourages dissemination within communities or social networks	Yes
Monitors behaviour change and celebrates success	Yes

4.3.2 KIDS' ISO 14000 PROGRAMME

Kids' ISO14000 is an environmental education programme that originated in Japan in 2000. The programme is now expanding internationally via UN agencies and over 100 000 children have participated in it. It encourages children to implement the ISO14000 environmental management technique within their own homes and communities using a Plan-Do-Check-Act cycle. Older students are encouraged to collaborate with other groups worldwide. There is evidence it has led to 10–15 percent cuts in GHG emissions from participating homes. (UNESCO, 2012b).

This programme provides an excellent way to tackle emissions and environmental impact over an extended period of time. However, it does require commitment from schools to embed the programme into the curriculum and support from parents. As the programme progresses over a number of years it would require the support of many different teachers and time away from other subjects. Government buy-in at national or regional level would be necessary to ensure schools made the necessary long-term commitment to the programme.

Kids' ISO 14000	Yes/No?
Focuses on specific achievable behavioural changes	Yes
Action planning and empowerment	Yes
Evaluates and challenges current systems/behaviour	Yes
Identifies and tackles barriers to action	Yes
Develop and practises relevant action skills	Yes
Fosters a connection with nature	No
Promotes public commitment to taking action	Yes
Encourages dissemination within communities or social networks	Yes
Monitors behaviour change and celebrates success	Yes

Kids ISO 14000 Web site: http://www.iso.org/iso/kidsiso_home

4.3.3 SANDWATCH

Sandwatch, coordinated by the Sandwatch Foundation, encourages schools and community groups to 'adopt' their local beach or coastline. Groups monitor the beach, e.g. checking water quality or surveying vegetation and wildlife, to determine if the beach is healthy. If a problem is identified then action is planned, e.g. alerting the media, beach clean-ups or replanting. Groups are encouraged to post data and pictures online, contribute to newsletters and participate in workshops and conferences. (UNESCO, 2012b).

Sandwatch is an excellent example of conservation behaviour in action and encourages environmental sensitivity and action skills among members. As actions are focused on monitoring and reactive, rather than pro-active, interventions it will not have any direct effect on mitigating climate change. However, as experience of nature and place attachment are important determinants of environmentally responsible behaviour and activism, it is reasonable to hope that participants' passion extends beyond their beach and to other pro-environmental actions.

Sandwatch	Yes/No?
Focuses on specific achievable behavioural changes	Yes
Action planning and empowerment	Yes
Evaluates and challenges current systems/behaviour	Maybe
Identifies and tackles barriers to action	Maybe
Develop and practises relevant action skills	Yes
Fosters a connection with nature	Yes
Promotes public commitment to taking action	Yes
Encourages dissemination within communities or social networks	Yes
Monitors behaviour change and celebrates success	Yes

Sandwatch Web site: http://www.sandwatch.ca/

4.3.4 FAO SCHOOL GARDENS

The FAO School Gardens programme encourages schools to establish and maintain their own learning gardens cultivating fruit, vegetables and even livestock. A manual and web site are available for support and advice on best practice. Parents and other community members are encouraged to get involved. The programme helps to develop skills that can be replicated at home and encourages healthy eating and environmental empathy (Nederveen, 2012).

This model, if fully embraced by schools and communities, provides an excellent way of engaging people with caring for the environment and sustainability. However, it is predominantly most suited to young children and the impact will be vastly diminished if parents and the local community are not involved in the programme.

School Gardens	Yes/No?
Focuses on specific achievable behavioural changes	Yes
Action planning and empowerment	Yes
Evaluates and challenges current systems/behaviour	Maybe
Identifies and tackles barriers to action	Maybe
Develop and practises relevant action skills	Yes
Fosters a connection with nature	Yes
Promotes public commitment to taking action	Maybe
Encourages dissemination within communities or social networks	Yes
Monitors behaviour change and celebrates success	Maybe

FAO School Gardens Web site: http://www.fao.org/schoolgarden/

4.3.5 FAO/YUNGA CHALLENGE BADGES

FAO has created a Youth and United Nations Global Alliance (YUNGA) engagement programme, which includes challenge badge programmes for youth groups like Scouts/Guides and schools. Participants have to choose and carry out a number of challenges in order to get a badge. Challenges include things like 'Commit not to buy at least five things you can do without' or 'Collect rainwater and use it to water your plants'.

These challenge badges embrace many of the essential factors for promoting behaviour change, by focusing on small achievable goals, encouraging action skills and dissemination and rewarding success. However the diversity of the tasks on offer means it is possible to choose tasks which, although worthwhile, do not actually lead to behaviour change, e.g. 'Interview an elderly relative' or 'Find out about carbon offsetting'. Also the short-term nature of the tasks means they may not lead to long-term habitual behaviour changes. YUNGA has set compulsory components in the curricular and provided guidance to teachers and youth leaders on how to achieve behaviour change so the challenge badge programme is generally a promising approach.

Challenge badges	Yes/No?
Focuses on specific achievable behavioural changes	Yes
Action planning and empowerment	Yes
Evaluates and challenges current systems/behaviour	Maybe
Identifies and tackles barriers to action	Maybe
Develop and practises relevant action skills	Yes
Fosters a connection with nature	Maybe
Promotes public commitment to taking action	Yes
Encourages dissemination within communities or social networks	Yes
Monitors behaviour change and celebrates success	Yes

Challenge Badge Web site: www.yunga-un.org

5. Targeting young people effectively

Key points

- Young people have a vested interest in preserving the world they will inherit.
- Shaping their behaviour as children could create habits for life.
- Engaging young people can help reach an entire community.
- Young people know a lot about environmental issues, but many do not consider it their duty or responsibility to do anything.
- Strategies like allowing students to follow their interests, providing hand-on experiences and putting plans into action can transform learning.
- Environmental studies often sits uneasily in the school curriculum, but non-formal educators are well placed to deliver effective programmes.

5.1 THE IMPORTANCE OF TARGETING YOUNG PEOPLE

Young people are an obvious and important target for climate change education programmes for both social and practical reasons. If pro-environmental behaviours are embedded at a young age they are more likely to become lifelong habits. Young people also provide a 'captive market', where large numbers can potentially be influenced via the school system and, if planned effectively, the impact can be spread to their wider community.

5.1.1 YOUNG PEOPLE ARE THE FUTURE

Children (under 15) and young people (aged between 15 and 24) make up around one-third of the world's population. They are the ones who will have to cope with the uncertain future that climate change brings. They are the voters, business leaders and policy-makers of the future. They also have a pivotal role within their local communities and access to information that can benefit everyone.

5.1.2 YOUNG PEOPLE ARE STILL FORMING THEIR WORLD VIEW

Young people are malleable. Their opinions are still forming and they are receptive to new ideas and information. They are idealistic and tend to see things in 'black and white', meaning they can be very passionate and focused on topics they feel are important. They are not bogged down by the day-to-day responsibilities and ingrained habits that are major barriers to change among adults.

5.1.3 THEIR SOCIAL NORM WILL BECOME THE SOCIAL NORM

Young people today have grown up in a society where pro-environmental activities like recycling are commonplace. Scientific knowledge is increasing at such a pace that children are often better informed about current issues that their parents (Ballantyne, Fien and Packer, 2000). Schools, children and youth organizations are often at the heart of their communities, making them well placed to influence attitudes and behaviour.

5.1.4 YOUNG PEOPLE ARE AT THE HEART OF THEIR COMMUNITIES

Young people play an important role within their communities and educating children can be an effective way of reaching their families, neighbours and friends. A survey of Australian environmental education programmes found that around half the participants had discussed issues they learned about with their families and 28 percent had discussed taking action on the issue (Ballantyne, Fien and Packer, 2000). There are even cases of children saving their parents, using what they have learned in Disaster Risk Reduction programmes (McDairmid, 2008; Baker, 2009). For example, through a 'disaster preparedness club' children in a flood-prone area of Viet Nam map out vulnerable areas and evacuation routes before visiting high-risk communities to share their findings (Baker, 2009).

5.1.5 PESTER POWER

Young people exercise increasing amounts of power over decision-making in the home. Evidence shows that children and young people can actively influence their parents' values, attitudes and behaviour in areas such as consumer choices and leisure activities (Ballantyne, Fien and Packer, 2000). 'Pesterers', who nag their families to change their behaviour, are more likely to be girls and 67 percent of girls questioned thought they influenced their families' lifestyle (Zampas, 2011).

5.1.6 YOUNG PEOPLE AS CHANGE-MAKERS

As children grow they have the potential to have an impact on the wider world. Encouraging young people to participate in politics, activism, democratic processes and debates means they might be able to influence more than just their own community or social networks. It is here that climate change education has the potential to make the greatest impact (Chawla and Flanders Cushing, 2007).

5.1.7 YOUNG PEOPLE CARE, BUT DO NOT FEEL THEY CAN MAKE A DIFFERENCE

Unfortunately, many young people are disengaged and youth turnout at non-compulsory elections is much lower than other age groups. A United Kingdom study showed that not only are current 18–29 year olds less likely to vote than other age groups, they are also less likely to vote than the same age group 20 years ago. Despite being interested in topical issues they do not trust politicians and do not feel their vote makes any difference (Stutz and Atkin, 2011).

5.1.8 THE IMPORTANCE OF TARGETING GIRLS AND YOUNG WOMEN

Although women tend to have less knowledge about environmental issues they are more emotionally engaged, more concerned and more willing to make changes (Kollmuss and Agyeman, 2002; Baker, 2009; Chawla and Flanders Cushing, 2007; Tikka, Kuitunen and Tynys, 2000).

Educating and empowering young women is a win–win situation. Not only will it help with climate change mitigation and adaptation but it will also help slow population growth, reduce infant and maternal mortality and slow the spread of HIV/AIDS and other diseases (Gardner and Stern, 1996a; Anderson, 2010). Children born to uneducated mothers are twice as likely to die or be malnourished than the children whose mothers attended secondary or higher education (Baker, 2009).

As women become more educated they also become more able to participate in decision-making and democratic processes within their own communities and the wider world (Gasperini and Acker, 2009). As women have been shown to be more environmentally sensitive and more willing to embrace change they are more likely to embrace sustainable development. Analysis of floods and droughts over 40 years showed that countries with high levels of education among women were more resilient and suffered less loss of life than countries with similar income and weather patterns and less-well educated females Their projections also suggest that educating young women is the most cost-effective strategy for boosting resilience of vulnerable countries (Blankespoor *et al.*, 2010).

5.2 YOUNG PEOPLE'S ATTITUDES TO THE ENVIRONMENT

The research on young people's attitudes to the environment shows a very mixed picture with high levels of knowledge, but low levels of empowerment.

5.2.1 YOUNG PEOPLE DO THINK ENVIRONMENTAL ISSUES ARE IMPORTANT

In a 2009 survey of over 1000 young people in the United Kingdom, 88 percent said that climate change would affect their lives and 75 percent felt they should do something about it (Ellison and Satara, 2009). United Kingdom primary school children recently rated environmental studies as the third most important subject after maths and literacy (The Co-operative Group, 2011). The most reported form of civic engagement among young people is protecting the environment (Chawla and Flanders Cushing, 2007).

5.2.2 YOUNG PEOPLE ARE KNOWLEDGEABLE

For the UN Convention on Biological Diversity Bio-Index report (UN CBD, 2010) 10 000 children aged 5–18 were asked about the environment. Overall the students were quite knowledgeable, correctly identifying the causes for loss of biodiversity and answering questions about the natural world. In 2006

a PISA (Programme for International Student Assessment) survey showed that students in OECD countries knew a lot about environmental issues (OECD, 2009).

5.2.3 YOUNG PEOPLE ENJOY SPENDING TIME IN NATURE

Encouragingly, 30 percent of 5–18 year olds said spending time outdoors was their favourite pastime (UN CBD, 2010) – spending time in nature has been shown to be a major determinant of pro-environmental behaviour (see 'Factors that influence behaviour').

5.2.4 THEY ARE NOT OPTIMISTIC ABOUT THE FUTURE

In the PISA study most students were not optimistic that environmental problems could be solved in the next 20 years. Generally, male students felt more optimistic about the future. The less students knew about the environment (based on test scores), the more optimistic they were about the future although results varied from country to country. There was no link between socio-economic group and awareness or optimism (OECD, 2009).

5.2.5 ENVIRONMENTALISM AMONG YOUNG PEOPLE MAY BE WANING

A cross-age study that sampled 50 000 Australians in 2003–2004 found that concern for the environment among young people aged 14–24 is much lower than the population average (with the highest levels of concern and recycling among the 50–64 and 65+ age groups) (Denniss, 2005).

Similarly, the most comprehensive study of attitudes over time, drawing on data from 30 years of surveys and around 100 000 high school students in a the United States of America, found a worrying downward trend in pro-environmental attitudes (Wray-Lake, Flanagan and Osgood, 2008). They found that environmentalism peaked in the early 1990s, but has declined somewhat since then.

5.2.6 THEY DO NOT FEEL IT IS THEIR DUTY OR RESPONSIBILITY TO TAKE ACTION

The 30-year United States study found that higher levels of materialism were correlated with less conservation behaviour and less belief in personal responsibility and resource scarcity (Wray-Lake , Flanagan and Osgood, 2008). Young people in Australia were more likely than any other age group to think environmental threats are exaggerated (Denniss, 2005). The PISA study showed that although young people felt some personal responsibility, they felt others need to take more responsibility too. Females reported a higher sense of responsibility towards the environment (OECD, 2009).

The picture is worrying – young people are knowledgeable about the environment, and younger children in particular are concerned about it, but many teenagers and young adults do not consider taking action to be urgent, or perhaps even necessary, and not their responsibility. Knowledge is not the problem – in many countries environmental education has been part of formal and non-formal curricula for decades now. The problem is that, because education programmes have focused largely on knowledge rather than action, many young people do not consider it their duty or responsibility to do anything about it. They lack the skills to evaluate situations and take appropriate action to reduce their environmental impact or to adapt to their changing climate.

5.3 TAILORED INTERVENTIONS FOR YOUNG PEOPLE

Targeting young people is clearly important, but not without its challenges. In line with previous advice, programmes must be tailored to the particular target group (Kirkby, Laris and Rolleri, 2007) in terms of both age/ability and locality. Alongside the traditional school programmes, non-formal education groups (i.e. youth clubs) are well place to deliver education programmes focused on behaviour change due to their more flexible approach.

5.3.1 MAKE ACTIVITIES AGE APPROPRIATE

Very young children find it hard to understand cause and effect for abstract concepts like invisible gases changing the weather. A developmental shift in reasoning seems to occur around the ages of 6–8, when children are able to identify environmental problems, e.g. litter or pollution, struggle to conceive of causes or solutions. A greater understanding of human's ability to damage the environment is fully developed by age 10–12 (Evans *et al.*, 2007).

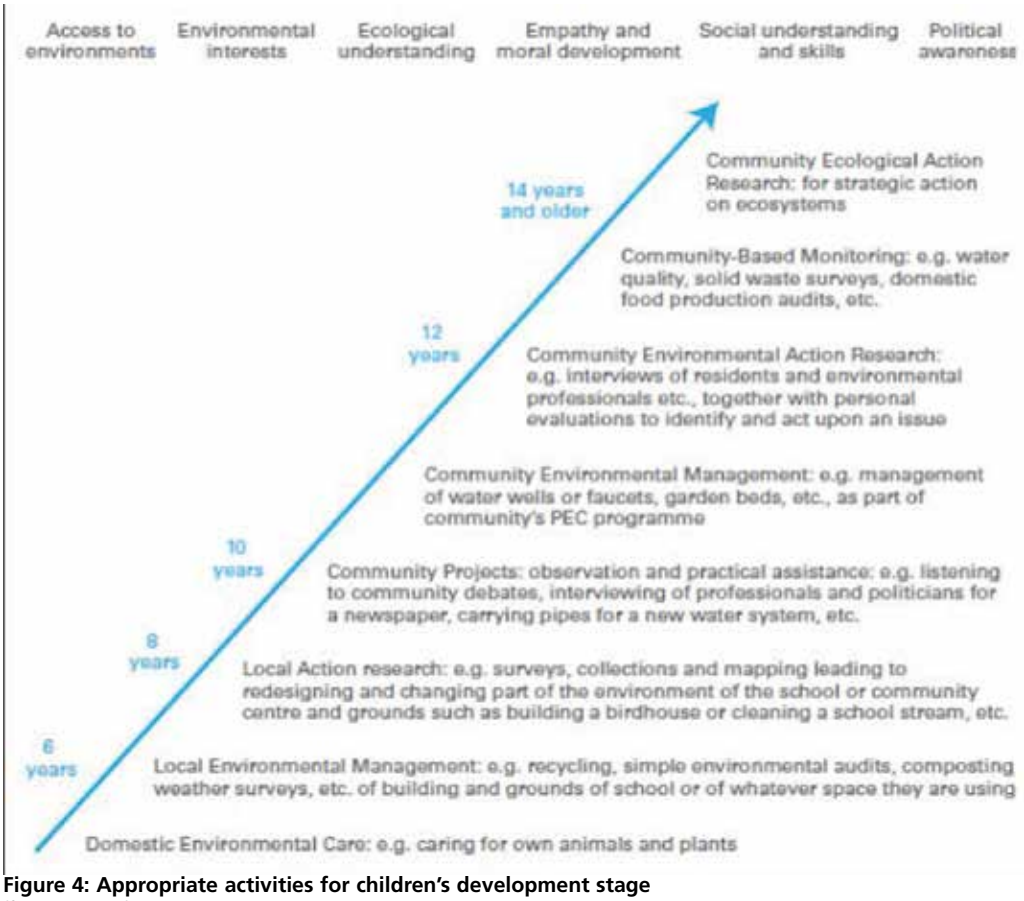

Figure 4: Appropriate activities for children's development stage
(from Iltus, 2012)

Figure 4 outlines age appropriate activities building from caring for plants and animals at age 6 to taking action in the local community at age 14+. Small private-sphere actions are more appropriate to the educational and developmental stage of young children, but older children and adolescents can (and should) learn how to become active citizens.

5.3.2 CHOOSE ACTIVITIES WISELY

Summarizing all of the research findings, Chawla and Flanders Cushing (2007) recommend the types of activities that evidence suggests would have the most impact on both pro-environmental behaviour and civic action (Table 4).

Various studies have identified strategies for maximizing the effectiveness of education programmes. Activities that take place over an extended time period and provide opportunities to learn and practise action skills, with success in achieving worthwhile goals, are particularly effective. Young people need to see that their efforts are taken seriously and to realize at least some of their ideas (Hungerford and Volk, 1990; Chawla and Flanders Cushing, 2007).

5.3.3 TAILOR PROGRAMMES TO LOCAL ISSUES

Westernized countries consume far more than their fair share of the world's resources, but suffer few of the consequences of their actions. In poorer countries the exact opposite is true – they contribute much fewer carbon emissions, but experience the worst effects of climate change and food insecurity.

Key issues that education needs to address in developed countries:

- Mitigating climate change
- Changing individual behaviour/GHG emissions
- Increasing empathy and valuing the natural environment
- Reducing consumerism
- Increasing activism

Table 4: Practical ideas for high impact, evidence-based educational activities
(adapted from Chawla & Flanders Cushing, 2007)

Role models and mentors	• Engage both peers and adults as role models • Create opportunities for peer group exchanges • Encourage role models to practice instructive modelling by demonstrating skills of graduated difficulty and verbalizing strategies for success
Everyday life experiences	• Make time for children to experience nature, individually and as a group, enabling them to develop bonds with nature • Practice democratic decision-making in the classroom • Provide opportunities for everyone's voice to be heard and valued
Participation in organizations	• Build club and organization activities around the shared values of the group and personal interests of individual participants
Discussion	• Make time for the discussion of environmental issues
Achieving success	• Help participants set goals and sub-goals that will provide opportunities to taste success
Social network	• Create a supportive social network for children and youth to build trust in others and have fun during the process
Age–appropriate initiatives	• Determine the scope of environmental activities based on the developmental stage of the child, with a focus on the nearby environment with younger children, expanding to the local community by middle childhood and eventually global connections
Development of action skills	• Enable children and youth to test their environmental action skills, applying the principles of guided practice
Personal significance	• Provide opportunities for children and youth to initiate environmental actions themselves
Parent involvement	• Reach out to parents to convey the importance of democratic parenting • Encourage parents to take an active and supportive role in their child's experiences of nature and participation in community projects

Key issues that education needs to address in developing countries:

- Adapting to climate change
- Educating and empowering women and girls
- Slowing population growth
- Improving food security
- Sustainable development
- Increasing activism

While the aims of education programmes must be different in different countries they all have the same goal of persuading people to change their attitudes and behaviour.

5.3.4 ENCOURAGE ACTIVISM

To develop the skills needed for civic action participating in discussions of environmental issues within a supportive, non-threatening environment allows people to hear different sides of the argument and form their own opinions. Personalizing issues, e.g. participating in an environmental clean-up within their own community, helps, as does developing skills like public speaking and working with others, perhaps through school councils or mock elections. Evidence shows that young people who participated in these types of activities during adolescence are more likely to be politically active as adults (Chawla and Flanders Cushing, 2007).

5.3.5 STRATEGIES FOR 'HARD-TO-REACH' CHILDREN

The majority of the world's 'hard to reach' children live in poor rural areas. Research conducted by FAO found a number of strategies that were effective overcoming barriers to educating rural people (Gasperini and Acker, 2009).

- Providing free access, including free transport and food
- Flexible provision, e.g. half day or after hours classes, no classes at busy times like planting or harvest
- Building and improving schools and training facilities
- Setting up satellite schools in remote areas for the youngest children and girls
- Better teacher training and professional development
- Making training materials relevant to the local situation
- Involve the local community and stakeholders (e.g. farmers) in planning

- Use peer-to-peer, non-formal, informal education approaches
- Include literacy and numeracy as well as life/job skills
- Provide incentives like subsidised housing, bonuses and profit sharing schemes to help recruit and retain teachers and trainers

5.3.6 STRATEGIES FOR ADOLESCENTS

Adolescents are dealing with multiple pressures including social development issues and peer pressure, while juggling exams and often jobs too. They are increasingly materialistic, spending more and more time indoors with a computer and, as the attitude surveys show, they are more concerned with peer norms than global issues. In developing countries they may have finished formal schooling and already be in work.

Harnessing social media might be effective at reaching those who are already interested. Others might be influenced by high-profile role models or early adopters within their social groups. Rewards and incentives might promote one-time behaviour changes, but are unlikely to lead to sustained habits. Belonging is important at this age so encouraging adolescents to form or join groups of like-minded individuals is useful, but these groups need to be action focused.

5.3.7 TARGET GIRLS AND YOUNG WOMEN

It is also important to make efforts to target girls and young women in both developing and developed countries. Women are proven to be more environmentally sensitive and willing to change. Educating and empowering females in developing countries has the benefit of reducing population growth and achieving other development goals. Youth organizations like the Girl Guides are well placed in this regard.

5.3.8 MAKE THE MOST OF NON-FORMAL EDUCATION

Although environmental education is now a core subject in many school curricula, there are problems associated with delivering climate change educational programmes within schools. The cross-curricular nature of the topics (encompassing science, geography and citizenship) means they do not fit neatly into secondary school programmes, which are usually taught according to subject specialism. Additionally, due to the fact schools focus on achievement, if 'environmental studies' is not an exam subject it will inevitably be neglected. As the outcomes of climate change education can be poorly defined and there are no 'right' answers this challenges the way many teachers think about teaching the topic (Læssøe *et al.*, 2009). There is also a critical shortage of suitably trained or qualified teachers in some countries.

Although studies often cite 'extra teacher training' as being necessary, such interventions are not particularly effective (Hattie, 2008). Although teachers need to understand the basic science of climate change to avoid misrepresentation, the school curriculum is so full and there is so much pressure on results and day-to-day issues that even the best teacher training programme is unlikely to yield results.

Youth groups like the Scouts/Guides or nature clubs clearly have an important role to play. Such organizations often encourage outdoor adventure, personally motivated issue investigation and community action – all of which are proven to be important determinants of behaviour change.

Formal, informal or non-formal learning?

- Formal education refers to teaching and learning that takes place in a school/university/classroom type setting with teachers trained to set standards.
- Informal education is learning that happens in other settings and as part of daily life and leisure activities e.g. after-school programmes, museums, watching TV, etc.
- Non-formal refers to structured education programmes that are not formally recognized, e.g. adult education, learn-to-swim programmes, Scouts/Girl Guides.

5.3.9 CONSIDER DIFFERENT DELIVERY MODELS

Engaging schools is often a key step to engaging large numbers of young people and extending that influence out into the local community. A valuable approach might be to have trained intermediates who go into schools or mentor teachers, set up and coordinate interventions, and revisit the school to monitor success and continuation. Again this would cost more that delivering a teacher training day or putting together a resource pack, but is far more likely to be successful in changing behaviour.

Training peer educators, having young people teach other young people, can also be an effective approach. Peer-to-peer interventions can be a powerful way of changing the social norm and community leaders and credible role models are proven to influence behaviour change.

6. A new focus on evaluation

Despite the vast sums of money that have been spent on environmental and climate change education initiatives, impact evaluations are infrequent, inconsistent and often anecdotal. It is essential that future programmes include well planned, evidence-based evaluations that focus on outcome achievement. This was identified as a key recommendation in the UNFCCC 2012 Review of the New Delhi work programme and has also been highlighted by other reviews (Southerton, McMeekin and Evans, 2011).

6.1 FOCUS ON IMPACT

Impact is the priority: good intentions and anecdotes will not stabilize greenhouse gas emissions, reduce consumption or slow population growth. Funding bodies also want to see the impact of their contributions and stories of how one school or community benefited are not enough to justify USD billions of investment.

6.1.1 COLLECTING RELIABLE DATA

Evaluations should, where possible, measure quantifiable behaviour changes (e.g. energy consumption, weight of material recycled) or be conducted by an impartial observer rather than relying on self-reported behaviour. When completing surveys or talking to interviewers there is a tendency (conscious or unconscious) to give what is perceived to be the 'correct' answer rather than the truthful one, or to overemphasize successes and play down failures. Anecdotes and case studies, while useful and interesting, are not robust measures of impact for the same reasons.

6.2 REFLECT AND SHARE

Educators also need to be honest about the effectiveness of their programmes – even if it means reporting that their pet project has not worked. Educators invest huge amounts of thought, planning and effort into their programmes and it can be painful to admit when they do not have the desired effect, but honest and thoughtful evaluation will help focus efforts and maximize impact in the future.

It would be useful to establish a moderated forum (e.g. a Web site or open access journal) for sharing information about the effectiveness of educational programmes. While publishing research in peer-reviewed journals remains the gold-standard, these papers often take years to come to light and are only available through paid subscriptions. However worthwhile and credible this research is, it has little impact, simply because not enough people will ever read it.

We all share the same planet and will share the same climate future so it is in everyone's interest to share evaluations and share knowledge so that every intervention counts.

7. Conclusion

7.1 USING EDUCATION EFFECTIVELY

Climate change and food security education programmes need to change focus. There needs to be more emphasis on achieving impact. However, making most effective use of education also means accepting its weaknesses. History shows that education for environmentally responsible behaviour can:

- trigger easy or low cost behaviour changes;
- provide the opportunity to practise relevant skills and develop strategies to overcome barriers to action;
- have an important, indirect long-term effect on changing the social norm and peoples values and beliefs;
- encourage political and civic action on environmental issues;
- provide information and help gain public support for policy changes.

7.2 CREATING SUCCESSFUL EDUCATION PROGRAMMES

1. Focus on specific, achievable behavioural changes
2. Encourage action planning and empowerment
3. Evaluate and challenge current systems/behaviour
4. Identify and tackle barriers to action
5. Develop and practise relevant action skills
6. Foster a connection with nature
7. Promote public commitment to taking action
8. Encourage dissemination within communities or social networks
9. Monitor behaviour change and celebrate success

7.3 ACHIEVING BEHAVIOUR CHANGE

Programmes need to identify simple achievable behaviour change targets with low barriers to action. These programmes should then prompt people to assess their current situation/behaviour, practise the skills required to employ the new behaviour, plan achievable steps, then put them into action. Participants should then monitor their progress, get rewarded for their successes and share what they have achieved within their social networks to encourage others to take action too.

The programmes should then be monitored and the participants given regular prompting to ensure the new behaviour becomes a habit and the social norm. Many disaster risk management programmes are already using this model effectively, but it needs to be rolled out more widely.

7.4 ACHIEVING CIVIC ACTION

Although specific behaviour change is one aim of these education programmes, another important outcome is to politicize people so that they feel compelled to vote, join pressure groups, lobby governments, boycott irresponsible companies and demand the future world that they deserve. Adolescents need activities such as self-directed issue investigations, sources of detailed reliable information and channelling towards networks of like-minded people. However, in all cases these activities must move away from simply 'raising awareness' or 'project work' and towards dissemination and action – there must always be a 'call to arms'.

7.5 EXPERIENCING THE NATURAL WORLD

Other worthwhile activities are those that enable people to experience the wonder of the natural world. Increasing urbanization and indoor lifestyles have led to a lack of connection with nature. Research shows that personal experiences of nature in childhood are one of the most important predictors of environmentalism in later life. Time spent in nature fosters respect and wonder and the feeling that the

Earth is something which should be protected, even if these experiences are limited to a school garden or city park.

7.6 MORE THOUGHTFUL PLANNING & EVALUATION IS REQUIRED

The challenge now is that education programmes will need more careful planned, tailored programmes, as simply copying successful programmes is unlikely work. Local needs must be taken into account, meaning more time and inevitably more money. However, this is money that could be wisely spent. Mass media advertising campaigns are eye-wateringly expensive and do not work. For example a California utility company spent more money advertising loft insulation than it would have cost to actually install the insulation in the homes of all the target customers (McKenzie-Mhor, 2000).

7.7 GOALS MUST BE REALISTIC

To maximize impact there needs to be thought given to targeting the most achievable behaviour changes – these are usually simple, low-cost and, preferably, visible changes or 'easy wins'. In particular, people who are already sympathetic to the cause could be nudged into action fairly easily.

There are limits to what education can achieve. No amount of education will convince die-hard drivers to get out of their cars – for these people laws, regulations and incentives/disincentives will be required.

However, if education can achieve small, but sustained, behaviour changes, it will empower the learners, building their sense of competence, hopefully setting them on a path of continual improvement. These learners will then helps drive a changing social norm that, in time, will make pro-environmental behaviour the rule rather than the exception.

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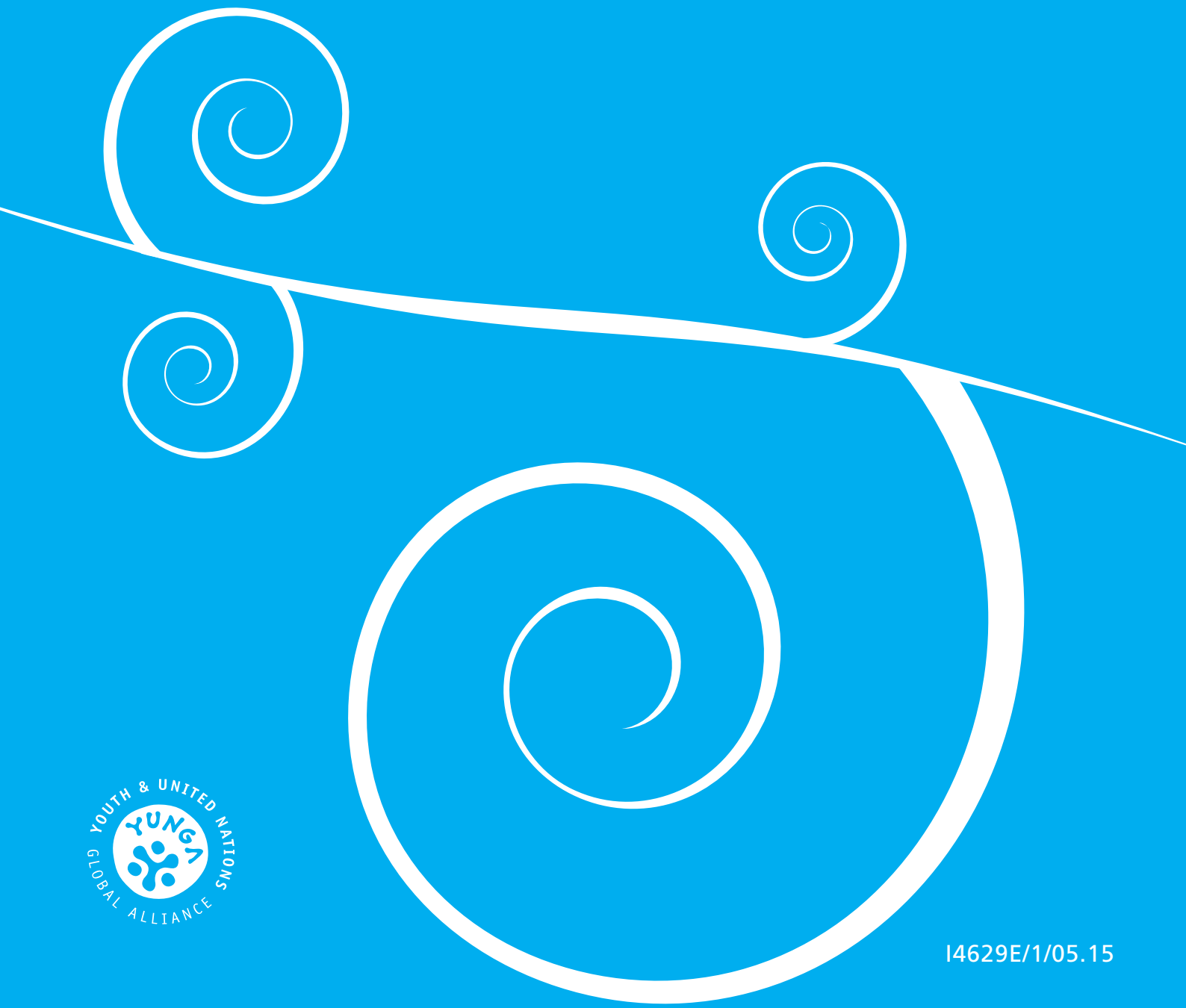
YUNGA acts as a gateway for children and youth to participate in the activities and initiatives of the United Nations.



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