



AFRICA ADAPTATION PROGRAMME FOR CLIMATE CHANGE:
REPUBLIC OF MAURITIUS



Education Pack on Climate Change Education





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Foreword

Climate change is one of the most critical issues facing the world today and could potentially cause massive and irreversible damage to the global environment and human society. In such a globalized and interconnected world subject to changing climatic conditions, small islands are particularly at risk – whether from increasingly unpredictable and severe weather, the prospect of rising sea levels. Despite geographical isolation, we are as vulnerable to climate change.

Climate variability worldwide and its impact on weather events have been noted in the Republic of Mauritius. We are likely to experience considerable economic loss, humanitarian stresses and environmental degradation. A number of initiatives that have been noted elsewhere in our country as well to address CC and other related environmental challenges that we face. Both public and private sectors are also making efforts to integrate issues of climate change in new developments strategies. The Government recognizes the need for appropriate education that addresses CC (risks, disasters, risk reduction, adaptation measures...etc) and also empower its citizens to make informed decisions on matters related to climatic conditions and to increase the adaptation capacity of its population with regard to coping with CC. These actions are being supported by various international programmes such as Africa Adaptation Programme (AAP).

AAP was launched in 2008 by the United Nations Development Programme (UNDP) in partnership with the United Nations Industrial Development Organization (UNIDO), the United Nations Children's Fund (UNICEF), and the World Food Programme (WFP); This programme benefits from financial support from the Government of Japan. The Ministry of Environment and National Development Unit together with the UNDP is leading the AAP in Mauritius. The AAP aims at attaining a number of specific objectives including promotion of climate change education at all levels in the country.

The MIE- AAP Project is in line with UN Decade of Education for sustainable Development (DESD, 2005-2014) and the Maurice Ile Durable Project. The project includes a range of activities and emphasizes the UNESCO's work around its strategic objectives such as building and maintaining the CC knowledge base: science, assessment, monitoring and early warning; and promoting mitigation of an adaptation to CC, including enhanced education and public awareness.

This manual is intended to serve as a resource kit for practicing teachers and is also suitable for teachers-in-training. It is designed to provide appropriate knowledge on CC and related disaster risks and hazards.

Other than being reader-friendly, this kit is written in a clear, concise, and thought-provoking

manner with a variety of activities. It provides various opportunities for developing students' understanding of CC and DRR while enabling the learners to relate basic principles of science and technology and geography to everyday situations and settings. The young learners can also be instrumental in promoting CCE and DRR among their peers, at home and in their community.

We noted the enthusiasm of teachers, and we hope that this manual will help them to find out how to CC and DRR

Project Team

Abbreviations

CC: Climate change

CCE: Climate change education

CCESD: Climate Education for Sustainable Development

CFCs: Chlorofluorocarbons

ESD: Education for sustainable development

GHE: GreenHouse Effect

MIE: Mauritius Institute of Education

MMS: Mauritius Meteorological Services

SIDS: Small Island Developing States

UNDP: United Nation Development Programme

UNEP: United Nations Environment Programme

UNESCO: United Nation Education Scientific Cultural Organisation



Part I: Introduction to the Manual



Introduction to the Manual

In 1992, international concern about global warming was translated into the United Nations Framework Convention on climate change (UNFCCC)-a global treaty which was encouraged to stabilize greenhouse gas (GHG) emissions. Climate change (CC) and sea-level rise are issues of major concern for all small island developing states. Mauritius signed the UNFCC during the UNCED conference at Rio and was the first member state to ratify it. Mauritius also ratified the Kyoto Protocol in 2001. Mauritius is reducing its emissions of greenhouse gases by implementing a number of projects on energy efficiency, alternative energy programmes and regular inventories of GHGs.

To stabilize the increasing GHG in the atmosphere and adapt to CC will take the concerted action of everyone and all parts of society. This is why UNESCO works in all its domains – education, culture, the sciences and communications –to address CC holistically. This project is therefore in line with the UNESCO CC initiative of the UNFCCC COP15 which is aimed at seeking to reinforce the scientific, mitigation and adaptation capacities of the countries and communities that are most vulnerable to the effects of CC.

Aim of the Project

The project is therefore aimed at sensitising all stakeholders on climate issues and adaptation strategies through a variety of media and strategies in the Republic of Mauritius (Mauritius, Rodrigues and Agalega).

Specific objectives:

- Sensitise teachers, students and parents on the implications of climate change, on adaptation strategies both internationally and locally for the individual, community and the country as a whole
- Creation of a Mobile Graphic Exhibition on climate change and adaptation and of low cost models for demonstrating climate change in all primary schools
- Organisation of competitions for primary and secondary Schools
- Evaluation of the impact of the project on the various stakeholders

Part II: Mainstreaming CC and DRR in Secondary School Subjects



We have therefore developed this educational pack which offers primary school teachers a useful educational tool that meets their expectations in terms of background information, teaching ideas and materials. This will help teachers to better mainstream concepts related to above concepts in various subjects such as languages (English, French), Science, Mathematics, Health Education and History/Geography and Drawing at primary level.

These resource materials and activities may be omitted or modified to make them relevant to social norms and contexts, cultural practices or religious convictions in particular contexts, areas or groups of pupils. As needed, alternative relevant materials/activities should be used.

A project team was therefore set up to carry out the study and it consisted of the following members:

Mr Om Nath Varma, Project Manager, MIE
Dr Ravhee Bholah, Coordinator, MIE
Mr Mohun Cyparsade, Co-coordinator, MIE
Mr Pierre André Boullé, Team Member, MIE
Mr Chandrashekhar Padaruth, Team Member, MIE

Other members were later roped in to develop appropriate CC & DRR material in their respective subject areas:

Mr Dhirendra Ramroop, Associate Professor-Department of Science, MIE
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Why teach CC and DRR?

Unit I: Climate Change and Disaster Risk Reduction

Unit I provides background information on CC and DRR. It is presented in a reasonable logical manner. It starts with the definition of some main concepts/terms generally used under CC and DRR Education.

INTRODUCTION

The following table highlights the definitions of weather and climate.

Weather	Climate
<p>Weather is what we observe about the sun, cloud, rain, temperature and wind.</p> <p><i>[Ministry of Education, Culture and Human Resources (2010) – History and Geography Standard 4]</i></p>	<p>Climate is what we observe about weather conditions over a long period of time.</p> <p><i>[Ministry of Education, Culture and Human Resources (2010) – History and Geography Standard 5 Part 2 – Pg 105]</i></p>

The difference between weather and climate

As so rightly put by a student:

“Climate helps you decide what clothes to buy, weather helps you decide what clothes to wear.”

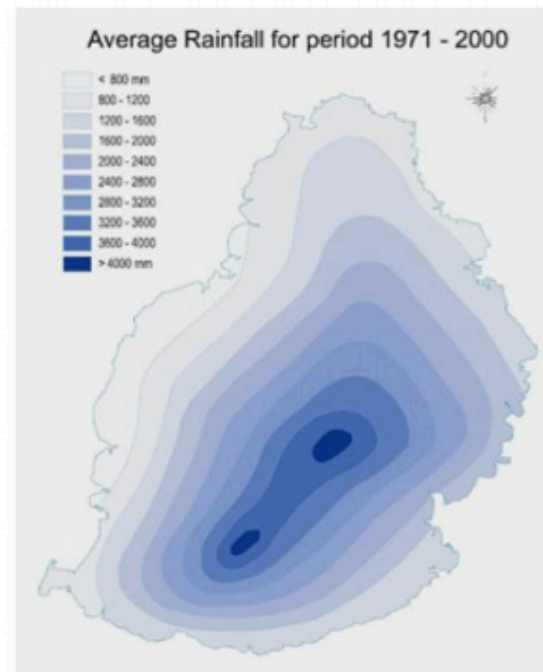
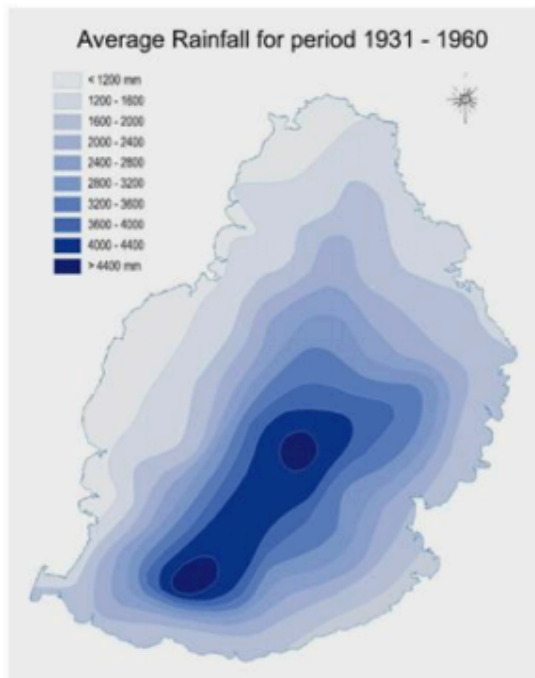
<http://epa.gov/climatechange/kids/basics/concepts.html>



OUR CLIMATE : Mauritius, Rodrigues and Agalega

Mauritius is an island in the Indian Ocean. Situated near the Tropic of Capricorn, the island enjoys a mild tropical climate. There are only two seasons: Summer and Winter.

The maps below show the annual distribution of temperature and rainfall in Mauritius

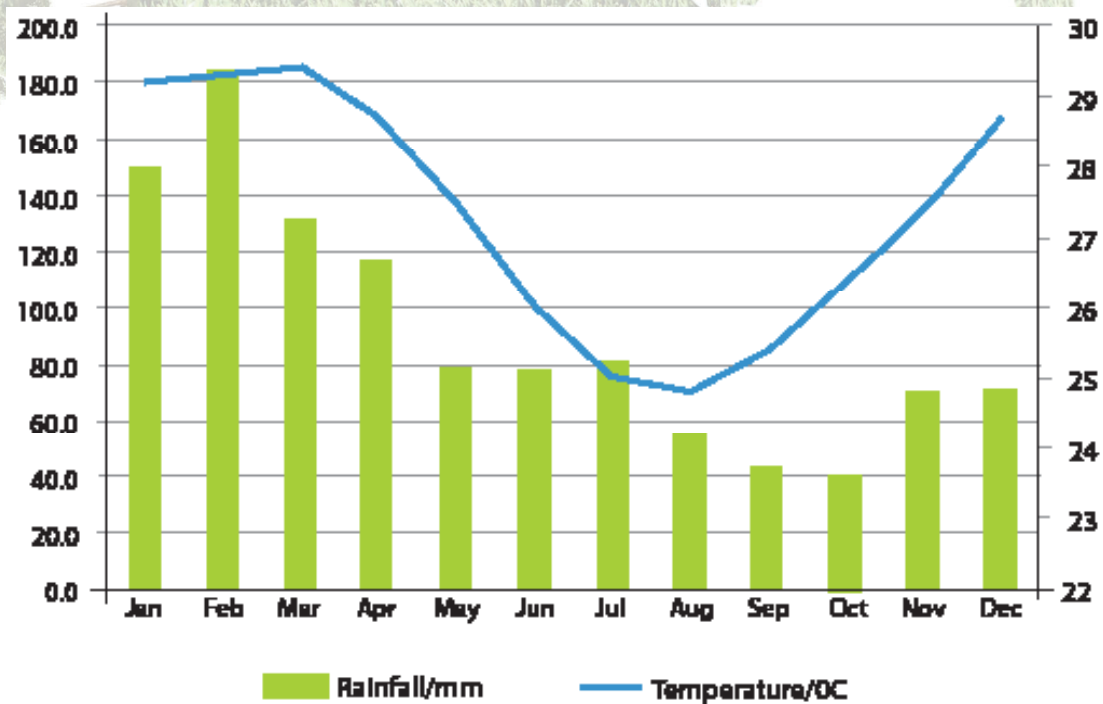


(Source: Mauritius Meteorological Services)

Rodrigues is an island located about 650 kilometres north-east of Mauritius. Like Mauritius, Rodrigues also has a mild tropical climate. However, due to its topography, it gets less overall rainfall.



CLIMATE GRAPH FOR RODRIGUES FROM YEAR 1961 TO 2007

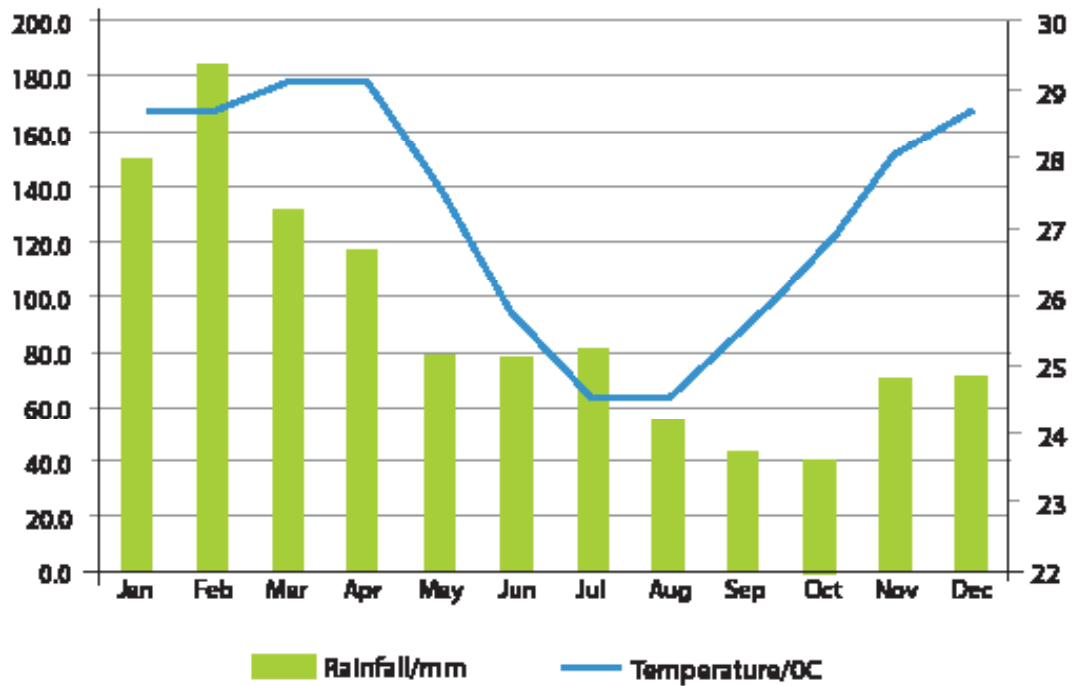




Agalega Islands are two islands lying 1,100 km north of Mauritius. The islands have a very hot and humid tropical climate.

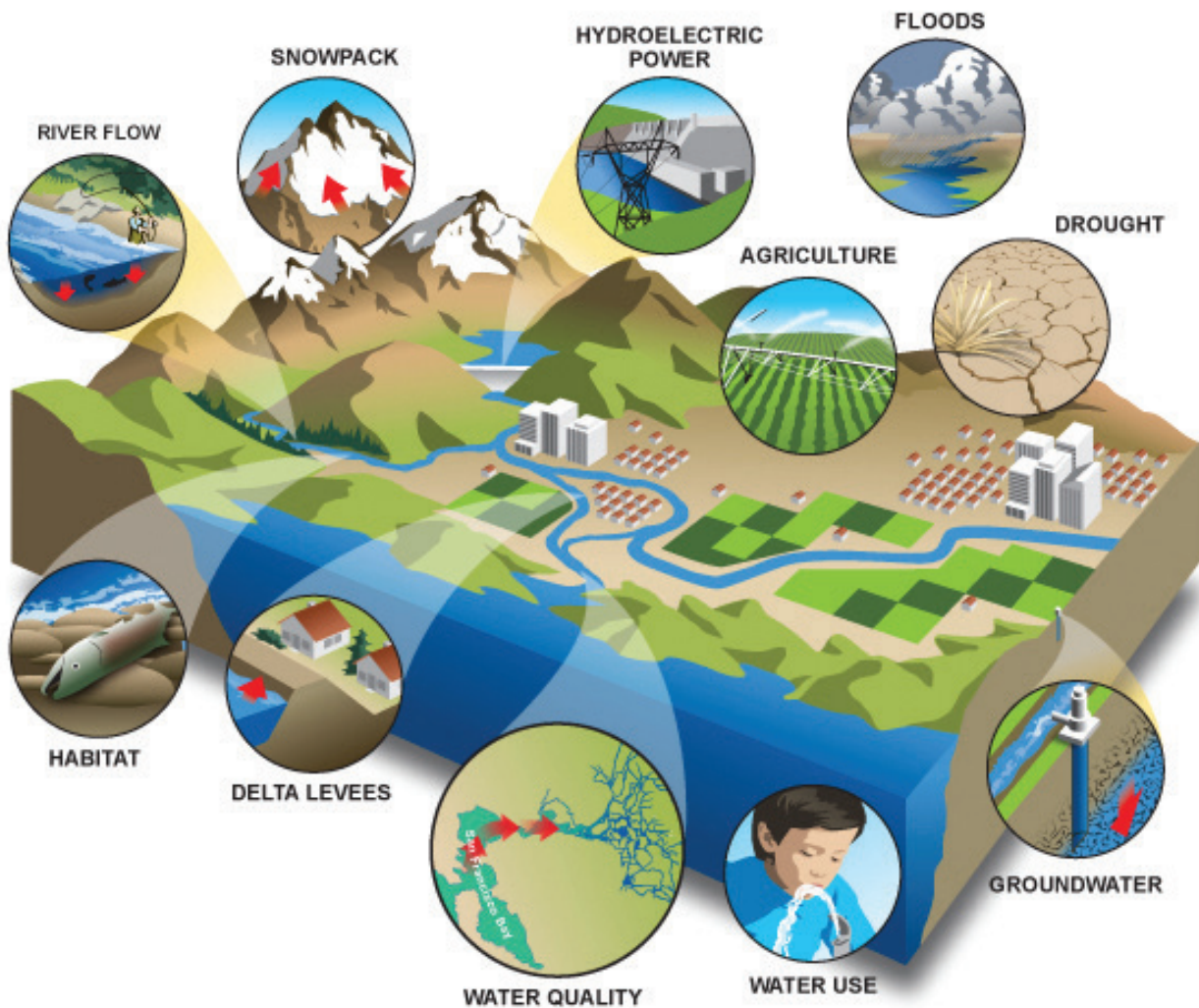


CLIMATE GRAPH FOR AGALEGA FROM YEAR 1961 TO 2007



OUR CHANGING CLIMATE

Over the past few years, meteorologist have observed that our temperature is rising and the rainfall pattern is changing. Our climate is undergoing some changes.





GLOBAL WARMING

Climate change is not only happening in our islands. The world is also experiencing changes in the global climate. The climate is changing globally. The main change is the warming of the planet, a phenomenon known as global warming.

Global warming: Causes and effects

Earth's temperature has risen about 1 degree Fahrenheit in the last century. The past 50 years of warming has been attributed to human activity.

Burning fuels such as coal, natural gas and oil produces greenhouse gases in excessive amounts.

Greenhouse gases are emissions that rise into the atmosphere and trap the sun's energy, keeping heat from escaping.

The United States was responsible for 20 percent of the global greenhouse gases emitted in 1997.

Most of the world's emissions are attributed to the United States' large-scale use of fuels in vehicles and factories.

During the past 100 years global sea levels have risen 4 to 8 inches.

Some predictions for local changes include increasingly hot summers and intense thunderstorms.

Damaging storms, droughts and related weather phenomena cause an increase in economic and health problems. Warmer weather provides breeding grounds for insects such as malaria-carrying mosquitoes.

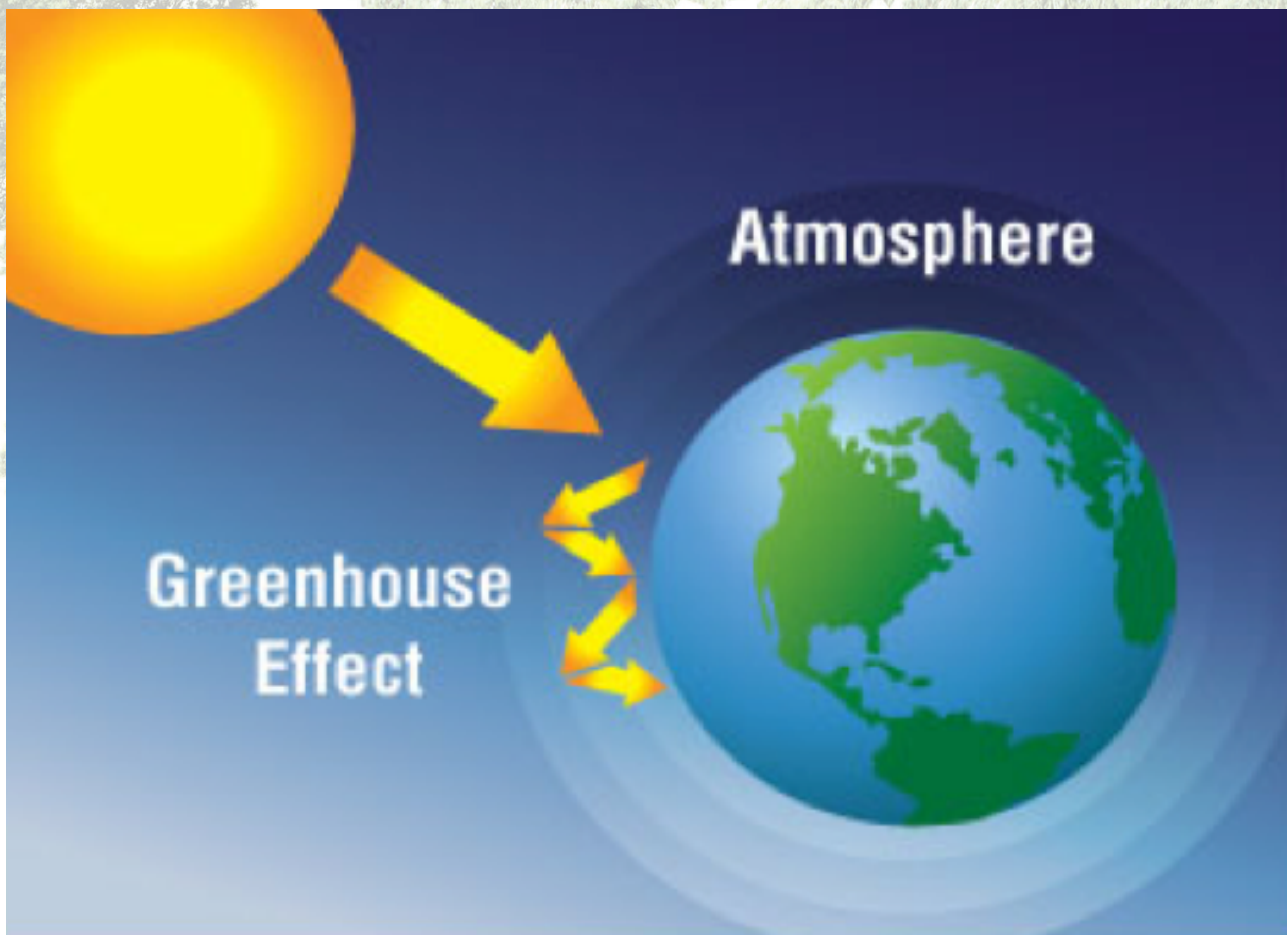
Source: Environmental Protection Agency

NATE OWENS/STAFF

GREENHOUSE EFFECT

The main cause of global warming is due to the GREENHOUSE EFFECT (GHE). Greenhouse effect is a natural event phenomenon which helps to keep the planet at a habitable temperature. Without the natural greenhouse effect, the earth would be colder by approximately 30 degrees Celsius. The greenhouse effect is caused by the presence of greenhouse gases like carbon dioxide and methane in our atmosphere. These greenhouse gases help to trap outgoing solar heat and send it back to earth, keeping the latter warm.

Normal Greenhouse

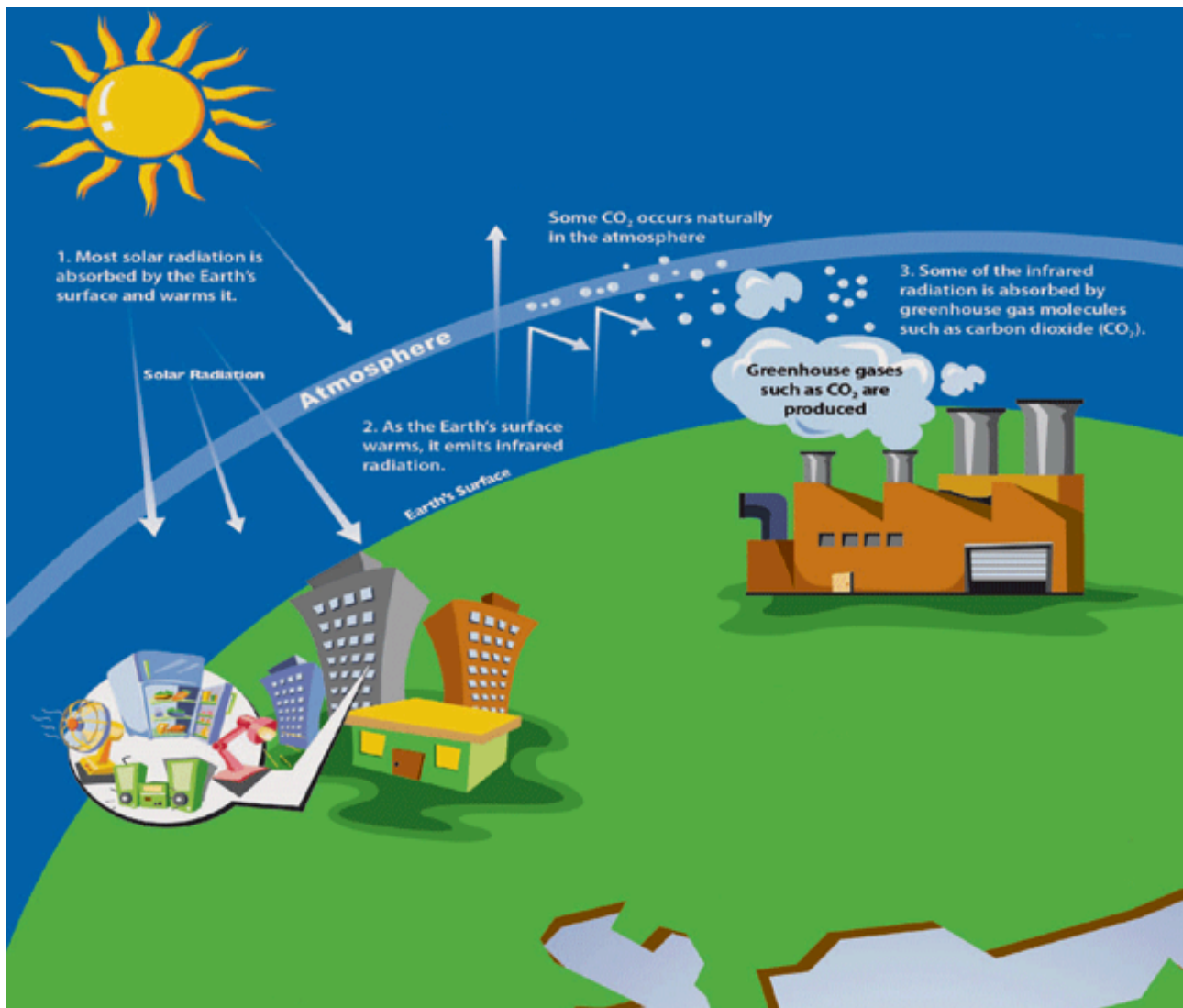




INDUSTRIALISATION AND THE INCREASE IN THE GREENHOUSE GASES

There has been a considerable increase in the concentration of greenhouse gases in our atmosphere. This has been mainly due to human activities: in the form of industrialisation. When the greenhouse gas increased, more of the outgoing heat is trapped and sent back to earth. This leads to the increase of the earth's temperature and is known as global warming

Amplification of greenhouse



Other activities that contribute to the increase in the GHGs in the atmosphere

What human activities contribute to GW?

1. Deforestation

When trees are cut down, carbon dioxide is no longer absorbed by them, thus increasing its amount in the atmosphere. When trees are cut down, carbon dioxide is no longer absorbed by them, thus increasing its amount in the atmosphere.



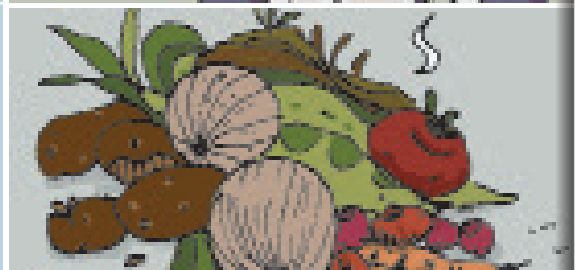
2. Burning of fossil fuel

A lot of carbon dioxide is released in the atmosphere when fossil fuels are burnt in the following ways: transport, industrial activities, electricity generation



3. Waste

Organic waste decomposes to release methane in the atmosphere



4. Agriculture and Farming

Methane is also released in livestock farming (rearing of cattle)

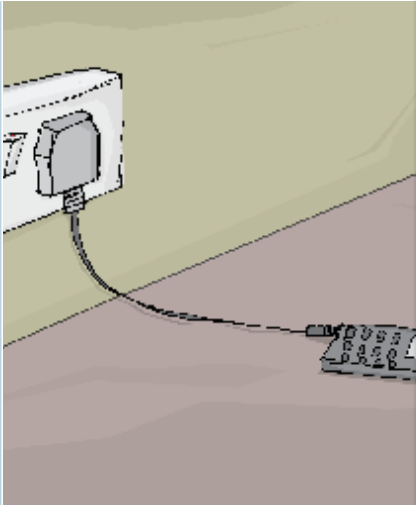
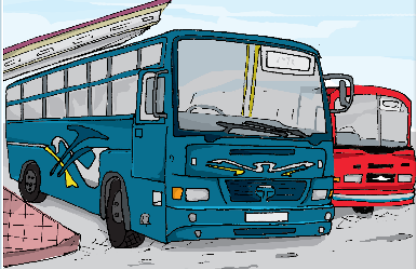






IMPACTS OF CLIMATE CHANGE AND GLOBAL WARMING

Impact	Reason
1. The sea level is expected to rise causing floods in low lying areas.	Melting of ice caps and warming of the ocean due to GW
2. Biodiversity affected	Loss of habitats, Potential emergence of new pests and diseases
3. Crop failures, food shortage, water shortage	Seasonal variations can cause crop failures and food shortages
4. Extremes weather conditions	Droughts and floods are expected to occur more frequently
5. Economic losses	More intense and frequent cyclones
6. Health Implications	Warmer weather will increase in some areas in which parasites such as schistosoma, which causes bilharzias, and Anopheles mosquitoes, which carry malaria, occur. There will be increase incidence of waterborne diseases, such as cholera. The incidence of diseases that affect heart and lungs may also increase as a result of air pollution and warming. There is already a high degree of malnutrition in the world. Changes in temperature and rainfall have a major impact on agricultural production and this can affect world's supply of food and thus increase malnutrition in some areas.

WHAT YOU CAN DO TO REDUCE GHGS AND CC

THEME	GOOD HABITS	ILLUSTRATION
<p>Electricity</p> <p>Most of our electricity is produced by burning coal which releases a huge amount of carbon dioxide in the atmosphere.</p> <p><i>Use electricity responsibly</i></p>	<p>Use electricity responsibly</p> <ol style="list-style-type: none"> 1. Turn off the lights when you are not in the room 2. Avoid leaving appliances on standby mode if you will not be using them 3. Do not leave mobile phone chargers on when not in use 4. While leaving the house for a long period of time, switch off all unnecessary items 	
<p>Transport</p> <p>Carbon dioxide emission from cars and other vehicles is substantial</p>	<p>Use public transport more often</p> <ol style="list-style-type: none"> 1. Use public transport when you can 2. Cycle or walk short distances 	
<p>Trees</p> <p>Trees absorb carbon dioxide and thus prevent it from going into the atmosphere</p>	<p>Plant a tree</p> <ol style="list-style-type: none"> 1. Try to plant as much as you can in your home/school gardens 	
<p>Composting</p> <p>When organic waste decays in landfill (absence of air), they release a lot of methane gas in the atmosphere. Proper composting of organic matter will release little or no methane gas in the atmosphere</p>	<p>Composting organic waste in your garden at home and at school</p> <ol style="list-style-type: none"> 1. Create a separate bin for composting at school 2. Make your own compost at home from organic waste 3. Use compost rather than man-made fertilisers 	



Disaster Risk Reduction

A disaster results when a hazard occurs and impacts on a community, overwhelming its capacity to cope. Disasters affect people, their livelihoods and their environment. The magnitude of impact is directly related to the intensity and scale of a hazard and the vulnerability of individuals and communities.

Disaster risk reduction (DRR) is the concept and practice of reducing disaster risks through systematic efforts to analyse and reduce the causal factors of disasters. Reducing exposure to hazards, lessening vulnerability of people and property, wise management of land and the environment, and improving preparedness for adverse events are all examples of disaster risk reduction.

Disaster risk reduction includes disciplines like disaster management, disaster mitigation and disaster preparedness, but DRR is also part of sustainable development. In order for development activities to be sustainable they must also reduce disaster risk. On the other hand, unsound development policies will increase disaster risk - and disaster losses. Thus, DRR involves every part of society, every part of government, and every part of the professional and private sector.

It aims to reduce socio-economic vulnerabilities to disaster as well as dealing with the environmental and other hazards that trigger them: here it has been strongly influenced by the mass of research on vulnerability that has appeared in print since the mid-1970s.[1] It is the responsibility of development and relief agencies alike and it should be an integral part of the way such organisations do their work, not an add-on or one-off action. DRR is very wide-ranging, therefore. Its scope is much broader and deeper than conventional emergency management. There is potential for DRR initiatives in just about every sector of development and humanitarian work.

Children are among the most vulnerable population group during a disaster, especially those attending school at the time of the catastrophe. During disasters, school buildings are destroyed, taking away the precious lives of children and teachers and stalling access to education in the aftermath of disaster. Rebuilding these schools can take years and is very costly. Learning about

disaster risk in primary and secondary schools help children play an important role in saving lives and protecting members of the community in times of disaster. Making disaster risk education an integral part of the national school curriculum helps to build greater awareness of the issues across entire communities. In addition to their essential role in formal education, schools must also protect children in the event of a natural hazard. Investing in strengthening school structures before a disaster occurs, reduces long-term costs, protects generations of children and ensures educational continuity after the event.

http://en.wikipedia.org/wiki/Disaster_risk_reduction

<http://www.unisdr.org/who-we-are/what-is-drr>

http://www.concernusa.org/media/pdf/2007/10/Concern_ApproachestoDRR%20paper%20-%20final.pdf

<http://www.unisdr.org/2007/campaign/pdf/WDRC-2006-2007-English-fullversion.pdf>



UNESCO and ESD

UNESCO has identified education for natural disaster preparedness as a core issue to be addressed under the Decade of Education for Sustainable Development (DESD). ESD is a most appropriate framework for natural disaster preparedness in three important ways:

- ESD is interdisciplinary and holistic. Therefore, important consideration is given to the impacts on, and relationship between, society, the environment, economy and culture;
- ESD promotes critical thinking and problem solving that is essential to the empowerment of stakeholder groups threatened or affected by natural disasters; and
- ESD seeks to be locally relevant, acknowledging that languages and cultures say and understand things differently, and addresses both local as well as global issues.

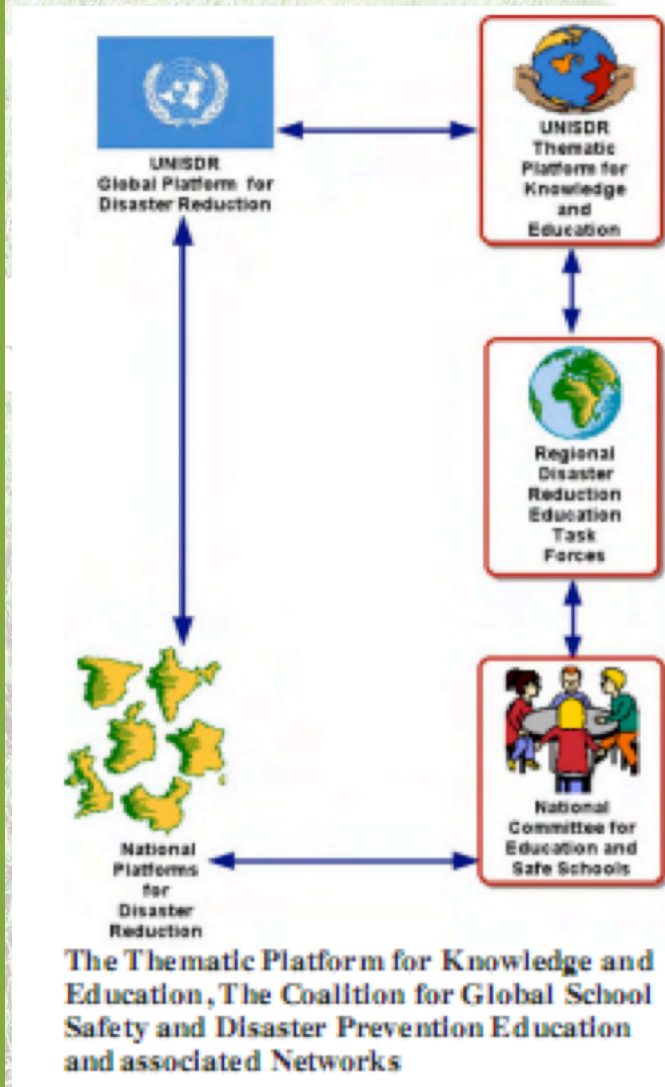
*The document entitled "Natural Disaster Preparedness and Education for Sustainable Development" (www.unescobkk.org/index.php?id=e-publications) provides details of the development of culturally appropriate and locally relevant educational material for natural disaster preparedness that targets key stakeholder groups and integrates Education for Sustainable Development (ESD) principles and strategies. It is expected to develop and strengthen a regional network to implement and further ESD initiatives throughout the region by promoting education for natural disaster preparedness as well as ESD. This will underpin an identified key area of the **Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters.***

UNISDR

The mandate of the United Nations International Strategy for Disaster Reduction (UNISDR) is to serve as the focal point in the United Nations system for the coordination of disaster risk reduction and to ensure synergies among disaster risk reduction.

Its core areas of work includes ensuring **disaster risk reduction (DRR) is applied to climate change adaptation**, increasing investments for DRR, building disaster-resilient cities, schools and hospitals, and strengthening the international system for DRR.

UNISDR's vision is based on the three strategic goals of the Hyogo Framework for Action: integrating DRR into sustainable development policies and planning, developing and strengthening institutions, mechanisms and capacities to build resilience to hazards, and incorporating risk reduction approaches into emergency preparedness, response, and recovery programmes.





The above diagram shows a model for how the work of global, regional, national and local coalitions for disaster risk reduction education and school safety can be linked. In each of these places where knowledge and education is being addressed, Ministries and Departments of Education, school districts, pedagogic leaders, and committed teachers should be found in leadership roles.

A national committee for disaster prevention education and safe schools can serve to link and guide various sub-national initiatives. Ideally the National Committee is linked to the National Platform for Disaster Risk Reduction, and is also represented in a Regional Platform for Knowledge and Education and Safe Schools.

Regional Task Forces in turn feed their experiences and priorities into global level mechanisms for mutual support.

Disaster Impacts on Schools

Natural hazards are not occasional phenomena with unfortunate consequences. Floods, wind and ice storms, drought, volcanic eruption, earthquakes and tsunami lead to about 400 national disasters, an average of 74,000 deaths and more than 230 million people affected every single year (CRED, 2008). These disasters have physical, educational, economic and psychological impacts.

These disasters can all be mitigated with knowledge and planning, physical and environmental protection measures, and response preparedness.

CHILDREN'S**RIGHTS****The UN Convention on the Rights of the Child (1990):**

This recognizes that every child has both the inherent right to life (Article 6) and the right to education (Article 28). Known, expected and recurring hydro-meteorological and geophysical hazards threaten both of these rights. Today as the global commitment to the Millennium Development Goals is avidly pursued, including achievement of universal primary "Education for All" by 2015, deliberate proactive steps are needed to ensuring that every school is a safe school, and that children's education includes the knowledge they need to keep themselves and future generations safe.

The promise of education will only be fulfilled if every new school built is a safe school

"HFA PRIORITY #3"**The UN International Strategy for Disaster Reduction:**

The Hyogo Framework for Action (2005) Priority 3 of the HFA is to: "Use knowledge, innovation and education to build a culture of safety and resilience at all levels." Disasters can be substantially reduced if people are well informed and motivated towards a culture of disaster prevention and resilience, which in turn requires the collection, compilation and dissemination of relevant knowledge and information on hazards, vulnerabilities and capacities. Key activities are:

- (i) Information management and exchange
- (ii) Education and training
- (iii) Research
- (iv) Public awareness

<http://www.unisdr.org/eng/hfa/hfa.htm>

Basic education and disaster prevention go hand in hand. The methods for recognizing and assessing the future impact of hazards, vulnerabilities and risks and identifying strengths and capacities happen to contain the fundamentals of scientific thinking as well as the basics of good citizenship and participatory governance. The values, attitudes and technologies needed for physical protection; informed planning, environmental stewardship disaster-resilient design and construction, are the same as those fundamental to sustainable development and livelihood security. The skills and provisions for disaster response are empowering and confer safety in everyday life. Disaster resiliency is built upon a foundation of analytical and problem-solving skills and draws from the development of personal and inter-personal intelligences.



GOALS OF SCHOOL DISASTER PREVENTION

The goals of a comprehensive school disaster prevention programme are:

1. To save lives and prevent injuries.
2. To prevent interruption of education due to recurring natural hazards.
3. To develop a resilient citizenry able to reduce the social, economic, and cultural impacts of recurring hazards.

The objectives are to create and maintain safe learning environments, teach and learn disaster prevention, and build a culture of safety around school communities.

The solutions are to:

Create safe learning environments with safe construction and retrofit

- Select safe school sites and design and build every new school a safe school.
- Prioritize replacement and retrofit of unsafe schools.
- Minimize non-structural risks from all sources.

Maintain safe learning environments with school disaster management

- Engage school administrators, staff, students and parents in ongoing school community disaster prevention activities.
- Practice simulation drills for expected and recurring disasters and planning for safe reunification.
- Maintain building structural and non-structural safety measures.

Protect access to education with educational continuity planning

- Develop school and national contingency plans in advance.
- Learn and implement “Minimum Standards for Education in Chronic Emergencies and Disasters”.
- Incorporate the needs of children not-yet-in-school, children with disabilities, girls.

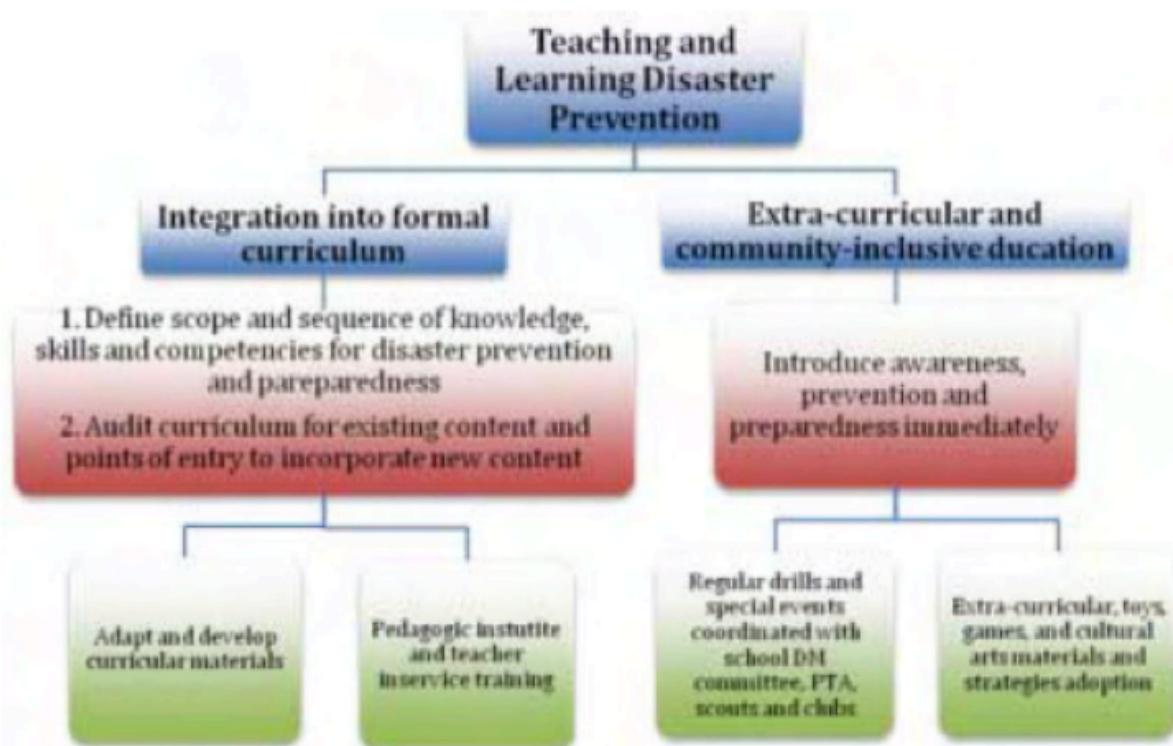
Teach and learn disaster prevention and preparedness

- Disaster prevention and preparedness and principles of disaster-resilient construction and environmental protection inside and outside the curriculum.
- Engage teachers and students in adapting, developing and testing strategies and materials for risk reduction education.

Build a culture of access and safety

- Develop and support training programmes for safe school construction and maintenance.
- Incorporate this content into the curricula of pedagogic institutes and post-secondary trade schools.
- Reach out to and involve school communities through non-formal education.





A c t i v i t i e s



English



Rising temperatures, changes in sea level, changing precipitation patterns, altered seasons and other environmental shifts brought about by CC have been affecting human societies in various ways in many countries including the SIDS.

Evidence shows that floods, wind, ice, storms, earthquakes, drought, volcanic eruption, and tsunami lead to about 400 natural disasters, an average of 74,000 deaths and more than 230 million people affected every single year (CRED, 2008). CC is expected to increase the frequency and intensity of climate-related hazards such as floods, droughts and heat waves. When some vulnerable communities lack the resilience

A recent UNESCO funded ESD project undertaken by the MIE (MIE, 2011) has also provided sufficient information that there has been lack of awareness on CC and DRR at school level. Therefore there is an urgent need to address CC and DRR in our schools equip the learners and their communities with life-saving knowledge and would help them to develop positive coping mechanisms, both as preventive and problem solving measures.

We have taken various steps to address them in this manual which we hope will create a stepping stone to further involvement through the creative ability of teachers to build on what this booklet aim at achieving.

What is the teacher's role?

We are all working in a country in which we believe that education should provide opportunity to all our children

As a teacher, you can really make a difference by informing, challenging and nurturing your learners. We have built the manual around three important and interlinked aspects.

How is this is manual organized?

The manual covers only some major concepts of CC and DRR. The lessons build knowledge, skills, attitudes and values appropriate for primary students. In the first part, we have provided some background information about the CC and DRR so as to build for the teachers. In the second part, a series of learning activities on above themes have been presented in various subjects. Teachers are requested to carry out the activities in their class.

Procedures:

1. The whole class watches the first 10 minutes of An Inconvenient Truth and takes notes on the reasons for Climate Change, its impact on the lives of people and the preventive measures that are being used
2. The whole class watches the first 10 minutes of The 11th Hour and takes notes on the reasons for climate change, its impact on the lives of people and the preventive measures that are being used.
3. The teacher initiates a whole class discussion and feedback on the reasons for climate change, its impact on people's lives and preventive measures currently implemented. (Teacher collects the information in the form of 3 different mind maps- the 1st for the reasons for climate change, the 2nd for impact and the 3rd for preventive measures)
4. Teacher gives each student a sheet of terms of persuasive techniques in the form of a bingo card. As soon as the teacher reads the definitions of individual persuasive techniques, students identify them on their sheet. The first one to finish identifying all techniques shouts Bingo.
5. Teacher initiates class discussion on the effectiveness of these techniques.
6. Teacher divides students into small groups and each group writes a speech on the preventive measures using at least 5 persuasive techniques identified in the game. They need to use the notes that they have taken in class. Students need to cater their speech for GCSE students
7. One person from each group reads his/her speech to the rest of the class.

Note: These speeches can be used to sensitize students of lower classes.



ACTIVITY 2

Debate on Alternative Energy Generation in Mauritius/ Rodrigues/ Agalega

Subject Area: Science/Information Technology/English/French/Oriental Languages

Target Group: Form V – Form VI (lower)

Materials Needed: Computers with Internet access, pens and paper, print materials like brochures/leaflets etc on alternative energy (e.g. photovoltaic system, solar panels, and wind turbines), Debate Roles and Rules (see below)

Aims:

- To identify and develop awareness and understanding of alternative/renewable energy sources; and the advantages of renewable energy in Mauritius/ Rodrigues/ Agalega
- To improve students' analytical and persuasive writing skills
- To enhance students' oral communication skills by verbalizing a debate

Outcomes:

At the end of this activity, students should be able to:

- Share ideas and describe how energy production and consumption affects climate change
- Recognise the necessity for alternative/renewable energy generation and the need to take actions to mitigate the effects of climate change nationally and internationally
- Identify alternative energy sources pertinent to the national context and their advantages in solving global warming problems
- Write and orally communicate an effective and persuasive argument in favour of a particular form of alternative/renewable energy generation

Energy Facts for the World

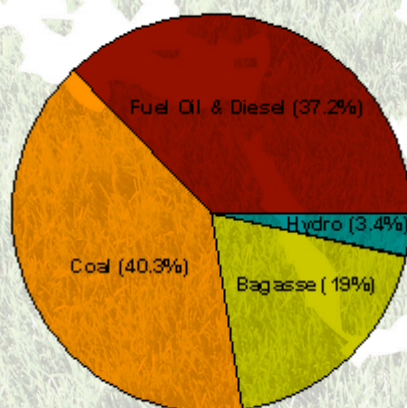
Energy Facts

The USA uses 20 and 30 times more fossil fuel energy per person than people in developing nations.

More than half of the world's electricity is generated using coal. This burns 1.9 billion tons of coal each year.

About 80% of energy needs in Mauritius is derived from burning expensive imported fossil fuels.

Energy Facts for Mauritius



<http://www.gov.mu/portal/sites/cdmmauritiu/undp.htm>

1. Students read energy facts and communicate their reactions
2. Students brainstorm on the damaging effects of fossil fuels and the alternatives.
3. Write the six most common renewable energy sources on the board (e.g., hydroelectric, geothermal, wind, biomass, tidal, and solar).
4. Divide students into six teams (approximately five students per team) and assign each team with carrying out an Internet search on ONE of the six alternative energy sources. [See below for helpful Website links]
5. Have teams provide the following information about their alternative energy source: a definition, three examples of how the source is used, and three advantages and three disadvantages of using the source [much of this information can be found on the Websites listed below]; and how this form of energy generation could be applied in Mauritius/ Rodrigues/ Agalega.



6. Explain to students that they will now be participating in a mock hearing of a Committee for Energy and Natural Resources. The hearing is being held to determine whether or not to explore renewable energy sources in Mauritius/ Rodrigues/ Agalega. Explain that this will be a debate and you will be the Chairperson.
7. Explain to students that in the debate, each team will assume the role of energy experts, trying to persuade the Committee that its opinion and energy source is the right one for Mauritius/ Rodrigues/ Agalega.
8. Write the Debate Roles and Rules on the board and explain to the students, emphasizing that they must adhere to these.
9. Give students 10 minutes to prepare their arguments as a team.
10. Conduct the committee hearing, the students will act as the committee members listening to the energy experts. Each team will have approximately 10 minutes to state its case.*
11. Then the committee will be permitted to ask additional questions. After each team testifies, ask the committee to determine which team was most persuasive and why. And ask the committee to determine which alternative/renewable energy source is most pertinent to the national context (with the intention that they identify wind or solar or hydro).

Teacher's Role

- Guide brainstorming activity and encourage discussion
- Stimulate dialogue and provide additional information/details
- Act as Chairperson for the Committee and enforce the Debate Roles and Rules

Follow up Activity:

- After the debate teams can be prompted to think in terms of energy mix and submit a proposal. (Use table 1 below to initiate the discussion)
- Research career opportunities related to resource management, conservation, and energy.
- Have students do a reading comprehension on a renewable energy passage or article.

Related Links:

http://www.eia.gov/kids/energy.cfm?page=solar_home

<http://www.altenergy.org/renewables/renewables.html>

<http://www.teachers.ash.org.au/jmresources/energy/renewable.html>

<http://www.nrel.gov/>

<http://energy.gov/>

***This is an activity that can be extended over a few classes so as to provide adequate time for research, preparation and debate presentation.**

DEBATE ROLES and RULES

1. Clear statement of main idea in opening statements
2. Presentation of the main topic points
3. Clear closing statements

Roles:

Your team must choose:

- Approx. 2 opening statement presenters – These presenters gather the main arguments into an introductory statement.
- Approx. 2 topic presenters – These present the main arguments for the team.
Each presenter gives specific details.
- Approx. 2 closing statement presenters – These present the closing arguments for the team.

Rules:

1. No taunts or insults.
2. You must raise your hand if it's not your time to speak.



Times: Times:

Each team will speak for approximately 10 minutes.

Procedure:

1. 1. Clear statement of main idea in opening statements
2. 2. Presentation of the main topic points
3. 3. Clear closing statements

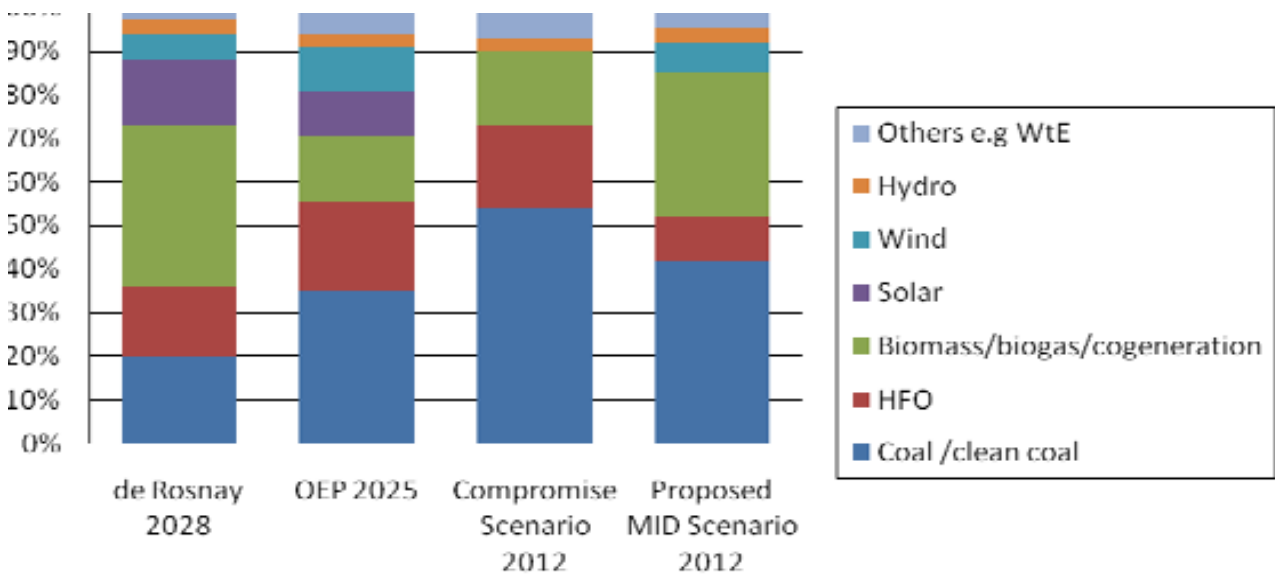


Table 1: Energy Mix <http://www.uom.ac.mu/sites/mid/files/resources/AnalysisandSynthesisReport.pdf>

Key Terms:

Joel de Rosnay-Energy expert

OEP-Outline Energy Policy

MID-Maurice Ile Durable

Wte-Waste to energy

HFO-Heavy Fuel Oil

ACTIVITY 3

ENERGY AND CARS

Subject Area: Science/Information Technology/Art and Design

Target Group: Upper 6

Materials needed:

computers with internet access,
pencils, coloured pens and papers,
cars brochures/magazines/ads

Aims:

- To identify the reasons why attitudes toward fossil fuel and alternative energy sources need to change
- To develop creativity and innovation

Outcomes:

At the end of this activity, students should be able to:

- Identify the problems with the use of fossil fuels to fuel cars
- identify other alternative sources of fuel for cars that are currently under research
- design a car model that is energy efficient

Procedure :

- Carry out a brainstorming on the topic of 'Cars'
- Choose the idea 'Energy' and elicit responses on why fossil fuels are the most popular fuel



- Students study models of cars from brochures to see if it is energy efficient
- Students carry a search on how internal car combustion engines work (fuel energy site and energy quest are helpful websites)
- Students present their findings
- Students carry a search on alternative energy sources that are being developed (ethanol, hybrid, electric, natural gas...) and how do these power the car
- Students present their findings
- Students design a car which would be energy efficient (encourage them to go beyond current research)
- Ask each group to market their product
- Ask other students to vote for the best car model

ACTIVITY 4

Climate Change in the Media

Subject Area: General Paper, Economics and French (main & sub)

Target Group: Upper 6

Materials needed: kitchen paper and markers

Aim:

- To create awareness about the impact of climate change
- To develop students' analytical and communication skills by analysing newspaper headlines (l'express.mu)

List of headlines (L'express.mu) that may be used by teachers:

- **Le prix de la pomme d'amour explose en raison de mauvaises conditions climatiques (4/7/2012)**
- **Les habitants de Camp-Leveux manifestent contre la mauvaise fourniture d'eau (4/14/2011)**
- **Averses à l'horizon et craintes d'inondations (1/8/2006)**
- **Pluies diluviennes: journée catastrophique pour les marchands de rues (12/29/2009)**
- **« Nous risquons une crise alimentaire » (8/25/2010)**



Outcomes:

At the end of this activity, the students will be able to:

- Generate and share ideas on the impact of climate change
- Describe the problems that may arise locally
- Realise the need to take actions to mitigate the effects of climate change

Procedure:

Divide Students in groups and allocate one headline to each group

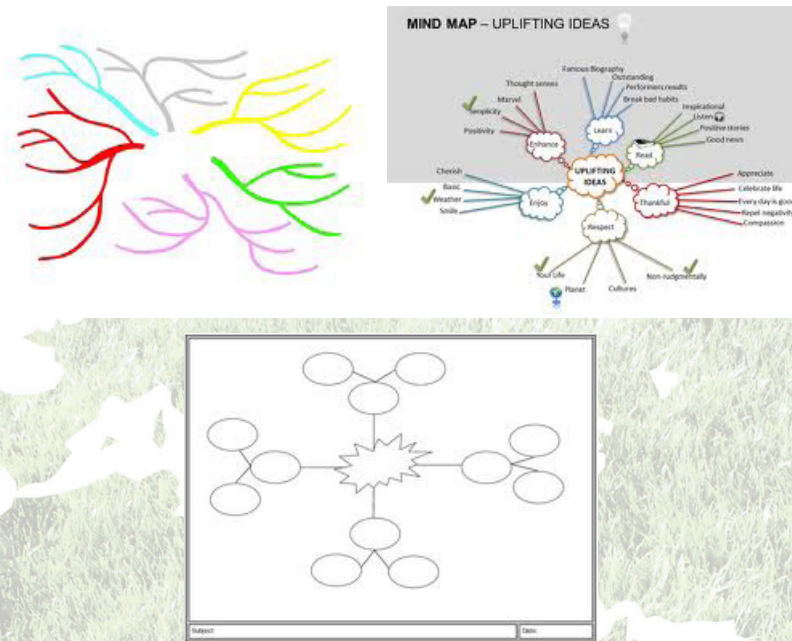
Ask them to:

1. identify the main topic of the article
2. think how the climate is having an impact on the lives of people by implication and extension from the headline (a demonstration by the teacher may be necessary) by using mind-mapping(see below)
3. suggest a list of actions that can be taken to prepare for/fight against the problem under study (encourage students to think 'outside the box,' solutions which they think could have any potential impact)
4. record their analysis on kitchen paper and present to the class

Follow up Activity:

- Students can be asked to interview people (fisherman, farmers, and others) in their community to record their statements of how they are affected by changes in the climate. Then they can propose measures to tackle these specific problems.

SAMPLES OF MINDMAPS FOR TEACHERS (from google)



For procedure 2 what is expected is that the students analyse the impact of climate change mentioned in the headline. For example, when hawkers cannot work during torrential rain, it means, they do not get money, their monthly income suffers and their family also is affected. An extension of this idea must force students to think about other people who cannot work due to torrential rain. For instance, market sellers are also affected as customers do not come etc. It is this information that is presented in a mindmap.



ACTIVITY 5

Disaster! Decisions for Prevention

Subject Area: General Paper

Target Group: Upper 6

Materials needed: Pencils, erasers, rough paper, Disaster Activity Worksheet 1 & 2 (see below)

Aims:

- To promote knowledge of natural disasters and develop understanding of the possible after-effects of a tsunami.
- To engage in decision-taking after crisis.
- To develop awareness on preventive measures for the vulnerable (women, elderly, children)

Table 1: Climate Change and Children

Climate change is increasing the number of disasters which hit children in poor countries, campaigners have warned. According to a study by Unicef, Plan International and Save the Children, there has been a steady increase in disasters linked to climate change over the past 10 to 20 years. It warns that low-level frequent climatic disasters including floods and droughts hit children hard. The report looked at eight countries which regularly experience such events, and found a link between an increase in disasters and diarrhoea, low birth weight and malnutrition. In most of the countries children's education suffered because of disaster damage and illness.



Table 2: Climate Change and Women

Among the 20,000 people who died in France during the extreme heat wave in Europe in 2003 there were more elderly women than men. In natural disasters that have occurred in recent years, both in developing and in developed countries, it is primarily the poor who have suffered—and all over the world, the majority of the poor are women, who at all levels earn less than men.

In developing countries, women living in poverty bear a disproportionate burden of climate change consequences. Because of women's marginalized status and dependence on local natural resources, their domestic burdens are increased, including additional work to fetch water, or to collect fuel and fodder.

In some areas, climate change generates resource shortages and unreliable job markets, which lead to increased male-out migration and more women left behind with additional agricultural and household duties

**Table 3: Climate Change and the Elderly**

Sydney's low-lying Rockdale and Botany Bay suburbs, coastal areas to the south of the central business district and site of the nation's main international airport, were rated most at risk to rising sea levels, flash flooding and extreme heat.

The two suburbs were also rated a high risk because they were home to a large percentage of elderly and low-income residents who could ill-afford air conditioners to combat killer heatwaves or renovations to make their homes more thermally efficient.

The study said about 176 people aged 65 or older die each year in Sydney due to heat-related causes. It said heat-related deaths could rise to between 432 and 1,042 by the end of the century, particularly amongst the elderly and young children in families least able to regulate their environment.





Procedure:

1. Divide students into small groups.
2. Give each group the one of the above case studies as warming up activity. Elicit responses on the effects of natural disasters on vulnerable groups in society.
3. Provide Disaster Worksheet 1, page 1, 2, 3.
4. Provide Disaster Worksheet 2 and get them to finalise their decisions.
5. Each group then provides oral feedback to the whole class explaining which patients they chose and explain why if their decisions changed.
6. After these activities, engage students in discussions on why the tsunami may have victimized the vulnerable.
7. Ask students to make a list of preventive measures that must be taken by authorities and individuals to prevent more casualties in the future. This list can be in form of leaflets or posters that are distributed or displayed in the school.

DISASTER WORKSHEET 1

Page 1

There has been a major tsunami in the Indian Ocean.

Many of the hospital staff are unable to get to the hospital to work or are injured themselves.

There is a limited amount of doctors and nurses; and medical supplies are running out.

You have enough equipment and beds to treat 4 patients.

Read through the following information and decide as a group who you will treat and why.





Patients

Page 2

Christian is a 9 year old boy with a suspected broken leg. He is brought in with his 3 year old sister. His parents have not been found.



Marie is Christian's sister. She is 3 years old and unconscious with a serious head wound.



Urmila has sprained her wrist and has cuts and bruises to her legs which are full of debris. She is 72 years old.



Mohamadally is an old fisherman who has a severe leg injury.



Virginie is a part-time care worker for the elderly. She is married with two children, both under 5 years of age. She is suffering from internal bleeding.



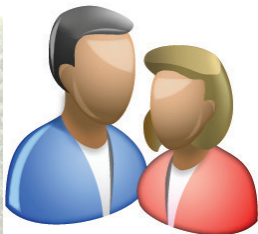
Sameerah is a 6 month old baby. She is unconscious and unresponsive. Her parents have not been found.



Our decision

Page 3

Our group has decided to treat the following 4 patients



Because



Because



Because



Because



DISASTER WORKSHEET 2

Page 1

- +** Christian is also a diabetic
- +** Marie has sustained brain damage
- +** Urmila has devoted her life to voluntary work helping orphans
- +** Mohamadally has recently lost his wife and has a teenage son who is still studying.
- +** Virginie is HIV Positive (from a blood transfusion during childbirth)
- +** Sameerah has leukaemia and is currently receiving radiation therapy

After receiving the additional information our decision changed/did not change because:

Persuasive techniques Bingo Card

Emotive words	Forceful phrases	Short sentences/ paragraphs	Contrasts	Exaggeration	Criticise the opposite opinion	Shock tactics
Clusters of Three	Personal pronouns	Humour	Statistics	Quote from a reliable source	Repetition of words and phrases	Rhetorical questions

Definitions of the terms

1. Questions that do not require an answer- (rhetorical question- students write 1 in the box where there is rhetorical question)
2. Demonstrating differences in viewpoint. (Contrasts- students hopefully write 2 in the box where there is contrasts)
3. Destroy the point of view of the opposing argument. (Criticise the opposite opinion- students write 3)
4. Using words like 'we', 'us' and 'you' to make the writing more appealing in order to create a bond between writer and audience. (Personal pronouns)
5. Making the reader surprised or horrified. (shock tactics)
6. Being over- the-top to get a point across. (Exaggeration/ hyperbole)
7. Opposite of long and complex sentences. Instead points are organised in simple structures. (Short sentences/ paragraphs)
8. Expressions/ examples used in order to make the audience either smile or laugh. (Humour)
9. Add the words of a professional on that particular subject. (Quote from a reliable source)
10. Include numbers/ graphs to provide convincing evidence. (Statistics)



11. Three words/phrases which mean more or less the same thing in order to emphasize a point.
(Clusters of Three)

12. Using phrases like 'I urge', 'I demand' to create a sense of urgency to get things done.
(Forceful phrases)

13. Using the same word or phrase several times to create an effect. For example, Barack Obama in his Inauguration Speech said 'Yes we can!' several times. (Repetition)

14. Use strong words that arouse certain emotions in the audience. 'We need to save our unique and fascinating planet from total destruction.' (Emotive words)

Instructions to the Persuasive Bingo Game

1. Teacher photocopies the bingo card above and gives it to all students.
2. Teacher starts reading the definition. Under each definition students need to write the number of the definition. For example, teacher reads 'Question 1, Questions that do not require an answer', teacher gives students time to write number 1 under Rhetorical questions. Then teacher reads question 2, gives them time to find the answer and put it in the right box. After all questions are read, teacher asks the answer. Students self- correct or teacher can decide on peer assessment. Once done, the student who gets all the answers correct shouts Bingo.

(Bingo game adapted resource from teachit.co.uk)

A c t i v i t i e s



Mathematics



Greenhouse Gases

Subject Area: Science for All/Science/Mathematics/Additional Mathematics/Information Technology

Target Group: Form 4

Aims:

To develop an understanding of one of the major greenhouse gases namely CO₂ through mathematical concepts

Materials needed: 10 cards with the name of different gases including greenhouse gases and 3 tables (see below)

Outcomes:

At the end of this activity students should be able to:

- Identify the sources of CO₂ emissions
- Represent figures in a bar chart
- Analyse and report the main trends

Procedure

- Ask students to classify the cards in GHG or non GHG
- Provide table 2 for checking
- Ask students which gas do they think is most responsible for global warming
- Brainstorm on the sectors producing CO₂ in Mauritius
- Ask students to tick in table 1
- Provide table 3 for study and compare with ideas received earlier

- Provide instructions on making a bar chart/pie chart
- In pairs ask students to represent the information in a bar chart
- In pairs ask students to report the main information in writing

Follow up Activity

- Students can be asked to predict total CO₂ emissions for 2005 and 2012 and represent information in a line graph or any other suitable form
- Students can be asked to carry out research on how CO₂ is emitted from these sectors.

Note: The same activity can be done in the Computer class where students can be shown how to draw graphs using Microsoft package

Table 1

Greenhouse Gas	Chemical Formula
Carbon Dioxide	CO ₂
Methane	CH ₄
Nitrous Oxide	N ₂ O
Tropospheric Ozone	O ₃
CFC-12	CCL ₂ F ₂
HCFC-22	CCl ₂ F ₂
Sulfur Hexafluorid	SF ₆

Main Greenhouse Gases accessed at <http://www.c2es.org>



Table 2

Sectors in Mauritius	Yes	No	Uncertain
Agriculture, fishing			
Real estate activities			
Government			
Financial intermediation			
Post, telecommunications			
Other services			
Paper; printing			
Wholesale, retail trade			
Hotels; restaurants			
Other manufacturing			
Food drink tobacco excl sugar			
Metal and mineral products			
Construction			
Textiles			
Chemicals			

Table 3

Sector in Mauritius	Carbon Dioxide (CO ₂) equivalent Thousand tonnes
Agriculture, fishing	428.1
Real estate activities	42.5
Government	66.4
Financial intermediation	24.9
Post, telecommunications	24.2
Other services	257.9
Paper; printing	24.6
Wholesale, retail trade	157.2
Hotels; restaurants	139.8
Other manufacturing	95.3
Food drink tobacco excl sugar	175.3
Metal and mineral products	99.1
Construction	150.8
Textiles	480.8
Chemicals	45.8

<http://www.gov.mu/portal/goc/cso/ei777/envi.pdf>

Central Statistics Office, Ministry of Finance and Economic Empowerment, Port Louis July 2009

A c t i v i t i e s



C h e m i s t r y



Subject Area: Chemistry & Environment

Target: Secondary Level Students (ages 14 to 17+)

Aim:

To make students develop links between human activities and effects on our environment.

Objectives:

To develop awareness of concepts that affects absorption of heat energy and rise in temperature of materials in our environment.

Materials used:

- Plastic cup
- Stainless steel vessels of a different shape or size
- Glasses with different taints
- Water
- Ice cube tray / Ice cubes

Procedure:

1. Add about 60 cm³ of tap water to the different vessels.
2. Place two similar pieces of ice in the water.
3. Record the time for the ice cubes in each vessel to melt completely.

Title: Time taken for melting of ICE cubes in different vessels.



Fig 1 shows different vessels containing water

- A : brown tainted tea cup (glass)
- B : stainless steel mug
- C : plastic cup
- D : black tainted glass
- E : stainless steel cup (thick)
- F : stainless steel cup

After adding Ice cubes

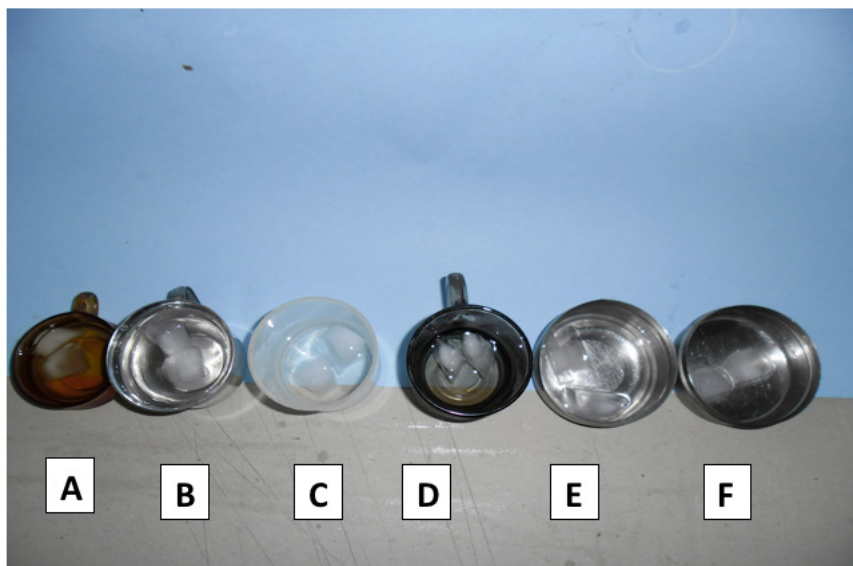


Fig 2 shows different vessels containing 2 pieces of ice respectively.

Steps:

1. After 5 minutes

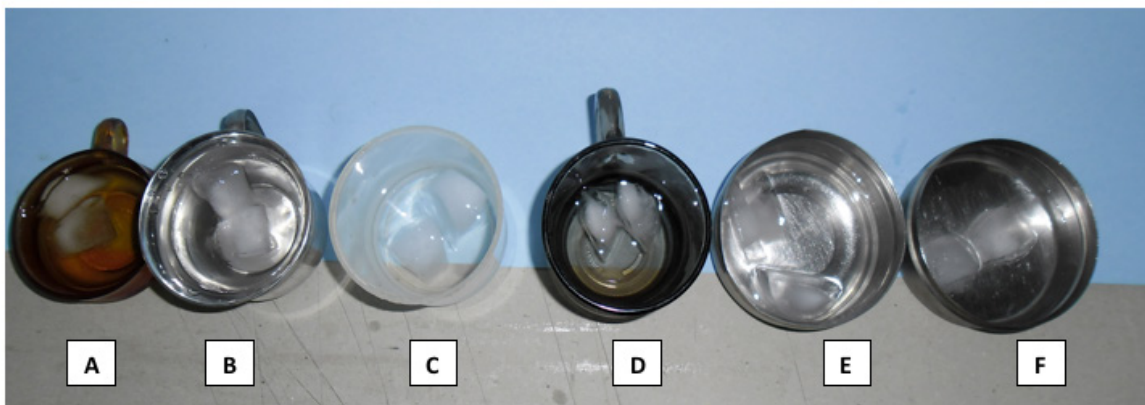


Fig 3 shows melting of ice after 5 minutes



2. After 20 minutes

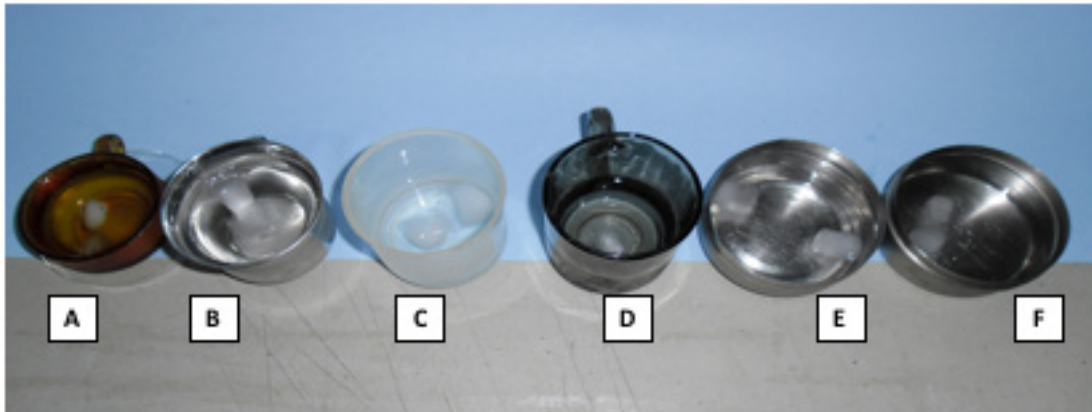


Fig 4 shows melting of ice after 20 minutes

3. After 40 minutes

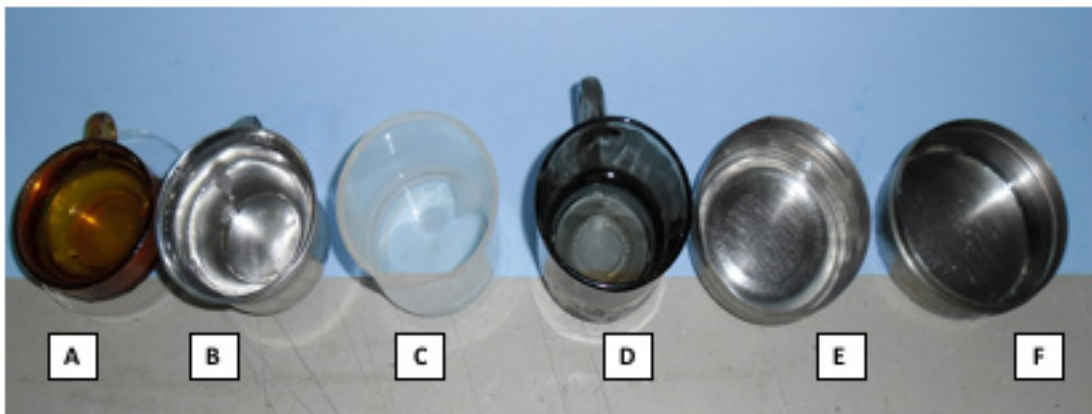


Fig 5 shows melting of ice after 40 minutes

4. After 80 minutes

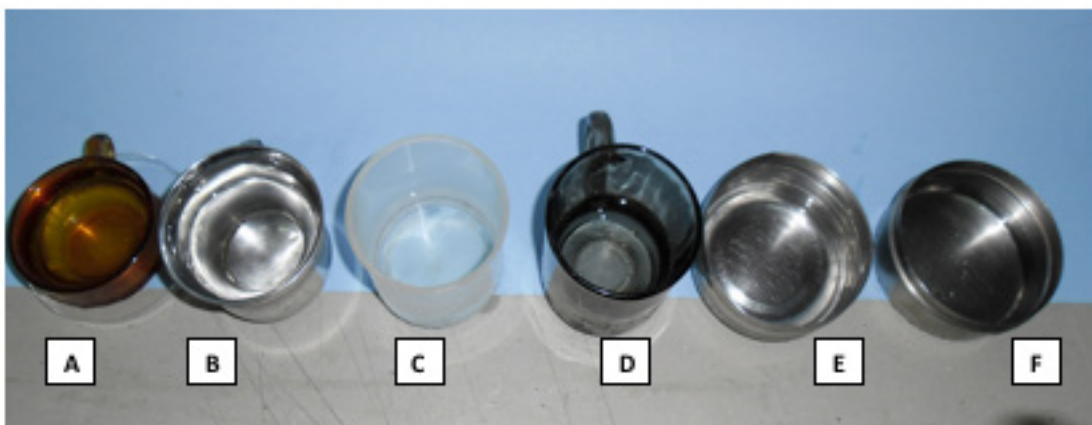


Fig 6 shows melting of ice after 80 minutes

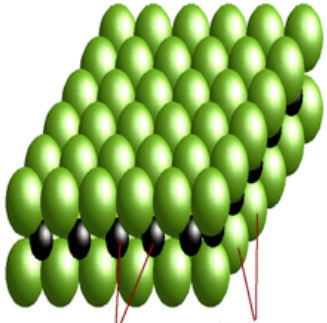

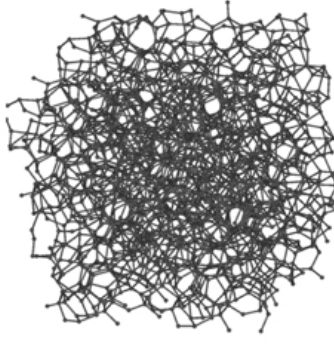
Table of results:

VESSELS	Time taken for the ice cubes to melt completely (Minutes)
A	40
B	70
C	75
D	50
E	60
F	55

Table 1 shows the time taken for ice cubes to melt completely

Discussion

Transfer of heat through materials depends on their structures. Metals, alloys, plastics, glass, rocks, ceramics, paper, concrete and other materials have different structures as shown below.

		
<p>Fig 7 shows structure of metals</p>	<p>Fig 8 shows structure of plastics</p>	<p>Fig 9 shows structure of glass</p>
<p>Strong chemical bonds with mobile electrons</p>	<p>Strong chemical bonds with no mobile electrons</p>	<p>Strong chemical bonds with no mobile electrons</p>



References

Molecular structure of a particle, of polystyrene. Polystyrene is a common plastic that is used for the manufacture of CD cases and foam drink cups, and many other articles.

<http://www.shutterstock.com/pic-95795035/stock-photo-molecular-structure-of-a-particle-of-polystyrene-polystyrene-is-a-common-plastic-that-is-used-for.html> (Accessed on 13/06/2012)

Structure of glass <http://vopatu.mrbasic.com/3005/home/amorphous-glass-structure> (Accessed on 13/06/2012)

Metal Information: What is a Metal? <http://www.green-planet-solar-energy.com/metal-information.html> (Accessed on 13/06/2012)

A c t i v i t i e s



P h y s i c s



Subject Area: Physics

Target Group: Form 4/Form 5

Topic: Transfer of Thermal Heat—Radiation

Aim:

To sensitize students on the use of thermal emissivity and absorbance to mitigate the effects of climate change

Outcomes:

Through this activity, students are expected to:

1. Reinforce their knowledge of good emitters/absorbers of infra-red radiation;
2. Extrapolate this knowledge to applications that will help mitigate the effects of climate change.
3. Understand that white rooftops, being less effective absorbers of radiation than black surfaces will cool down buildings, thus reducing the use of air-conditioners and cutting down the emission of greenhouse gases.
4. Find other applications of radiation in fighting climate change, e.g. the greening of urban areas (because trees, being for the most part dark in colour, are good absorbers of thermal radiation).

Procedure:

Case Study: As the mayor of Smart City, you are very concerned about the alarming rise in temperature caused by global warming and you have decided to implement a policy whereby all building/house owners are required to paint their premises in light colours. Failure to comply with the policy will result in a fine. Using your knowledge of the topics covered so far, how will the use of light colours help in fighting global warming? Based on your answer, discuss others ways of mitigating the effects of climate change.



Role of Teacher:

1. Use the above situation as a class discussion, a project or exam question.
2. Encourage students to apply their physics background to real-life situations, in this case to protect Earth by fighting climate change and to better adapt to the changes caused by this phenomenon so far.
3. Prompt students to develop their analytical skills and imagination.

Resources:

<http://iopscience.iop.org/1748-9326/7/2/024004/article>

<http://news.nationalgeographic.com/news/2010/03/photogalleries/100324-global-warming-geoengineering-pictures-asilomar/>

<http://www.phys.unsw.edu.au/.../The%20Physics%20of%20Climate.ppt>

<http://news.nationalgeographic.com/news/2010/03/photogalleries/100324-global-warming-geoengineering-pictures-asilomar/>



Target Group: Form V/VI

Topic: expansion of water

Aim:

To demonstrate the expansion of water and its consequences

Objectives:

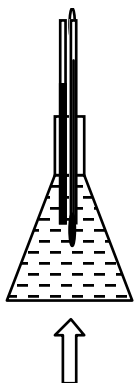
By the end of the lesson students should be able to:

1. Demonstrate the expansion of water
2. Calculate the increase in volume of water produced by an increase in temperature
3. Relate the expansion of water investigated in the lab to what is happening in the oceans due to global warming
4. Explain the consequences of rise in sea level to the activities in Mauritius, Rodrigues and Agalega
5. Explain what should be done to avoid such problems in the future
6. Explain what should be done to adapt to such a changing situation

Materials required

- Conical flask or round bottomed flask
- Rubber bung
- Glass tube
- Coloured liquid
- Half metre rule
- Travelling microscope
- Bunsen burner
- Thermometer

Apparatus



Procedure

1. Measure the internal diameter of the glass tube using the travelling microscope
2. Use the materials to mount the apparatus as shown
3. Measure the initial temperature of water
4. Measure the initial length of the liquid column in the glass tube
5. Heat the water and observe the rise in the level of water
6. Measure the final temperature of water and the final length of liquid column
7. Calculate the initial and final volumes of water in the tube
8. Calculate the increase in volume when there is a respective increase in temperature

Diameter of glass tube:

Initial temperature of water:

Initial length of liquid column:

Final temperature of water:

Final length of liquid column:

Initial volume of water:

Final volume of water:

Increase in volume of water for 5 degree rise in temperature:

9. Explain qualitatively and quantitatively what would happen to the oceans if the temperature of the Earth (including oceans) rises by about 5 oC in the coming years

.....
.....
.....

10. Describe the scenario especially in the coastal regions, who will be affected and how; how business, leisure activities, tourist industry, fishing industry etc will be affected

.....
.....
.....
.....
.....
.....



11. What should we do to avoid such a situation in the future and to adapt to this change?

.....

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A c t i v i t i e s



Technology **(ICT Design and Technology)**



ACTIVITY

RE-USE OF LIGHT CARD PACKAGING

Subject Area: Design and Technology and Design and Communication

Target group: Form 4 and 5

Aim:

Help pupils to reuse an existing light card packaging and to develop the attitude of reducing waste by reusing and recycling and finally be concern about global warming.



Objectives:

At the end of this activity pupils will be able to:

1. Identify an event where a light card packaging is needed.
2. Produce the design for a packaging
3. Draw the net development of the packaging
4. Develop their skills of marking out, cutting, folding, painting and assembling.
5. Realize a new packaging with appropriate graphics related to an event.
6. Demonstrate positive attitude related to issues of protecting the environment by reusing instead of producing waste.
7. Be aware of facts about paper and light card making.
8. Be concern about global warming by reusing and recycling.

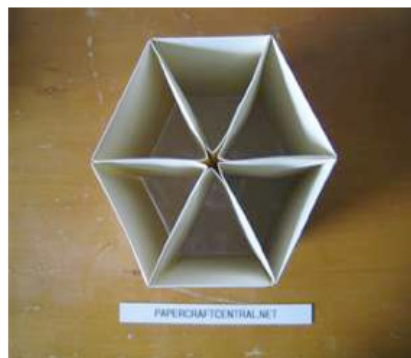
Materials needed:

- Plain Paper
- Existing light card packaging
- Paper glue
- Scissors/ paper cutter
- Pencil
- 30 cm ruler

Teacher's role

- Teacher act as a facilitator
- Demonstrate some existing packaging made of light card for a specific event.
- Provides facts about paper making and how reusing light card or paper can help reduce global warming.
- Ask pupils to bring some empty packaging made of light card such as "Cornflakes", "Weet-abix", milk box, shoes box, etc... from their home environment.
- Help pupils to identify an event where there is need for a small packaging such as " Divali", " Eid festival", Birthdays, Spring Festival etc... for the distribution of cakes and pastries among friends, relatives and neighbours.
- Ask pupils to sketch and then draw appropriate graphics related to the event chosen on the sides and top surface of the new packaging.
- Ensure that the net development of the new packaging fit in the flat surface of the existing light card packaging.
- Follow all safety procedures when realising the new packaging.

BELOW ARE SOME EXAMPLES OF PRODUCTS MADE BY REUSING EXISTING PACKAGING.





BELOW ARE THE MAIN STEPS TO FOLLOW FOR RESUING AN EXISTING PACKAGING

Procedures

Step 1: Collect some existing light card packaging such as “Cornflakes”, “Weetabix”, milk box, shoes box, etc...

Step 2: Make flat the existing light card packaging by unfolding and ungluing.

Step 3: Decide on an event where a small packaging is needed such as “Divali”, “Eid festival”, Birthdays, Spring Festival etc....

Step 4: Produce some ideas for the new packaging and the graphics to fit in the event selected.

Step 5: Finalize on the dimensions so that the net development of the new packaging fit on the flat surface of the existing light card packaging.

Step 6: Draw the net development of the new packaging with glue tabs, supporting flaps and opening flaps, see thru and fold lines.

Step 7: Mark out then cut to size and fold to form the shape of the new packaging.

Step 8: Draw the chosen graphics on the sides and top surface. Use colours to make it attractive.

Step 9: Apply glue and assemble to form the new packaging.

HOW DOES THIS ACTIVITY EXPLAIN GLOBAL WARMING?

Pupils will be aware of:

- The facts about paper and paper waste
- The use of trees and mass deforestations contribute to global warming.

POINTS TO REFLECT UPON AS FROM NOW.

Bringing a change in attitude and culture about reducing , reusing and recycling. What can I do to reduce global warming? Should we protect or destroy trees and forests?

ACTIVITY 2

Investigating Electricity Production and Climate Change

Curriculum area: Design & Technology

Target group: UPPER SECONDARY

Aim:

Being energy wise. Relationship between electricity production and global warming. How can consumer electricity choice address global climate change?

Learning Objectives

At the end of this activity pupils will be able:

- To know that many everyday appliances use electricity.
- To investigate that electrical appliances have power ratings measured in watts or kilowatts.
- To differentiate between 'power' and 'energy'.
- To calculate out how much energy an appliance uses.
- To know how the electricity bill is calculated
- To be aware of various means of producing electricity.
- To monitor how much energy we use.
- To understand what is meant by 'global warming'.
- To understand how our increased electricity consumption can cause climate change and affect the local and global environment?
- To make a difference by bringing a change in our way of life.

Teacher's role

- Teacher start a brainstorming session about global warming
- Teacher act as a facilitator
- Demonstrate some pictures or existing everyday electrical appliances.
- Analyse a local electricity bill in class
- Provides information and facts about electricity production, both locally and internationally.
- Brainstorm ideas with pupils about electricity made from fossil fuels, water and other sources.
- Discuss with pupils about means to reduce electricity consumption at home, and at school
- Explain how electricity production contributes to global warming.
- Provide information about the consequences of global climate change.

How do we measure electricity use?

- Power – we measure the rate at which an appliance takes power from the electricity supply in watts or kilowatts (W or kW).
1 kilowatt is the same as 1000 watts

How long is it on for?

- Energy – we work out how much electrical energy is used by multiplying the power of the appliance (kW) by the number of hours it is used for. This gives the amount of energy used in kilowatt-hours or kWh.



- One kWh is the energy used when one kilowatt of power is used for one hour.

Which one uses the most energy?



- A 1 kW microwave oven, used for 2 hours?
- A 1 kW vacuum cleaner, used for 1 hour?
- A 3 kW kettle, used for 1 hour?

Power and energy

- Remember that 1000 watts = 1 kilowatt
- If one light bulb uses 20 watts of power....How many light bulbs would use 100 watts?
- How many light bulbs would use 1000 watts or 1kW?
- If all these light bulbs were left on all day from 8 in the morning to 6 at night, how many kWh of electricity do they use?
- Now investigate how many light bulbs are there in your school and at home and how much power are used.?

Analyse an electricity bill

How do we calculate the amount of electricity we pay?
What are the various types of tariff do we have locally?
What penalties are applied for late payment of bills?

POINTS TO REFLECT UPON

How this activity has helped us to be energy wise and be concern about climate change and global warming?

A c t i v i t i e s



**Design & Clothing
& Textiles**



Subject: Design and Textiles

Theme: Consumerism

Target Group: Form VI

Focus:

The clothes we wear and the textile they are made from can cause much damage to the environment especially with unsustainable textile manufacturing. Clothes take up precious space in landfill sites and this can be avoided by recycling and reusing clothes

Aim

To encourage students to reflect on the impact of consumerism and the fashion industry on climate change.

Learning Outcomes

Students should be able to:

- Show awareness of the effect of consumerism on the environment
- list the major steps involved in the making of clothes and consider the impact of each textile manufacturing process on climate change
- cooperate in groups and share ideas on simple actions for green consumerism

Teaching Strategies: Brainstorming, discussion, oral questioning and groupwork

Resources: Pictures/video on landfills

Procedure

1. Brainstorm on students' choice of clothes and their buying frequency. Initiate a class discussion on the effect of consumerism on our environment, especially with the growth in population and increase of demand. Sensitize students of their responsibility when they over-consume by showing them pictures/video on landfills. ["Landfills and dumps poison our air, water, land, and food supplies and their use fuels an unsustainable linear system of consumption and wasting. As the largest human-created source of methane gas, landfills are also a significant contributor to global climate change" (<http://www.no-burn.org/section.php?id=86>)].
2. Using a flow chart, invite students to list the major processes involved in the making of clothes, from the manufacture of fibres to consumers buying clothes. Encourage students to consider each stage and its impact on the environment.

[e.g. farmers use pesticides to protect cotton plants as they grow, which can harm wildlife, contaminate water and food we eat.

e.g. cellulose from trees are used for the manufacture of viscose rayon (Fibrane).

e.g. fossil fuels are used in the manufacture of synthetic fibres (Nylon, Polyester, Acrylics).

e.g. the dyeing and finishing processes consume much water and use many chemicals.]

3. Organise students into small groups of 5 to 6. Ask the groups to discuss of the various ways we can properly dispose of old/unwanted clothes and propose simple actions for green consumerism.

[e.g. buy clothes only when necessary as overconsumption will lead to greater waste and use of resources.

e.g. buy good quality clothes which last longer.

e.g. give away old/unwanted clothes by giving to charity/ family/ friends.

e.g. collect old clothes at the level of the school and give to poor families in the community or send to African countries.

e.g. reuse old clothes or textile scraps/waste from dressmakers/textile industries to make items for use in the home or at school e.g. cushion covers, table mats, floor mats.

e.g. buy recycled clothes or eco-labelled clothes or clothes from organic materials e.g. organic cotton, pineapple fibre or clothes made from fair trade.

e.g. sensitize peers and family to adopt eco-fashion.

e.g. adopt concept of three R's.]

4. Each group leader reports their answers to the class.

5. Conclude the lesson.

Resources:

<http://www.stepin.org/casestudy.php?id=ecofashion&page=1>

<http://www.no-burn.org/section.php?id=86>

http://www.outsapop.com/2009/08/fashion-business-after-sale-insanity.html#.T9WtD_XdeM8



Resources: Pictures



Textile wastes from Textile and Clothing industries





Children and elderly workers in a textile and clothing industry in China





Discharge from dyeing and finishing of jeans in a textile and clothing industry in China



Sandblasting to finish jeans in a textile and clothing industry in Bangladesh

A c t i v i t i e s



Food & Nutrition
Food Studies



EFFECT OF CLIMATE CHANGE ON THE DIET

Subject Area: Food and nutrition

Target group: Form 4-5

Aim:

To sensitise students about the impact of climate change on the diet

Outcomes:

At the end of this activity, the pupils should be able to:

- Name the factors affecting the nutrient content of foods
- Identify climate change as factor which influences the diet in terms of changes to the nutritional content of food and availability of food
- Realise the importance of caring for our climate

Instructions:

Step one: Introduce the topic “the nutrient content of foods” in class.

Step two: Group work

Divide the class into groups of 3 or 4 depending upon the number of students

Ask students to prepare a list about:

- The factors affecting the nutritional value of foods.
- Practices that lead to a loss of nutrients
- Practices that conserve nutrients
- Practices that enhance nutritional value

Step three: Brainstorming session.

Write out the examples provided by the students on the whiteboard. (Use half the board)

Prompt students about climate change. Do they think there is a link between climate change and the nutritional value of foods? Does climate change affect food production? Could it lead to malnutrition?

Ask students about personal actions which they can implement to reduce climate change.

Educators may make use of the points provided on the next page regarding impacts of climate on the diet.

Role of educator:

- 1) To guide brainstorming activity and encourage discussion
- 2) To provide students with facts about how climate change impacts upon the diet.

HELPFUL POINTS FOR THE EDUCATOR

Factors affecting the nutritional value of foods are:

- The species or type of plant or animal
- Where or how they are grown or reared
- The effect of harvesting and slaughter
- The time taken to transport food
- The effect of processing the food in a factory
- The amount of wastage when preparing a food
- The effect of various processes and cooking practices in the kitchen

(Source: Food and Nutrition, Anita Tull)

All extreme events particularly in relation to reduced water from rainfall, destroy or damage a wide range of crops and livestock – changes in cost and availability of food.

Climate changes especially in relation to reduced rainfall and available water – change in ability to grow certain foods in certain areas.

Temperature and CO₂ increase – changes in crop yields and protein levels.

Temperature increase – affect feed intakes and animal reproduction.

(Source: Health impacts on climate change: adaptation strategies for Western Australia.)

One of the major consequences of climate change will be lack of food. The relationship between disease and malnutrition goes both ways: disease has an impact on nutrition and under-nutrition increases the risk of disease.

(Source: Science for environment policy, issue 18, February 2010)

Examples of actions which help in reducing climate change:

- Turn off lights, appliances, televisions and computers when they are not needed.
- Encourage family members to read newspapers online instead of buying printed newspapers
- Encourage parents to make use of energy efficient bulbs
- Encourage family members to recycle
- Bring your packed lunch in a plastic container instead of a new paper bag or plastic bag daily.

Example of activities at school level:

The environment club could provide 2 large bins which are labelled paper and plastic. All unwanted newspapers, magazines and paper wrappers could be thrown in the papers bin. Plastic bottles and empty plastic bags could be thrown in the plastic bin. At the end of the school week, these bins will be collected by recycling institutions.



CLIMATE CHANGE AND FOOD POISONING

Subject Area: Food studies

Target group: Upper VI

Aim:

To sensitise students about the link between food poisoning and climate change

Outcomes:

At the end of this activity, the pupils should be able to:

- Demonstrate an understanding of the status of food poisoning in Mauritius
- Share ideas and describe how climate change has an impact on health via food borne diseases.
- Realise the importance of caring for our climate

Instructions:

Step one: Introduce the topic food poisoning as per the food studies syllabus.

Step two: Group work

Divide the class into groups of 3 or 4 depending upon the number of students

Ask students about the trend of food-borne diseases in Mauritius.

Each group is asked to prepare a list of food poisoning cases that they know about.

Encourage students to think about what were the possible causes of these food poisoning outbreaks.

Step three: Brainstorming session.

Write out the examples provided by the students on the whiteboard. (Use half the board)

Prompt students about climate change. Do they think there is a link between climate change and food-borne diseases?

Encourage students to provide examples on how they can protect themselves against food-borne illnesses.

Ask students about personal actions which they can implement to reduce climate change.

Teachers may make use of the facts provided on the next page regarding health impacts of climate change.

Role of educator:

- 1) To guide brainstorming activity and encourage discussion
- 2) To provide students with facts about:
 - Food poisoning in Mauritius
 - Health impacts of climate change.

A c t i v i t i e s



Art & Design



ACTIVITY

“3-Dimensional Sculpture using Materials from the environment”

Subject Area: Art & Design

Target Group: Lower Six and Upper Six

Aim:

To Develop Student’s creative thinking skills in planning, assembling and creating of a 3-D sculpture using materials from their environment.

Materials Needed:

- * Glue
- * Wires (of Different types)
- * Kitchen papers
- * Sketch pens/pencils

Outcomes:

At the end of this activity, the students will be able to:

1. Develop through their sketches various ideas using the PARIS sequence-Plan-Analyze-Research-Ideas-Solution.
2. Demonstrate the ability to look, observe and collect found objects from a creative perspective.
3. Understand that we can make an artwork using recycled materials.
4. Showcase their artworks to sensitize others about the importance of re-using any materials through creating an artwork.

Procedures:

- * Theme: Decide on a theme e.g.: An Extinct bird or any other animals
- * Confirm the maximum size limit with the students (100 cm x100 cm x100 cm)
- * Brainstorming: Have a classroom discussion and note down the key words and terms on the board for 10-12 minutes where they can generate various ideas through a sharing their point of view.
- * Prompt students to think and sketch in small groups of 5 about what materials they can use to construct their sculpture.
- * In small groups students need to look for materials such as plastic bottles, paper, and non organic materials which they can find around the school. (Under supervision). A week prior to the activity they may start looking for found materials.
- * The students will then in small group sketch and develop their proposed ideas until they come up with a final solution.
- * Then they may start assembling their artworks using the support of glue, wires and pins.
- * The artworks should then be exhibited in the classroom-or a spot visible to all students in the school.

Role of the Teacher:

- * The Teacher act as a facilitator.
- * Discuss and acknowledge with the students through the brainstorming.
- * Reinforce the student's ideas during the development of ideas.
- * Facilitates the setting of an exhibition of the artworks.

Example of Artwork which may inspire the students-<http://www.webdesignerdepot.com/2009/12/non-trashy-recycled-and-trash-art/>





ACTIVITY 2

“Design Study-Poster Design to propagate the use of Recycle Materials”

Target Group: Lower Six and Upper Six (Component 3)

Aim:

To Develop Student’s creative awareness on environmental issues, and fostering a sense of personal environment responsibility, and greater motivation and commitment towards the protection of the environment through designing a poster.

Materials Needed:

- Paper
- Poster colour
- Kitchen papers
- Sketch pens/pencils

Outcomes:

At the end of this activity, the students will be able to:

5. Explain their poster which should be appealing and displaying an awareness message.
6. Demonstrate the ability to think and generate ideas in terms of graphics and punch lines.
7. Foster a sense of personal environment responsibility.
8. Showcase their artworks to sensitize others about the importance of re-using any materials through creating an artwork.

Procedures:

- Theme: Decide on a theme e.g.: Let’s use only Recycled Materials.
- Confirm the maximum size limit with the students (A3)
- Brainstorming: Have a classroom discussion and note down the key words and terms on the board for 10-12 minutes where students may generate various ideas through sharing their point of view.
- Prompt students to think and sketch about their concepts and what they want to display in terms of the graphics.
- Individually students will discuss and explain what they understood about the topic which should be given to them a week earlier so that they may research about it.
- The students will then develop their proposed ideas until they come up with a final solution.
- Then they may sketch and plan their final work with proper composition and layout.

- The final posters are then displayed in the Art room and the best poster is then selected and implemented in terms of a campaign to promote the use of recycled materials in Artworks and in general.

Role of the Teacher:

- The Teacher act as a facilitator.
- Discuss and support the students through the brainstorming.
- Reinforce the student's ideas during the development of ideas.
- Critically analyze their posters in terms of the aesthetic qualities, layout and concept with constructive feedbacks.

Examples of Posters:





ACTIVITY 3

“Interpretative Study-Title: Nature Fading”

Target Group:

Lower Six and Upper Six (Component 2)

Aim:

To Develop Student’s ability to organize a pictorial composition and produce a personal and original interpretation of climate change related topic such as Nature fading which may be representational or close to abstraction.

Materials Needed:

- Paper 180 gsm and above
- Poster colour
- Coloured pencil
- Acrylics
- Watercolours
- Kitchen papers
- Sketch pens/pencils

Outcomes:

At the end of this activity, the students will be able to:

9. Compose a pictorial composition and produce a personal and original interpretation of a theme.
10. Demonstrate the ability to communicate ideas and feelings inspired by the chosen theme in a personal way.
11. Create a visually stimulating composition.
12. Showcase their artworks to sensitize others concerning the issues related to climate change.

Procedures:

- Theme: Decide on a theme e.g.: Nature Fading
- Confirm the maximum size limit with the students (A3)
- Brainstorming: Have a classroom discussion and note down the key words and terms on the board for 10-12 minutes where students may generate various ideas through sharing their point of view.
- Prompt students to think and sketch about their interpretation and what they want to picture through their artwork

- Individually students will discuss and explain what they understood about the topic which should be given to them a week earlier so that they may research about it.
- The students will then develop their proposed ideas until they come up with a final solution.
- Then they may work on their preparatory works and plan their final work with proper composition and media.
- The final compositions are then displayed in the Art room

Role of the Teacher:

- The Teacher act as a facilitator.
- Discuss and support the students through the brainstorming.
- Reinforce the student's ideas during the development of compositions.
- Critically analyze their Interpretative study in terms of the aesthetic qualities, techniques and interpretation of the theme with constructive feedbacks.

ACTIVITY 4

“Altered Books”

Subject Area: Art & Design

Target Group: Lower Six and Upper Six

Aim:

To develop Student's ability in creating an Altered Book which is original as well as to creatively explore recycled and scrap materials.

Materials Needed:

- Old hardcover book
- Utility Knife
- Scissors
- Glue Sticks
- Fabric Glue
- Acrylics
- Watercolors
- Paint brushes
- Watercolor Pencils
- Multi-Pastel Chalk Pencils
- Drawing Pencils
- Decorative Designer Papers
- Origami Papers
- Picture Mosaics



- Recycled Items
- Craft Button Assortment
- Creative Fiber Assortment
- Feathers
- Beads
- Magazines and Newspapers
- Ink and Stamps
- Fabric/Lace

Outcomes:

At the end of this activity, students will be able to:

- Students will create an altered book as a form of communication. The themes and symbols will communicate meaning in their books.
- Students will research, select and apply information to a visual structure.
- Students will be able to complete a portfolio creatively.

What is an Altered Book?

The altered book is a rapidly growing art form in which the artist creates the “Art” that goes onto the page. An altered book is a book that’s been recycled, rescued and then has been changed or altered by means of gluing, painting, collaging, drilling, rebinding, sewing, rubber stamping, cutting, tearing, or embellishing. It is an expression of your work, an experiment in creativity, or a creative journal. When finished the viewer of the book interacts through the discovery of the various additions and alterations that are done to the book.

It’s also an old method of recycling. In the eleventh century Italian monks recycled old vellum manuscripts by scraping off ink and adding new text and illustrations. This process also left the old text visible through the new, creating new pieces of art over old ones. This process is called Palimpsest.

First known Altered book

In 1969 a British artist Tom Phillips purchased an obscure Victorian novel entitled *A Human Document* from a secondhand bookshop. He then proceeded to “alter” it: he colored and blacked out many of the lines and even pages so that certain key words and phrases formed new images and sequences; he cut up and rearranged other pages to form new narrative passages. Miraculously, the rather staid original novel was turned into an entirely new work. The altered novel became known through literary and art magazines and quickly acquired a cult following.

Today artists are exploring the form of the book along with its substance. Existing images and text become something entirely new. By covering, cutting, and changing the structure, altered books run the gamut from books that have become shrines to books that are transformed into colorful images totally unrelated to their origins.





Procedures:

- Theme: Decide on a theme e.g.: Mauritius and myself
- Confirm the maximum size limit with the students (A3)
- Brainstorming: Have a classroom discussion and note down the key words and terms on the board for 10-12 minutes where students may generate various ideas through sharing their point of view.
- Prompt students to think and sketch about their interpretation and what they want conceptualize through their altered book
- Individually students will discuss and explain what they understood about the topic
- The students will then develop their proposed ideas until they come up with a final solution.
- The students will then have to collect and bring any scrap papers and recycled materials which could be used in their altered book.
- All the altered books will be displayed in the Art room the week after

Role of the Teacher:

- The Teacher act as a facilitator.
- Discuss and support the students through the brainstorming.
- Reinforce the student's ideas during the development of ideas
- Critically analyze their interpretation in terms of the aesthetic qualities, techniques and theme with constructive feedbacks.

A c t i v i t i e s



**Social Sciences
Economics & Business**



ACTIVITY

Mini Project work: Green consumerism and its impact on climate change.

Subject Area: Business

Target Groups Form IV

AIM:

To develop an awareness of how changing consumer behaviour can contribute towards a healthier environment.

OUTCOMES:

At the end of the activity, the pupils will be able to:

1. Explore the various ways how consumer behaviour influence environment.
2. Provide learning opportunities for children on being a green consumer
3. Raise awareness among children to care for our environment.

Introductory Note:

Green consumerism

Consumers as end users of products and services, influence the way companies manufacture and sell their goods. Consumers exert considerable power over companies as organizations become more customer-focused. Demand is rising for products that are of high quality, ethically produced, well priced, and safe, and consumerism pressures companies to operate and produce goods and services in accordance with the public's wishes. A particular form of consumer pressure, motivated by environmental concerns, is green consumerism, which campaigns for environmentally friendly goods, services, and means of production.

Green consumerism creates a balance between the expectations of consumer behaviour and businesses' profit motives - within the orbit of environmental protection. It is important to look upon the entire life cycle of a consumer's purchases - because a consumer does not just buy 'a' product, but also everything that went into its production, and everything that will happen in the future as a result of that product.

We need to realize that all products have an environmental impact, however small. The concept of green consumers also focuses on businesses and their survivability as they respond quickly to demands of consumers for products and services that are also environmentally friendly.

The idea is that when awareness of environmental problems penetrates deeply enough into the community the purchasing power of the mass market will force all manufacturers to green both their products and their manufacturing processes for fear of being rejected in the market-place by green-leaning consumers. Today's consumption is undermining the environmental resource, thus climate change catastrophe can be averted by "greening" consumer behaviour rather than by curbing economic growth and mass consumerism.

Procedures

Theme: Green consumer and climate change

Brainstorming: Have a classroom discussion and note down the key ideas, words and terms on the board

Use mind -map to link up common / related ideas where possible

Steps for Brainstorming

1. Teacher introduce the theme " Being a green consumer"
2. Allow pupils to express themselves freely on the theme.
3. Benefits and impact of green consumerism.
4. Note down all the ideas on the board
5. Link up all common ideas (Mind Map).

After discussion pupils are expected to have a clear idea of being a green consumer.

A mini project work will be carried out on "**Green consumerism and its impact on climate change**".

Pupils will work in group of 4-5 to write up the project.



ROLE OF TEACHER

1. Set up group of students within the class (Group of 4 to 5) depending on the roll of the class.
2. Lead the brainstorming session and join in the ideas
3. Key questions / ideas for discussion
 - Define consumers' needs and wants and how they are linked to business
 - How are the products and resources we consume actually produced?
 - How businesses use scarce resources to satisfy consumers' needs and wants?
 - What are the impacts of the process of production on the environment, society, on individuals?
 - The concept of green consumer and changing consumer behavior
 - How can businesses adapt their activities to go for green products and using eco-friendly material /resources?
 - Benefits of green consumerism:-Economic benefit, social benefit and environment benefit.
4. Summarise on the impact of green consumerism on society and climate change
5. Initiate/Coordinate pupils towards writing up of a mini project based on small scale research on the theme.(encourage the use of examples, photos, facts and figures, charts etc)

For Group Dynamics:

- Pupils will need to select a group leader
- Divide the work among group members
- Gathering of information through web search/ newspaper articles/journals/books etc.

- Meetings at regular intervals to discuss on information gathered and monitor progress
- Selection of appropriate information to be included in the project.
- Writing up of project.

Useful Websites:

<http://www.mtl-cec.org/take-action/all-actions.html>

<http://www.scribd.com/doc/70085483/Youth-Xchange-Climate-Change-and-Lifestyles-Guidebook>

<http://sites.google.com/site/richardgosden/green-consumerism>

<http://www.gdrc.org/uem/green-consumer.html>



ACTIVITY

Designing of a Brochure on Frugal Living

Subject Area: Business/ Economics

Aim:

To raise awareness of frugality as a new way of living in an increasing challenging economic environment.

Objectives:

At the end of this activity, Students should be able to:

- Describe frugal living.
- Relate the concept in their daily lives with examples
- Discuss the extent to which frugal living occurs in their environment.
- Design a brochure that promotes frugal living.

Introductory note

Frugality is about intentional conservation to reduce waste, conserve resources and save money. Economic progress has often created commodities that are cheap, abundantly available and thereby routinely wasted. However, economic recession is forcing the world to review their consumption of both cheap and expensive commodities. To quote one of the millionaires, "Only buy something if you really need it. Think about it a lot before buying. Ask yourself what else you could be doing with the money first." Indeed, from this quote and like , a new and crisp concept has emerged from the past world economic tumult creating a new societal order in terms of smart living/consumption for everyone touching the individual, households, firms, government pattern of consumption. In short "frugality" is: "The practice of acquiring goods and services in a restrained manner, and resourcefully using already owned economic goods and services to achieve a longer term goal."

Instructions:

- Ask pupils to carry research work about the concept and identify examples in their current environment.
- Guide them to places where Information could be provided like books, internet websites/ videos and news paper articles etc.
- Help them develop a line of thinking on frugal living.
- Observe their lifestyle.
- Make a list of resources used by them
- Highlight areas where there is wastages of resources
- Describe where wastages could be reduced and areas where consumption can be improved.
- Bring into discussion the concept of frugal living at home, with friends and elderly people.
- Each Pupil should be able to present an individual write-up with pictures to illustrate the concept.
- Students devise smart quotes/tips on frugal living
- Design a brochure with some illustration to communicate tips on frugal living.



- Present the brochure in the class by inviting to a panel of educators including the rector/manager for evaluation and comments.
- Discuss the idea and improve the brochure.
- Come up with a final version and promote frugal living in the school community and /or other connected stakeholders like parents.

Resources:

1. Microsoft office –Publisher 2007 (Sample of Brochure)
2. <http://zenhabits.net/the-cheapskate-guide-50-tips-for-frugal-living/>
3. <http://gradmoneymatters.com/buried/101-tips-for-frugal-living.html>
4. <http://tipnut.com/category/household-tips/frugal/>