

Environment, Climate Change and Disaster Risk Reduction



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Module One: Environment- the foundation of livelihoods and sustainable development

Introduction

In this module we will examine the links between the environment and people's livelihoods and sustainable development. Once you have completed the module you should be able to answer the following important questions.

- How does the environment underpin people's livelihoods and sustainable development?
- Why are considerations of the environment crucial to the achievement of the Millennium Development Goals?

Learning Outcomes

By the end of this module you should be able to list the ways the environment underpins:

- people's livelihoods
- sustainable development
- Millennium Development Goals

How do people use the environment to support their livelihoods on a day to day basis?

There are many ways that the environment underpins people's livelihoods.

For example, clean air ensures that people can breathe freely and not suffer from respiratory diseases, plants can be used for traditional medicine and as the basis of pharmaceuticals, and wild animals such as fish can be used to supplement dietary needs. 30 million people are totally reliant on reed-based resources as a primary means of food production, income and livelihoods.

But there are many more ways that people may depend on the environment for their livelihoods and everyday needs.

People use the environment to support their livelihoods on a day to day basis.



Ethiopia

- Thatch for homes
- Grains for food
- Livestock for food and money
- Forests for firewood and non-timber forest products
- Water for drinking, cooking and cleaning



The Pacific

- Fibres for utensils
- Wood for furniture
- Fruits and vegetables for food
- Fish for food and income
- Fibres for clothing and bags

These are just some of the ways that people may depend on the environment for their livelihoods and everyday needs. There are many more ways that the environment underpins people's livelihoods.



Cambodia

- Rain for crops
- Crops for food and income
- Livestock for food, farm work and money
- Water for bathing
- Water for irrigation



Latin America

- Rain water for drinking
- Wood for fishing nets
- Fish for food and income
- Fibres for clothing

In much of the developing world the environment provides the foundation of people's livelihoods

Here are three main ways in which the environment provides the foundation of people's livelihoods.

The environment provides livelihood security

The majority of the poor depend on subsistence agriculture for their livelihood. Agriculture depends on the environment. The Convention on Biodiversity estimates that at least 80 per cent of the needs of the poor are derived from natural resources (2010). The environment supports livelihoods and incomes of the poor in a number of ways including:

- agricultural production
- collection of non-timber forest products
- small scale and artisanal mining
- fisheries
- water
- fuel wood

For example, in Cambodia the poorest 20 per cent of households are reliant on the environment to provide fuel wood, non-timber forest products and fish.

Source: *Poverty and the Environment: Understanding Linkages at the Household Level*, World Bank: Washington, 2008.

The Convention on Biological Diversity. See www.cbd.int

The environment enables wellbeing and health

Health and wellbeing outcomes are strongly linked to the environment in poor countries. The environment provides access to basic services such as energy, water and sanitation.

For example, fuel wood is used for energy to cook grains for human consumption and clean water is required for drinking and washing household effects.

Source: *Poverty and the Environment: Understanding Linkages at the Household Level*, World Bank, 2008.

The environment can decrease vulnerability

The environment provides safety nets. Many people may rely on natural resources when other income options are scarce.

For example, during the Asian economic crisis in the late 1990s, World Bank researchers were surprised to find that many Indonesian farmers were not too adversely affected by the crisis due to their ability to rely on traditional farming to support their families.

Forested hills reduce flooding and landslides and conserve agro-biodiversity, which may produce future drought or flood resistant crops that help with climate change adaptation.

Source: *Weathering the Storm: The Impact of the East Asian Crisis on Farm Households in Indonesia and Thailand*, World Bank Research Observer, Vol. 17, No. 1, pp. 1-20, 2002

Reid, Hannah and Krystyna Swiderska, *Biodiversity, Climate Change and Poverty : Exploring the links*, International Institution for Environment and Development, IIED Briefing Papers, 2008.

What are the outcomes when the environment is degraded, polluted or threatened?

‘Three million children die each year from environmental causes’

There are many potential negative outcomes from a degraded, polluted or threatened environment. For example, more than three million children die each year from environment-related causes and conditions such as diarrhoea, respiratory infections and vector borne diseases.

What does this mean?

This makes the environment one of the most critical contributors to child deaths annually (WHO 2005). In fact, most of the leading health risks in the developing world are related to the environment. These include malnutrition, unsafe water, lack of sanitation and hygiene and exposure to indoor smoke from solid fuels.

Source: *Poverty and the Environment: Understanding Linkages at the Household Level*, World Bank, 2008.

How does the environment provide the basis for sustainable development?

Many developing countries are dependent on natural resource sectors to enable growth and national development. But can a healthy environment make a difference to the quality of life and sustainable development options of a country?

Let's look at a case study where the environment and its management play a key role for the development prospects of a nation.

Case Study – A tale of two countries

This case study will look at two very different countries. To help you identify the different ways the environment contributes to sustainable development, certain facts about each country will be presented.

Country A is Haiti

In Haiti a vicious cycle has been created between forest degradation, declining productivity and increased poverty.

Facts

1. This country is the poorest country in the western hemisphere.
Source: *The World Factbook: Haiti*, USA Central Intelligence Agency
2. This country is one of the most environmentally degraded countries in the world.
Source: *UNEP in Haiti: 2010 Year in Review*, United Nations Environment Program. See www.unep.org
3. 55% of the population lives on less than USD1 a day.
Source: UNdata website. See www.data.un.org
4. Almost all of the country was originally forested but now there is less than 2% forest cover.
Source: World Bank Country Brief : Haiti. See www.worldbank.org and search for Haiti
5. As a consequence of deforestation, between 1950-1990 the amount of arable land halved due to soil erosion.
Source: *The Economics of Ecosystems and Biodiversity* study, 2010. See www.teebweb.org

6. Deforestation has diminished evaporation back to the atmosphere resulting in reduced rainfall by as much as 40% thereby reducing stream flow and irrigation capacity.
Source: *Bridging the Gap Conference: Responding to Environmental Change – from Words to Deeds*, Slovenia, 2008
7. The country's irrigation system supports only half of the initially planned 3,844 hectares.
Source: *Bridging the Gap Conference: Responding to Environmental Change – from Words to Deeds*, Slovenia, 2008
8. Hillsides do not efficiently retain or filter water often resulting in flooding even when rains are moderate.
Source: *Bridging the Gap Conference: Responding to Environmental Change – from Words to Deeds*, Slovenia, 2008
9. Ground and stream waters are laden with sediment and pollution which has degraded estuary and coastal ecosystems.
Source: *Bridging the Gap Conference: Responding to Environmental Change – from Words to Deeds*, Slovenia, 2008
10. Nearly 90% of children are chronically infected with intestinal parasites that they acquire from the water they drink.
Source: *Bridging the Gap Conference: Responding to Environmental Change – from Words to Deeds*, Slovenia, 2008
11. Due to flooding the country has lost half of its hydropower potential since sediment clogged the national dam.
Source: Jacqueline Charles and Scott Hiaasen, 'Dysfunctional dam a symbol of Haiti's post-quake problems', *The Palm Beach Post*, 11 July 2010

Country B is the Dominican Republic

In the Dominican Republic environmental management practices have helped spur a positive mutually reinforcing cycle of human wellbeing, environmental integrity and economic development.

Facts

1. 45% or about 1,972,000 hectares of the country is forested. The rate of deforestation is officially zero, but informal logging still takes place.
Source: World Resource Institute : Search for Haiti on www.wri.org
2. This country has fertile soils and includes some of the richest agricultural areas in the world.
Source: Diamond, J, *Collapse: How Societies Choose to Fail or Succeed*, Viking 2005.
3. The country has 21 cubic kilometers of renewable water resources with 89% used for farming.
Source: World Resource Institute : Search for Haiti on www.wri.org
4. The country's irrigation systems support 127,749 hectares.
Source: Books LLC, *Water Supply and Sanitation in the Dominican Republic: Irrigation in the Dominican Republic*, General Books LLC 2010
5. Until recently the country was reliant on agricultural exports. The service sector has now overtaken agriculture as the largest contributor to Gross Domestic Product.

Gross Domestic Product Gross Domestic Product is the total market value of all final goods and services produced in a country in a given year, equal to total consumer, investment and government spending, plus the value of exports, minus the value of imports.

Source: *The World Factbook: Haiti*, USA Central Intelligence Agency

6. 95% of the population has access to clean drinking water.
Source: World Health Organisation. Search for the Dominican Republic on www.who.org
7. Since 2000 the country cut child mortality by more than a third. The rate is now 31.9 deaths per 1,000 children under age five.
Source: *Child Mortality at Record Low; Further Drop Seen*, New York Times, 13 September 2007
8. Per capita income is around USD8000 per annum and the country is defined as an upper-middle income developing country.
Source: The World Bank. Search for the Dominican Republic on www.worldbank.org
9. In 2009 flooding in the country resulted in one death.
Source: *Floods in Dominican Republic leave 1 dead and 1,500 evacuated*, Dominican Today, 24 January 2009
10. A series of dams and hydropower plants are planned for the country, the development of which have been hailed as a "model of environmental management".
Source: Corporacion Dominicana de Empresas Electricas Estatales

What can we learn from this example?

The environment and its management play a key role for the development prospects of a nation. Although they share the same island the two countries are vastly different.

In the case of Haiti a vicious cycle has been created between forest degradation, declining productivity and increased poverty. Poverty then drives further need to exploit the environment to support livelihoods thereby further reducing productivity and reinforcing ongoing poverty.

- The U.N. ranks Haiti at 145 out of 182 countries on its Human Development Index.
- In Haiti, average life expectancy is 61.7.

By contrast, the Dominican Republic's environmental management practices have helped spur a positive and mutually reinforcing cycle of human wellbeing, environmental integrity and economic development.

- The U.N. ranks the Dominican Republic 88 out of 182 countries on its Human Development Index.
- In the Dominican Republic, average life expectancy is 72.8 years.

What is the Human Development Index?

The first Human Development Report published in 1990 by the United Nations Development Programme introduced a new way of measuring development by combining indicators of life expectancy, educational attainment and income into a composite human development index, the HDI. The breakthrough for the HDI was the creation of a single statistic which was to serve as a frame of reference for both social and economic development

Source: United Nations Development Program. Search for the Dominican Republic on www.undp.org

The environment provides the foundation of sustainable development

The Haiti/Dominican Republic case study provides a poignant example of how the environment provides the foundation of sustainable development.

We can say that the environment provides the basis of sustainable economic growth

The environment provides the raw materials for livelihoods, sustenance, medicines, trade, tourism and industry. Genetic diversity provides the basis for new breeding programs, improved crops, enhanced agricultural production, and food security.

Natural ecosystems such as forests, grasslands, freshwater, marine environments provide a range of services, often not recognised in national economic accounts but nevertheless vital to human welfare: regulating water flows, flood control, pollination, decontamination, carbon sequestration, and nutrient and hydrological cycling.

In 2000, agriculture, including forestry and fishing, represented 24% of total GDP in low-income developing countries.

Source: Millennium Ecosystem Assessment at www.maweb.org.

We can say that the environment provides income opportunities

75% of the world's poor live in rural areas. Most of the rural poor depend directly or indirectly on agriculture for their livelihoods. Agriculture is a source of livelihood for an estimated 86% of rural people (2.5 billion people) and provides jobs for 1.3 billion smallholders and landless workers.

Source: Consultative Group on International Agricultural Research. See www.cgiar.org

We can say that the environment provides social protection

The profits from the environment and natural resources can be used to spur economic development and make pro-poor investments commonly known as social protection or welfare. For example, in recent years new market mechanisms have emerged to help finance environmental conservation in developing countries. Known as Payment for Ecosystem Services (PES), these schemes transfer funds from those who benefit from the services the environment provides (e.g. clean water) to those who help ensure that environmental services continue (e.g. people who live in the watershed).

Example

One example of this is a hydro-electric company paying poor people who live in a water catchment forest area not to cut down trees. These schemes can directly provide poor people with incomes and protection of their habitat from other interests (e.g. logging companies).

Source: The Centre for People and Forests. Search for PES on www.recoftc.org

Millennium Development Goals In Action

The Millennium Development Goals (MDGs) are a set of eight development goals, including eradicating extreme poverty, reducing child mortality rates and fighting diseases.

The goals were adopted by world leaders in the year 2000 with the aim to achieve them by 2015. All 192 member states of the United Nations, as well as a number of international organisations, including AusAID, adopted the MDGs.

How many of the Millennium Development Goals does the environment underpin?



MDG 1: Eradicate extreme poverty and hunger

Many people in developing countries depend on natural resources and ecosystems for their food, shelter and income.

Unsustainable use of natural resources can lead to a cycle of poverty and falling productivity thereby reinforcing the conditions which create poverty.



MDG 2: Achieve universal primary education

Access to education for both girls and boys is improving in East Asia, the Pacific and South Asia.

However, poverty, disease, heavy workloads and poor nutrition stemming from resource depletion and environmental degradation limits school attendance.



MDG 3: Promote gender equality

Levels of access to resources and exposure to harmful pollution can greatly affect the lives of women and girls.

Inclusive decision making about how resources are managed, better access to safe water and secure energy can reduce the workloads of women and girls and help to sustain the livelihoods of their families.



MDG 4: Reduce child mortality

Diarrhoea and respiratory infections are major killers of children under five. These diseases are closely linked to contaminated water, poor sanitation and polluted air.

Ensuring a clean environment is vital to improving the health of children and reducing child mortality.



MDG 5: Improve maternal health

Improving access to safe water, reducing the contamination of air, water and food and improving the distribution of resources can dramatically improve the health of women during pregnancy and childbirth.



MDG 6: Combat HIV/AIDS, malaria and other diseases

Controlling pollution, reducing the use of toxic chemicals and controlling diseases spread by mosquitoes (such as malaria and dengue fever) or those spread in water (such as cholera and dysentery) can significantly reduce the prevalence of disease.



MDG 7: Ensure environmental sustainability

Healthy ecosystems and natural resources provide livelihoods for millions of people.

Sustaining their productivity and functioning will provide ongoing incomes, clean water and secure food supplies. Crops may be affected by pollutants.



MDG 8: Develop a global partnership for development

Many environmental issues have regional and global dimensions. Joining international efforts that combine the resources of many nations will enable knowledge and best practice approaches to be shared.

The environment underpins the achievement of all eight Millennium Development Goals

You wouldn't build a house without any foundations. Similarly, attempting to reduce poverty and spur development without considering the environment is like trying to build a house without foundations.

However, the environment is under severe threat in many places around the world.

Why?

Unprecedented population growth

The current world population of close to 7 billion is projected to reach 9.3 billion by the year 2050, reaching 10.1 billion by the year 2100 according to the *2010 Revision of World Population Prospects*, the official United Nations population projections prepared by the Population Division of the Department of Economic and Social Affairs. Much of this increase is projected to come from the high-fertility countries, which comprise 39 countries in Africa, nine in Asia, six in Oceania and four in Latin America.

Source: United Nations, Department of Economic and Social Affairs.

Unsustainable use of natural resources

With population growth and development comes greater pressure on natural resources to provide for people's livelihoods and sustainable development. Addressing resource use efficiency and ensuring sustainable production and consumption is key to maintaining the integrity of the environment so that it may continue to support livelihoods and economic development.

Ecosystem degradation, pollution and its effects including climate change

Ecosystems are being lost and degraded more rapidly and extensively than at any comparable period in global history due to a combination of unsustainable resource use, pollution and the effects of climate change.

The very ecosystems that protect cities and agricultural areas from flooding, conserve soils, sustain water yields, reduce vulnerability of communities to coastal storms, and produce food and shelter are already degraded or are threatened in many developing countries that are the most vulnerable and least resilient to the impacts of climate change.

Module Two: Climate Change - the risks and challenges for development assistance

Introduction

The Australian Government takes climate change very seriously as both a threat to the environment and to the achievement of our objectives to eliminate poverty and support sustainable development. The evidence that the world is getting warmer is unequivocal. Over the last 100 years the global air temperature has increased by around 0.8°C. In Australia, average air temperatures have increased by around 0.9°C since 1910, and each decade has been warmer than the previous decade since the 1950s.

Source

Australian Government – Clean Energy Future web-site. See www.cleanenergyfuture.gov.au

CSIRO and Australia Bureau of Meteorology

See *State of the Climate 2012* www.csiro.au/Outcomes/Climate/Understanding/State-of-the-Climate-2012.aspx

NASA. See www.nasa.gov.

This module will give you a basic overview of the science of climate change and its predicted impacts. The goal of this session is to:

- provide a basic understanding of what climate change is
- demonstrate why we must consider climate change as part of the aid program.

Learning Outcomes

By the end of this module you will be able to:

- list some of the impacts of climate change
- explain how and why we should consider climate change in the aid program
- describe the two activities that the world is undertaking to address climate change: mitigation (including low carbon growth) and adaptation (increasing climate resilience)

Six billion others

If you have time, please [watch the short video “six billion others”](#). It is a series of short statements from people who live off the land and close to nature talking about how climate variability is impacting on their livelihoods.

Views expressed in this video do not represent the Australian Government position.

Source: Six Billion Others, United Nations Environment Program. See www.unep.org

Garnaut Climate Change Review

BBC World Service Global Poll *All Countries Need to Take Major Steps on Climate Change* conducted by GlobeScan and the Program on International Policy Attitudes, 2007

Defining climate change

The video you just watched captures a key interest for Australia's aid program. Climate change will have the greatest impact on the most vulnerable people and those most dependent on the environment for their livelihoods – the poor.

If you'll recall from the last module, 75% of the world's poor live in rural areas and most of the rural poor depend directly or indirectly on agriculture for their livelihoods. Consequently, climate change has the ability to undermine the core goal of our work – to eradicate poverty.

What is climate change?

Climate change is not the weather. Rather, it is a change in the average pattern of weather over a longer period of time (typically 30 years or longer). This change is primarily a result of observed increases in human-produced greenhouse gases.

Source: The Science of Climate Change: Questions and Answers, 2010 Australian Academy of Science: Canberra.

What is global warming?

The terms 'global warming' and 'climate change' are often used interchangeably, but there is a difference.

Global warming is the gradual increase of the earth's average surface temperature due to greenhouse gases in the atmosphere.

Climate change is a broader term. It refers to long-term changes in climate, including average temperature and rainfall.

Source: Australian Government - Department of Industry, Innovation, Climate Change, Science, Research and Tertiary Education

The carbon cycle

The amount of global warming or the degree to which the climate changes over the long term depends not only on greenhouse gas emissions and land use change, but is also influenced by various 'feedback mechanisms' that exist within the earth's natural carbon cycle.

Similar to the hydrological cycle (which recycles water through the earth's natural filter systems), the carbon cycle stores and circulates carbon throughout the planet.

The movement of carbon, in its many forms, between the atmosphere, oceans, biosphere, and geosphere is described by the carbon cycle.

Biosphere: All of the living organisms on Earth.

Geosphere: The solid portion of Earth, including the crust and mantle.

What are the components of the carbon cycle?

The geological component of the carbon cycle is driven by plate tectonics and includes processes like volcanic eruptions and burial of carbon-rich sediments on the ocean floor.

The biological component of the carbon cycle is driven by respiration and photosynthesis by living organisms.

How does the carbon cycle operate?

The carbon cycle is the set of biogeochemical processes by which carbon undergoes chemical reactions, changes form, and moves through different reservoirs on earth, including living organisms.

This cycle consists of several storage pools of carbon and the processes by which the various pools exchange carbon.

The two pools are:

Sink: If more carbon enters a pool than leaves it, that pool is considered a *net carbon sink*.

Source: If more carbon leaves a pool than enters it, that pool is considered *net carbon source*

What is an example of a 'sink' and a 'source'?

For example

A forest tends to be a *net carbon sink* meaning it absorbs or stores more carbon than they emits. However, if a forest burns in a bush fire it becomes a *net carbon source*.

How do humans influence the carbon cycle?



Source: Visionlearning resources. See www.visionlearning.com

Australian Government - Department of Industry, Innovation, Climate Change, Science, Research and Tertiary Education

What are greenhouse gases?

Many greenhouse gases exist naturally in the atmosphere. They help to make our planet liveable by trapping some of the earth's heat in the atmosphere. Without the greenhouse gases, the average temperature at the earth's surface would be below the freezing point of water.

Greenhouse gases in the atmosphere absorb solar radiation and re-radiate it back to earth keeping the earth's temperatures much as we know it now. This is the "greenhouse effect" – the gases act like the walls of a greenhouse, trapping and bouncing the heat back into the atmosphere.

What are the different types of greenhouse gases?

Different greenhouse gases have different levels of radiative forcing or in simple terms amount of heating ability. They also survive in the atmosphere for different lengths of time. These two factors determine each gas's contribution to global warming. Gases are compared by their global warming potential.

The greenhouse gases include:

- water vapour
- carbon dioxide (stays in the atmosphere for 100 years)
- methane (stays in the atmosphere for about 10 years and has a warming potential more than 20 times greater than carbon dioxide on a volume basis)
- nitrous oxide (stays in the atmosphere for 120 years)
- industrial gases such as chlorofluorocarbons (CFCs) (stays in the atmosphere for thousands of years)

Source: Australian Government - Department of Climate Change and Energy Efficiency

What happens if we add more greenhouse gas to the atmosphere?

Adding more of a greenhouse gas, such as carbon dioxide, to the atmosphere intensifies the greenhouse effect resulting in the earth's climate warming.

More information about specific greenhouse gases.

Carbon dioxide

Carbon dioxide is the most important of the greenhouse gases. This is because of its prevalence in our natural system. Large amounts of carbon dioxide are continually transferred to and from the atmosphere, including exchanges of carbon with the oceans and vegetation on the land.

Until 200 years ago, these natural exchanges were in rough balance. This is demonstrated by nearly constant concentrations of atmospheric carbon dioxide for most of the last 2000 years. The importance of human-caused carbon dioxide emissions is that they are changing the balance, adding carbon to the atmosphere faster than it can be removed by carbon sinks that control the carbon balance.

Water vapour

Water vapour accounts for about half the present-day greenhouse effect. Its global average concentration in the troposphere (the low layers in the atmosphere where most water vapour is found) is controlled mainly by the atmospheric temperature and winds. Warmer temperatures cause higher water vapour concentrations.

This is in contrast with other greenhouse gases, for which concentrations are strongly influenced by human-created inputs to the atmosphere. If other factors warm the atmosphere, then water vapour concentrations are expected to increase and, because water vapour is a greenhouse gas, the increased concentrations would amplify the initial warming. This is known as a positive feedback.

Source 1: Visionlearning resources. See www.visionlearning.com

Source 2: USA Environmental Protection Agency

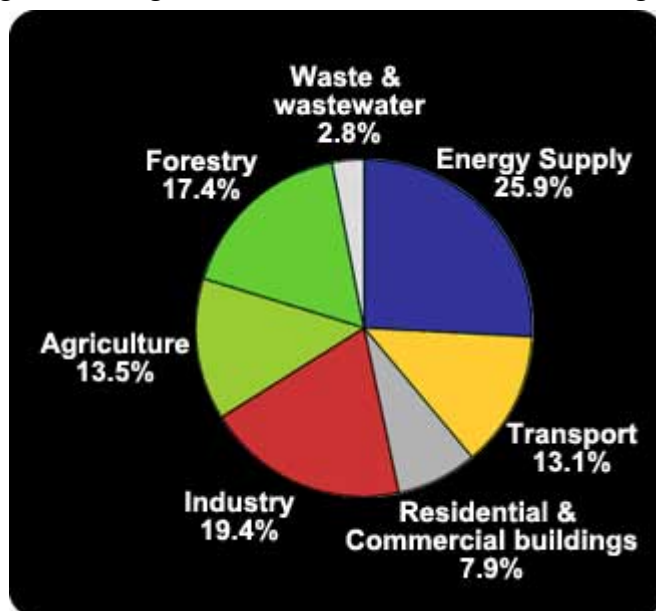
Source 3: The Science of Climate Change: Questions and Answers, 2010. Australian Academy of Science, Canberra.

Sources of greenhouse gases

Although many greenhouse gases exist naturally in the atmosphere and environment, the overall concentration of greenhouse gases in the atmosphere has increased due to an increase in human activities which emit greenhouse gases.

Modelling of the climate is unable to reproduce observed weather data unless the human component of emissions is added to the model.

How much greenhouse gas do we get from each source listed on the graph?



Note: Approximately 70% of GHG emissions result from burning fossil fuels.

What is predicted to happen?

If all the different greenhouse gases were converted to carbon dioxide (CO₂e), it would be the equivalent of 455 parts per million in the atmosphere.

Climate models suggest that at 450 parts per million we are likely to see a 2 degree Celsius rise in global average temperatures.

Note: CO₂e means carbon dioxide equivalence. Carbon dioxide equivalence is a measure used to compare the emissions from various greenhouse gases based upon their global warming potential.

Source: Intergovernmental Panel on Climate Change "IPCC Fourth Assessment Report: Climate Change 2007" in www.ipcc.ch/publications.

Is there more information available?

Climate Change Science – Frequently Asked Questions

Search for climate change scientific facts on the website at www.climatechange.gov.au for the Australian Government Department of Industry, Innovation, Climate Change, Science, Research and Tertiary Education

Supplementary Video – Climate Change in Google Earth

Search on the Google Earth site at www.google.com to explore the potential impacts of climate change and learn about solutions for adaptation and mitigation.

More views on climate change

We hope that you now have a good idea of the carbon cycle, climate change and its causes. If you are interested in more views, here is a range of videos that you may choose to view at your leisure and according to your own understanding of, and interest in, climate change.

Please watch the video that interests you.

Video 1 Summary: David Attenborough, once a self-proclaimed climate change sceptic, presents the data which helped convince him of the reality of climate change.
Views expressed in this video do not represent the Australian Government position.

Duration: 2 minutes 44 seconds

[Is climate change real?](#)

Video 2 Summary: This award-winning animation presents both the science and impacts of climate change, including some controversial predictions as to the social impacts of climate change and what should be done about it.
Views expressed in this video do not represent the Australian Government position.

Duration: 11 minutes 35 seconds

[I'm fairly convinced about climate change but I feel overwhelmed about what to do](#)

Video 3 Summary: Dr Ben Newell from University New South Wales' School of Psychology talks about the difficulties for climate scientists in cutting through misconceptions and misinformation to get their messages across.
Views expressed in this video do not represent the Australian Government position.

Duration: 11 minutes 50 seconds

[I am a climate change scientist but I have problems getting my message through to people.](#)

The impacts of climate change

Climate change will have the greatest impact on the most vulnerable people and those most dependent on the environment for their livelihoods – the poor. Here are some of the known and predicted impacts of climate change on different parts of our environment and planet.

Biodiversity

- Biodiversity is the most sensitive of all the different aspects of the environment. Even a 1 to 2 degree Celsius change could mean the extinction of 20% of the world's species.
- Scientists predict that a 3°C increase in average global temperature could deliver 30 to 50% reduction in the number of species.
- 3-4°C rise could mean the extinction of 40-75% of biodiversity.
- The main cause of extinctions will be **life cycle mismatches** between species and their environment but causes can also be attributed to overall losses of climate niches and habitats.
- There is already an observed pole-ward movement of many species.
- Marine biodiversity impacts are likely to be highly significant (e.g. coral bleaching)

Source: Dawson, B. and M. Spannagle, *The Complete Guide to Climate Change*. Routledge: New York and London (2009).

Water

- **Increase in water scarcity** – the number of people living in severely stressed river basins is projected to increase significantly from 1.4 billion to 1.6 billion in 1995 to 4.3 to 6.9 billion in 2050.
- **Decline in groundwater recharge** – efforts to offset declining surface water availability have the potential to further reduce groundwater reserves in some already water-stressed regions, where groundwater reservoirs are already being rapidly depleted due to increased population and water demand.
- **Water quality** – higher water temperatures, increased precipitation intensity and longer periods of low flows and droughts are likely to exacerbate many forms of water pollution with impacts on ecosystems, human health and water system reliability and operating costs.
- **Increase in water demand** – global water demand will grow in the coming decades, primarily due to population growth and increased affluence. Large changes in irrigation water demand as a result of climate change are likely and current water management practices will probably be inadequate to reduce the negative impacts of climate change on water supply reliability, flood risk, health, energy and aquatic ecosystems.

Source: The World Bank, Search www.worldbank.org for *Climate Change for Development Professionals* materials: Fundamentals of Climate Change, eLearning course.

Food and Agriculture

Projected impacts on agriculture include:

- Intergovernmental Panel on Climate Change (IPCC) modelling shows decreased yields in much of Africa, South Asia and Latin America by 2020.
- Pests and diseases may increase and affect crops.
- Growing seasons may shorten.
- Productivity may shift pole wards.

Health

Projected impacts on human health include:

- Increased risk of heat-related mortality especially for the elderly, chronically sick, very young and socially isolated in many parts of the world.
- Increased risk of food and water shortages, malnutrition and water- and food-borne diseases in areas affected by drought.
- Increased risk of deaths, injuries and water- and food-borne diseases and post-traumatic stress disorders as tropical cyclone activity increases.
- Increased risk of deaths and injuries by drowning and floods with increased sea level rise and more intense rainfall events.
- Later in the century, decrease in availability of crop yields in seasonally dry and tropical regions which will increase hunger, malnutrition and consequent disorders including child growth and development.
- Heat stress and changing patterns in the occurrence of disease vectors affecting human health.
- Increased number of people exposed to vector-borne diseases, such as malaria and dengue and water-borne diseases such as cholera especially in the tropics and subtropics.
- Additional 220 to 400 million people at risk to malaria globally.

Source: The World Bank, Search www.worldbank.org for *Climate Change for Development Professionals* materials: Fundamentals of Climate Change, eLearning course.

Extreme Weather Events

- Storm surges and cyclones - will damage various ecological and socioeconomic systems.
- Floods – may cause landslides, damage to properties and increased insurance costs.
- Droughts – reduced rangeland productivity, increased wildfires and decreased hydro-power may result.
- Higher Minimum Temperatures – fewer colder days, frost days and cold spells, extended range of pests and disease and loss of some crops and fruit.
- Higher temperatures and heatwaves – increased mortality in older people in urban areas, damage to crops and heat stress on livestock.
- Disaster risk reduction will therefore become a priority action area.
- Climate resilience – ensuring that infrastructure is built to withstand predicted impacts and extreme weather events is important.

As changes in climate variability are projected to increase, extreme weather events are likely to become more intense and frequent. For most developing countries, Gross Domestic Product is heavily dependent on agriculture, forests and other natural resources which are affected by extreme weather events especially floods, droughts and storm surges. With an increase in frequency or severity of these events there may be little time for “recovery” between events.

Source: The World Bank, Search www.worldbank.org for *Climate Change for Development Professionals* materials: Fundamentals of Climate Change, eLearning course.

Sea Level Rise

- Sea levels have risen by 20 centimetres in the last century and are increasing by 3 millimetres per year.
- Rates of sea level rise are predicted to accelerate as ice sheets and glacial retreats have been more rapid than expected.
- Research conducted since the IPCC *Fourth Assessment Report* in 2007 suggests that a plausible estimate of the amount of sea level rise by 2100 compared to 1990 is 0.5-1.0 m

Regions of the World

Many of AusAID's partner countries will be severely affected by climate change. Developing countries are often the least equipped to effectively adapt to the impacts of climate change.

As we saw in the video "six billion others" at the beginning of this module, many people in developing countries are already suffering from the adverse effects of climate change such as melting glaciers, flooding, rising sea levels, drought, crop failure and increased disease.

What are the predicted impacts of climate change in regions where we work?

Small Island Developing States

Climate change and sea level rise pose a serious threat to small island developing states which span the regions of the Pacific, Indian and Atlantic Oceans as well as the Caribbean and Mediterranean Seas. Small Island States are some of the most vulnerable to the impacts of climate change.

- Increased inundation, storm surges, erosion and coastal hazards due to sea level rise which can threaten infrastructure, homes and communities.
- Deterioration of coastal ecosystems affecting local resources and tourism.
- By the mid-century climate change is expected to reduce water resources for many small islands resulting in drought while some small islands are expected to experience flooding from intense rainfall events.
- Invasion by non-native species is expected to occur particularly on mid- and high-latitude islands.
- Agricultural land and therefore food security is expected to be compromised by sea level rise, inundation soil salinisation and sea water intrusion.

Source: The World Bank, Search www.worldbank.org for *Climate Change for Development Professionals* materials: Fundamentals of Climate Change, eLearning course.

Asia

Asia is home to 60% of the world's population and is already experiencing pressure on natural resources on which many people are dependent for their livelihoods. Climate change will exacerbate these pressures. The magnitude of changes in climate will differ across the region. However, there is already evidence of increases in the intensity and frequency of extreme weather events. Impacts from disasters range from hunger and susceptibility to disease to loss of income and livelihoods.

- By 2050 freshwater availability is projected to decrease especially in large river basins.
- Coastal areas, especially in the mega-deltas, will be at risk of flooding from the sea and rivers.
- Climate change will compound pressures on natural resources and the environment that are associated with rapid urbanisation, industrialisation and economic growth.
- Increased endemic morbidity and mortality due to diarrhoeal disease associated with floods and droughts due to projected changes in the hydrological cycle. There is also expected to be an increase in the abundance and/or toxicity of cholera in South Asia.
- Increased number and severity of glacial melt-related floods and slope destabilisation followed by decreased river flow as glaciers disappear.
- Reduced soil moisture and evapo-transpiration may increase land degradation and desertification.
- Agriculture may expand in northern areas. Northward shift of forest fires but increased risk of forest fires.
- Wetlands, mangroves and coral reefs threatened.

Source: The World Bank, Search www.worldbank.org for *Climate Change for Development Professionals* materials: Fundamentals of Climate Change, eLearning course.

Africa

African climates are the most variable in the world both seasonally and over decades. Floods and droughts occur in the same areas within months of each other resulting in widespread famine and disruption of socio-economic wellbeing. Africa is highly vulnerable to climate change. Impacts are projected on water, food production, human health, desertification, and coastal regions.

- By 2020, 75 to 250 million people are projected to be exposed to increased water stress and insecurity.
- By 2020, yields from rain-fed agriculture could be reduced by 50%. Food production in general is projected to be severely compromised.
- The number of people at risk from coastal flooding is likely to increase as more than a quarter of Africa's population live within 100 kilometres of the coast.
- By 2080, there could be an increase of between 5 and 8% of arid and semi-arid land.
- Sea level rise, coastal erosion and extreme weather events will threaten coastal deltas and coasts.
- Fish stocks will be further compromised by rising water temperatures and the degradation of marine ecosystems.
- Deforestation and forest fires, degradation of grasslands, species migration and habitat reduction. Increased desertification around the Sahel and Southern Africa.
- 25 to 40% of animal species may become endangered.

Source: The World Bank, Search www.worldbank.org for *Climate Change for Development Professionals* materials: Fundamentals of Climate Change, eLearning course.

Latin America

Impacts across the Latin American region will be highly variable. The region is already vulnerable to El Niño climate patterns.

- Tropical forests will be gradually replaced by savannah in eastern Amazonia due to temperature increases and associated decreases in soil water.
- Biodiversity losses especially in tropical areas due to higher temperatures and loss of groundwater. This will impact indigenous communities heavily.
- Agricultural productivity is likely to decline in some important crops and livestock, resulting in greater incidences of food insecurity.
- Changes in rainfall patterns and glacial melting will affect the amount of water available for consumption, agriculture and energy.
- Extreme weather and sea level rise will impact on low-lying areas including cities, marine resources, and tourism.

Source: The World Bank, Search www.worldbank.org for *Climate Change for Development Professionals* materials: Fundamentals of Climate Change, eLearning course.

Millennium Development Goals In Action

The Millennium Development Goals (MDGs) are a set of 8 development goals including eradicating extreme poverty, reducing child mortality rates and fighting diseases. The goals were adopted by world leaders in the year 2000 with the aim to achieve them by 2015. All 192 member states of the United Nations as well as a number of international organisations, including AusAID, adopted the MDGs.

How many of the Millennium Development Goals does *climate change* threaten?



MDG 1: Eradicate extreme poverty and hunger

Climate change is an environmental variable which will further impact progress on this MDG by destabilising the forests, fish stocks, pastures and crop land and infrastructure that many poor families depend on for food and livelihoods. This has the potential to exacerbate social tensions over resource use which may lead to conflict and force communities to migrate or become 'environmental refugees'.



MDG 2: Achieve universal primary education

Climate change threatens progress by increasing the intensity of floods and storms, disrupting communities, destroying buildings and forcing migration, all which hinder children attending school.

Poor health from increased disease can mean long absences from school.



MDG 3: Promote gender equality

Climate change could exacerbate current gender inequalities as access to natural resources decline. Female-headed households with few assets are severely affected by climate related disasters – an increasing occurrence in the Pacific.

The majority of the world's poorest people are rural female farmers who will be disproportionately affected by climate change impacts on agriculture.



MDG 4: Reduce child mortality

Climate change is expected to increase exposure to environment-related diseases in children. Some areas will see a reduction in the quality and quantity of safe drinking water, which will exacerbate health issues.



Reduced agricultural productivity may increase malnutrition in children.

MDG 5: Improve maternal health

Climate change will reduce access to safe drinking water caused by extreme weather conditions such as heat-waves, floods, droughts and cyclone.

Pregnant women are particularly vulnerable to water-borne diseases and foetal health can be compromised by poor diet exacerbated by impacts of climate change on food production.



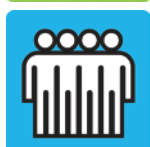
MDG 6: Combat HIV/AIDS, malaria and other diseases

Increasing temperatures will increase mosquito viability and hence diseases, particularly malaria into areas previously unsusceptible. Harmful bacterias may breed in warmer waters leading to increases in cholera and dysentery.



MDG 7: Ensure environmental sustainability

Climate change is an environmental variable which will further alter the quality and productivity of natural resources and ecosystems and potentially compound existing environmental degradation and loss of biodiversity.



MDG 8: Develop a global partnership for development

Climate change is a global challenge. Responding to it requires global cooperation, especially to enable developing countries to tackle poverty and inequality. Global funds are required to provide additional resources for climate change adaptation.

Climate change has the potential to undermine the achievement of all Millennium Development Goals

Addressing both climate change and poverty is essential if we are to avoid the worst consequences of climate change and achieve sustainable development. The people most vulnerable to the impacts of climate change are the people who are already the most vulnerable – the poor.

Nicholas Stern, Professor of Economics and Government, Chair of the Grantham Research Institute on Climate Change and the Environment at the London School of Economics announced that,

“Poverty and climate change are the two great challenges of the 21st century”

Supplementary Reading

For more information on Nicholas Stern's comments on climate change and poverty search the website at www.worldbank.org

What is to be done?

Adaptation....is defined as adjustments in human and natural systems, in response to actual or expected climate stimuli or their effects, that moderate harm or exploit beneficial opportunities.

Source: IPCC Intergovernmental Panel on Climate Change cited in OECD, 2009, *Integrating Climate Change Adaptation into Development Co-operation*, OECD: Paris, 2009, page 48

Mitigation...consists of activities that aim to reduce greenhouse gas emissions, directly or indirectly, by avoiding or capturing greenhouse gases before they are emitted to the atmosphere or sequestering those already in the atmosphere by enhancing “sinks” such as forests. Such activities may entail, for example, changes to behaviour patterns or technology development and diffusion. Mitigation also includes energy efficiency activities. Activities can be extremely cost effective and appropriate for many developing countries. For example, there is growing consensus that low emissions growth also known as green economy or green growth may provide resilient paths to development with the potential to increase jobs, productivity, manage resources wisely and alleviate poverty.

Source: IPCC Intergovernmental Panel on Climate Change cited in OECD, 2009, *Integrating Climate Change Adaptation into Development Co-operation*, OECD: Paris, 2009, page 48

Supplementary Reading

Search the listed references for supplementary reading on the following topics.

AusAID's Climate Change Adaptation Initiative

See AusAID's Climate Change and Environment Thematic Network

OECD Policy Guidance

Search for OECD Policy Guidance *Integrating Climate Change Adaptation into Development Co-operation* on www.oecd.org

UNDP's "Designing Climate Change Adaptation Initiatives"

Search for UNDP's *Designing Climate Change Adaptation Initiatives* on www.undp.org

AusAID's Climate Change Mitigation Initiatives

See AusAID's Climate Change and Environment Thematic Network

DFID and AEA's low carbon fact sheets

For more information search on www.aeat.com

Eldis resource guides on climate change

For more information search on www.eldis.org

UN Climate Change Activities

For a searchable map of UN Climate Change Activities see www.un.org

Module Three: Disaster risk reduction - smart development practice in a disaster prone world

Introduction

AusAID's work in Disaster Risk Reduction (DRR) is integral to better disaster, climate change and environmental management in order to achieve sustainable development and reduce people's vulnerability.

This module will give you a basic overview of disaster risk reduction strategies. The goal of this session is to:

- demonstrate why disasters matter in the aid program
- explain how disaster risk reduction can be extremely effective in protecting people and their livelihoods
- demonstrate the scope of activities of disaster risk reduction

Learning Outcomes

By the end of this module you will be able to:

- list three reasons why disasters are a development concern
- list three ways in which disaster risk can be reduced

Disaster risk reduction - smart development practice in a disaster prone world

Why worry about disasters in AusAID?

We consider disaster risk reduction as a cornerstone to sustainable development in all of AusAID's programs. To appreciate why thinking about disasters is crucial to AusAID's work you must first be familiar with a few facts about the impact of disasters.

What do you already know about disaster risk?

Welcome to the DRR Challenge.

This activity will present eight key facts about the impact of disasters in form of questions.

Question 1:

How many people worldwide are estimated to live in informal settlements which are vulnerable to disasters?

Answer: Over 1 billion

Source: *Global Assessment Report on Disaster Risk Reduction*, United Nations International Strategy for Disaster Reduction Secretariat, 2009

Question 2:

Approximately how many people in the Asia-Pacific Region live in low-lying coastal areas exposed to tsunamis?

Answer: 16 million

Source Phil Cummins (acknowledgements: Alanna Simpson, John Schneider, Trevor Dhu, Jonathan Griffin, David Burbidge, et al.), 2009, *Natural hazard risk in the Asia-Pacific region: Asking the right questions*, PowerPoint presentation to AusAID, October 2011.

Question 3:

Approximately how many people in the Asia-Pacific Region are estimated to live within 50 kilometres of a volcano?

Answer: 200 million

Source Phil Cummins (acknowledgements: Alanna Simpson, John Schneider, Trevor Dhu, Jonathan Griffin, David Burbidge, et al.), 2009, *Natural hazard risk in the Asia-Pacific region: Asking the right questions*, PowerPoint presentation to AusAID, October 2011.

Question 4:

Approximately how many people in the Asia-Pacific Region are estimated to live in areas with high to very high earthquake risk?

Answer: 480 million

Source

Phil Cummins (acknowledgements: Alanna Simpson, John Schneider, Trevor Dhu, Jonathan Griffin, David Burbidge, et al.), 2009, *Natural hazard risk in the Asia-Pacific region: Asking the right questions*, PowerPoint presentation to AusAID, October 2011.

Question 5:

Since 1975, the number of natural disasters has increased from an average of less than 75 a year to more than?

Answer: 370

Source

Phil Cummins (acknowledgements: Alanna Simpson, John Schneider, Trevor Dhu, Jonathan Griffin, David Burbidge, et al.), 2009, *Natural hazard risk in the Asia-Pacific region: Asking the right questions*, PowerPoint presentation to AusAID, October 2011.

Source

Options for Decision Makers, Expert Meeting on Climate Change and Disaster Risk Management, FAO Headquarters, Rome, 28-29 February 2008

Question 6:

Approximately how many people were killed by natural disasters in 2010?

Answer: 296,800

Data from the Center for Research on the Epidemiology of Disasters (CRED) shows that 373 natural disasters took place in 2010, killing nearly 300,000 people and affecting over 200 million others, at a cost of nearly US\$ 110 billion.

Source: CRED website at www.cred.be.

Question 7

What percentage of deaths from disasters is estimated to occur in developing countries?

Answer: 95%

Source : *Tsunami provides an opportunity to rethink disaster management*, World Bank press release, 17 January 2005. Search on www.worldbank.org

Question 8:

What was the estimated cost (USD) of disasters worldwide for 2010?

Answer: 110 billion

Source: *Deadliest Year for Natural Disasters*, Pro Bono News, 27 January 2010

Six Reasons to Worry About Disasters in AusAID

There are six key reasons as to why thinking about disasters is crucial to AusAID's work. It is for these reasons that we consider disaster risk reduction as a cornerstone to sustainable development in all of AusAID's programs.

Reason 1: Because we live and work in a disaster prone region

Asia-Pacific distribution of population - approximately 16 million people live in low-lying coastal areas exposed to tsunami sources

Asia-Pacific distribution of population - approximately 200 million people live within 50kms of a volcano

Asia-Pacific distribution of population - approximately 480 million people live in areas with high to very high earthquake risk

Source

Phil Cummins (acknowledgements: Alanna Simpson, John Schneider, Trevor Dhu, Jonathan Griffin, David Burbidge, et al.), 2009, *Natural hazard risk in the Asia-Pacific region: Asking the right questions*, PowerPoint presentation to AusAID, October 2011.

Reason 2: Because climate change adds to the risk

The rising number of disasters is caused almost entirely by weather-related events. Climate change is likely to increase the number and severity of weather-related hazards, which accounted for over 76% of natural disasters over the last two decades. During the period 1987 to 2006, the number of reported weather-related disasters increased significantly from an average of 195 per year between 1987 and 1998 to 365 per year between 2000 and 2006.

The beaches of Lalomanu after the tsunami. Photo: Lou Anderson/AusAID.

Reason 3: Because disasters are increasing in number, scale and impact

Here is the time trend of reported natural disasters 1975 – 2010.

Source: *2010 Disasters in Numbers*, UNISDR, USAID, Centre for Research on the Epidemiology of Disasters.

Reason 4: Because disasters disproportionately affect the poor

Over 95% of people killed by natural disasters are from developing countries. The poorest people in developing countries are the most vulnerable to disaster impacts and have the least capacity to reduce their risk exposure. The poor are more likely to reside in marginal, hazard-prone locations, live and work in sub-standard buildings that cannot withstand stress, have limited livelihood options and food security, and poor access to social protection mechanisms.

Reason 5: Because disasters threaten development

Source: AusAID Library

Although the costs of natural disasters tend to be higher in absolute terms in developed countries, they tend to be higher in relative terms in developing countries.

For example, natural disasters tend to cost more in total in places like Japan. However, in Japan the cost of natural disasters may only be a small proportion of total Gross Domestic Product (GDP). This contrasts to places like Vanuatu where a natural disaster can end up costing the entire GDP of a country.

So although in absolute terms an earthquake in a rich country can cost more, richer countries are usually better able to manage these costs and therefore bounce back more rapidly.

Reason 6: Because urbanisation and population growth are increasing the risk

Urbanisation and population growth are increasing the risk. Approximately one billion people worldwide live in informal settlements, which are often built on land deemed unsuitable for residential or commercial use. The expansion of informal settlements is closely associated with the rapid increase in weather-related disaster reports in urban areas.

Source: AusAID Library

So we know what disasters are....but what is disaster risk?

Disaster risk is the relationship between a hazard and the vulnerability and resilience of a population.

It is important to recognise that individuals can be both vulnerable and resilient at the same time. For example, an individual may be vulnerable due to poverty, old age or disability, but may also be resilient due to a range of livelihood options, safe housing, insurance and access to health systems.

Hazard: A hazard is a natural event that *may* cause loss of life, injury or other adverse impacts. Earthquakes, volcanic eruptions, tsunamis, cyclones, droughts and floods are all hazards.

Vulnerability: Vulnerability refers to *factors that increase the likelihood of loss from a hazard*, including:

- Poverty
- Disability and disease
- Poor infrastructure
- Age (elderly and young)
- Environmental degradation

Resilience: Resilience is *the ability to resist, accommodate and recover from the effects of a hazard*. Mechanisms that increase resilience include:

- Livelihoods diversification
- Healthy ecosystems
- Warning systems
- Improved buildings

Disasters are not inevitable and hazards do not have to become disasters!

For a hazard to become a disaster it must interact with high levels of vulnerability for example:

- weak building structures
- high rates of poverty
- homes and businesses built on unsuitable land, such as flood plains
- poor community awareness of risks
- environmental mismanagement

How are disaster impacts exacerbated?

Disaster impacts are exacerbated by several factors including:

- increases in global population
- unplanned urbanisation
- growing informal settlements
- investment in high risk coastal areas
- deforestation
- poor land-use management
- inadequate enforcement of building codes
- periodic economic fluctuations

Can people living in developing countries display high levels of resilience to natural hazards?

Yes, they can also display high levels of resilience to natural hazards. Mechanisms that increase resilience include:

- having income from a variety of sources
- warning systems, like radio alerts
- access to health and education
- safe buildings
- legislation and governance that supports good disaster risk reduction practices and builds resilience

Case Study: Compare and contrast California, USA and Bam, Iran

A good example of the interactions between hazard, vulnerability and resilience is a comparison of the central California and Bam earthquakes. Both earthquakes were of a similar magnitude (6.5 and 6.6 respectively) and occurred in highly populated areas.

Paso Robles earthquake

The 2003 Paso Robles earthquake in central California left two people dead and 40 injured.

Bam earthquake

Four days later, an earthquake struck in Bam, Iran resulting in over 30,000 deaths and another 30,000 injuries.

Why was there a dramatic difference in the impacts of these earthquakes?

The dramatic difference in the impacts of these earthquakes is attributable to differences in the structural quality of buildings in each location. Eighty-five per cent of the buildings in Bam collapsed during the quake. A major factor contributing to the devastatingly high death and injury toll was that traditional mud brick buildings were not earthquake resistant, and crumbled and suffocated people inside.

Mohamed Rahimnejad, a civil engineer working in Bam after the quake, said that **‘the houses killed the people, not the earthquake’**

Source: *Hyogo Framework for Action, 2005-2015*, UNISDR

What is DRR?

DRR is defined by UNISDR as “the concept and practice of reducing disaster risks through systematic efforts to analyse and manage the causal factors of disasters, including through reduced exposure to hazards, decreased vulnerability of people and property, wise management of land and the environment and improved preparedness for adverse events.”

Source: See the Terminology page on UNISDR's website, at www.unisdr.org

AusAID's overall DRR aim involves efforts to reduce social, economic and environmental losses from hazards through increasing resilience **AND** decreasing vulnerability

Disaster risk reduction: case study from Bangladesh

Bangladesh is one of the best case examples of successful disaster risk reduction.

Over the last few decades, Bangladesh has made great improvements in preparing for and preventing disasters. They have invested heavily in cyclone shelters, a large scale community preparedness program (early warning system) and storm surge and flooding embankments to protect many households. This has led to a marked reduction in deaths caused by cyclones in Bangladesh, as shown below.

How does this compare to other disasters affecting similar communities?

This stands in contrast to Cyclone Nargis, the cyclone that devastated much of Burma on 2 May 2008 and resulted in an estimated 100,000 deaths.

Bangladesh and Burma have similar Human Development Index rankings, similar poverty levels and similar annual GDP. At first appearance the lives and vulnerabilities of Burmese and Bangladeshi communities living on extensive delta systems may appear to be similar.

Why then did similar cyclone events affecting similar communities result in strikingly different disasters?

In recent years, Bangladesh has incorporated early warning systems, mitigation measures and community preparedness activities into its development program. Unfortunately, Burma has not.

The three key DRR measures that made all the difference in Bangladesh were:

- effective early warning systems
- appropriate flood and storm surge embankments
- preservation or restoration of mangrove forests

It is not the size of a natural hazard that puts communities at risk of a disaster, but rather it's the actions taken by governments and communities to mitigate, prepare and warn their communities.

How can we reduce disaster risk?

Reducing disaster risk can be simple, easy to implement and cost effective.

Disaster risk reduction includes.....

Economic action

Economic action (e.g. insurance, livelihood diversification). The picture on the right shows how DRR can protect livelihoods. Its one of our favourite examples of DRR because it's so simple and it's been very effective. In highly flood prone areas in Bangladesh, Oxfam GB worked to diversify livelihoods through replacing chickens (which kept going missing during storm events) with ducks. As ducks obviously can survive flooding and eat nutrients that are stirred up by the floods, this ensured greater livelihood resilience. DRR can be as simple as this!

Environmental action

Environmental action (e.g. plant shelter breaks, reforestation). This picture shows an AusAID mangrove rehabilitation project in Tien Lang District, Hai Phong City, Vietnam. In this district AusAID funded the rehabilitation of 3 kilometres of mangrove forests to minimize the impact of typhoon storm surge damage on river communities.

Social action

Social action (e.g. education, training). Here doctors are tending to a volunteer patient during an Australian-funded emergency simulation at Pondok Kopi Hospital, east Jakarta. More than 200 hospital staff and 100 volunteers took part in the exercise to ensure the hospital is prepared to deal with a major influx of patients.

Political and legislative action

Political and legislative action (e.g. laws and controls such as building codes). These houses are right at the water's edge, with open sea behind them. When Cyclone Nargis hit Burma and the water came, it covered the roofs of these houses. Laws that prevent building structures right on the waters edge or better building codes would have helped to reduce the devastation of this disaster.

Physical action

Physical action (e.g. flood controls, safe buildings). Here you can see one of the Build Back Better signs in Padang which explains how to build stronger and safer structures. These building practices will reduce the risk of the building falling down in the event of an earthquake.

Technical action

Technical action (e.g. early warning systems). Early warning systems play an important role in disaster risk reduction by allowing people additional time to move to higher ground in the event of a tsunami or flood and/or move away from unsafe structures in the event of an earthquake. Effective early warning systems have saved many lives.

Millennium Development Goals In Action

The Millennium Development Goals (MDGs) are a set of eight development goals, including eradicating extreme poverty, reducing child mortality rates and fighting diseases. The goals were adopted by world leaders in the year 2000 with the aim to achieve them by 2015. All 192 member states of the United Nations as well as a number of international organisations, including AusAID, adopted the MDGs.

In module one we looked at how the success of the MDGs is underpinned by the environment. In module two we demonstrated how climate change can undermine the achievement of the MDGs.

How many of the Millennium Development Goals could disaster risk reduction help to achieve?



MDG 1: Eradicate extreme poverty and hunger

Disasters increase poverty and hunger by destroying livelihoods, such as farming. Protecting and diversifying helps build resilience to cyclical hazards such as floods and droughts.



MDG 2: Achieve universal primary education

Safe, structurally sound and accessible buildings means children are protected while at school. They also minimise disruption to school attendance after a disaster. Schools or health centres can double as emergency shelters and safe evacuation buildings.



MDG 3: Promote gender equality

Women are disproportionately affected by disasters. After a disaster, the burden of household and caring duties usually increases for women. Women also tend to eat and drink less after a disaster to save rations for their family, and are more vulnerable to abuse from other household members who are under stress.



MDG 4: Reduce child mortality

Children are more vulnerable during disasters. Teaching children about safety during disasters and preventing destruction of critical infrastructure can protect children from death, disease and disability.



MDG 5: Improve maternal health

Protecting clinics and hospitals can ensure safe places are available for birthing. Early warning systems allow pregnant women to move safely before a disaster. Protecting or diversifying livelihoods ensures that pregnant women's nutritional needs are better met.



MDG 6: Combat HIV/AIDS, malaria and other diseases

Effective DRR reduces the possibilities for the spread of contagious diseases following disasters. For example, after a disaster stagnant water may breed pests and disease. DRR can work to reduce the incidence of this.



MDG 7: Ensure environmental sustainability

Restoration of ecosystems such as mangroves, coral reefs and forests reduce the impact of and exposure to hazards. Effective land-use planning helps people identify safe areas to live and environmentally sound places to grow crops.



MDG 8: Develop a global partnership for development

The Hyogo Framework for Action is the international blueprint for disaster risk reduction. It has built consensus internationally on how best to ensure development is more sustainable through reducing disaster risks.

Source: *Hyogo Framework for Action, 2005-2015*, UNISDR

Disaster risk reduction can combat some of the worst impacts of climate change

So although climate change has the potential to undermine the achievement of all eight Millennium Development Goals, disaster risk reduction can also combat some of the worst impacts of climate change on people, their livelihoods and environment and also help to achieve the Millennium Development Goals

Why do disaster risk reduction...?

Disaster risk reduction...

- ...saves lives
- ...protects livelihoods
- ...is cost effective

Integrating environment, climate change and disaster risk reduction across the agency

AusAID integrates environment, climate change and disaster risk reduction across the aid program.

There are two key reasons for this.

1. There are strong links between the environment, disaster risk reduction and climate change.
2. It reduces duplication of programming.

Example - Mangrove restoration

Mangrove restoration – a good example of a joint environment, climate change and disaster risk reduction intervention

Healthy mangroves shield coastlines from the damaging effects of strong wind and waves caused by cyclones and tropical storms. With an expected increase in weather-related events due to global warming, mangroves are also an effective climate change adaptation measure. Mangroves not only protect against extreme weather events, but also provide positive environmental impacts through their ability to control soil erosion, absorb carbon dioxide and improve water quality through pollutant filtration.

Supplementary Reading

Read the reference to learn how to integrate environment, climate change and disaster risk reduction into your work and to see examples from AusAID on how this has been done successfully.

Integration in practice: Integrating disaster risk reduction, climate change and environmental considerations in AusAID programs, AusAID, October 2010.

Search on www.ausaid.gov.au

Module Four: Environmental protection - AusAID's legal obligations

Introduction

Under the *Environment Protection and Biodiversity Conservation Act (1999)* or EPBC Act Australia must ensure that no significant negative environmental impact occurs, or is likely to occur, anywhere in the world as a result of the aid program.

All AusAID funded projects must adhere to the EPBC Act. AusAID staff at Post and in Canberra are legally responsible for working with our partners to ensure that our programs comply with the EPBC Act. This module will familiarise you with program legal obligations under the EPBC Act.

Learning Outcomes

By the end of this module you will be able to describe AusAID's legal obligations under the EPBC Act to protect the environment.

Policy and Legal Context

AusAID is bound by the *Environment Protection and Biodiversity Conservation Act (1999)* or EPBC Act.

AusAID staff at Post and in Canberra are required by the Agency to identify potential environmental risk and manage potential impacts when administering the aid program. This approach ensures AusAID complies with the EPBC Act and upholds good development practices. Remember that many of the poorest people in developing countries rely on the environment for their wellbeing and livelihoods. Protecting the environment is in line with the overall purpose of the aid program - to help people overcome poverty.

AusAID must report annually on its environmental performance under the EPBC Act and is accountable for the information it provides. Read on for more information about the EPBC Act.

What is the EPBC Act?

The EPBC Act is Australia's principal national legislation for the protection of the environment. It came into effect in 2000.

The objectives of the EPBC Act are to:

- protect the environment
- promote ecologically sustainable development
- promote the conservation of biodiversity
- cooperatively implement Australia's international environmental responsibilities
- properly assess and address activities likely to have significant impacts on the environment

Of most relevance to AusAID's work is the promotion of ecologically sustainable development. The relevant parts of the EPBC Act for AusAID's work are sections 28, 160 and 161.

See the website at www.environment.gov.au for more information.

What is ecologically sustainable development?

The principles of ecologically sustainable development are outlined under section 3A of the EPBC Act.

Decision-making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations.

If there are threats of serious or irreversible environmental damage, the lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation (the 'precautionary principle').

The present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations (the principle of 'inter-generational equity').

The conservation of biological diversity and ecological integrity should be a fundamental consideration in decision making.

Improved valuation, pricing and incentive mechanisms for the protection and sustainable use of biological and physical resources should be promoted.

Ecologically sustainable development is compatible with the aims of the aid program. The principles (section 3A of the EPBC Act) are also consistent with the internationally agreed concept of environmentally sustainable development.

How do we define the 'environment'?

Environment is defined as our biological and physical surroundings and the way in which we interact with these surroundings.

The environment includes:

The qualities and characteristics of locations, places and area that make them special or unique

- Natural resources
- Ecosystems and each individual part of the ecosystem, including people
- Heritage values
- The social, economic and cultural aspects of all ecosystems, people and communities, natural and physical resources, qualities and characteristics of places and heritage values

What does this mean for AusAID?

The EPBC Act's definition of the environment complements AusAID's approach to the environment as a cross-cutting development issue. AusAID integrates environment, climate change and disaster risk reduction considerations under one framework. We do this because climate change can impact all aspects of the environment and must be taken into account alongside other environment considerations. The same is true of disaster risk reduction, which aims to reduce risks from natural events that present a hazard to human wellbeing.

What this means for you

The EPBC Act requires AusAID to seek and consider advice from the Minister for the Environment (or delegate) before entering "... into a contract, agreement or arrangement for the implementation of an activity that has, will have or is likely to have a significant impact on the environment anywhere in the world".

Reference: EPBC Act, 1999, section 160, chapter 4, part 11, division 4, subdivision A

What is a 'significant impact' on the environment?

A significant impact is "an impact which is important, notable, or of consequence, having regard to its context or intensity."

The factors that need to be taken into account to identify a significant impact are the:

- sensitivity, value, and quality of the environment which is impacted; and
- intensity, duration, magnitude and geographic extent of the impacts.

What does this mean for AusAID?

The term 'significant impact' has special meaning for the aid program. AusAID is required to identify, assess and manage both positive and negative environmental impacts.

This requires us to screen all aid activities for potential impacts. If after screening our activities we find that there is opportunity to achieve significant positive environmental impacts, we should act on these and incorporate them into the outcomes.

If we find there is likely to be a significant negative environmental impact from our activities then we must refer the matter to the Minister for the Environment.

Why determine if an activity is likely to have a significant impact on the environment?

The main purpose of determining whether an activity is likely to have a significant impact on the environment is to ensure AusAID identifies and manages risks, and takes advantage of opportunities to protect the environment through our activities. This approach is integral to achieving sustainable development and in line with international best practice.

Note: It is important for AusAID partners to familiarise themselves with AusAID's obligations under the EPBC Act and to take into account environmental factors in the design and implementation of projects.

How to comply with the EPBC Act?

To comply with the EPBC Act and deliver effective aid, AusAID must properly assess, plan and manage all strategies, plans, initiatives and activities for environmental impacts. This means considering all types of impacts – positive or negative and direct or indirect.

AusAID's *Environment Management Guide for Australia's Aid Program 2012* outlines how AusAID considers the environment of people living in poverty in implementing its programs and draws on best practice from around the world. The guide will help our development partners understand how to address and manage the environment to the benefit of disadvantaged communities.

To learn more about the types of impacts assessed in AusAID, complete the Environmental Impact Chart.

Environmental Impact

Direct impact is a change (physical, chemical or biological) to the environment because of an activity.

For example:

- building a road
- funding an irrigation canal
- establishing a waste-water system
- protecting natural resources, or introducing a plant or animal species.

Indirect impact is where changes in policy or behaviour flowing from an activity will affect the environment in the future or 'downstream'.

For example:

- designing a road system
- funding land titling
- providing environmental education
- strengthening an institution in the natural resource sector.

Positive impact is a beneficial environmental outcome.

For example:

- increased biodiversity
- adaptation to climate change
- better health as a result of a clean water supply.

Negative impact is an adverse environmental outcome.

For example:

- a contaminated water table from sewerage systems
- erosion from poorly planned infrastructure activities
- decimation of existing vegetation through the introduction of livestock).

Such outcomes can sometimes be irreversible and have a chain of impact on poverty, such as poor health or a reduction in livelihood potential.

Identifying what types of impacts are likely to occur as a result of a planned program, strategy or activity is therefore essential to ensuring that we protect people's livelihoods and enable sustainable development.

Screen for environmental impacts

We do this to not only avoid doing harm to the environment but to also identify opportunities to build in positive environmental benefits from the outset of strategy development, planning and design.

The most effective way to avoid negative impacts and identify positive opportunities is to screen for environmental impact early. We can then make decisions on whether further environmental assessment and planning is required and, if so, what type and level.

The next module will take you step by step through AusAID's environmental management system. This system has been designed to meet our legal obligations under the EPBC Act. It starts with environment screening at the concept stage which then enables you to determine the appropriate level of analysis required at the design stage.