UNDP Lebanon

Republic of Lebanon
Ministry of Environment

A Citizen's Guide to

Climate Change

Climate Change

Global Environment Facility

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A Citizen's Guide to

Climate Change

What is the Climate System? & What is Climate Change?

The Climate System combines the different natural elements on earth & links them together to form the web of life that we know. The atmosphere, the oceans, the land, the ice caps, and the biosphere are all part of the Climate System. Because climate is everywhere, we are all affected by it.

" **Climate Change** is defined as a change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods."

You may have heard people talking about global warming. **Global warming** is the average increase in temperature on earth, which in turn causes changes in climate. A warmer earth could lead to changes in rainfall patterns, a rise in sea level, & may have numerous impacts on plants, animals, & humans. In other words, a change in the entire climate system.

Evidence of Climate Change

At the Global Level

Since 1861, temperature records have been taken using data from thermometers: however temperature records have also been constructed from tree rings, corals & ice cores for the past 1000 years. These records indicate an increase in the global average temperature.

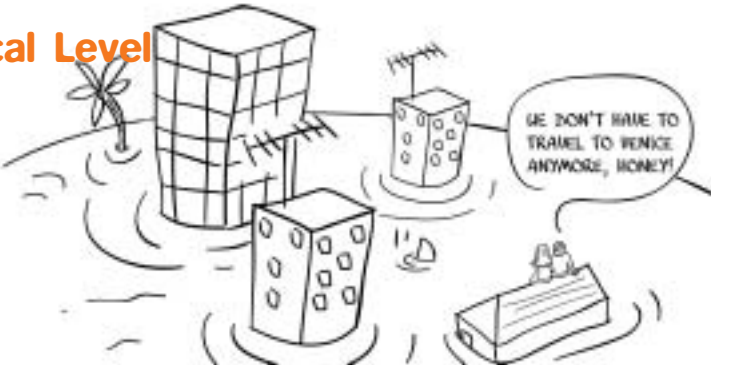
During the 20th century, global temperature has increased by 0.6 °C, the largest of any temperature increase over the past 1000 years.

What's more is that the 10 warmest years ever recorded have occurred just very recently, between 1985 & 2000. The warmest year on record is 1998.

Since 1960, global snow cover has decreased by 10%. Also, around the North Pole, huge chunks of ice are breaking off and floating around the ocean, eventually melting.

At the same time, global sea level has risen between 0.1-0.2 meters.

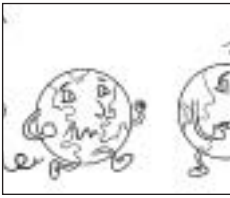
At the Local Level



Climate Change
occurs not only
in remote areas like
the arctic sea
or on tropical islands.
It is happening right here
as well.

In Lebanon,
records show that
the average temperature has slightly
increased over the years.

The seasons also
appear to be
changing.

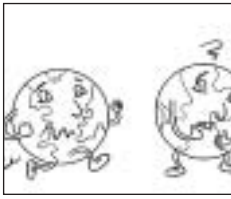


Courtesy of Ramzi Haidar.

While temperature is getting higher, average annual rainfall is getting less. The pattern of rainfall is also changing so that rainshowers are becoming more intense.

How are Weather & Climate different?

When we describe what is happening outdoors in a given place at a given time we talk about the weather. Most people start their days off by checking the weather simply by taking a look at the sky, stretching a hand out of an open window, or grabbing a newspaper to read if the day will bring rain or sunshine. Weather – which includes temperature, rainfall, pressure, & wind conditions – can change rapidly within a very short period of time. For example, it may rain for an hour & then suddenly become sunny & clear. The weather reports you see on television usually give you a good idea of what the weather will be like the next day or so.



When we talk about **climate**, we are describing the average weather conditions in an area over a longer period of time. Climate tells us what it's usually like in the place where we live. For instance, Beirut is known to have a humid climate, while Zahle has a dry climate. Climate also determines where plants grow. Agriculture depends a lot on climate. Similarly, Lebanese Cedars will not grow on the coast where it is too hot & humid for them to survive.

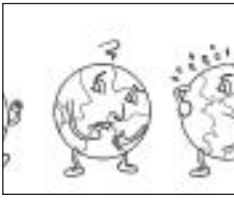
Just as weather can change, so can climate. However, changes in climate usually take place over hundreds or thousands of years. The climate change we are experiencing today developed over the last century. This rapid change over such a short period is one of our main concerns.

Why is the Climate Changing?

The climate is changing because something in the natural composition of our atmosphere is being changed.

A lot of people think of the atmosphere as just air, but the atmosphere is actually a mixture of gases that perform many functions & help support life on our planet. Without oxygen, for example, we would not be able to breathe.
But the gases have another very important function. They keep the earth warm. Without them, the temperature on our planet would be around 30°C colder than it actually is.

Courtesy of Rabih Andraos



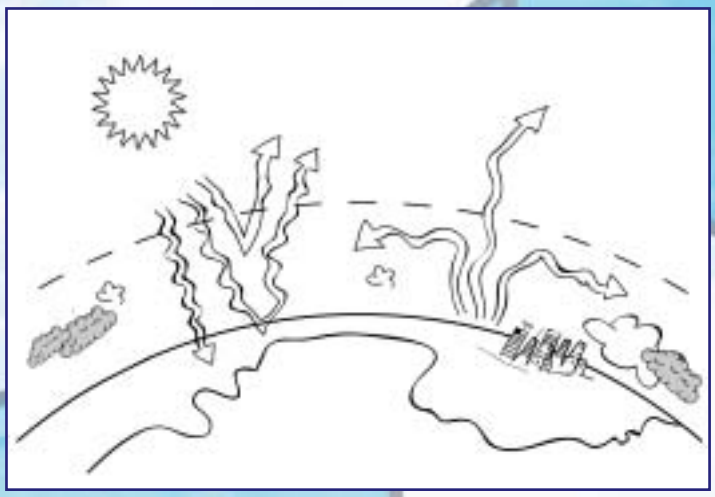
"But how can gases keep the earth warm???"

you may wonder.

Think of a greenhouse. Greenhouses are not made of wood or cement, but of glass or plastic, which allow the sun's rays to pass through and warm up the air inside. The warm air then gets trapped inside the greenhouse, allowing plants to grow there even during winter.

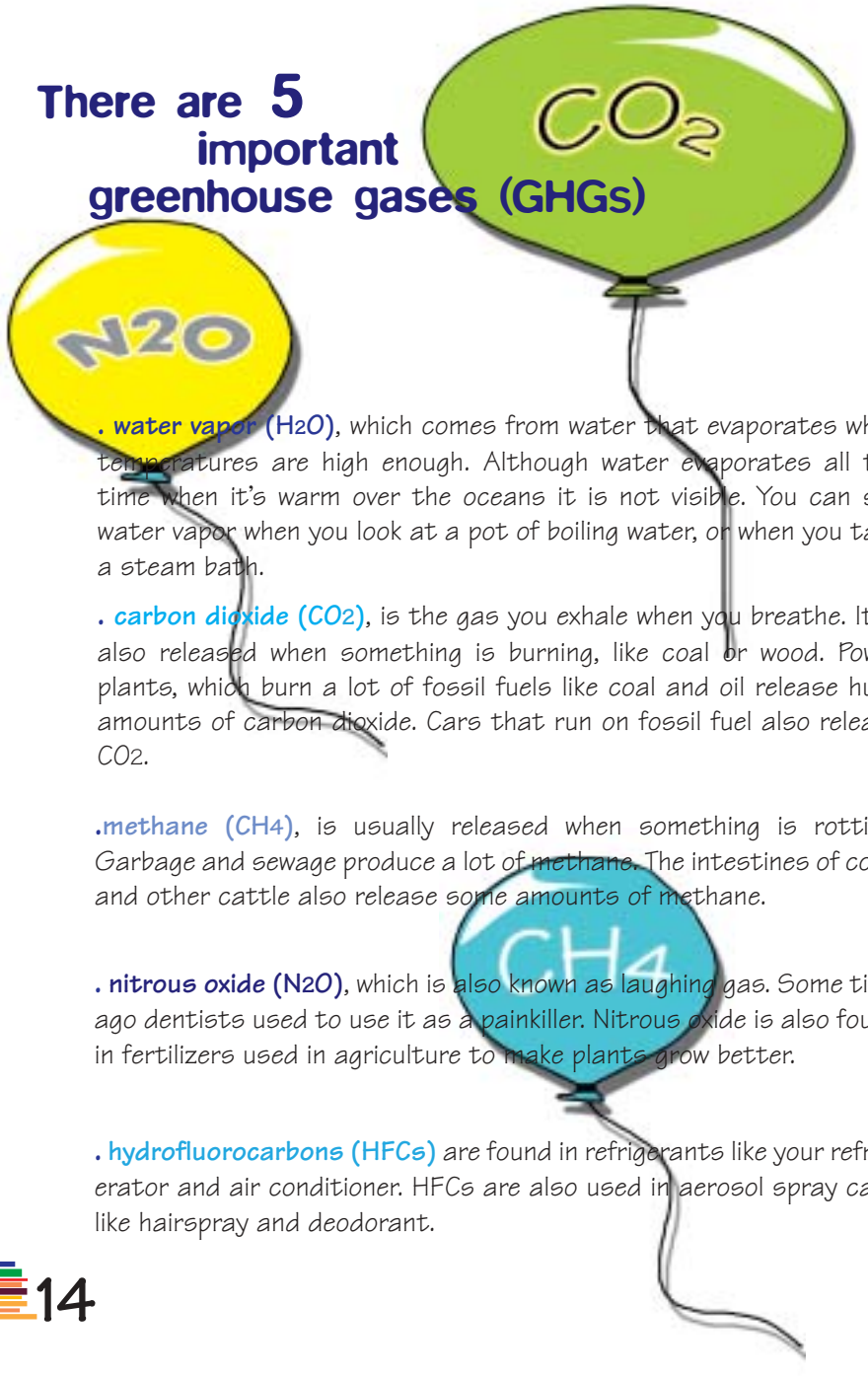
The Natural Greenhouse Effect

The earth works in a similar way like a giant greenhouse. Its climate is driven by a continuous flow of energy from the sun.



Most of the sun's rays pass through the atmosphere & warm up the earth. Some are reflected back into space. The warmth is radiated back to the skies where it is absorbed by some of the gases in the atmosphere known as "greenhouse gases". These gases have the ability to absorb & re-emit heat similar to how the glass & plastic of a greenhouse trap the heat & keep it inside. That is why we call this process the "natural greenhouse effect".

There are 5 important greenhouse gases (GHGs)



. **water vapor** (H_2O), which comes from water that evaporates when temperatures are high enough. Although water evaporates all the time when it's warm over the oceans it is not visible. You can see water vapor when you look at a pot of boiling water, or when you take a steam bath.

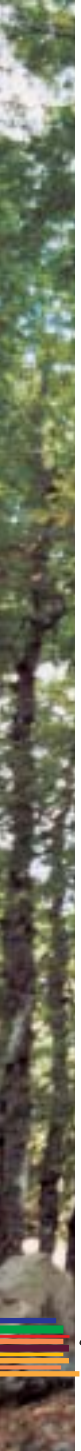
. **carbon dioxide** (CO_2), is the gas you exhale when you breathe. It is also released when something is burning, like coal or wood. Power plants, which burn a lot of fossil fuels like coal and oil release huge amounts of carbon dioxide. Cars that run on fossil fuel also release CO_2.

.**methane** (CH_4), is usually released when something is rotting. Garbage and sewage produce a lot of methane. The intestines of cows and other cattle also release some amounts of methane.

. **nitrous oxide** (N_2O), which is also known as laughing gas. Some time ago dentists used to use it as a painkiller. Nitrous oxide is also found in fertilizers used in agriculture to make plants grow better.

. **hydrofluorocarbons** (HFCs) are found in refrigerants like your refrigerator and air conditioner. HFCs are also used in aerosol spray cans like hairspray and deodorant.

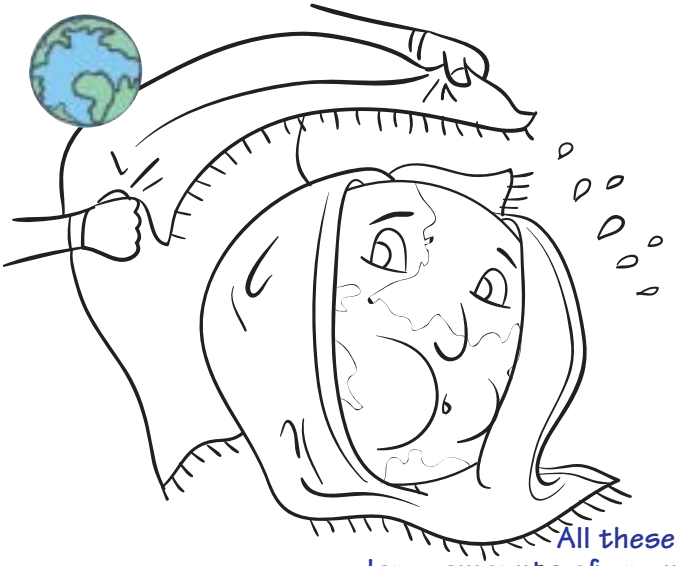
Courtesy of Ramzi Haidar.

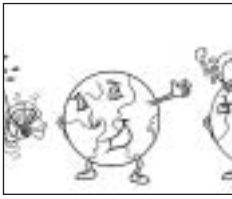


The Enhanced Greenhouse Effect

A lot of the greenhouse gases occur naturally, however over the last 250 years humans have added huge amounts of these gases to the atmosphere. In the 1700s, people started to use machines in industry & agriculture to make life easier. But these machines needed energy, & this energy was obtained from burning fossil fuels like coal & oil.

Today we still use the same fuels to generate electricity & run our cars. At the same time we continue to cut down forests to make space for cities & agriculture.





All these activities release large amounts of greenhouse gases into the atmosphere. When the amount of greenhouse gases increases, more heat is absorbed and retained. So the more greenhouse gases we release, the warmer the earth will become. This is what we call the " enhanced greenhouse effect".

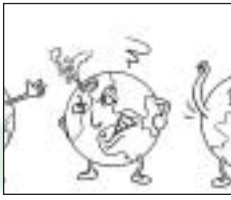
You can think of the greenhouse gases as a blanket covering the earth. Without the blanket – or the greenhouse gases – the earth would be much colder than it is today. However, as you start to add one blanket after the other, the earth's temperature is going to start to rise just as you would begin to feel hot if you were wrapped in 10 blankets. Fortunately for you it is easy to throw off the blankets once you're hot. The earth on the other hand reacts in a completely different manner. It reacts through **Climate Change**.

The Effects of Climate Change

A lesson to learn from

Why do you think people are so worried about Climate Change?
Why do we need to care at all?
The biggest concern we have is that we do not know exactly what might happen to our planet
& to us if Climate Change continues.
Scientists & experts agree that the consequences will be disastrous,
but how much disastrous ??
nobody knows exactly...

If we think back a few million years & dig deep into our earth's history we can find a very valuable lesson to learn from. The **dinosaurs** once populated the earth just like we humans do today. And then all of a sudden they all disappeared. Some scientists believe that at that time a large rock traveling in space, an asteroid, hit the earth, breaking into a million pieces & throwing up tons of dust & smoke. These dark clouds covered the skies & prevented sunlight from reaching the earth, killing plants & lowering the temperatures worldwide. Without food & with a colder climate, a lot of the animals died, including all the **dinosaurs**.



This by no means should suggest that we will suffer the same fate as the dinosaurs.

It just shows us that Climate Change has the ability to affect our lives in a very powerful way.

Exactly what might happen, we are not sure of yet. However, scientists have confirmed that Climate Change is underway, that human activities do & will continue to alter the composition of the atmosphere, & that the recent warming can be largely attributed to human causation.

Courtesy of Rabih Andraos

What do the Scientists expect ?

The most direct effect
of increasing the concentration
of greenhouse gases
in the atmosphere is a noticeable
increase in
global temperature.
Within this century,
temperatures are expected to rise
by around 1.4 to 5.8 °C.
Imagine what that would mean!!!

Over the same period of time, the sea level is estimated to rise by about 0.09 to 0.88 meters. This may not seem like much to you but there are coastal areas & islands that will become partially submerged if the sea level rises this high. Scientists think that the sea level rise is partly due to the added water coming from the melting glaciers and the warmer temperatures which make water expand.

Courtesy of Souhaila Sahmarani

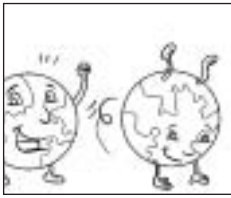
What else might happen:

Glaciers are large sheets of ice that move very slowly. Sometimes big chunks of them break off & float around the waters of the Arctic Ocean. As you would expect, the **warmer temperatures** will continue to melt the ice adding more water to the oceans & threatening the habitat of some animals like ice bears, seals & penguins.

Extreme weather events like droughts & heavy rains leading to floods are almost certain to become more frequent & powerful. These events will also spread to areas where they are unlikely to happen, causing heavy financial losses & claiming human lives. Losses from **catastrophic** events already cost the United States over $304 billion every year. Just think how costly **climate change** is from only this perspective.

Warmer temperatures can also have a **negative** effect on **human health**. Some disease-causing mosquitoes are likely to spread to new areas that become **warm** enough for them to survive. More severe & frequent **heat waves** are expected, which can cause cardiac & respiratory illnesses as well as **death** especially in the elderly.

Courtesy of Rabih Andraos

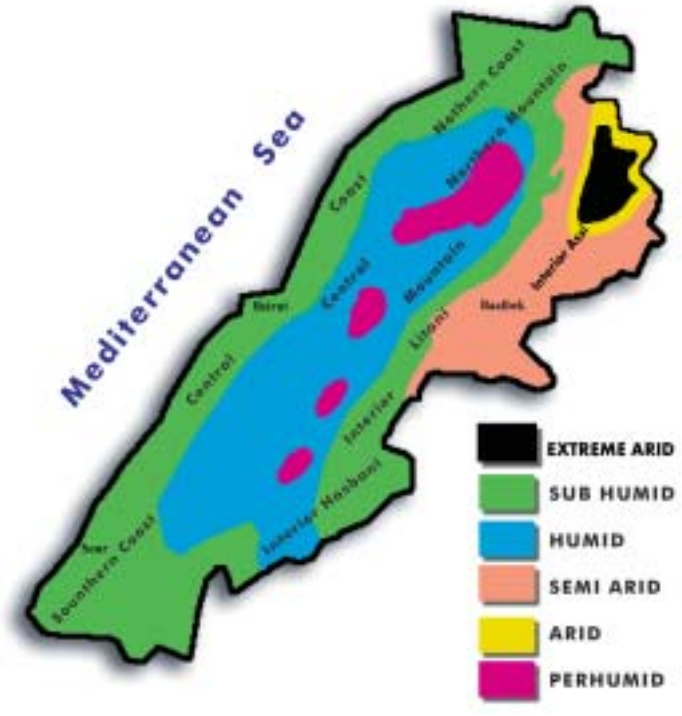


The effect on agriculture is expected to be great. Productivity is projected to decrease dramatically in some areas as they become hotter & more drought-prone. In some parts of the world, people may not be able to produce enough food to keep themselves alive.

What might happen in Lebanon?

Climate Change might impact Lebanon in a number of ways. The different climatic zones that give Lebanon its unique natural character might begin to blend into one another, while the oromediterranean might disappear & a new zone, the extreme arid, will likely appear in the Northern Bekaa region..

Courtesy of Ramzi Haidar



Water resources are highly vulnerable, with deficits building up between 140 to 800 million cubic meters annually by 2015, accompanied by deterioration in quality.

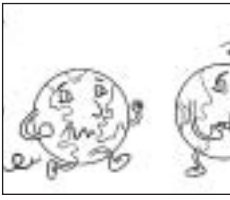
In coastal zones, an estimated annual loss of $75 million is expected due to flooding of low-lying areas. Coastal activities such as fisheries are likely to suffer from a doubling of losses by 2020.

We are all responsible

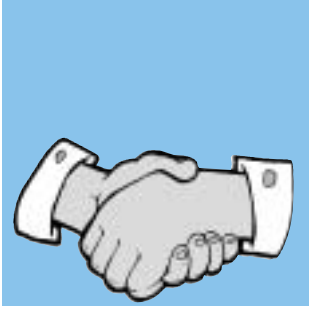
How do we contribute to Climate Change every day

You may be surprised to find out that nearly everything you do on a daily basis contributes in some way or another to greenhouse gas emissions.

For example, you send greenhouse gases into the air whenever you watch TV, listen to the stereo, turn on a light or the air conditioner, heat a meal in the microwave oven, & wash your clothes in the washing machine. These activities all require electricity, which is generated in power plants by burning fossil fuels that release greenhouse gases, especially carbon dioxide. Therefore the less electricity we use & the less waste we produce the less greenhouse gases we emit.



But that's not all. There are many other things we do besides using electricity that send greenhouse gases into the air. Whenever we drive or ride in a car, the engine burns gasoline, releasing a number of greenhouse gases, especially carbon dioxide. The trash that we send to landfills produces gases like methane when it decomposes. Burning wood for heating, producing cement for building, & using fertilizers for growing plants are all activities that release one or more greenhouse gases.



How we can Help

International Action

Governments worldwide have recognized the seriousness of the situation & a number of measures have already been taken to address the problem.

Because Climate Change is a global problem it is important for governments to work together towards a solution.

• 1988, the Intergovernmental Panel on Climate Change (IPCC) was formed to further investigate human impact on climate change.

• May 1992, the United Nations Framework Convention on Climate Change (UNFCCC) was adopted at the Rio Earth Summit. The Convention aims at reducing man-made greenhouse gas (GHG) emissions to levels that would prevent interference with the climate system.

• March 1994, the UNFCCC entered into force after receiving the required 50 ratifications. Member parties to the Convention agreed to hold annual meetings to follow up on each other's efforts and reach joint solutions. The annual meetings are referred to as the Conference of the Parties (COP).

• December 1997, several member parties to the Convention adopted the Kyoto Protocol at the 3rd COP held in Kyoto, Japan. The Kyoto Protocol calls upon industrialized countries to reduce greenhouse gas emissions from the year 2008 to 2012 by 5% from 1990 levels.

• The terms of the Kyoto Protocol continued to be negotiated in subsequent COPs up until COP8 held in New Delhi at the end of 2002.

• As of December 2002 100 members have already signed Kyoto Protocol. Entry into force is expacted in next several months.

• In early 2001, the IPCC released its Third Assessment Report, which addressed several questions related to the scientific evidence of Climate Change the sensitivity, adaptive capacity, and vulnerability of natural and human systems, mitigation measures and economic development.

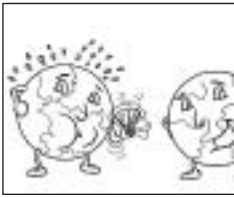
National Action

- December 1994, Lebanon ratified the UNFCCC.

- Having signed the UNFCCC, Lebanon has received the support of the global community in helping the government determine the amount of greenhouse gas (GHG) emissions & work on decreasing these emissions through national plans & programs.

- 1997-1999, through the Climate Change Phase I Project, Lebanon's First National Communication report was prepared & submitted to the Secretariat of the Convention. The project was funded by the Global Environment Facility (GEF), managed by the United Nations Development Program (UNDP), & executed by the Ministry of Environment (MOE).

- The First National Communication presented the national greenhouse gas inventory, a description of the amounts & sources of greenhouse gases in Lebanon. The report recognized two sectors that have the largest contribution of greenhouse gas emissions in Lebanon: electricity production & transport. Several suggestions have been given to try to reduce these emissions:



Electricity Sector	Transport Sector
Substitution of fuel and diesel oil with natural gas	Reinstallation of annual car maintenance checkups. Cars should be checked for technical status as well as emissions from exhaust pipes
Improvement of the energy supply mix by using renewable energy like hydropower (water) & solar power (sun).	Improvement of traffic management & the public transport sector.
Encouragement of efficient energy producing technologies.	Switching to alternative fuels.

National Action

- November 2001, the Climate Change Enabling Activity – Phase II project was launched in partnership with U.N.D.P/M.O.E/G.E.F. The main aim of this project was to:

1. Raise more public awareness about Climate Change.

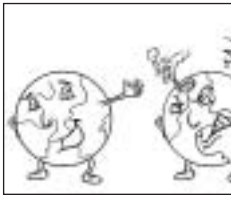
2. Build national capacities, especially in monitoring the status of emissions, & participating in systematic observation networks.

3. Assessment of technology needs & technology transfer.

4. Undertake studies to address the improvement of the Climate Change emission factors.

5. Update of GHG inventory (16 million tones of CO_2, Energy (86%) industry (11%) in 1999).

As for the future, new programs are also being prepared to address GHG emissions in the energy & building sectors:



a. A project executed by the Ministry of Energy and Water will aim at reducing GHG emissions in Lebanon by improving energy efficiency on the demand side.
The creation of a multi-purpose Lebanese Center for Energy Conservation and Planning is considered for his task.

b. A project executed by the Directorate General for Urban Planning will be addressing the reduction of GHG emissions from the building sector by improving the thermal standards of buildings.

c. Other initiatives led by the Center for Development and Reconstruction will tackle the reduction of GHGs from the transport sector & the reuse of methane gas from solid waste.

Courtesy of Green Service Program

What You Can Do

Do you ever ask yourself,
"What difference can I possibly make?"
Well just look around you & you will realize that if each one of us contributed in only a small way we can collectively make a BIG difference.

Many greenhouse gases come from things we do every day. However, driving cars or using electricity is not necessarily wrong. We just have to be smart & wise about it. Consider some of the things you could do day after day to reduce greenhouse gas emissions and help lessen the impact of Climate Change:

_ Save electricity. Turn off the lights when you leave the house, or when you're not in the room. Don't leave the TV or stereo on if nobody's watching or listening.

_ Conserve Energy by buying more energy-efficient appliances. You can reduce your electricity consumption – & hence your electric bill – by almost 40% if you use products that are designed to consume less energy. These products usually display specific labels such as the ENERGY STAR® label.

_ Make sure your home is thermally efficient. Cracks in the walls & around windows allow cold air to come in even if all the doors & windows are shut. Closing the shutters & curtains at night not only keeps out light from the street but also forms an insulating layer.

_ Go solar. If you have the space on the roof of your house, you can install a solar-powered thermal system. Think how this will reflect on your electric bill if you no longer need electricity to heat your water.

_ Conserve water by using low-flow faucets & water-saving toilets.

_ Use alternative methods of transportation. Walking & biking can get you anywhere in the city. Public transportation & sharing cars (carpooling) helps cut down on exhaust emissions from vehicles.

_ If you use your car, make sure you have it tuned up regularly and its tires inflated properly to save on fuel costs.

_ When you buy a new car, consider a fuel-smart vehicle, one that gets more kilometers per fuel tank. Also match your vehicle to your needs. If you live in the city, there is no need for a Sports Utility Vehicle (or you may call them 4-by-4).

_ Encourage recycling by segregating your waste & buying recycled products. Things that are made of recyclables usually use up less energy in the production process.

_ Plant trees & not just in the mountains. Trees are of great benefit because they absorb carbon dioxide from the air.

_ Educate yourself & others. Read & ask around how you can help and contribute. Get your friends & family involved. Remember, the more we care about Mother Nature, the better she will treat us in the future.

Taking action on Climate Change is simple. In most cases it takes only a small change in your habits & behavior to make a Big Difference in Our Own Future.

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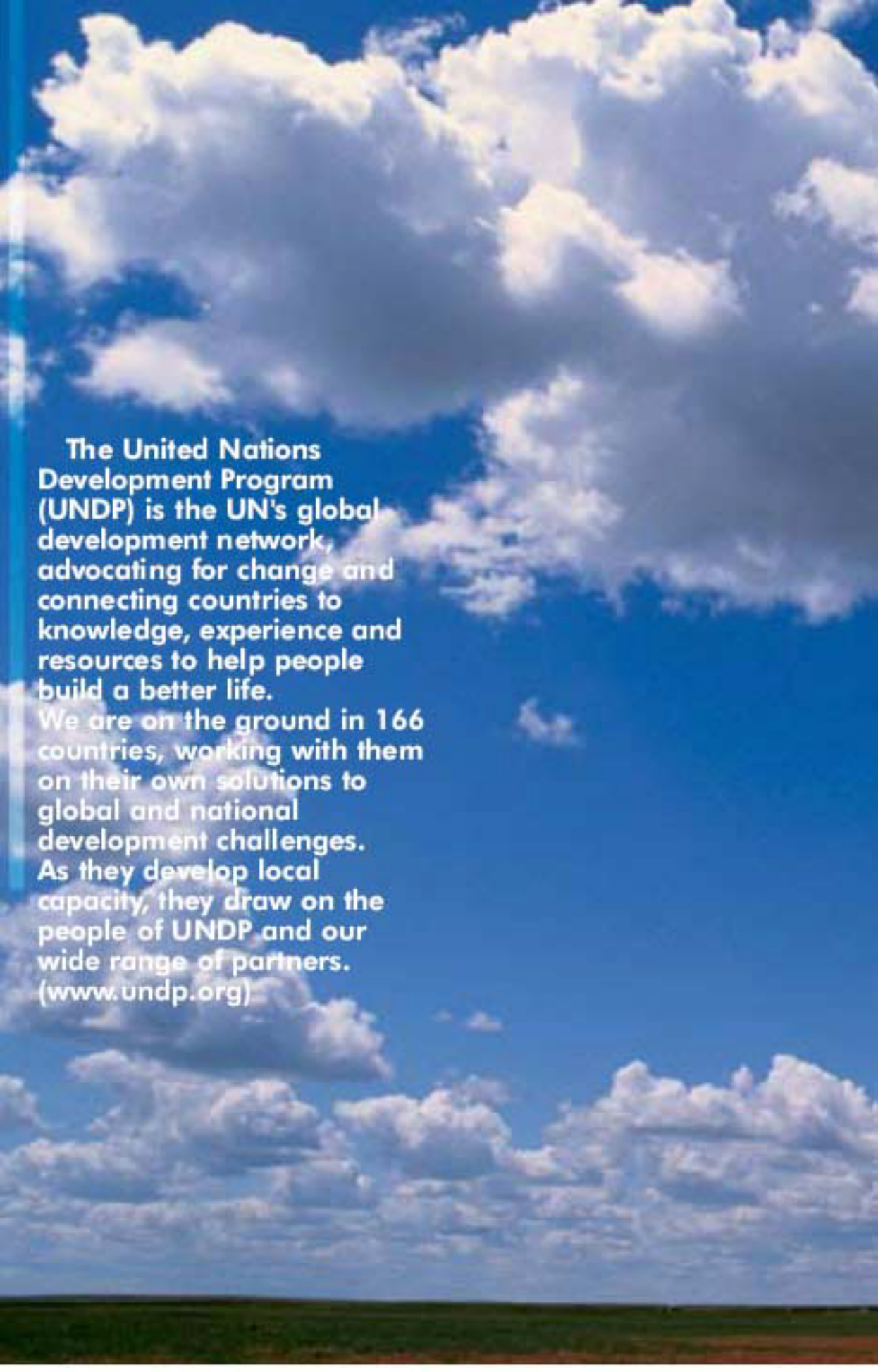

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