SPECIAL

Global Warming

Global Warming is defined as the increase of the average temperature on Earth. As the Earth is getting hotter, disasters like hurricanes, droughts and floods are getting more frequent. Over the last 100 years, the average temperature of the air near the Earth's surface has risen a little less than 1° Celsius (0.74 ± 0.18°C, or 1.3 ± 0.32° Fahrenheit). Does not seem all that much? It is responsible for the conspicuous increase in storms, floods and raging forest fires we have seen in the last ten years, though, say scientists. Their data show that an increase of one degree Celsius makes the Earth warmer now than it has been for at least a thousand years.

Earth should be in cool-down-period

But it is not only about how much the Earth is warming, it is also about how fast it is warming. There have always been natural climate changes – Ice Ages and the warm intermediate times between them – but those evolved over periods of 50,000 to 100,000 years. A temperature rise as fast as the one we have seen over the last 30 years has never happened before, as far as scientists can ascertain. Moreover, normally the Earth should now be in a cool-down-period, according to natural effects like solar cycles and volcano activity, not in a heating-up phase.

Natural and man-made causes

Global Warming is caused by many things. The causes are split up into two groups, man-made or anthropogenic causes, and natural causes.

Natural Causes

Natural causes are causes created by nature. One natural cause is a release of methane gas from arctic tundra and wetlands. Methane is a greenhouse gas. A greenhouse gas is a gas that traps heat in the earth's atmosphere. Another natural cause is that the earth goes through a cycle of climate change. This climate change usually lasts about 40,000 years.

Man-made Causes

Man-made causes probably do the most damage. There are many man-made causes. Pollution is one of the biggest man-made problems. Pollution comes in many shapes and sizes. Burning fossil fuels is one thing that causes pollution. Fossil fuels are fuels made of organic matter such as coal, or oil. When fossil fuels are burned they give off a green house gas called CO_2. Also mining coal and oil allows methane to escape.

How does it escape? Methane is naturally in the ground. When coal or oil is mined you have to dig up the earth a little. When you dig up the fossil fuels you dig up the methane as well.

Another major man-made cause of Global Warming is population. More people means more food, and more methods of transportation, right? That means more methane because there will be more burning of fossil fuels, and more agriculture.

Now your probably thinking, "Wait a minute, you said agriculture is going to be damaged by Global Warming, but now you're saying agriculture is going to help cause Global Warming?" Well, have you ever been in a barn filled with animals and you smell something terrible? You're smelling methane. Another source of methane is manure. Because more food is needed we have to raise food.

Animals like cows are a source of food which means more manure and methane. Another problem with the increasing population is transportation. More people means more cars, and more cars means more pollution.

Since CO_2 contributes to global warming, the increase in population makes the problem worse because we breathe out CO_2.

Also, the trees that convert our CO_2 to oxygen are being demolished because we're using the land that we cut the trees down from as property for our homes and buildings. We are not replacing the trees (an important part of our eco system), so we are constantly taking advantage of our natural resources and giving nothing back in return.

The Greenhouse Effect?

Seen from space, our atmosphere is but a tiny layer of gas around a huge bulky planet. But it is this gaseous outer ring and its misleadingly called greenhouse effect that makes life on Earth possible – and that could destroy life as we know it.

The sun is the Earth's primary energy source, a burning star so hot that we can feel its heat from over 150 million kilometers away. Its rays enter our atmosphere and shower upon on our planet. About one third of this solar energy is reflected back into the universe by shimmering glaciers, water and other bright surfaces. Two thirds, however, are absorbed by the Earth, thus warming land, oceans, and atmosphere.

Much of this heat radiates back out into space, but some of it is stored in the atmosphere. This process is called the greenhouse effect. Without it, the Earth's average temperature would be a chilling -18 degrees Celsius, even despite the sun's constant energy supply.

In a world like this, life on Earth would probably have never emerged from the sea. Thanks to the greenhouse effect, however, heat emitted from the Earth is trapped in the atmosphere, providing us with a comfortable average temperature of 14 degrees.

So, how does it work? Sunrays enter the glass roof and walls of a greenhouse. But once they heat up the ground, which, in turn, heats up the air inside the greenhouse, the glass panels trap that warm air and temperatures increase.

Our planet, however, has no glass walls; the only thing that comes close to acting as such is our atmosphere. But in here, processes are way more complicated than in a real greenhouse.

Only about half of all solar energy that reaches the Earth is infrared radiation and causes immediate warming when passing the atmosphere. The other half is of a higher frequency, and only translates into heat once it hits Earth and is later reflected back into space as waves of infrared radiation.

This transformation of solar radiation in to infrared radiation is crucial, because infrared radiation can be absorbed by the atmosphere. So, on a cold and clear night for example, parts of this infrared radiation that would normally dissipate into space get caught up in the Earth's atmosphere. And like a radiator in the middle of a room, our atmosphere radiates this heat into all directions.

"We need new criteria for emission cuts

A broad range of global, regional and bilateral environmental agreements – including those on Climate Change, depletion of the Ozone layer, chemicals and wastes and conservation and sustainable use of natural resources, such as biodiversity, endangered species and migratory species - provide the legal foundation for achieving this goal. Here again, they need to be effectively implemented at national level through national laws and regulations if we are to realize the full benefits of these international accords.

Let us look at climate change as an example. IPCCC reported that 70% of global warming is due to burning of fossil fuel. That heat pollution would be the biggest environmental catastrophe that humankind ever faced. To avoid this, IPCCC suggested a carbon budget (1456 trillion tons of carbon for the whole century). However this budget will expire in 2032 if we continue business as usual.

In order to fight climate change we need new criteria for emission cuts based on IPCCC's carbon budget and there should be an adaptation fund estimating the actual cost of climate change. A new monitoring institution and a new international climate change court of justice, where defaulting nations would to be answerable in order to ensure environmental justice, should be established. Otherwise climate change related terrorism will be another form of global terrorism and we will have to establish an environmental prosecutors forum at global level to address the present burning global issues.

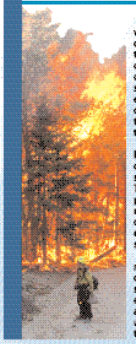
Excerpt from the speech of Environment and Natural Resources Minister **PATALI CHAMPIKA RANAWAKA,** *at the South Asian Regional Meeting for Environmental Prosecutors in Sri Lanka, held on 22-24 June 2009.*

Alaskan Ice Melting

A petrochemical plant spews flue gas and steam at dawn. Such greenhouse gasses are contributing to changes in climate

Floods in Mumbai

Forest fires burn their way into climate change



New evidence suggests wildfires are a wild card in climate change. The chemical junk that forest fires spew into the air might affect atmospheric chemistry in a manner similar to - and on a scale similar to - the impact of sulfurous chemicals from volcanic eruptions. This further complicates the complex challenge scientists face in trying to understand what's happening to Earth's climate.

Volcanic debris moving through the lower atmosphere washes out fairly quickly. But chemicals that reach the stratosphere spread around the world. They undergo reactions that produce a pall of sulfuric acid droplets. This haze reflects some incoming sunlight and cools the underlying atmosphere. The effect of a single eruption can last for several years.

Scientists have known that forest-fire smoke also spreads widely. The fire chemicals caused "atmospheric effects similar to those seen during a volcanic eruption," according to the paper's announcement. It notes that powerful updrafts in so-called "supercell" thunderstorms can carry wildfire debris to stratospheric heights where it can "affect environmental conditions, including cloud formation and climate change."

Scientists are only beginning to understand the role of wildfires in climate change. Yet two points are clear. Their influence on climate is more subtle than scientists have realized. Moreover, Drs. Fromm and Servranckx suggest it is likely to grow as warming temperatures encourage more fire outbreaks in high northern latitudes.

Second, there is a significant difference between the volcanic and forest-fire wild cards. We can't control volcanic eruptions. We can minimize wildfires. Many fires result from human carelessness or outmoded slash-and-burn farming. Lack of proper forest maintenance also encourages conflagrations. It may be difficult to do such maintenance in remote parts of high latitude northern forests. Protection of forest resources and the lives and property of forest dwellers is reason enough to raise the status of forest fire management on the list of national and international priorities.

Ordinary DISASTERS

AVALANCHES While avalanches are sudden, the warning signs are almost always numerous before they let loose. Yet in 90 percent of avalanche incidents, the snow slides are triggered by the victim or someone in the victim's party.

Avalanches kill more than 150 people worldwide each year. Most are snowmobilers, skiers, and snowboarders. Disastrous avalanches occur when massive slabs of snow break loose from a mountainside and shatter like broken glass as they race downhill. These moving masses can reach speeds of 80 miles (130 kilometers) per hour within about five seconds. Victims caught in these events seldom escape. Storminess, temperature, wind, slope steepness and orientation (the direction it faces), terrain, vegetation, and general snowpack conditions are all factors that influence whether and how a slope avalanches.

EARTHQUAKES Some 80 percent of all the planet's earthquakes occur along the rim of the Pacific Ocean, called the "Ring of Fire" because of the preponderance of volcanic activity there as well. Most earthquakes occur at fault zones, where tectonic plates—giant rock slabs that make up the Earth's upper layer—collide or slide against each other. These impacts are usually gradual and unnoticeable on the surface; however, immense stress can build up between plates. When this stress is released quickly, it sends massive vibrations, called seismic waves, often hundreds of miles through the rock and up to the surface. Other quakes can occur far from faults zones when plates are stretched or squeezed. Scientists assign a magnitude rating to earthquakes based on the strength and duration of their seismic waves. A quake measuring 3 to 5 is considered minor or light; 5 to 7 is moderate to strong; 7 to 8 is major; and 8 or more is great.

HURRICANES Hurricanes are giant, spiraling tropical storms that can pack wind speeds of over 160 miles (257 kilometers) an hour and unleash more than 2.4 trillion gallons (9 trillion liters) of rain a day. These same tropical storms are known as cyclones in the northern Indian Ocean and Bay of Bengal, and as typhoons in the western Pacific Ocean. The Atlantic Ocean's hurricane season peaks from mid-August to late October and averages five to six hurricanes per year. Hurricanes begin as tropical disturbances in warm ocean waters with surface temperatures of at least 80 degrees Fahrenheit (26.5 degrees Celsius). These low pressure systems are fed by energy from the warm seas. If a storm achieves wind speeds of 38 miles (61 kilometers) an hour, it becomes known as a tropical depression. A tropical depression becomes a tropical storm, and is given a name, when its sustained wind speeds top 39 miles (63 kilometers) an hour. When a storm's sustained wind speeds reach 74 miles (119 kilometers) an hour it becomes a hurricane and earns a category rating of 1 to 5 on the Saffir-Simpson scale.

TSUNAMI The most infamous tsunami of modern times hit Indian Ocean shorelines on the day after Christmas 2004. That tsunami is believed to have packed the energy of 23,000 Hiroshima-type atomic bombs.

A tsunami is a series of ocean waves that sends surges of water, sometimes reaching heights of over 100 feet (30.5 meters), onto land. These walls of water can cause widespread destruction when they crash ashore. These awe-inspiring waves are typically caused by large, undersea earthquakes at tectonic plate boundaries. When the ocean floor at a plate boundary rises or falls suddenly it displaces the water above it and launches the rolling waves that will become a tsunami.

TORNADOES Tornadoes are vertical funnels of rapidly spinning air. Their winds may top 250 miles (400 kilometers) an hour and can clear-cut a pathway a mile (1.6 kilometers) wide and 50 miles (80 kilometers) long.

Twisters are born in thunderstorms and are often accompanied by hail. Giant, persistent thunderstorms called supercells spawn the most destructive tornadoes.

These violent storms occur around the world, but the United States is a major hotspot with about a thousand tornadoes every year. "Tornado Alley," a region that includes eastern South Dakota, Nebraska, Kansas, Oklahoma, northern Texas, and eastern Colorado, is home to the most powerful and destructive of these storms.

LIGHTENING Contrary to the common expression, lightening can and often does strike the same place twice, especially tall buildings or exposed mountaintops. Cloud-to-ground lightning bolts are a common phenomenon—about 100 strike Earth's surface every single second—yet their power is extraordinary. Each bolt can contain up to one billion volts of electricity. This enormous electrical discharge is caused by an imbalance between positive and negative charges. During a storm, colliding particles of rain, ice, or snow increase this imbalance and often negatively charge the lower reaches of storm clouds. Objects on the ground, like steeples, trees, and the Earth itself, become positively charged-creating an imbalance that nature seeks to remedy by passing current between the two charges. A step-like series of negative charges, called a stepped leader, works its way incrementally downward from the bottom of a storm cloud toward the Earth.

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