PSC
Planetarium Science Center
newsletter
3rd year | 3rd edition
Planetarium Science Center
Science For All!

SUMMER 2010

In this edition...

Versus the Change!

By Maissa Azab, PSC Publications Coordinator

Not so long ago, we could all tell when it would be Spring, Summer, Autumn, or Winter; today, that is no longer possible! It might sound like no big deal; but the truth of the matter is that it is the biggest deal of all. In fact, it is a matter of life or death.

Our planet's climate is anything but simple. All kinds of factors influence it, from massive events on the Sun to the growth of microscopic creatures in the oceans, and the subtle interactions between many of them. Yet, a firm and ever-growing body of evidence points to a clear picture: the world is warming, this warming is due to human activity increasing levels of Greenhouse Gases (GHG) in the atmosphere; if emissions continue unabated, the warming will too, with increasingly serious consequences.

Global warming is indeed a global problem that requires a global solution. However, this does not mean that there is nothing we can do individually; "think globally, act locally" is the way to go. Why? Because the undeniable truth is that life, as we know it, is at stake.

While not a major contributor to the world's total GHG emissions, Egypt is vulnerabe to climate change. With 95% of Egypt's fresh water needs supplied from the Nile River, the country's vulnerability increases with any changes in rainfall patterns throughout the Nile Basin. Climatic changes will also impact agricultural productivity and fisheries, thus influencing the country's food supply. The predicted socioeconomic implications due to human migration, land loss, and soil salinity are significant concerns. Furthermore, the rise in sea level threatens Egypt's long coastal stretch on the Mediterranean and the Red Sea, which not only leads to potential damages to the tourism industry, a major contributor to the Gross Domestic Product (GDP), but also to the entire ecosystem.

In this issue, we tackle various aspects of climate change, particularly global warming, in an attempt, not only to explain it and demonstrate its fatal consequences, but also to show how we, as individuals, can contribute to stopping it; hence, saving our planet, our life and that of our offspring.

http://www.newscientist.com/article/dn11462-climate-change-a-guide-for-the-perplexed.html
http://www.eeaa.gov.eg/ecc/ClimateMain.htm

PSC, Three Little Letters... A Whole New Way of Life!

By Ingy Hafez, PSC Publications Specialist

After almost two years of being part of an organization that has been, is and will always be an element of change, I realize that the change that the New Library of Alexandria in general, and the Planetarium Science Center in particular, inspire within the community really starts with those who work in it. I know that because, in such little time since my graduation, I have already grown and changed a lot!

At the PSC, I am a member of the Publications Team. Our Team's mission statement; engaging, informing, educating and inspiring; represents the benchmark we aspire to reach. Our mission is to be creative in visualizing, writing, designing and animating, with the purpose of exploring, adapting and developing printed and digital science communication publications for the general public, but especially for children and youth. We aim to accomplish our mission by applying the principles of effective operation and project management in our daily work.

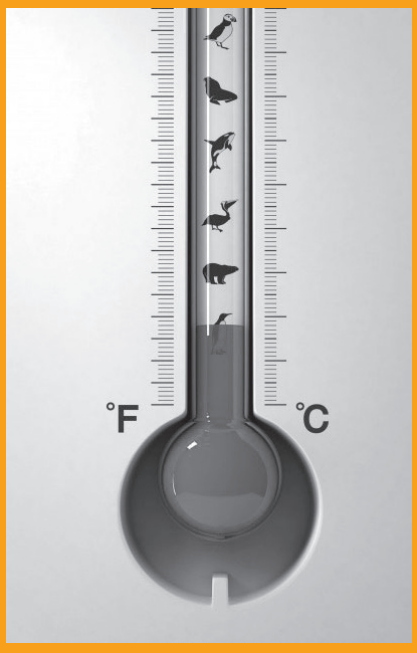
Although the PSC Publications Team is primarily a functional team with ongoing operational tasks managing the Center's online, text, design and printing requirements, we are constantly developing publication project programs. The Team consists of editors and designers working hand-in-hand to achieve a set of predefined objectives and attain the professional benchmark level they aspire; bringing their own personal dreams true along the way.

One of our most significant successes has been the PSC newsletter, issued three times a year. It all started with a spark of an idea; to compile the PSC seasonal activities in a small publication. After a while, a bigger picture was conceived. In addition to promoting the Center's activities, the PSC newsletter now aims to convey science to the public in an easy and simple way. It is our Team's future objective to further develop the newsletter to soon become a local popular science magazine.

As our Team understands and believes that big achievements cannot be accomplished individually, we have worked hard on earning our colleagues' respect, interest and enthusiasm. Our success in involving different PSC staff members has taken the newsletter to a new level. Not only that, through them, we have also acquired the valuable cooperation of both science experts as well as blossoming young talents; yet another milestone on our road to our destination.

Working as an editor at the PSC has granted me the opportunity to develop not only my technical linguistic skills but also the quality of my professional process and product. More importantly, it has given me inspiration. Here, I have learnt to dream and think big; to be innovative and ambitious, while being accurate, meticulous and organized. This is the place where one feels proud to be part of the culture, part of the message and part of the change.

I have learnt that being part of this pioneering facility is much more than a job... it is a perspective and a whole new way of life!



A Two-Thousand-Year-Old Dream Comes True
The History of the Planetarium

*Adapted from the article by Mark R. Chartrand, the American Museum-Hayden Planetarium. Reprinted from the Planetarian, September 1973
*Adapted and updated by Maissa Azab, PSC Publications Coordinator

The planetarium profession started a little less than a hundred years ago. At that time, progress in optics, instrumentation, and electricity made possible the realization of a two-thousand-year-old idea: the perfect depiction of the starry sky inside a room.

Twenty centuries ago, maps of the sky were placed on the outside of globes to illustrate the heavens for the purposes of art and learning. Some actually moved, reproducing the diurnal motion.

Archimedes is credited for the first device to demonstrate planetary motions in about 250 BCE. After his death, the device was taken to Rome where it was seen and described by Cicero, but its fate remains a mystery. Later, Ptolemy's globe is said to have even demonstrated the precession of the equinoxes.

The next improvement came with the enlargement of the globes. The most famous was the Gottorp globe constructed in the 17th century. It was about 4 meters in diameter, weighed over 3 tons, and could seat several persons inside on a circular bench; the stars were holes in the globe. Other globes like the Gorroro sphere were built; one of the last being the Atwood globe in 1913 for the Museum of the Chicago Academy of Sciences. With a diameter of almost 5 meters, the Atwood globe shows 692 stars; a moveable light bulb represents the Sun and holes along the ecliptic represent the planets.

The Dream

The *Orbitoscope* is generally considered the first projection device for showing planetary motions; it was invented by Prof. E. Hindermann in about 1912, in Basel, Switzerland. This instrument is driven by spring work and has two planets revolving about a central Sun. This ingenious device is useful for instruction, but of course had many shortcomings.

The idea of realistically reproducing the sky in detail is credited to German astronomer Max Wolf. In 1913, Wolf suggested for the Deutsches Museum—an institution devoted to science and technology—the idea of a device that would reproduce, not only the stars, but also the planetary motions. The Museum approached the well-known optical firm of Carl Zeiss, and they agreed to look into the problem.

In 1919, Walther Bauersfeld, chief design engineer and later director of Carl Zeiss, hit upon the idea of projecting the celestial objects in a dark room. The original plan had been for some sort of globe similar to that of Gottorp. The new idea simplified things immensely, but five years of calculations and trials were needed to bring this idea to fruition.

Becoming Reality

For five years, Bauersfeld and a large staff of scientists, engineers, and draftsmen considered the astronomical principles involved and the mechanical devices which would realize them. They rediscovered the work of Christiaan Huygens and constructed star plates of film with images of 4500 stars. They found ways of interconnecting the daily and annual motion drives so the planets would stay in proper relative positions. In short, they invented the modern projection planetarium.

In August 1923, a 16-meter dome was set up on the roof of the factory in Jena, and the first "Model I" projector was installed. The "Wonder of Jena" had its first unofficial showings before it was shipped to the Deutsches Museum where it was installed in a 10-meter dome. It operated there until the beginning of World War II, when it was taken down and put in safe storage where it survived the bombing that almost totally destroyed the Museum in 1944-45. After the Deutsches Museum was rebuilt, the original "Model I" was re-installed in May 1951. It has since been replaced with a "Model IV".

Conquering the World

The planetarium so impressed many scientific and civic leaders in Germany that in the few years following the first "Model I", several other cities ordered and received projectors. "Model II" was the large dumbbell-shaped projector, which everyone has since identified with Zeiss. 1927 saw the first planetarium outside Germany, a temporary installation in Vienna. The Rome planetarium opened in 1928 and the Moscow planetarium in 1929.

1930 witnessed five new planetariums in Stockholm, Milan, Hamburg, Vienna, and the first outside of Europe when Max Adler, a Chicago philanthropist, donated the first planetarium in the Americas to his home city. The Orient got its first glimpses of a planetarium sky in Osaka in 1937 and Tokyo in 1938.

The 1930s also saw the first non-Zeiss planetarium, designed and built by the Korkosz brothers in Springfield, Massachusetts, and installed in the museum there. The device projects 9500 stars, but has no planet projectors. Later, a similar device was built for the Charles Hayden Planetarium in Boston.

And Beyond

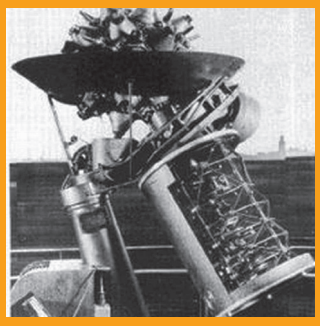
In 1936, Armand Spitz, a Philadelphia newspaperman, took a part-time job as a lecturer at the Fels Planetarium and immediately saw the academic possibilities of the planetarium. He also saw that it was impossible for a small school or museum to have one, because of the great cost in money and space. He set out to build a projector that would give a reasonable simulation of the sky but that was much more cost and size efficient than that of the Zeiss projectors. His invention has caused his contemporaries to affectionately name him the "Henry Ford of the planetarium field"!

The first Spitz projector was demonstrated to a meeting of astronomers at Harvard College Observatory in the late 1940s. The small projector was a great success and in 1949, Spitz Laboratories were founded.

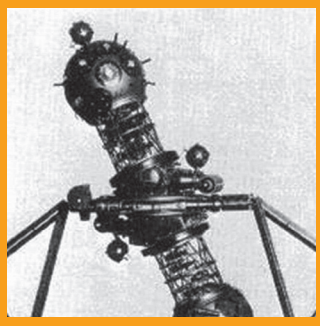
The Spitz "A-1" projector revolutionized the planetarium industry and made it possible for schools and small museums to build dome presentation theaters for education and public entertainment. Throughout the 50s and 60s, Spitz also began to develop larger displays for prestigious planetariums in the USA and around the world. By the 1960s, Spitz installed over 500 systems, many of which are still in operation today.

During the early 1970s, Spitz was responsible for the development of the first domes for large-format film systems, and today, Spitz supplies domes for IMAX theaters worldwide.

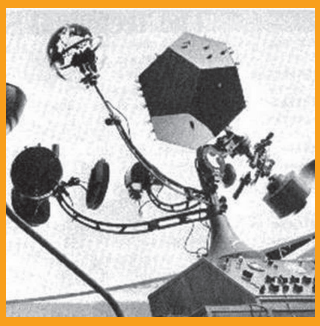
In 1995, Spitz began the development of its immersive video group of products. And in May of 1997, it opened its first ElectricSky theater. The ESky video



The first Zeiss planetarium instrument in the Deutsches Museum in Munich, 1923



The Zeiss "Model II" planetarium as produced during the 1920s and 1930s



The Spitz Model A-I planetarium with its famous dodecahedron

system was the most versatile and cost effective dome video system available in the world. At present, Spitz Incorporated is responsible for over 1,200 installations worldwide.

Across the World

Towards the late 1950s, Seizo Goto, a leading Japanese industrialist, used the expertise of his company in the field of telescopes to produce the first Goto planetarium. The Goto Company was the first to produce a small projector that included planetary motions. Many Goto instruments have since been installed all over the world, a large number of which is in the USA.

Today, Goto Planetariums is most famous for the "GOTO HYBRID PLANETARIUM". This is a system that combines an opto-mechanical planetarium projector with a full-dome digital video imaging system, all under one synchronizing control system.

The Minolta company of Japan, known for high-quality cameras and optics, made some tentative entries into the field in the late 1950s. Minolta decided to officially enter the planetarium business and the Planetarium section was established in 1963. Minolta Planetarium Co., Ltd. was established in 1988. In April 2001, the company developed and sold the Medialglobe, the world's first full-color digital planetarium.

Later

The number of planetariums has grown tremendously. With this growth, projection systems have become more sophisticated in operation and accurate in their portrayal of the heavens.

While the small planetariums find their primary use as teaching devices in schools and colleges, the planetariums in museums serve the function of informing an interested audience of the wonders and discoveries of astronomy; from the simple identification of constellations, to elaborate and sophisticated multi-media shows. Those demonstrate and explain concepts that were not even around when Bauersfeld first proudly demonstrated his "Wonder of Jena"; concepts such as quasars, pulsars, and black holes.

The planetarium, both as a fine instrument and as an institution, has come a long way since 1923 when astronomer Elis Stromgren wrote:

"Never before was an instrument created which is so instructive as this; never before one so bewitching; and never before did an instrument speak so directly to the beholder. The machine itself is precious and aristocratic... The planetarium is school, theater, and cinema in one classroom under the eternal dome of the sky".

And it is still true today.

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The International Planetarium Society (IPS)

IPS 2010 in Alexandria, the Cradle of Astronomy

By Maissa Azab, PSC Publications Coordinator

What is the IPS?

www.ips-planetarium.org

Founded in 1970, the International Planetarium Society, known as the IPS, is the global association of planetarium professionals. Its nearly 700 members come from 35 countries around the world. They represent schools, colleges, universities, museums, and public facilities of all sizes including both fixed and portable planetariums.

The primary goal of the Society is to encourage the sharing of ideas among its members through conferences, publications, and networking. By sharing their insights and creative work, IPS members become better planetarians*.

More than 20 regional and national planetarium associations from around the world are affiliated with IPS. Representatives from those affiliates, together with the elected officers, make up the Executive Council; the ruling body of the organization.

Forty years of IPS conferences

www.ips-planetarium.org

IPS conferences take place every two years, brining IPS members and other parties involved in planetarium technologies together to review and share the worldwide progress of this unique field. The conferences foster cooperation through networking and exchanging of expertise and resources on the national, regional and international levels.

The first IPS conference took place on 21 to 23 October 1970 at the Abrams Planetarium in Michigan, USA. Eleven out of the nineteen IPS conferences that followed took place in different locations in the USA, the last of which was in 2008 at the Adler Planetarium in Chicago. Other IPS conferences took place in Canada (1982/2000), Mexico (1984), Sweden (1990), Japan (1996), England (1998), Spain (2004) and Australia (2006).

In 2010, and for the first time in Africa and the Middle East, the IPS conference is hosted by the Bibliotheca Alexandrina Planetarium Science Center, 26 to 30 June 2010.

IPS 2010

www.bibalex.org/ips2010

IPS 2010 is entitled "Back to Alexandria, the Cradle of Astronomy" in acknowledgement of the important role the ancient Library of Alexandria played in enriching all fields of science, especially astronomy. IPS 2010 represents a milestone for the new Library of Alexandria that aspires to be a center of excellence in the production and dissemination of knowledge, and to be a place of dialogue, learning and understanding between cultures and peoples.

The overarching theme of IPS 2010, "The History of Astronomy", also resonates with the conference's location, Egypt—a country that has significantly contributed to the human heritage. On the regional level, the deliberations of the IPS 2010 taking place in Egypt, the meeting point of Eastern and Western civilizations and Africa's gateway to the world, are expected to push the cradle marking a new milestone in the history of astronomy in the region. The conference is expected to revive the role of Arab astronomers recapturing the recognition their ancestors received during the golden age of Islam.

IPS 2010 is expected to raise the awareness of decision makers and the public as to the essential role of planetariums in informal science education. It is also expected that this gathering will enhance the establishment of new planetariums in Africa and the Middle East to meet the regional high demand for science edutainment facilities.

*Planetarian: a person who operates a planetarium.

AVAILABLE SHOWS

The Zula Patrol
23 Min. Full-dome Show

Stars of the Pharaohs
35 Min. Full-dome Show

Seven Wonders
30 Min. Full-dome Show

New Horizons
23 Min. Full-dome Show

Human Body
40 Min. IMAX Show

Ring of Fire
40 Min. IMAX Show

Cosmic Voyage
35 Min. IMAX Show

Oasis in Space
25 Min. Full-dome Show

Stars Show
45 Min. Live Show by the PSC resident astronomer

VISITORS INFO

- For the Planetarium daily schedule and fees, please consult the Center's official website: www.bibalex.org/psc.
- Kindly note that, for technical reasons, the Planetarium maintains the right to cancel or change shows at any time without prior notification.

The Story behind Climate Change

Climate Change throughout Human History

By Reda Kandil, PSC Programs and Events Specialist

Earth's climate has never been of a fixed state; over the millions of years of Earth's existence, it has changed many times in response to a diversity of natural causes. However, when people talk about "climate change" today, they mean the palpable changes in temperature over the last 100 years. During this period of time, the average temperature of the Earth's atmosphere has risen by 0.74 degrees Celsius.

That is not all; most scientists agree that global temperatures will rise still, depending on future emissions of greenhouse gases, which is not a natural cause, but a manmade one. If temperatures increase with high rates, changes in climate are likely to be so extreme that they will be difficult to cope with. There are likely to be more intense and frequent extreme weather catastrophes like floods, hurricanes, and rise in sea levels.

How was it that we came across Climate Change?

The history of the scientific discovery of climate change began in the early 1800s when natural changes in paleoclimate were first suspected and the natural greenhouse effect first identified. Palaeoclimatology is the study of climate changes taken on the scale of the entire history of Earth. It uses records from ice sheets, tree rings, sediment, corals, shells and rocks, to determine the past states of the climate system on Earth.

Timeline of Major Events

1712- British ironmonger Thomas Newcomen invented the first widely used steam engine, paving the way for the Industrial Revolution and industrial scale use of coal.

1753- Scottish physician Joseph Black discovered carbon dioxide.

1824- French physicist Joseph Fourier described the Earth's natural "Greenhouse Effect", stating that "The temperature of the Earth can be augmented by the interposition of the atmosphere, because heat in the state of light finds less resistance in penetrating the air, than in re-passing into the air when converted into non-luminous heat".

1827- Fourier used the analogy of a greenhouse to suggest that an atmospheric effect kept the Earth warmer than it would otherwise be.

1861- Irish physicist John Tyndall showed that water vapor and certain other gases create the greenhouse effect.

1896- Swedish scientist Svante Arrhenius proposed that carbon dioxide emissions from the burning of coal would enhance the Earth's greenhouse effect and lead to global warming.

1900- Another Swede, Knut Angstrom, discovered that even at the tiny concentrations found in the atmosphere, CO_2 strongly absorbs parts of the infrared spectrum. Although he did not realize the significance, Angstrom showed that a trace gas can produce greenhouse warming.

1927- Carbon emissions from fossil fuel burning and industry reached one billion tons per year.

1938- British engineer Guy Callendar used records from 147 weather stations around the world to show that temperatures had risen over the previous century. He also showed that CO_2 concentrations had increased over the same period causing warming.

1955- American researcher Gilbert Plass used a new generation of equipment to analyze in detail the infrared absorption of various gases. He concluded that doubling CO_2 concentrations would increase temperatures by 3-4°C.

1957- American oceanographer Roger Revelle and chemist Hans Suess showed that seawater will not absorb all the additional CO_2 entering the atmosphere as assumed.

1970- Beginning of the period of atmospheric warming known as "Global Warming".

1988- The UN establishes the Intergovernmental Panel on Climate Change (IPCC) to assess the science of climate change.

1992- The Earth Summit in Rio de Janeiro; governments agree on the United Framework Convention on Climate Change (UNFCCC). Its key objective "stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system".

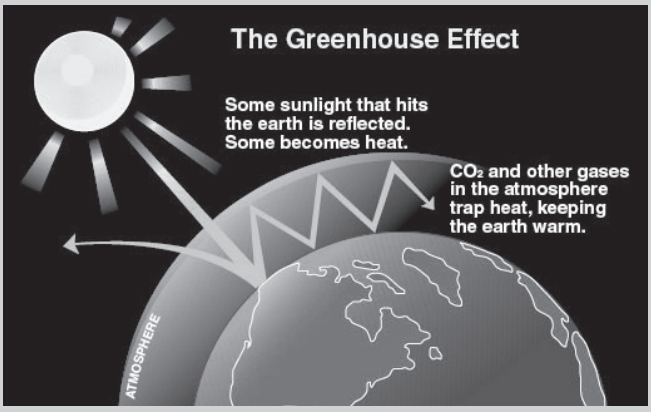
1997- The Kyoto Protocol, agreed upon under the UNFCCC, included the first emissions reduction targets for industrialized countries.

2001- The IPCC's Third Assessment Report found "new and stronger evidence" that humanity's emissions of greenhouse gases were the main cause of the warming seen in the second half of the 20th century.

2006- The Stern Review on the Economics of Climate Change; a report released by economist Nicholas Stern discussing the effect of global warming on the world economy; concluded that climate change could damage the global Gross Domestic Product (GDP) by up to 20% if left unchecked.

2006- Carbon emissions from fossil fuel burning and industry reached eight billion tons per year.

2009- 192 governments convened for the UN climate summit in Copenhagen (www.cop15.org).



The Climate Detective

How Scientists Detect Weather Change!

Scientists think like detectives. They investigate the clues in order to find evidence that can give them a better idea to understand the climate; they use several ways to collect this evidence.

This process has started a long time ago. However, the procedure itself has differed from the past to the present. Some scientists invented methods and tools to study Earth's temperature, such as Weather satellites and stations and such, while others used tools such as ice cores, sediment analysis, etc.

Investigating the Past

Ice Cores

Some scientists study ice as a key to understand weather. But not just any ice; they study the ice coming from glaciers that have been around for a very long time. They cut pieces of ice and look for air bubbles that were trapped in the ice hundreds or even thousands of years ago. The air bubbles help them discover what the climate used to be like on Earth. They uncovered a historical record of regional temperatures and greenhouse gas concentrations dating 160,000 years back.

Sediment Analysis

Sediment is the earth and rock that has built up in layers over time. Sediment layering provides information about where glaciers have been in the past. Ocean sediments provide a map of how ocean currents have flowed in the past. Fossilized pollen found in sediment layers tells us where different plants had grown in the past.

Tree Rings

You can tell how old a tree is by counting its rings because it grows a new ring every year. Tree rings can also tell us how much precipitation fell each year in the place where the tree lives. Precipitation is rain or snow or any other moisture that falls to the Earth. Scientists study the sizes of tree rings; the different sizes of the rings tell us about the changes in temperature and precipitation.

Investigating the Present

Weather Stations help to find out the temperature on the surface of the Earth. They use special thermometers that show the temperature. It can also present how fast the wind moves and how much rain falls on the ground during a storm.

Weather Satellites are launched into space to send back information to scientists about Earth's weather and temperature.

Weather Balloons are released to float high up into the atmosphere; they carry special instruments that send all kinds of information about the weather back to Earth.

Ocean Buoys are objects that float on water, and are often used to warn boats away from dangerous places in the ocean or a river. But some buoys have special instruments on them that can tell the temperature and other atmospheric conditions.

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VISITORS INFO

Opening Hours

Saturday to Thursday [from 09:00 am to 16:00 pm]
Friday [from 15:00 pm to 18:00 pm]

Guided Tours Schedule

Saturday to Thursday
[10:30 am + 11:30 am + 12:30 pm + 13:30 pm + 14:30 pm]
Friday [16:45 pm]

- Museum entry fees are included in all Planetarium show tickets.
- For non-audience of the Planetarium, Museum entry fees are 0.50 EGP.
- Museum Tours are free for ticket holders.

Climate Change... Before & After!

While the effect of human activity on the global climate is fiercely debated, physical signs of environmental change are all around us!

Melting Glaciers

Some scientists say an increase in the rate of melting of the world's glaciers is an evidence of global warming. For instance, Argentina's Upsala Glacier was once the biggest in South America, but it is now disappearing at a rate of 200 m/year. Other scientists say its reduction is due to complicated shifts in glacial dynamics and local geology.

Rising Tides

Some scientists predict that a warmer climate and the rising sea level will trigger more violent storms, which will cause increased rates of coastal erosion. This is a section of shoreline at Cape Hatteras in North Carolina in the USA, pictured in 1999 and 2004. The southern United States and Caribbean region were worn out by a series of powerful hurricanes.

Vanishing Islands

Other parts of the world could face even more drastic changes. The Intergovernmental Panel on Climate Change (IPCC) predicts that sea levels could rise by between 9 cm and 88 cm in the next century, which would threaten low-lying islands, such as Tuvalu in the Pacific. These images show the effects of a higher than usual tide.

http://news.bbc.co.uk/2/shared/spl/hi/picture_gallery/05/sci_nat_how_the_world_is_changing/html/1.stm

Why You Should Visit the ALEXploratorium!

By Ingy Hafez; PSC Publications Specialist

A fascinating and ground-breaking establishment, the ALEXploratorium is an unconventional hands-on science edutainment facility. It aims to intrigue its visitors with amazing adventures unraveling some of the wonders of science in an atmosphere of amusement and enjoyment.

ALEXploratorium activities are not limited to the young; on the contrary, they attract visitors of all ages and backgrounds. All visitors get to experience science through very simple and fun activities that are easily accessible, understandable and far more interesting than traditional methods of science communication. Most importantly, visitors see how science is present in everything they see, hear, or touch in their daily life.

The new ALEXploratorium is designed to reinforce the discovery concept through three zones: Discover Yourself, Discover Your Environment and Discover Your Universe. Throughout the three zones, visitors get to experience a variety of experiments related to the Human Body, Earth's Geography and Geology, the Environment, Food Chains, Plants, Natural Elements, Mechanics, Electricity, Meteorology and Astronomy, and much more.

Secret Code

One of the most popular exhibits in the "Discover Yourself" zone, the **Genetics** computer game tackles the branch of science that studies how traits are passed down from one generation to another.

A person's height, eyes, hair color, and intelligence are all examples of human traits that are determined by a person's genes. Human genes are found in 23 pairs of chromosomes that are encoded in a double-helix known as DNA. In this exhibit, the visitor selects an option of a certain characteristic from both the father and the mother to see how the offspring will look like.

Genetics science was first explored by Gregor Mendel, known as the "Father of Genetics", who was an abbot at the Monastery of Brunn, where he started investigations of variation, heredity and evolution of plants at the Monastery's garden. He made two very important generalizations from his pea experiments, now known as the Laws of Heredity; he coined the present day genetics terms: dominance and recessiveness.

The Biggest Organ!

You might be surprised to find out that the skin is an organ in the first place. However, no matter how you think of it, your skin is crucially important because it covers and protects everything inside your body.

The sense of touch depends on the sensitive cells found in the skin; that is how you identify different surface textures and types; namely, soft, tough, hot and cold. One of a group of interesting "Discover Yourself" experiments focusing on the Five Senses, **Touch and Guess** is an intriguing experiment, where visitors put their hands inside a number of containers and try to identify the objects hidden inside using only their sense of touch.

The secret of the sense of touch is that under your skin, you have nerve endings that work with your brain and nervous system so that your brain receives messages about what you are touching. Sometimes what you feel is dangerous, so the nerve endings work with your muscles to keep you from getting hurt.

How Much Water?

Did you know that the largest component inside your body is water? Water makes up for 45-75% of body weight. This percentage differs according to body fat variation from one person to the other and it progressively decreases from birth to old age; mostly during the first ten years of life. Overweight decreases the percentage of water in the body, sometimes to as low as 45%.

How Much Water is in Your Body is one of the attractive experiments of the ALEXploratorium, where you stand on a scale and watch the water inside the tube rise indicating the percentage of water inside your body.

Moving the Unmovable

When visitors access the "Discover Your Environment" zone through the Suspension Bridge, they experience the Motion section focusing on Mechanics.

Archimedes Screw is one of the iconic exhibits in the hall. It is a mechanical tool believed to have been invented by the Greek mathematician Archimedes in the 3rd century BCE. It consists of a container within which a continuous screw, extending the length of the container, forms a coiled chamber. By introducing the lower end in water and rotating the screw, water is raised to the crest. The theory is applied in machinery used for drainage and irrigation, and also in some types of high-speed tools. It can also be functional for handling light, loose materials such as grain, sand, and ashes.

Another popular exhibit in this area is **Levers**. In ancient Egypt, constructors used the lever to move and uplift obelisks weighing more than 100 tons. In its simplest form, a lever is a stick that is free to spin around or move back and forth at a certain point. By changing the position of the fulcrum; the point on which the lever moves; you can gain extra power with less effort. A good example of a lever is a see-saw. At the ALEXploratorium, we have models of levers, where you experiment lifting a load using different ropes to observe the differences yourself.

As for **Pulleys**, they are used in the real world to lift large masses onto tall heights. They make work seem easier and save effort because they change the direction of motion to work with gravity. By looping a rope around two, three, or even four pulleys, you can really cut down on the effort needed to lift something. In other words, if you use two pulleys, it takes half the effort to lift something, but you have to pull the rope twice as far. As you increase the number of pulleys, you also increase the distance you have to pull the rope.

The Power of the Unseen

The zone continues on with the Waves and the Energy sections featuring the Laser Musical Instrument, Magic Carpet, Generating Electricity Using Human Power, the Electronic Board, Saving Electricity, as well as Clean and Renewable Energy.

Radiant energy from the Sun, known as the **Solar Energy**, has powered life on Earth for many millions of years. In the 1830s, British astronomer John Herschel, used a solar thermal collector box that absorbs sunlight to collect heat for cooking food. Today, people use the Sun's energy for many purposes. When converted to thermal or heat energy, solar energy can be used to heat water for use in homes, buildings, or swimming pools, or heat spaces inside homes, greenhouses, and other buildings.

However, there are drawbacks for solar energy. The amount of sunlight that arrives at the Earth's surface is not constant; it depends on location, time of day, time of year, and weather conditions. Since the Sun does not deliver that much energy to any one place at any one time, a large surface area is required to collect the energy at a useful rate.

Today, **Wind Energy** is also used to generate electricity. It is a treasure of renewable and clean energy. Like old fashioned windmills, today's wind machines, also called wind turbines, use blades to collect the wind's kinetic energy. The wind flows over the blades creating lift, which causes them to turn. The blades are connected to a drive shaft that turns an electric generator to produce electricity.

More interestingly, the total amount of economically extractable power from the wind is more than present human power use from all sources. An estimated 72 terawatt (TW) of wind power on the Earth potentially can be commercially viable, compared to about an average global power consumption of 15 TW from all sources in 2005. However, not all the energy of the wind flowing past a given point can be recovered.

All the above are just a few of almost sixty different exhibits that cover a diversity of scientific themes, all of which are just at your fingertips in the fascinating new ALEXploratorium!

The Workshop

Workshops are hands-on activities that allow students to get in direct contact with scientific phenomena while interacting with PSC staff. Every season, ALEXploratorium specialists develop new ideas for the workshops they prepare for the students. Their main concern is to make the workshops enjoyable, in addition to being practical and useful for students. Through direct contact with the students, the specialists have developed an extensive knowledge of their interests and the appropriate methods to approach them.

This season, students are going to learn about different fields of science. Among other things, they will be introduced to the history of astrolabes, the consequences of natural hazards and the power of plants. The students will also learn some interesting facts about recycling, and how to design and build a house. In addition, they are going to acquire some mathematical skills during the numbers workshop, and get some information about nutrition and electroplating as well.

On the occasion of the International Year of Biodiversity (IYB 2010), students will enjoy some new workshops; unraveling the secrets of marine life, exploring genetic traits and comparing them, as well as getting acquainted with their ecosystems and life cycles.

As always, we do our best to guarantee that the students enjoy their experience with us and come visit us every new season for a new variety of intriguing workshops.

Recycling

Learning crafts develops imagination and creativity, as well as observation and handiness; it also promotes positive self-esteem. This workshop offers small children suitable, simple and fun crafts. Children also learn how to make use of available materials instead of getting rid of them.

- Target age group: 6–9 years

Nutrition

It is a common misconception that everything that tastes good is bad for you. A poor diet has bad impacts on health, but not all tasty food is unhealthy. In this workshop, children learn to choose the right food, taking into consideration taste, culture, affordability, and personal preferences.

- Target age group: 6–9 years

Fish

Through this workshop, students understand the importance of fish in our lives, analyze their skeletons and study their different characteristics. They dive into the world of fish to explore their different kinds and learn more about one of the most dangerous types; sharks.

- Target age group: 6–9 years

Plant Power

This workshop provides students with an opportunity to learn more about the plant kingdom and its value to humans. Using games, experiments and stories, the workshop informs children about the vital role of these organisms in the treatment of numerous diseases; hence, their impact on our daily life.

- Target age group: 6–12 years

Numbers

The main objective of this workshop is to raise students' awareness of mathematics. They get to learn the history of numbers in different civilizations. They also learn different, entertaining and simple ways of calculation, as well as how to measure items using hands, arms and legs.

- Target age group: 6–12 years

Marine Biodiversity

It is almost certain that life originated in the oceans. Today, marine biodiversity is threatened by human activities. This workshop introduces children to marine life in Egypt through a variety of activities showcasing the nature of marine organisms. An outdoor activity, the workshop includes a trip to the aquarium.

- Target age group: 9–12 years

Astrolabe

A historical instrument, the astrolabe was used for centuries by astronomers and navigators to locate the positions of the Sun, Moon, planets, and stars, as well as determine latitude, longitude, and time of day. During this workshop, students learn the history and uses of the astrolabe, as well as make their own.

- Target age group: 9–16 years

Buildings

Buildings come in numerous shapes and functions; they serve several needs of society; as shelter from weather, for privacy, for storing belongings and for living and working comfortably. This workshop helps students understand the principal of building through interactive experiments and learning some concepts such as design, plan, elevation and side view.

- Target age group: 9–16 years

Electroplating

Electroplating is used to beautify, insulate, protect, and increase the corrosion resistance of metals. The most common metals used in plating are copper, nickel and gold. In this workshop, students get to know how to use electroplating for different purposes and how plating protects metal objects from corrosion.

- Target age group: 9–16 years

Natural Hazards

A natural hazard is a threat of a naturally occurring event; such as tornadoes, volcanoes, earthquakes and tsunamis. This workshop introduces children to different natural hazards in order to understand the impact of these hazards on us as well as how to face them.

- Target age group: 12–16 years

Scratch

Scratch is a new programming language designed to create interactive stories, animations, games, music, and art. It represents the latest learning environment adopted by SEED (The Schlumberger Excellence in Educational Development). Scratch can be a self-study activity that connects the creative soul with the scientific mind. This makes it possible for anyone, whether student or adult, to create animations about their favorite topics and share them on the Internet. This is what our students are going to learn during this workshop.

- Target age group: 12–16 years

DISCOVERY ZONE

Opening Hours

Saturday to Thursday [from 09:00 am to 16:00 pm]
Friday [from 15:00 pm to 17:00 pm]

Guided Tours Schedule

Saturday to Thursday
[10:00 am + 11:00 am + 12:00 pm + 13:00 pm + 14:00 pm + 15:00 pm]
Friday [15:00 pm + 16:00 pm]

Entry Fees

Students	2 EGP
Non-students	4 EGP

LISTEN AND DISCOVER

- For the list of shows available at the «Listen and Discover» and the schedule, please consult the Center's official website: www.bibalex.org/psc.
- For reservation, please contact the PSC Administrator at least one week before the desired date.

Show fees

DVD shows:	Students	1 EGP
	Non-students	2 EGP
3D shows:	Students	2 EGP
	Non-students	4 EGP

Programs & Events

New Programs

Photography

Photography is the process and art of creating still or moving pictures by recording radiation on a sensitive medium; such as a photographic film, or an electronic sensor. This program helps students learn the art of photography and its different purposes.

- Target age group: 12–16 years

Creativity Club

This new program offers the perfect opportunity for children to have fun while exploring their creative side and developing their social skills. In each session, a specific theme is tackled. At the end of each session, the children present what they created to the other participants as well as their parents.

- Target age group: 9-12 years.

Sustainability

There are various debates concerning the definition of sustainability. Generally speaking, it is the concept of living within our limits, understanding interconnections among economies, societies, and the environment, as well as providing equitable distribution of resources and opportunities. In this program, students calculate their footprints, recycle, make paper and compost, plant gardens, clean beaches, and learn environment-friendly crafts.

- Target age group: 12-16 years.

Ongoing Programs

Chess Club

In cooperation with the Egyptian Chess Federation, this program aims to develop the mental capacity and analytical skills of children. Chess is an exercise for the mind; it develops valuable mental abilities such as concentration, critical thinking, pattern recognition, strategic planning, creativity, analysis, synthesis, and evaluation, to name a few. Chess is a highly effective tool for teaching problem-solving and abstract reasoning through analyzing situations by focusing on important factors and eliminating distractions.

- Target age group: 6–16 years
- Program duration: 3 months
- Number of sessions/week: Twice
- Session duration: 2 hrs
- Maximum number of participants: 25
- Fees (following interview): EGP 150
- For registration, please contact the PSC Administrator.

Space Technology

Understanding Space is essential to face 21st century challenges; such as, climate change, natural disasters, security, and communication, among others. The program approaches the field through multiple activities including lectures, workshops, fieldtrips, and research projects.

- Target age group: 15–21 years
- Duration: 3 hrs
- Number of participants: 10–20
- Program fees are EGP 100 per participant.
- For registration, please contact the PSC Administrator.

Super Science Show

Introducing a new form of science learning that is pure entertainment, the Super Science Show is a dynamic and highly motivational activity that gets children involved in a variety of amusing and exciting hands-on scientific experiments that stimulate infectious enthusiasm.

- Target age group: 6–12 years

Fun with Science

In collaboration with the Young People's and Children's Libraries, this program applies a series of fables containing valuable messages to provide children with a scientific basis and enable them to make use of scientific facts as a creative tool. A major theme of this program is the introduction of "systems thinking"; children learn that everything is interconnected. The first part of the program is based on storytelling, while the second part focuses on hands-on scientific activities.

- Target age group: 6–12 years

ALEXploratorium Contests

The contest provides students with an opportunity to test their knowledge and mental abilities through exploring the world of science and practicing teamwork. It also encourages them to participate in the process of science communication and share their knowledge with each other.

- Target age group: 12–16 years

HSM Contests

The History of Science Museum transcends the traditional museum concept of a static display. In its quest to simplify national and regional scientific heritage, it offers its visitors this energetic interactive contest that is based on games and quizzes about the information found within the Museum.

- Target age group: 8–16 years

Camps and Trips

Elfayoum Camp

Elfayom is a unique example of environmental and cultural diversity. This camp allows students to interact with this environment, aiming to develop children's teamwork and scientific problem-solving skills. The camp activities are multidisciplinary and tackle astronomy, history, geology and botany.

- Target age group: 10–16 years
- Duration: 3 days

Dina Farms Trip

The mission of Dina Farms is to produce premium quality products by applying the best applicable production technologies and management practices to meet the identified needs of consumers in local and global markets; thereby enhancing Egyptian exports and creating more job opportunities across several sectors of the national economy. At Dina Farms, students will know more about agriculture, animals and Agro-Industries.

- Target age group: 9–12 years

Exhibitions

Biodiversity Exhibition

Biodiversity is the very heart of our life. It is the extraordinary variety of living creatures and ecological communities growing and interacting with each other all over the world. It is the richness and complexity of species and ecosystems throughout the planet continually acquiring and honing the adaptations necessary for survival under constantly changing conditions. Discover how biodiversity is important and how to conserve it by visiting the «Biodiversity Exhibition».

Lectures

H1N1 Lecture

- Target age group: 9–12 years

Thinking out of the Box

- Target age group: 9–12 years

Live Tomorrow

- Target age group: 12–16 years

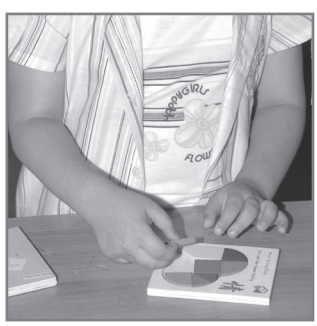
Internet Awareness

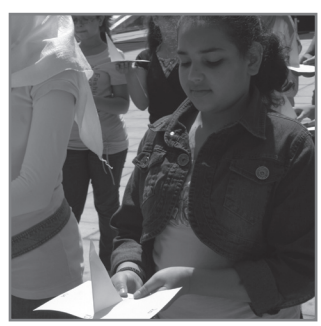
- Target age group: 12–16 years

Save the Date!

World Environment Day
14 June 2010

Eratosthenes
21 June 2010





Intel-BASEF 2010

Unleash your Imagination!

By Ingy Hafez, PSC Publications Specialist

On 10-11 March 2010, and in collaboration with Intel Co., the PSC organized the Intel Bibliotheca Alexandrina Science and Engineering Fair (Intel-BASEF 2010).

The first place prize went to Omar Ghorab, Mohamed Ayman and Zyad Emam in the Environmental Management (EM) category for their project entitled "How to Increase the Rate of Methane Production?" The aim of the project was to increase the rate of methane production from anaerobic digestion of organic solid wastes to overcome the global decline in hydrocarbons and to preserve our environment by recycling organic wastes into natural gas to be used as a biofuel, securing a source of renewable energy that is environmentally friendly.

The second place prize went to Romisaa AbdelAlim in the Electrical and Mechanical (EE Category) for her project entitled "Safety Bag", which tackled the protection of humans subjected to car crashes.

The third place prize went to Aida Tarek Abdou in the Behavioral and Social Sciences (BE Category) for her project entitled "A closer look at relationships between youth's recreational activities and their general knowledge". The project aims to investigate correlations between Recreational Activities (RA) and General Knowledge Level (GKL), considering some types of RA and their effect on GKL as well.

Besides the Intel-BASEF Grand Awards, there were other special awards granted to the best team, best idea and best efforts, among others. Moreover, there were prizes for the best in each category granted to 10 students and/or teams.

Intel-BASEF aims to prepare students from Alexandria and neighboring governorates to participate, compete, and win in the national competition, Egypt Science and Engineering Fair (ESEF), as well as the International Science and Engineering Fair (ISEF) that takes place every May in the United States.

As the world's largest international pre-college science competition, ISEF provides an annual forum for more than 1,500 high school students from over 40 countries to share ideas and showcase cutting-edge science projects.

Intel-BASEF welcomes students who are capable of creative thinking and have innovative ideas in any field of science or engineering. Students are asked to research a certain topic of their choice from among a variety of scientific themes. After that, they are required to prepare a research paper, a data handbook, a prototype, a display and a presentation.

The projects are evaluated by university professors, specialized scientists and engineers, as well as industry professionals. The evaluation is judged using a 100-point scale, with points assigned to creative abilities, scientific thinking, engineering goals, thoroughness, skills, and clarity.

Being selected to participate at Intel ISEF is evidence of an outstanding level of talent and commitment, and is recognized by top colleges and universities of the world. We, at Intel-BASEF, are committed to your success in this challenge, and we encourage you to unleash your imagination and contact us as soon as possible to get started on the road to success.

International Year of Biodiversity 2010

Biodiversity is life, Biodiversity is our life

By Marwa Gaber and Nihal Soliman, PSC Programs and Events Specialists

2010 International Year of Biodiversity

The year 2010 has been declared the International Year of Biodiversity (IYB 2010) by the United Nations. It celebrates the diversity of life on Earth, including every animal, plant and micro-organism. On the occasion, the PSC has launched a public awareness campaign about biodiversity, in order to reveal and emphasize its significance and importance as well as promote action to ensure its future health. The year-long campaign encompasses a diversity of interactive activities that tackle a variety of biodiversity aspects.

The **Sustainability Program** introduces the concept of living within our limits; understanding the interconnections among economies, society, and the environment; as well as providing equitable distribution of resources and opportunities. The hands-on activities relate sustainability to everyday life and include fieldtrips, as well as discussions and a staging of a biodiversity management meeting. The program also elaborates on what can be done to lead a sustainable life.

The **Ecosystem Services Workshop** briefs children on the meaning of biodiversity and its significance in our lives, as well as its three main levels; ecosystems, species and genetic diversity. The workshop focuses on different ecosystems all around the world, with emphasis on Egypt; allowing children to explore animals, plants, and environmental resources, as well as the various interrelationships between these elements.

The **Biodiversity and Climate Change Workshop** acquaints students with the huge impacts that small changes in temperature could cause on many of our native species and habitats.

The **Biodiversity Conservation Workshop** aims to emphasize conservational efforts close to home, acquainting students with protected areas, conservation centers, and local management techniques. The workshop points out the importance of biodiversity's components; mentioning medicines, industrial products, foods, and the contributions of breeding programs to agriculture. It also stresses the role that biodiversity and biological resources play in shaping human cultures.

From a scientific perspective, conserving biodiversity means more than just protecting the variety of different species; it also means preserving the natural variation that exists among the individuals of each species. Preserving variety is essential for preserving the ability of species to cope with environmental change. The **Genetic Diversity Workshop** includes a three-part activity that introduces students to the concept of genetic diversity within a population.

As for the **Adaptation Workshop**, it revolves around physical adaptation, which helps living organisms obtain food, stay safe, build homes, withstand weather, and attract mates. Through a number of activities, the workshop explains to children how animals use physical characteristics to adapt to the different environmental conditions.

During the **Food Chain Workshop**, students learn how every living organism plays a specific role in the food chain of life through a series of hands-on activities that teach them more ecosystems, life cycles, food chains and food webs.

Among the activities also adopted by the PSC are **Field trips** and **Camps**; their main objective is to get the children out of the classroom and into nature to experience and study the diversity of life directly. One camp targets Elfayoum, a unique example of environmental and cultural diversity. Another camp targets Elbahareya Oasis where young students get to interact with the environment of the West Desert and identify patterns of wildlife.

As humans, we appreciate biodiversity from diverse points of view: as scientists, we study its origins and global significance; as artists, we celebrate its staggering beauty; as consumers, we depend on it; and as organisms, we participate in it. In an ongoing **Series of Lectures**, prominent scientists, artists, and public figures share their perspectives on biodiversity.

Finally, the **Biodiversity Exhibition** will allow the public to explore Earth's incredible variety of wildlife, habitats, and cultures; to learn more about how each benefits and supports the others. Through fascinating and thought-provoking interactive experiences, the public will discover how to sustain and protect our planet's fragile web of life.

Climate Change & Egypt's Battle

By Prof. Boshra Salem
Head, Environmental Sciences Section,
Faculty of Science, Alexandria University

Not a day goes by without us encountering the issue of climate change, which has become a clear and present danger on the future of life on planet Earth. Climate change has become a global phenomenon that threatens the ecological balance on our planet. To face these dangers, scientists are working hard to find a solution to this dilemma and to avoid its consequences. The climate change problem requires the mobilization of all human resources and international expertise to face the impacts of a possible environmental catastrophe that can endanger the fate of humanity.

How Does Climate Change?

Not all sunrays that fall unto the Earth's atmosphere reach its surface. 25-30% of the sunrays are reflected right back into space upon hitting the atmosphere, clouds and Earth. The atmosphere and clouds absorb another 19% leaving around 51% of the energy of the sunrays (solar energy) to be absorbed by the Earth's lands and water bodies, and that is the energy that warms the globe.

The warm surfaces radiate the heat energy they gain from space back in the form of infrared rays. Because the atmosphere contains Carbon Dioxide (CO_2), methane and water vapor in balanced concentrations, and because these gases do not let infrared rays through, the heat becomes trapped inside the atmosphere. This phenomenon is known as "Global Warming" or the "Greenhouse Effect"; without it, the Earth's surface temperature would drop to 33°c less than its current level, making life on Earth impossible.

CO_2 is the main greenhouse gas; its concentration in the atmosphere increases due to emissions from human activities, especially burning of fossil fuels; coal, petroleum and natural gas; as well as the destruction of vegetation, which is a huge store of CO_2. Concentrations of CO_2 in the atmosphere depend on the rate of its removal and absorption by seas and vegetation, a process known as the geochemical cycle of carbon, which balances CO_2 concentrations in the atmosphere.

Climate change can be identified as the constant modification of the Earth's climate system; it occurs and persists according to long-term standards that can linger for thousands of years. This change happened in the past and can happen in the future. Recently, scientific evidence indicates that the industrial revolution, the spreading of means of transportation and other human activities have led to major climate changes, the effects of which still persist. The global climate used to change human life; it seems that now, humans are changing the global climate.

What follows Climate Change?

The global climate is an extremely complicated system where factors other than temperature (such as rain, wind and their distribution) make it difficult to predict the final result of all these changes collectively. For example, wind and rain distributions that prevailed for hundreds of years and on which millions of humans depended can change; and sea water levels can increase, endangering islands and coastal lowland regions. In an already congested and exhausted world, and with ongoing global problems, these additional pressures can lead directly to more famines and calamities.

The Earth's atmosphere now has a 380 of a million of carbon dioxide, which is the main greenhouse gas causing global warming, in comparison with the 275 of a million before the industrial revolution. Hence, we conclude that CO_2 concentration in the atmosphere has increased by 30%. Methane concentration has also risen to double its value before the industrial revolution. Moreover, chlorofluorocarbon concentrations are rising by 4% annually. As for nitrous oxide, its concentration has now become 18% higher than it used to be before the industrial revolution.

If the current rates continue, the atmosphere's temperature will rise and scientists expect that global warming will lead to shortage in drinking water, deterioration in agricultural productivity and soil fertility, further desertification, spread of pests and diseases, rise in ocean and sea water levels, as well as catastrophic weather incidents.

The official website of the Egyptian Ministry of Environment states that although Egypt's greenhouse gas emissions in 2005-2006 has reached 150 million tons of CO_2; the equivalent of 0.57% of total global emissions; Egypt is one of the countries most affected by Climate Change.

How to face Climate Change?

In alignment with other environmental issues, climate change studies involve three main axes. The first is concerned with scientific aspects of the issue; the second is concerned with studying the impact of foreseen problems, while the third adopts the necessary policies and strategies for facing the problem or adapting to it.

Naturally, all countries of the world are concerned with the issue of climate change because all countries will suffer its negative impact. In Egypt, there are studies on the expected effects of climate changes especially on agriculture. The most prominent of these studies is that conducted by the Center for Agricultural Research, where the Center Director, Dr. Mohamed Farid Abo-Hadid, is leading the group of researchers studying the effects of climate change on Egyptian agriculture. Other studies are dedicated to the impact of climate change, especially global warming, on the rise of sea water levels, and the consequent threat on coastal zones, such as the Nile Delta.

Within the past few years, the first execution phase of the project for implementing solar energy in touristic resorts and new reclamation villages has been completed. Another project completed is that for improving energy capacity and decreasing greenhouse gas emissions with the purpose of reducing electricity waste in production, distribution and transportation. Furthermore, standards for measuring consumption rationalization have been put, in addition to preparation of energy saving building regulations.

Future plans aim to survey greenhouse gas emissions from the different sectors and to evaluate the evolution of climate changes—its impact on the different sectors as well as relevant scientific researches conducted in Egypt. It also aims to identify means for dealing with and adapting to it, as well as place a regional model simulating climate changes in the Nile Delta region to predict the future situation of water resources.

The plan also intends to execute climate change adaptation projects, as well as pilot projects to reduce greenhouse gas emissions that aim to disseminate clean energy technologies such as solar energy and bio-fuels, as well as sustainable development mechanism development projects.

Global Danger a

The impacts of a warming world are scary enough when considered one-by-one. Together, the view is simply shocking!

Global warming, just one of the aspects of climate change, at its present rate is a death sentence for many species. With the current overwhelming rate of global warming, most of the world's creatures and resources could be annihilated within our lifetime!

The Science in a Nutshell

CO_2 is the most significant of those gases keeping Earth warm. Its natural cycle keeps its amount in our atmosphere in balance. Decaying plants, volcanic eruptions and the respiration of animals release natural CO_2 into the atmosphere, where it stays for about one-hundred years. It is removed again from the atmosphere by photosynthesis in plants and dissolution in water. The amount of naturally produced CO_2 is almost perfectly balanced by the amount naturally removed.

However, concentrations of CO_2 in the atmosphere are now almost 40% above those of two-hundred years ago; and its emissions into the atmosphere have been rising by more than 2% a year since 2000. That is why the world is warming up with an average of 0.74°c during the past century; mostly since 1970.

The devastating news is that all this extra greenhouse gas is our own doing; it stems overwhelmingly from humans burning fossil fuels and destroying forests, both of which are made of carbon.

How have we made such a mess?

The generation of electricity is the single largest source of CO_2 emissions. That is because coal supplies 57% of the total energy harnessed to generate electricity, and burning coal produces far more CO_2 than oil or natural gas. Hence, reducing reliance upon coal combustion has to be the cornerstone of any credible global climate change prevention plan [www.powerscorecard.org].

Other major factors contributing to this global and massive problem are industrial factories of all sorts and transportation vehicles, the mass majority of which run on fossil fuels. Airplanes alone pump carbon emissions high into the atmosphere, producing 12% of transportation sector emissions.

Warming... at All Measures!

*Adapted from the official website of the World Wide Fund for Nature (WWF); http://www.panda.org/about_our_earth/aboutcc/how_cc_works/
*Adapted by Ingy Hafez, PSC Publications Specialist

The Prospects

"There are tipping points in the climate system, which we are very close to; if we pass them, the dynamics of the system take over and carry you to very large changes which are out of your control" **James Hansen, NASA.**

Nature, through both oceans and forests, currently absorbs about half the CO_2 we put into the air. The rest of it stays in the atmosphere for centuries. Nevertheless, the amount of carbon soaked up by natural ecosystems is declining steadily. To stabilize temperatures at a sufficiently low level, we have to stop emitting as fast as we can.

What If We Do Not?

Global temperatures will continue to rise; by at least 2-4.5°c late this century. Warming will be greatest on land, especially continental interiors, and Polar Regions. **With more heat energy and water vapor in the atmosphere, climate and weather of all kinds will become more extreme:**

- Storms may become more intense and more frequent. Wet areas will generally become wetter and dry areas drier.
- Droughts will get longer and more intense, and will extend to new areas, including the Mediterranean, Middle East, Central Asia and southern Africa, all of which can expect substantially less rain.
- Melting glaciers and ice sheets on land will raise sea levels.

According to published analyses, we can expect more than a one-metre sea-level rise by 2100; enough to displace at least 100 million people in Asia; 14 million people in Europe; and 8 million each in Africa and South America. However, sea-level rise will not stop in 2100. All that could be just the start.

The Impacts

The climate plays such a major role in our planet's environmental system; even minor changes have large and complex impacts. It affects people and nature in countless ways and increases existing threats.

When climate changes, Life changes...

Chaotic weather...

The world is witnessing extreme and unpredictable weather, with severe impacts on everything; heat waves, droughts, floods, tropical cyclones and hurricanes.

Glaciers at risk…

Glaciers are ancient rivers of compressed snow that creep through the landscape, shaping the planet's surface. They are the Earth's largest freshwater reservoir, collectively covering an area the size of South America.

Glaciers have been retreating worldwide since the end of the Little Ice Age (around 1850); a period of cooling that occurred after a warmer era known as the Medieval Warm Period, extending from the 16th to the 19th centuries. However, in recent decades, they have begun melting at unbelievable rates.

Over the next century, climate change will further increase the rate at which glaciers melt leading to floods and water shortage. As sea levels rise, coastal communities and habitats will be destroyed.

The Arctic and Antarctica melting away…

Sea ice in the Arctic has declined drastically in the last 30 years and the Northwest Passage was ice-free for the first time in history in 2007. At the Arctic and Antarctica, massive ice shelves are disintegrating and breaking away.

The signs of change at the poles are even more pervasive; but, the fact is that they affect us all. A vast expanse of the Arctic is made up of permanently frozen ground, called "permafrost". This frozen ground supports roads, pipelines, and buildings. As the temperatures increase, the permafrost liquefies and the infrastructure becomes unstable.

Beyond the visible impact of melting ground is the threat posed by the carbon and methane that has been locked in the permafrost and beneath the cold arctic waters for millions of years. As the temperatures warm, these greenhouse gases are increasingly released into the atmosphere causing further warming.

Moreover, the change in "albedo"; the extent to which a surface can reflect sunlight; from reflective ice and snow to absorbent open water imposes another danger. Snow resting on top of the sea-ice reflects about 90% of the Sun's energy, whereas open water absorbs about 94%. Thus, as the open water of the ocean absorbs more heat and causes more sea-ice to disappear, it exposes even more water.

Other than that, species now struggle to survive as Polar Regions become warmer. In the Arctic, a whole ecosystem relies on the presence of sea-ice; from plankton and all the way to harp seals and polar bears.

Coral reefs bleaching to death…

Coral reefs are extremely important for biodiversity; they provide a home for over 25% of all marine life. They are also vital for people and business through supplying nurseries for many commercially important fish species, protecting coastal areas from storm waves, and attracting tourists.

However, coral reefs are very fragile sensitive ecosystems that can only tolerate a narrow temperature range. For that reason, coral reefs around the world have been severely damaged due to unusually warm ocean temperatures.

When the ocean warms, the oxygen content reduces, and corals become "bleached". The heat affects the tiny algae that live inside corals and supply them with food, consequently leading to their damage and coral death.

Species threatened…

Climate change and global warming affect species in a number of ways. Animals and plants that are suited to cooler climates will need to move "polewards" or uphill when the climate becomes even just that little bit warmer.

This process has been observed in many places, as the impacts on species are becoming so significant. Now, their movements can be used as an indicator of a warming world. They are the silent witnesses of the rapid changes being inflicted on the Earth.

Scientists predict that global warming could contribute to the mass extinction of wild animals in the near future.

People at risk

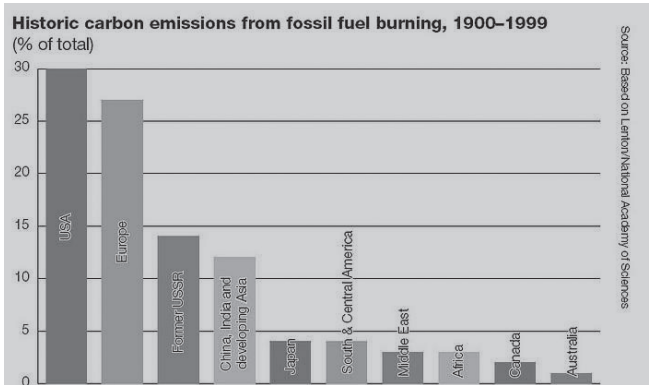
Climate change will severely affect our future water supply and quality. Both rainfall deficits and droughts are projected to become more extreme and the economic impact will be significant.

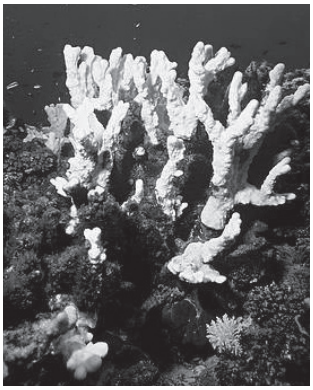
Climate change is likely to have a significant impact on the agriculture. Crops are likely to be subjected to increasing rainfall variability, reduced soil moisture, changing pest, disease and weed threats, and increased heat stress.

Climate change can harm human health directly and indirectly. Direct effects include injury and death from heat waves, tropical cyclones and floods. On the other hand, indirect effects include increasing incidence of infectious diseases, food poisoning from contaminated produce, water-borne diseases, and an increase in skin cancer and eye cataracts due to ozone depletion.

Some countries, especially small islands, face obliteration due to climate change and rising sea levels.

Global warming is not a problem that has appeared overnight; how much longer are we going to allow it to continue?!





Take ACTION

At home

Get your house in order!

- **Switch to renewable energy.** Buy non-polluting green electricity generated from natural sources such as solar, hydro and wind power.
- **See the light.** Use compact fluorescent light bulbs; they reduce the amount of fossil fuels that utilities burn. They may cost more than ordinary lamps but you end up saving money because they use only around 25% of the electricity needed to provide the same light. Not to mention that you save 45 kg of carbon for each incandescent bulb that you replace with a compact fluorescent, over the life of the bulb.
- **Turn it down.** Heating and air conditioning draw more than half of the energy that a home uses. Turn down the heat or air conditioning when you leave the house or go to bed. You can easily install a programmable thermostat that can save up money and carbon.
- **Turn it off.**
  - Turn off lights when you do not need them; it saves energy and money!
  - Turn off televisions, videos, stereos and computers when they are not in use. These appliances use 10%-60% of power even when on "stand by"; a power strip is a practical way to switch off the VCR, TV and DVD player stand-by losses; you can cut off all 3 devices at once.
- **Save it.** As the temperature rises, it is predicted that there will be a shortage of water.
  - Do not let the water run while shaving, brushing teeth or washing vegetables.
  - Reuse water from washing vegetables to water house plants.
  - Take short showers.
  - Wash economically.
  - Flush wisely.
- **Recycle**. Products made from recycled paper, glass, metal and plastic reduce carbon emissions as they use less energy to manufacture than products made from new materials.
  Recycling paper also saves trees and lets them continue to reduce climate change naturally as they remain in the forest, where they remove carbon from the atmosphere.
  - Reuse paper for scrap and recycle.
  - Print on both sides of a page when possible.

On the Road

- Walking or riding a bike rather than driving a car saves 0.5 kg of carbon for every 1.5 km.
- Use public transportation if walking or biking are not good options. A group of people traveling together significantly lowers the overall carbon footprint.

Out shopping

- **Bring your own bag**. Using your own bag instead of the plastic or paper ones provided by stores reduces waste.
- **The less packaging the better.** Product packaging is just a waste. Less packaging could reduce what you buy. This means less waste in landfills, which release large amounts of methane that causes global warming.
- **Use tap water.** Do not buy bottled water if you know your tap water is safe to drink. Transporting water from its source to the supermarket is an expensive waste of energy. The plastic and glass water bottles add to the mountains of rubbish that we produce.
- **Think before you buy.** To reduce over consumption, buy items that will last longer instead of buying the same item several times, or consider buying second-hand.
  - Reduce the amount of materials you use by buying in bulk.
  - Avoid disposable products.
  - Reuse containers and clothing.
  - Repair and sell things you no longer need.
- **Act globally, eat locally.** If you shop at a supermarket, the food you buy may travel in a plane from the other side of the world, burning fossil fuels the entire trip. Shop at a local farmers markets and you will find fresh and healthy food, and help save our climate.

In the garden

- **Plant a tree.** Trees absorb CO_2 from the air and use it as their energy source, producing oxygen for us to breathe.
  - A tree planted in the right place near your home can provide cooling shade in the summer and save on air conditioning costs.
- **Save water.** Collect rainwater to water your garden.
- **Stop using chemical pesticides.**
  - **Welcome birds.** Birds eat aphids and other garden pests, reducing the need to use chemicals. Use traps, parasites and other natural predators such as ladybirds, to protect your plants.
  - **Use natural alternatives.** Use neem oil; a type of vegetable oil pressed from fruits and seeds of neem, and mix it up with some garlic oil to spray on tree trunks and diseased plants and shrubs. This works like a charm on pests, bacteria and fungus.
- **Save energy and get fit.** Do not use electrical equipment like leaf blowers; they consume so much energy for so little gain. Use a rake instead; it is low impact and better for your health too!

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Experts believe that the Arctic sea-ice is melting at a rate of 9% per decade, endangering the polar bear's habitat and existence

A child in Honduras, after Hurricane Mitch has wrecked havoc on the country in 1998

Severe droughts might double in south Asia over the coming years

Climate change threatens the offspring of sea turtles, as nest temperature strongly determines the sex; the coldest sites produce male offspring, while the warmer sites produce female offspring.

Since frogs rely on water to breed, any reduction or change in rainfall could reduce frog reproduction; higher temperatures contribute to the drying out of breeding pools, consequently, to the deaths of tadpoles and eggs.

Global Warming, the Nile Delta in Peril

By: Nathalie Seferian and Anna Diacofotakis, Mission Laiique Francais

"The invisible catastrophe approaching the Nile Delta" is the title of an article by Nina Hubinet, 7 December 2009, on www.rfi.fr.

In the past few years, the environment has become more and more of a publicized theme in the media. Scientists agree that Earth is changing; the majority consent that it is all due to human activities. However, in spite of the movement of public opinion and governments, there is not yet a definite solution to environmental problems.

Scientists have proved that the Earth's temperature has risen considerably within the span of twenty years, with grave consequences on humans, the environment, our way of life and our health.

One of the most serious and most evident and continuing consequences is the rise of sea water level. Thanks to modern measuring equipment, many ecological organizations have been able to observe the rise in the oceans' levels. Many coastal cities, islands and deltas can be submerged rather quickly.

The Group of Intergovernmental Experts on Climate Evolution (GIEC) states that by 2050, the sea level will rise by a meter, putting in danger the North of Egypt, particularly the Nile Delta, which opens unto the Mediterranean. The catastrophe will strike Egypt, a developing country with its load of socioeconomic problems that the Government has to face before broaching environmental issues.

Is the Nile Delta indeed a vulnerable zone endangered by climate change, especially the rise of sea water levels? What can the consequences be on this highly populated region of great economic importance?

The Nile Delta, a Nation's Source of Life

"We cannot predict with certainty the consequences of global warming, but there are many indications that demonstrate that the impact will be considerable and intense" says Mohamed Elraey, Environment Professor, University of Alexandria.

The Nile Delta is the Lower-Egypt region. It includes the cities north of Cairo to Alexandria and Port-Said. Thanks to its location on the Mediterranean, this region is of great importance in many sectors. It is essential for the country's agriculture; in fact the cultivation of rice, wheat, beans, cotton and bananas, as well as fisheries, represent almost half the country's agricultural revenue. It is also home for 60% of the Egyptian population; around 46,800,000 people.

As a result, Egypt is classified as the third country of the globe in terms of the gravity of expected consequences due to climate change.

The Nile Delta in the Face of Global Warming

Global warming can, and will lead to a rise in sea water levels. If the Mediterranean level rises, a large portion of the Nile Delta will be inundated (the brown regions in the map) resulting in fatal consequences in several areas.

The River Nile is already very polluted. If the salty water inundates the Delta due to the rise of sea level, Egypt will be facing another kind of danger. Drinking water will become limited, possibly triggering military conflicts.

Egypt has to immediately start finding and applying solutions for managing and using water effectively to control future problems that will start appearing from now and until 2020.

The majority of Egypt's agriculture is in the Nile Delta region. All these agricultural lands are irrigated by water from the Nile. Once the sea level rises, even by just 50 cm, salty water will penetrate the Delta. The majority of the agricultural lands will become barren and plants will no longer grow due to the rise of salinity in irrigation water.

That would be the direct consequence on the lands fertility, but it is not the only possible consequence. Water can also penetrate ground water reservoirs; upon evaporation of the water, the salt will further increase the salinity of the lands reinforcing its sterility.

Nevertheless, the high fertility of the lands in the Delta region should also be taken into consideration. The Aswan Dam, constructed primarily to supply the country with electricity, also controls the Nile's flooding; this can have a negative effect on the impact of global warming. The Dam can diminish the intake of alluvium, which has certain consequences on the country's productivity; but on the other hand, the accumulated sediments can form a strong resistance against the sea. Still, this too can be an alarming situation because the Delta could collapse under its own weight.

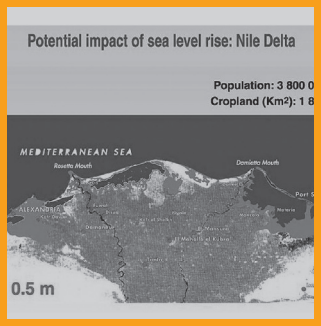
All of this will affect the country's economy; as the agricultural revenues decrease, farmers will try to benefit from the lands salinity by turning it into fisheries. Egypt will consequently lose a huge portion of its agricultural product; that of cotton, bananas, beans, wheat and rice, all of which are highly abundant in the region, but cannot endure the salt.

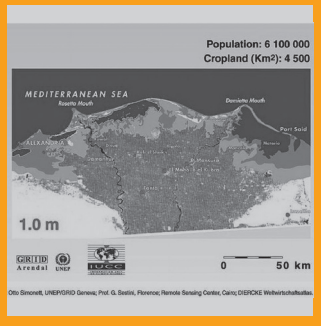
The Delta is also home for 60% of the Egyptian population. The inundation of a large portion of the region will force all these people to migrate to cities that are not coastal or located in the Delta, some of which, such as the capital, are already over-populated. Moreover, the population is expected to rise considerably, if not dangerously, within the next half-century; it might even double by 2050 reaching 160 million inhabitants. This will lead to further displacement of a large portion of the population; hence, great migration movements.

Dr. George Maged, Egyptian Minister of Environment, stresses that the oceanic rise can be visible by 2020. If the sea water level rises, even by a few centimeters, many coastal Egyptian cities; such as Alexandria, Port-Said and Rashid, among many others; can be submerged, leaving a huge population abandoned and in panic.

Despite this catastrophic scenario, the question of climate change is not being dealt with in Egypt. Large construction investments are still growing within coastal zones. However, with the increase of warning reports, some action is being taken such as the extension of coasts and construction of protective barriers.

Will these actions be sufficient to save the New Bibliotheca Alexandrina from sinking under the sea? The answer to this question may be in our own hands; but will we have the courage to own the responsibility of saving our planet, our country, our city and our life?





Things You Do Not Kn
Climat

By Marwa Gaber, PSC Programs and Events Specialist

The first decade of the 21st century dawned with a global strategy to fight climate change; unfortunately, it ended in chaos with greenhouse gases dispersed with few constraints. The sad news is that it will be our children and grandchildren who will have to suffer the dire consequences of our reckless actions. If we do not change course immediately, the only heritage we leave behind would be a dying planet.

Analysis conducted by NASA's Goddard Institute for Space Studies (GISS) shows that 2009 was the warmest year since modern records, which began in 1880. Already, more frequent droughts, floods and other climate-related disasters are forcing entire communities to flee their homes. Experts predict that conflicts over shrinking food and water supplies will destabilize already shaky governments and economies around the world.

Tackling climate change is not just about lowering carbon dioxide emissions. It is about helping people and nature survive its inevitable effects. The reality is that even if we stopped greenhouse gas pollution today, the fallout from 200 years of industrialization would be felt for generations to come.

It is not hopeless though; there is a range of successful strategies to counteract the rising devastation. From developing better irrigation systems on drought-stricken land, to planting natural buffers such as mangroves to protect coastal communities against storm surges, to strengthening food security by keeping coral reefs strong enough to survive warming seas. For the world's poorest and most vulnerable nations, these actions can literally mean the difference between life and death.

Courageous adaptation measures and reliable funding are needed to deal with the effects of climate change today, as well as those that will be felt for decades to come. The short-term cost will not be cheap. If we do not act now, we will pay a far greater cost in the future; in money and lives.

Lake Chad: Going… Going… Gone!

Lake Chad was considered to be one of the largest lakes in the world when first surveyed by Europeans in 1823. According to the UN, it shrank by as much as 95% between 1963 and 2001, from 25,000 km^2 to under 1,500 km^2; its surface area becoming less than one-tenth of its earlier size. It is forecasted that the Lake could disappear altogether within 20 years.

Climate change and overuse have put one of Africa's mightiest lakes in mortal danger; consequently, the livelihood of the 30 million people who depend on its waters is hanging by a thread. If the Lake in fact dries up, a huge security problem will arise from a growing competition on the limited quantities of water. Poverty and hunger will increase; violence is bound to follow!

The alarming consequences have already started. Villages that used to be flourishing lakeside ports are now miles from the water, and have been swallowed by the advancing Sahara Desert. The lack of water has caused fields to dry up, leading also to a serious shortage of animal feed, resulting in cattle deaths and plummeting livestock production.

Both fishers and farmers are struggling to survive and people are leaving the basin area to look for water, increasing the rate of outward migration. Biodiversity too has been hit by the Lake's retreat, so has the region's health situation.

Little can be done at the regional level about climate change, which is attacking the Lake on two fronts; decreasing rainfall and accelerating evaporation. The Lake's shallowness makes it particularly vulnerable to these attacks. The situation is indeed grim, but not entirely hopeless.

Over-extraction is an aspect of the problem that can be tackled locally. The Lake's shrinkage is due to both human pressures on water resources, as well as climate change. Awareness and effective management of water is a solution that is in our hands.

Malaria Flaring Up in the Heating Africa

A study published by the Kenya Medical Research Institute claims that the only change that has occurred recently in the area causing an increase in malaria is the climate change. The malaria parasite can only mature in temperatures above 18 degrees; the average annual temperatures have risen from 17 degrees in 1989 to nearly 19 degrees today.

The spread of malaria in the Mount Kenya region is a worrying sign of things to come. Without strong and urgent action to tackle climate change, malaria could infect areas without any experience of the disease. That is why we need to make sure vulnerable, developing nations have the support they need to tackle the potentially devastating impacts of climate change.

The Upside: African Livestock versus Climate Change

In a book published by the International Institute for Environment and Development (IIED) and SOS Sahel, researchers say that Africa's cattle producers are an exception to the rule, by proving resilience to climate change and generating huge economic benefits for their nations and regions. This shows how pastoralism is a major economic player whose importance is set to grow as climate change takes hold!

Pastoralists[1] manage complex webs of profitable cross-border trade and draw huge economic benefits from rangelands ill-suited to other land use systems. In fact, their livestock play a key role in the economic prosperity in African dry lands by supporting of millions of people, and a massive meat and leather industry. What is remarkable is that these benefits all arise from animals fed on natural pasture only.

The book shows that, contrary to popular belief, pastoralists actually profit from climatic variability. Harsh, arid and unpredictable environments are not obstacles to pastoralists as they would almost inevitably be to other primary producers. This is because pastoralists are experts at leading, breeding and training their animals to use the richest possible diet for milk and meat production in environments where highly nutritious grasses are not growing everywhere at the same time.

Antarctica, the Sleeping Giant!

We hear a lot of stories about how the Arctic is melting away ever so quickly. However, we have not heard much about the melting of Antarctica's ice sheets. If global warming is causing polar ice melt; why don't we hear about Antarctica?

That is because the Continent's ice sheets are simply not melting that much... yet, that is. The Antarctic Peninsula is, in fact, continually melting; the Wilkins ice shelf is collapsing, but overall the change is relatively slow.

The reason is that higher temperatures mainly occur during winter and spring instead of summer when almost all the melting happens. The summer has been shielded from warming by strong circumpolar winds[2]. Stronger winds act like a cold air seal, keeping warm air out. Over the past few decades, the winds have been stronger because of a thinner ozone layer, but that is reversing itself. Over the coming decades, the ozone layer will thicken, winds will become weaker; warming and melting will increase.

The scary news is that Antarctica's ice sheets contain enough frozen water to raise global sea levels by 60 meters. Antarctica is simply a sleeping giant; let us not wake it.

now About te Change!

Himalayan Glaciers: How Much Longer?

The Intergovernmental Panel on Climate Change (IPCC) claims that the Himalayan glaciers will disappear by 2035. The majority of observations on glacier fluctuation indicate that the Hindu Kush-Himalayan (HKH) glaciers are retreating substantially. More than 200 glacial lakes formed by retreating glaciers are "potentially dangerous"; they are liable to burst out leading to floods.

Glaciers take some time to react to climatic disturbance; this is known as the response time. Larger glaciers have a larger response time or longer time-lag, maybe decades, but smaller glaciers can take only a few years. As glaciers store fresh water, glacier fluctuations are likely to have an impact on global water resources though, so far, it is difficult to predict the extent and timing of future impacts.

Climate Change Initiators Getting Away with It!

Global warming could reduce the range of plant biodiversity by more than 9% by the end of the century. In the coming decades, it is set to produce worldwide changes in the living conditions for plants, whereby major regional differences may be expected to occur.

Today´s cool, moist regions could in the future provide habitats for additional species; while in dry and hot regions, the climatic basics for a high degree of plant diversity will decline. For example, in far northerly latitudes, land locked in permafrost(3) would open up to vegetation through warming, which implies uninhabited tracts of Canada or Siberia could be opened up to agriculture. But deserts, savannahs, moist tropical forests and other habitats where humidity holds the key to species survival would be damaged by water stress. The Amazonian rainforest would be the most vulnerable of all.

One consequence is that "generalist" species that can adapt to change could expand at the expense of less adaptable native plants that can only survive in a narrow temperature range. These could become rarer and even extinct. This is the conclusion reached in a new study by scientists at the Universities of Bonn, Göttingen and Yale.

The irony is that the privileged areas coincide largely with the industrialized nations, who are responsible for the majority of global warming due to their high amount of greenhouse gas emissions!

The study points clearly to the consequences of a half-hearted climate policy. Should the global temperature rise by 1.8°c with respect to the year 2000, the proportion of favored and disadvantaged regions in terms of species richness would still remain in balance. However, even if the climate protection goals agreed in Copenhagen are achieved, we are still heading for a temperature rise of up to 4°c, in which case, projected losses of plant species richness would considerably exceed possible gains in other regions.

Climate Change Solutions Turning Sour

The EU wants at least 10% of transport fuels to come from renewable sources within the next 10 years. This target will be met mainly by industrial biofuels; fuels made on an industrial scale from agricultural crops, the majority of which are likely to come from developing countries.

A study of the expected impact on people and global hunger estimated that the amount of biofuels in Europe's petrol and diesel will increase nearly fourfold. It says this will have a disastrous impact on the world's poor as food prices rise; poor people can spend as much as 80% of their income on food.

Biofuels are not even an answer to climate change. Most biofuels are worse than the fossil fuels they are supposed to replace. The majority of biofuels need nitrogen fertilizer, releasing nitrous oxide, a greenhouse gas 300 times more damaging than carbon dioxide. Scientists believe that the extent of nitrous oxide emissions has been seriously underestimated. Large-scale biofuel plantations also increase carbon dioxide emissions, either directly by cutting down forests or ploughing up other carbon-rich habitats, or indirectly by forcing farmers to move into these areas.

Climate-Proof Food Plants: Solution on the Horizon?

What if we could come up with a plant that defied climate change, and kept growing and fruiting regardless of whether it got very hot or very cold?

That day could come sooner than we think; perhaps in the next 10 to 15 years; because molecular biologists have had a crucial breakthrough. They have isolated a «thermometer» gene that helps plants sense temperature; this could provide a shortcut to plants that fruit in any temperature.

The discovery could potentially push agricultural microbiology forward by leaps in much the same way that early medicine was revolutionized by an increased understanding of bacteria.

Time is a crucial factor. Scientists indicated that this discovery would cut down the time it took to find varieties that were more tolerant to extreme temperatures, and will lead to precision breeding.

Glossary

(1) Pastoralism: Pastoralism or pastoral farming is the branch of agriculture concerned with the raising of livestock.

(2) Circumpolar Winds: The Antarctic Circumpolar Current (ACC) is an ocean current that flows from west to east around Antarctica. It keeps warm ocean waters away from Antarctica, enabling that continent to maintain its huge ice sheet.

(3) Permafrost: Permafrost, or permanently frozen ground, is soil, sediment, or rock that remains at or below 0°C for at least two years.

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Green is the New Black

By Nihal Soliman; PSC Programs and Events Specialist

Experts claim that what we wear can be a factor in climate change. When they are manufactured, when they are transported, when they are washed and even when they are thrown away, clothes are responsible for significant greenhouse gas emissions!

"People think of fashion as the stuff you buy and wear", said Jo Paoletti, a Professor at the University of Maryland who studies clothing trends. "But it is an entire process from the raw material, to the conversion of fibers into yarns, and then into fabrics, to manufacturing them into clothing and transporting it to where it is sold. There are energy costs all along the way".

"A label can tell you a shirt is polyester, but many consumers do not know that polyester is made from oil," Paoletti said. "A label can tell you the shirt is 100% USDA organic cotton(1), but that claim does not tell the whole story: What about the dyes and finishes used in the shirt?"

Dyeing is one of the most environmentally harmful steps in the process of making clothes. Just in the dyeing process, water use can range wildly from a best-case scenario of 80 liters per kilo of fabric to a sloppy and careless 800 liters. The story does not end when clothes reach the racks.

Energy expenses do not stop once the garment reaches consumers. A study by the Institute for Manufacturing at Cambridge University found that 60% of the greenhouse gases generated over the life of a simple T-shirt come from the typical washings and machine dryings. A typical washing machine emits about 73 kg of carbon dioxide each year, while a clothes dryer puffs out about 318 kg, not even taking into account the environmental toxins used in traditional dry cleaning.

Fashion's Footprint(2)

The production of clothing uses vast amounts of water and energy; hence, contributing to their loss. Moreover, cotton production alone is responsible for one-quarter of global insecticide use.

Besides water and energy losses due to washing and drying clothes, once worn, over one million tons of clothing are thrown away each year, with half this amount ending up in landfills(3). When wool and cotton are thrown into landfills, they produce methane; a gas 23 times more powerful at warming the atmosphere than CO_2. In fact, it takes ten times more energy to make a ton of textiles than it does to make a ton of glass. Yet most people happily recycle bottles and do not think of recycling clothes.

Furthermore, today, about 8,000 synthetic chemicals are used throughout the world to turn raw materials into textiles. The US Environmental Protection Agency considers many domestic textile manufacturing facilities to be hazardous waste generators. Lenient standards and enforcement in developing countries, where the majority of textiles are produced, means that untold amounts of pollution are likely being deposited into local soils and waterways in regions that can hardly stand further environmental insult.

Low-quality fashion is sold at "prices that make the purchase tempting and the disposal painless". Yet, this sort of so-called "fast fashion" leaves a pollution footprint, with each step of the clothing life cycle generating potential environmental and occupational hazards. That is to say, the manufacture of polyester and other synthetic fabrics is an energy-intensive process requiring large amounts of crude oil, and emitting volatile organic compounds, solvents, and other harmful by-products into the air and water.

At the Opposite End of the Spectrum

While scientists monitor how our clothing affects the climate, trend-watchers are more interested in the opposite; how climate change is beginning to alter our attire. Grumblings began in 2008, when retailers reported alarmingly poor sales of winter coats. "There is no strong difference between summer and winter anymore," Milan Fashion Week founder Beppe Modenese told The New York Times in September 2008: "the whole fashion system will have to change".

Radley Horton, a climatologist at Columbia University's Center for Climate Systems Research, confirms that fact that so worries fashion makers: "there are less extreme differentials between seasons", he says; "spring is sneaking upon us earlier by 7 to 10 days, while fall is getting delayed by about a week".

Detoxing Fashion

Half of all the products we buy are clothes, and every year we throw away an average of 30 kg of them, most of which goes to dumpsters. More shockingly, our clothes purchases account for about 1,000 kg of CO_2 a year; roughly half that emitted by a small diesel car. However, buying quality clothes that will last, buying second hand clothes, and recycling clothes can, it is claimed, substantially reduce that impact.

"What if you only had half the wardrobe but everything in it was something you really, really loved?" Paoletti suggested; "you are never going to reduce your carbon footprint to zero; being naked really is not an option".

Fashion is often blamed for the severe ethical and environmental impacts of our throwaway clothes culture and obsession with the latest trends. "As the impact of global warming is felt, we can anticipate debates over cotton versus polyester and increasing concern about the water and energy needed to launder clothing," Paoletti said. "In the future, smart clothing that monitors and adjusts to body temperature may help us reduce our need for air conditioning and heating".

Fashion designers, in particular, are making use of Earth-friendly fibers. The "Luxury Eco" label by Los Angeles-based Linda Loudermilk makes dresses from wood pulp(4) and recycled soda bottles, as well as blouses made of sasawashi(5) fabric, which is an anti-allergen(6) blend of Japanese paper, herbs, vitamins and amino acids.

How to do it!

Here are some tips to help you detox your outfits and make them more environmentally friendly:

- Wash at low temperatures using environmentally-friendly detergents.
- Line dry instead of tumble dry to reduce clothing environmental impact.
- Iron only when necessary.
- Make, do and mend; prolong the lifespan of a garment by finding a local tailor or buying a sewing kit to fix rips and lost buttons.
- Stretch your existing wardrobe by customizing outfits or refashioning with accessories such as belts.
- Never throw clothes in the bin. Gift them to charity, pass them on, or turn them into cleaning rags.
- Buy second-hand, vintage, or recycled clothes from vintage fashion fairs.
- See new clothes as an investment. Pay more for higher quality clothes that will last season after season.

Glossary

(1) USDA Organic Cotton: It is generally understood as cotton, from non-genetically modified plants to be grown without the use of any synthetic agricultural chemicals such as fertilizers or pesticides.

(2) Footprint: The ecological footprint is a measure of human demand on the Earth's ecosystems. It compares human demand with planet Earth's ecological capacity to regenerate.

(3) Landfills: A method of controlled disposal of public solid waste on land.

(4) Wood pulp: Pulp is a dry fibrous material prepared by chemically or mechanically separating fibers from wood which is mainly used to make paper.

(5) Sasawashi: It is an eco-friendly fabric that looks like linen and made of Japanese paper and the kumazasa herb. It is an excellent absorbent, act as a natural antibiotic, gentle on the skin, and washable.

(6) Anti-allergen: Agents that are used to treat allergic reactions.

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Maissa Azab
PSC Publications Coordinator

Ingy Hafez
PSC Publications Specialist

For more information and reservation, please contact:
PSC Administrator
planetarium@bibalex.org
ALEXploratorium@bibalex.org
TEL:+203 4839999
EXT: 2350, 2351
FAX: +203 4820464

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