Infomapper

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Global Climate Change

Climate disturbances
such as rising temperatures
cause sea levels to rise
thus affecting low-lying areas.

Editorial

Even before the United Nations Conference on Environment and Development, dubbed "Earth Summit" opened on June 3, many green groups and non-governmental organizations have regarded it as a failure. Early on, the United States declared that it would not sign the biodiversity treaty because it would hurt its biotechnology industry. On the other hand, Malaysia threatened not to attend the summit if a treaty on forest conservation would be forced on the participants. While Malaysia wants to conserve its tropical forests, it has to cut trees to sustain its economy.

The Philippines shares Malaysia's predicament. As a country that is struggling to solve its economic crisis, it must strike a balance between utilization and preservation/conservation.

These realities focus on the basic issue of the global environmental effort: how to reconcile the needs of the environment with the demands of development. While the industrialized and wealthy nations of the North can well afford to strictly implement rules for the preservation of their environment, developing nations of the South have no choice but to harness their resources to meet their people's needs and sustain their economy.

The Earth Summit is the largest international conference on the environment which sought the committment of nations to conserve the world's natural resources, preserve the environment, and at the same time attain economic growth. When the meeting ended on 14 June, more than 157 nations had signed two treaties: the Rio Declaration on Environment and Development and Agenda 21 - an 800-page blueprint for action on sustainable development. This document tackles an array of problems from poverty to pollution.

The DENR, which represented the Philippine government in the Earth Summit, presented its Strategies for Sustainable Development and Forestry Master Plan among other initiatives, as action plans of the government toward conserving our natural resources and environment. While the department has taken positive steps to arrest the continued denudation of our forests, conserve our watershed areas and clean up polluted rivers and bays, much still has to be done. Congress must act swiftly on the Total Logging Ban bill. Existing rules and regulations on smoke belching, wildlife protection, and other concerns must be efficiently enforced.

Perhaps the most significant achievement of the Earth Summit is that it provided the necessary impetus towards the awakening of environmental consciousness not only among nations but individuals as well. Heads of states, diplomats, businessmen and environmentalists tackled various issues such as: reduction of carbon dioxide and other green gases that contribute to global warming; protection of tropical forests that host threatened species of flora and fauna; and rapid population growth that put undue pressure on land and water resources.

In this issue, the Infomapper discusses global warming and the El Niño phenomenon as its contribution to the worldwide effort in raising environmental consciousness. It is hoped that the awareness generated by the articles on these topics will open the minds and hearts of unconcerned individuals and urge them to take a more active role in environmental efforts.●

NEW PRODUCTS

Five (5) topographic maps at scale 1:50,000 for the Albay-Sorsogon Mapping Project have been printed by NAMRIA. These maps were produced using 1988 aerial photographs taken by FF Cruz and cover the municipalities of Bulan, Gubat, Matnog, and Pio Duran, and Iriga City.

Provincial maps of Cavite at scale 1:50,000 and Albay at scale 1:150,000 and land cover map of Region V at scale 1:250,000 were also produced. This brings to 41 the total provincial maps and two regional land cover maps already printed by NAMRIA.

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Features

The El Niño: More than an Enfant Terrible

By Jocelyn P. Salud
Information Management Department

By now, the term "El Niño" has become a byword to almost all Filipinos, particularly those in the areas that have been stricken with drought. But what exactly is the El Niño phenomenon?

The term was first heard in 1892 by a scientist named Camilo Carillo from Peruvian fishermen in the Port of Paita who kept on talking about the "Corriento del Niño" or "Current of the (Christ) Child." Apparently, the fishermen were referring to the flow of warm water that occurred around Christmas, the date celebrated worldwide as the birth of Jesus, causing a sharp increase in fish catch. The abundant catch, however, lasted for only a short period of time. What followed later was a sharp decline in the fish population, resulting in lesser catch.

Earlier documents/references from ship captains' logs as far back as 1795 have also reported occurrences similar to the conditions following an El Niño. Today, the phenomenon is defined as "a spectacular oceanographic/meteorological phenomenon that develops in the Pacific," mostly off Peru. This is associated with "extreme climatic variability" characterized by devastating rains, winds, droughts, and other natural calamities that wreak havoc on the economy and society, both in the local and global scales. Simply put, the phenomenon can be characterized by weather disturbances or unexpected climate changes such as the absence of rains during the rainy season or the occurrence of typhoons during the dry season.

Under normal circumstances, the easterly **trade winds*** that drive the ocean circulation blow from east to west, creating a thicker and warmer mixed layer in the Central and Western Pacific, while a thinner and colder mixed layer occurs in the Eastern Pacific. This also brings about a cold upwelling off South America. Under normal easterly trade wind conditions, sea level is higher by about 40 cm. in the western Pacific. Fluctuations in wind stress likewise affect the sea level, which rise when the trade winds blow stronger than normal. Correspondingly, when the trade winds slacken, the sea level falls and unusual things start to happen. Suddenly, the drag on the ocean surface diminishes. Warm water runs back towards the east and aborts the upwelling of cold water off Peru, giving birth to an El Niño.

The El Niño, like some other major changes in the ocean currents and temperatures, is related to the global pattern of oceanic and atmospheric fluctuations called the *Southern Oscillation (SO)*.

The SO is a large-scale exchange of air mass between the eastern and the western hemisphere in the tropics. This exchange can be described as the see-saw of high pressure in the South Pacific Ocean and low pressure in the Indian Ocean. Pressure variations cause wind changes which result in an oscillation, the most pronounced being centered in the Pacific Ocean. This is characteristically repeated a couple of years at 2 - 10 year intervals.

The El Niño/Southern Oscillation (ENSO) phenomenon is thus a disturbance of great magnitude affecting both atmosphere and ocean. Periods with very warm sea surface temperatures (SSTs) in the east equatorial Pacific and the global pattern of climatic anomalies that usually accompany this warm water are referred to as *El Niño events*.

It is not known what exactly upsets the normally balanced cycle of wind and water, but every few years, something triggers a change. It could be snow in the Himalayas affecting a wandering jet stream just enough to push the SO into oscillation, or something else that pushes the annual warm current too far south.

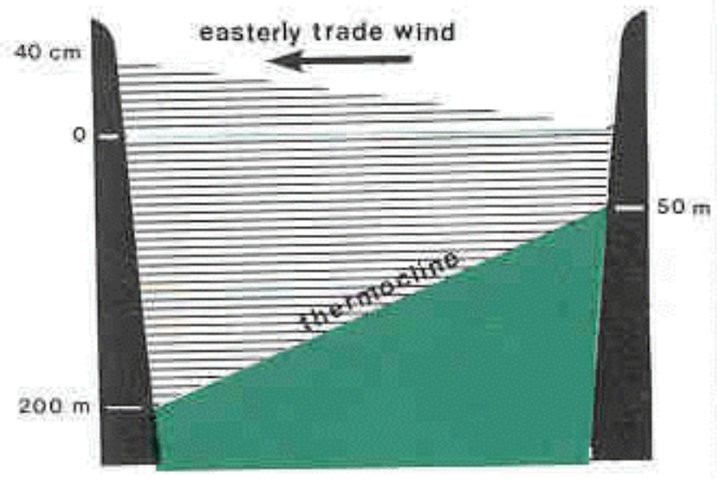
The general conditions that precede an El Niño can be seen in the changes in the equatorial current system and sea level. In a typical anomaly with a falling Southern Oscillation Index (SOI), pressure over the western tropical Pacific region rises, accompanied by a relaxation in the Pacific trade winds, while the easterly trade winds in the western equatorial Pacific diminish and change direction, blowing from west to east instead of the usual east to west. This creates a much thicker mixed layer and warm ocean surface off Equador and Peru, which is the El Niño anomaly. Consequently, more cloud formation brings heavy intertropical rains to the central and eastern Pacific leaving the rest of the equatorial belt (western Pacific) relatively dry, and to a certain extent, in drought conditions.

Since 1935 to 1987, ten occasions of the El Niño anomaly have occurred, with the 1982-83 occurrence recognized as the most deleterious. Although some countries may, for some time, be favored by this phenomenon, (as in the United States which experienced a very warm winter during the 1982-83 occurrence, thus saving approximately $500 B in energy costs), the overall effect has been, to say the least, unfavorable. Drought, heavy flooding, coastal storms and mudslides are some of the other consequences of the El Niño, with drought having been observed as the most lethal. Reports indicate that drought, with its unpredictable occurrence and magnitude, has caused the greatest damage not only econo-mically but socially as well. It has also been described as "man's worst natural enemy...with an impact ranging from slight personal inconvenience to endangered nationhood."

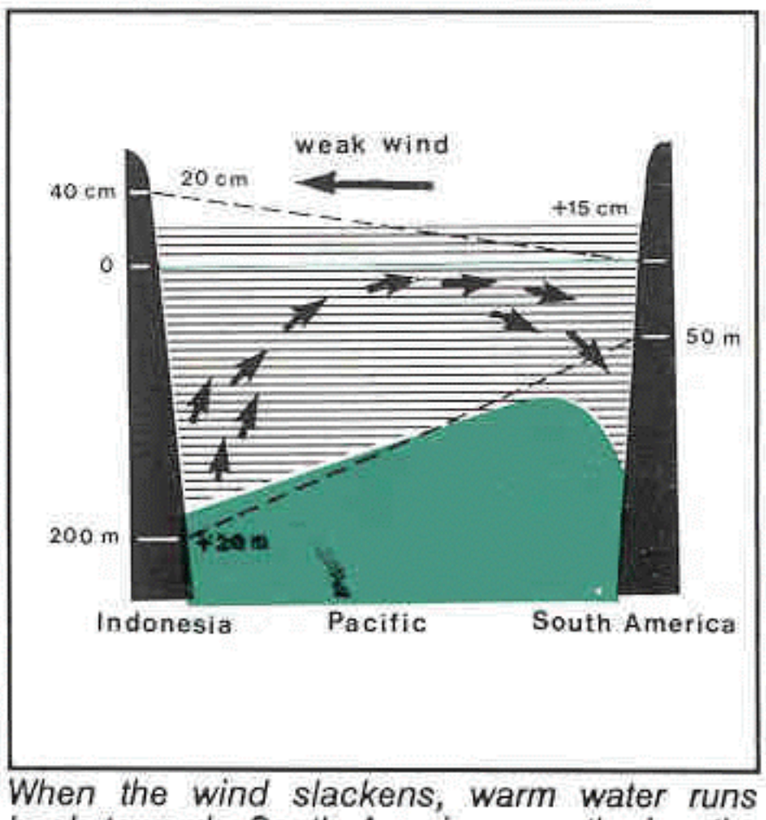
Dryland agriculture is oftentimes the first to experience the direct effects of drought. The result is reduced agricultural production compounded with dwindling livestock, which may lead to malnutrition, disease, and eventually, death. The economic development of a country affected by drought will most likely experience a setback, as in the case of Indonesia. In the Philippines, agriculture has been greatly affected by the 1986-87 drought, damaging approximately 183,600 hectares of rice and corn land in 44 provinces at a cost of P430.5 M.

In 1986, the Philippine Atmospheric Geophysical and Astronomical Services Administration (PAGASA) initiated a study on climatic variability and its impact on agriculture during the El Niño years. The study confirmed that major drought events in the country are associated with the warm episodes in the central and eastern equatorial Pacific. This prompted the enhancement of an already existing climate impact assessment for agriculture and the development of the Drought Early Warning Monitoring System (DEWMS) by Dr. Aida M. Jose of PAGASA. The DEWMS provides timely weather condition assessment and

Continued on p.15 El Niño . . .



Under normal conditions the easterly trade winds cause a bank of water on the western boundary of the Pacific.



When the wind slackens, warm water runs back towards South America, smothering the normal cold upwelling there. (both illustrations are from PAGASA)

* Terms in bold type and marked with asterisks are defined in the Glossary of Terms on page 16.

THE HEAT IS ON --
Some Facts on Global Warming and Climate Change

By Charmaine Rowena C. Aviquivil
Information Management Department

Summertime has never been more oppressive in the Philippines than it is right now. These days, all one can think of is how to beat the heat, which not even the most refreshing drinks or coolest showers can alleviate. To top it all, this is compounded by the daily power failures which aggravate the already feverish conditions in the country.

The Metro Manila temperature reading for April 24 this year reached a high 37.8°C. And as if that isn't enough, the heat peaked in the following month when the temperature shot to 38°C on May 10.

The rise in temperature is just an indication of climate-related disturbances being felt worldwide, such as global warming, the El Niño phenomenon[1], and others. This article discusses the hellish consequences of global warming as well as its twin demons, the greenhouse effect and ozone layer depletion.

The Greenhouse Effect

Contrary to common notions, the *Greenhouse Effect* is only a contributor, and is not exactly synonymous, to global warming. Just what is the greenhouse effect, and how does it affect life on earth?

The earth may be compared to a greenhouse, with a warm and controlled environment which nurtures human beings, animals, plants and other living organisms. It has an atmosphere which provides a mix of gases (about 78% nitrogen, 21% oxygen, and a sprinkling of inert gases, hydrogen, carbon dioxide and water vapor) essential to all living things.

The atmosphere is like a glass roof which regulates the entry of heat and light into the greenhouse, protecting the living things inside from the elements. It lets solar radiation in, retains about 25 - 30% of the energy to warm the earth's surface, and reflects this energy back to space. What prevents earth from being an ice-covered, lifeless planet is the presence of *greenhouse gases* in the atmosphere. These gases absorb some of the solar radiation and keep the absorbed energy within the earth's atmosphere, thus producing a warming effect and making the earth a life-sustaining planet.

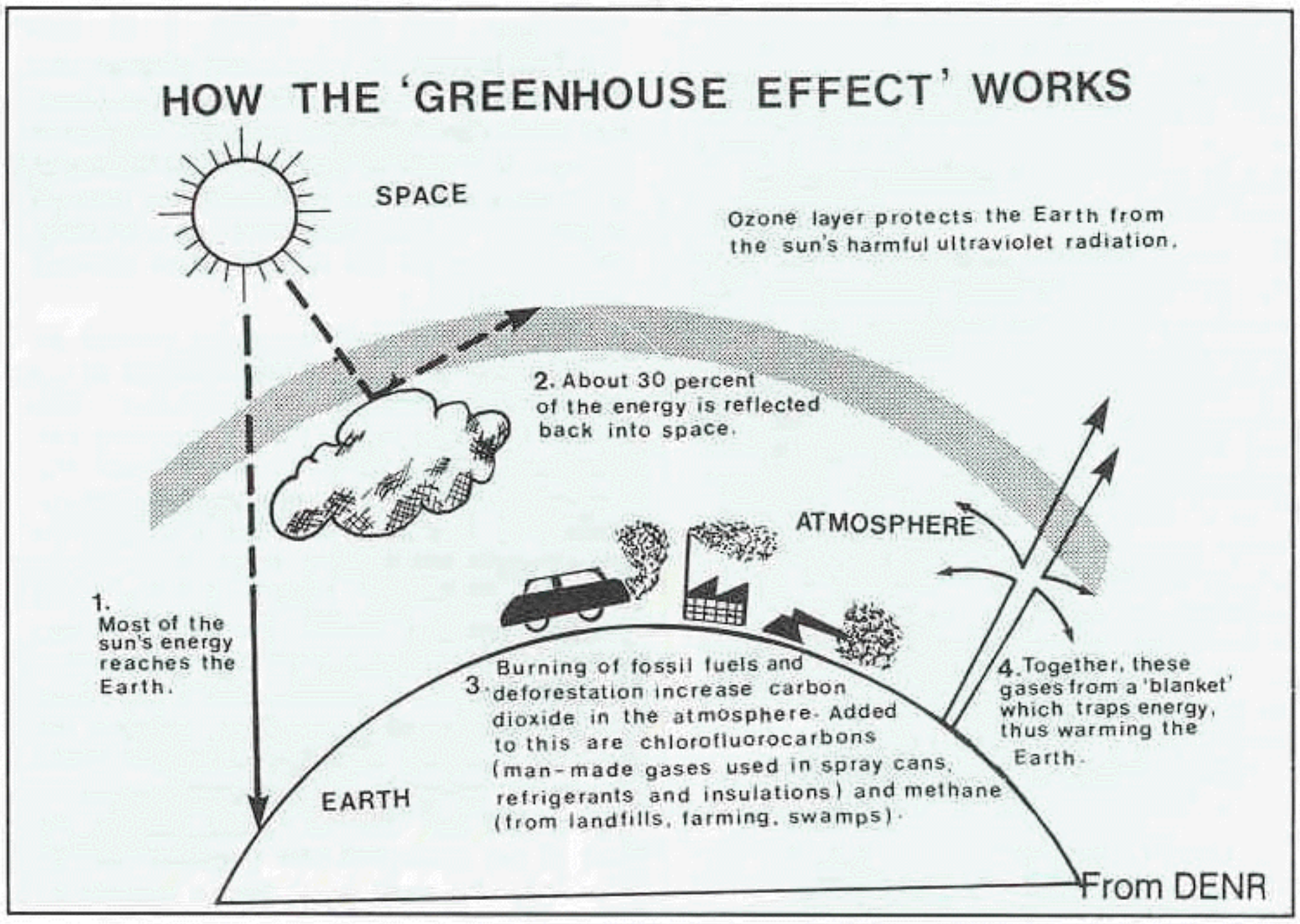
This, then, is the greenhouse effect, as coined by Swedish chemist Svante Arrhenius, and it is supposed to be part of the natural environmental system. However, man's expanding activities, particularly in industrialization and to a lesser extent, in agriculture, has turned this natural phenomenon into a problem with potentially catastrophic proportions. Today, the nurturing greenhouse screen has become a heat trap which threatens to turn this planet into a living inferno.

Greenhouse Gases

A. Carbon Dioxide (CO_2)

There are approximately 40 known greenhouse gases in the atmosphere, but the main contributor to global warming is *carbon dioxide*. CO_2 occurs naturally in the atmosphere and is essential for plant growth. It is released when fossil fuels such as coal, oil, and natural gases are burned. Forest destruction and burning also emit carbon dioxide into the atmosphere and aggravates the situation because the reduction in forest cover decreases the *sinks* or carbon dioxide absorbers in nature.

The pre-industrialization atmospheric carbon dioxide level was estimated at about 270 parts per million by volume (ppm) and in 1990, this has increased by about 25% to 353 ppm which is higher than the CO_2 levels at any time within the last 160,000 years. It is rising at about 0.5% or 1.8 ppm due to anthropogenic or man-made emissions. Atmospheric CO_2 takes about 50 - 200 years to adjust to changes in sources or sinks. Thus, carbon dioxide introduced into the atmosphere today is bound to influence its concentrations in the future. To stabilize present-day CO2 levels, global anthropogenic emissions must immediately be reduced by 60 - 80%.



B. Methane (CH_4)

Methane is found in natural sources such as wetlands, oceans and freshwaters, while anthropogenic sources are ricelands, livestock, coal mines, leakages during natural gas drilling, and in solid waste dumps where the decomposition of organic matter occurs.

The current atmospheric methane concentration is placed at 1.72 ppm which is more than double the pre-industrial levels. It is also increasing at 0.90% annually. Its atmospheric existence can last up to ten years and to stabilize present day concentrations, global anthropogenic emissions must be immediately reduced by 15 - 20%.

C. Nitrous Oxide (N_2O)

The increased atmospheric concentration of nitrous oxide may be traced to human activities such as high temperature combustion, biomass burning, and agricultural practices such as the use of mineral fertilizers containing nitrogen.

The atmospheric concentration of N_2O is presently estimated at 310 parts per billion by volume (ppb), which is about 8% greater than pre-industrial times. It is increasing at 0.25% annually. Its lifetime is approximately 150 years and it would be necessary to immediately reduce nitrous oxide emission by 70-80% to stabilize concentration at today's levels.

D. Chlorofluorocarbons (CFCs)

Chlorofluorocarbons do not occur naturally in the environment. They are synthetic chemicals developed about 50 years ago and are commonly used for industrial purposes--they are found in your ordinary spray net or air freshener cans as aerosol propellants, in refrigerators and air conditioners as freon (refrigerants), and may also be used as solvents, foam blowing agents, and fire retardants.

Present day concentrations of the different CFCs vary from 60 parts per trillion by volume (ppt) to 280 ppt. CFCs are said to be 10,000 times more effective in keeping the atmosphere warm than carbon dioxide. Their atmospheric concentrations have increased faster than the other greenhouse gases (at least 4% per year). Some of the CFCs have a lifetime of about 75 - 150 years.

It must be emphasized again that the natural presence of these greenhouse gases is not the real culprit behind global warming since they actually make this planet habitable due to their temperature-regulating

[1] A separate article on El Niño is also featured in this issue

function. It is man's increasing industrial activities which have accumulated these gases in the atmosphere and created this close to intolerable heat we are now experiencing.

Ozone Depletion

Another contributor to global warming is *ozone layer depletion*. *Ozone* (O_3) is a simple molecule formed by three oxygen atoms. It occurs naturally in the atmosphere. Ozone molecules form a layer which absorbs ultraviolet radiation emitted by the sun up to about 320 nanometers (nm), thus shielding the earth from these harmful rays. Without this protective shield, harmful radiation cannot be filtered and ultraviolet wave-lengths of 200 - 280 nm (known as UV) lethal to man and other living organisms can then penetrate the earth.

In the 80s, British Antartic Survey scientists discovered a gaping hole in the ozone layer over Antarctica. Ozone concentration was dropping at a dramatic rate each spring and is replenished by November each year. It was found out that the South Pole's dry and cold air had ice crystals facilitating chemical reactions between ozone molecules and chlorine atoms, breaking down the former. As in the greenhouse effect, CFCs were found to be a culprit in ozone layer depletion. Under the influence of ultraviolet light, chlorine atoms which rapidly destroy ozone are released from these CFCs.

Other contributors to ozone depletion are fertilizer use; high temperature supersonic aircraft combustion engines which inject nitric oxide into the **stratosphere*** and nuclear explosions which also produce nitric oxide.

Climate Change and other Effects of Global Warming

Climate is defined as the "prevailing weather conditions of a place." It provides a special character to regions of the earth, influencing lifestyles and cultures. With the onset of global warming, however, the once stable and familiar climate patterns are starting to drastically change.

The most apparent climatic change due to global warming is the rise in temperature. Experts say the earth is now 0.5°C warmer than it was over a century ago, and estimate a rise of temperature between 1.5 - 4.5°C by the year 2030.

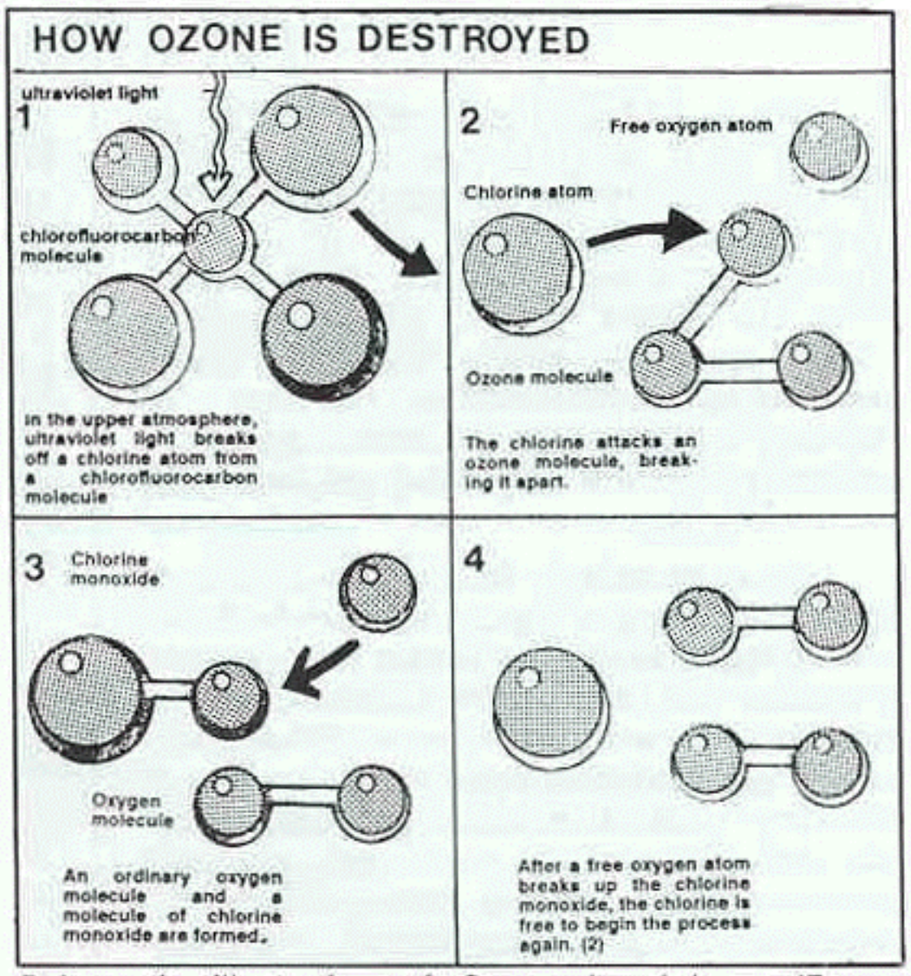
Apart from the general discomfort extremely warm weather brings, rising temperature may affect the earth's natural systems. A 1.5 - 4.5°C rise will cause sea levels to rise by 40 - 120 cm. due to oceanic thermal expansion and will melt land-based ice masses such as mountain glaciers and the Greenland and Antarctic ice sheets. As polar ice caps melt, the earth's reflectivity decreases, bouncing less sunlight back into space and trapping more heat. And as ice shelves thin and weaken due to the heat, tributary glaciers discharge ice which when melted, cause sea level to rise.

Rising sea level can cause flooding in coastal and low-lying areas, overflow vital wetlands, increase frequency of storm surges which endanger lagoons, estuaries, and coral reefs, and erode sandy beaches. In Asia, a one-meter rise in sea level could submerge mangrove swamps and possibly, destroy fish or shrimp ponds and salt pans. The Philippines, with its 30,000 kilometers of coastlines, may also be adversely affected by continuous sea level rise[2].

Global warming also increases sea surface temperatures which increase the frequency of tropical storms, endangering corals, coastal mangrove swamps, and marine resources.

It can also cause drastic changes in precipitation patterns such as increased rainfall, changes in geographical patterns of cloudiness and rainfall, increased drought stress, and intensity of winds.

It can disturb natural ecosystems, leading to the disappearance of forests, tundra and coral reefs, and the disruption of animal migrations. It is also linked to crop yield reduction due to the instability of climate patterns.



Schematic illustration of Ozone breakdown (From Envi- Issues)

Global warming due to the depletion of the ozone layer can result in prolonged exposure to UV, increasing the incidence of sunburn, eye and skin cancer, premature ageing and wrinkling of skin, and other health hazards. Australia, which is very near the South Pole, now has the world's highest incidence of skin cancer.

Natural events such as the Mt. Pinatubo eruption has further complicated matters. It is said that the millions of particles spewed by the volcano into the atmosphere contain chemicals which will damage the ozone layer. However, volcanic eruptions can also have beneficial effects. They release aerosols or sulfuric acid droplets into the stratosphere which reflect sunlight away from the ground toward space. This produces a cooling effect which will probably last for several years.

Possible Solutions

Global efforts must be made to avert the continuing trend of global warming. Several countries, among them Japan and those belonging to the European Community, have already signed in 1987 an agreement called the Montreal Protocol which provides for a decrease in CFC use and its eventual phase-out by the year 2000. It is unfortunate to note that the USA has not cooperated towards this effort, insisting that it is not fully convinced about the link between CFC use and global warming.

At a conference in Villach, France in 1986, several initiatives were proposed to control the increase in greenhouse gases:

1. Reducing CO_2 inputs into the atmosphere through the reduction of fossil fuel use and the utilization of alternative energy sources such as solar, wind, tidal and other forms of energy;

2. Intensifying reforestation efforts; and

3. Limiting the increase of non-CO_2 greenhouse gases into the atmosphere through a reduction in the use of CFCs, and CO, NO, and hydrocarbon emissions.

Further depletion of the ozone layer may be prevented through:

1. Limiting the number of aircrafts flying at altitudes of above 17 km.;

2. Controlling smoke emissions due to industrial and domestic burning of fuel; and

3. Reducing the use of CFCs.

DENR information materials quote the World Research Institute (1989) as to how individuals can help in saving the earth from the adverse effects of global warming:

1. Be energy-efficient. Purchase appliances which require less energy.

2. Conserve energy.

3. Use fuel-efficient vehicles or better still, commute whenever possible.

4. Plant trees which are good absorbers of CO_2.

5. Avoid using products made with CFCs.

6. Inform friends about global warming and how it can be stopped or minimized.

The world is now gearing up for the *Earth Summit* in Rio de Janeiro in June this year, where about a hundred heads of state and thousands of delegates are expected to attend and where a treaty on global warming is expected to be signed. We can only hope that this Summit's participants, particularly those from First World countries, do not place their interests before the well-being of other countries. This Summit, the first of its kind, must be able to succeed where other conferences have failed, and direct the world towards a new path of environmental concern before it is too late.●

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Continued on p. 15 The Heat is on . . .

* See Adm. Jose G. Solis' Briefing on Tidal Phenomenon on page 11

Photogrammetry and its Development

The word "photogrammetry" came into general usage when the American Society of Photogrammetry was founded, although the term already had been widely used in Europe for several decades. It is derived from the Greek words, photos meaning "light", gramma meaning "something drawn or written" and metron meaning "to measure". The root words, therefore originally signified measuring graphically by means of light.

Photogrammetry as it is known today is the interpretation and measurement of photographic images to obtain sizes, shapes, positions, and other useful characteristics of physical features or objects. Photogrammetry has been developed in the domain of Geodesy (a science which determines the size and figure of the earth through direct measurements such as triangulation, trilateration, etc.). Even nowadays, it is scientifically and practically advanced by geodetic experts.

At present, the task of photogrammetry all over the world is to produce planning materials rapidly for the revision of topographical maps and cadastral surveying in developing countries.

Methodical Expansion

The development of photogrammetry can be analyzed from the point of view of increased technical performance through the use of computers.

The transition from **analog*** to **analytical photogrammetry*** at around 1960 can be considered as the major development in photogrammetry in about 20 years. This can be attributed to the availability and greatly enhanced performance of digital computers, and manifested in the development of modern aerial triangulation, particularly the various sophisticated forms of **block adjustment***. **Aerial triangulation*** has greatly improved the accuracy and economy of the process.

In mapping, measurements on photographs replace field surveys, in whole or in part; consequently, the use of photographs and photogrammetry in mapping is often referred to by such terms as aerial survey or photogrammetric survey.

Aerial photogrammetry* denotes the use of vertical aerial photographs or other sensor data which have been obtained from an airborne sensors. In stereophotogrammetry, overlapping pairs of photographs are observed and measured, or interpreted in a stereoscopic viewing device, which gives a three-dimensional view and creates the illusion that the observer is viewing a relief model of the terrain. Vertical aerial photographs are used, although much of the early development of the basic theory of photogrammetry was evolved from horizontal and oblique photographs.

Vertical photographs are those taken with the optical axis of the lens pointing vertically downward at the time of exposure. Such photographs are actually only nearly vertical, because at present time there is no practical means available of holding the optical axis in an exactly vertical position at the instance of exposure. Each so-called vertical photographs is therefore tilted, in some degree, from the true vertical.

Precise photogrammetric instruments provide means by which the amount of **tilt*** is measured in each photograph is determined so that rectification to the equivalent of the true vertical can be accomplished by simple adjusting devices.

Aerial triangulation became a clearly structural system, composed of separate modules (point transfer, measurement, data reduction, adjustment). It also became highly predictable with regard to accuracy, time and costs, and is now one of the best predictable operations in photogrammetry.

Another development in aerial triangulation which has progressed towards wider scopes of performance is block adjustment. Existing block adjustment computer programs now have extended capabilities for auxiliary data, external constraints self calibration, and automatic blunder detection.

The digital computer has also greatly influenced the design of photogrammetric stereo instruments. The analytical plotter which now governs the scene is essentially an instrument with a built-in digital computer as its main component which handles the projection relations between object and image points. It also serves as or is combined with a general purpose computer, which is applied for many data editing functions and additional data processing. Modern analytical plotters represent a much higher level of accuracy, convenient handling, speed of operation and especially versatile applications as compared to their analog ancestors.

The most recent development in this field is the transition from analytical to digital photogrammetry. Basically, the former depends on mathematical methods while the latter uses computer-assisted techniques. According to the *Proceedings of the 43rd Photogrammetric Week at Stuttgart University*, "Digital methods are essentially still in the research phase. However, first applications are already practicable and the system development is emerging, ready to be introduced and utilized in a number of fields."

Photogrammetry in other parts of the world

The need for maps has been increasingly felt in the developing countries of the world. Most of these countries equipped their governmental survey agencies with Swiss, Italian, American or German systems. Many major projects for road and railroad design, hydro and electric installations, oil and mineral exploration in Asia, Africa and South America have been performed using modern photogrammetric methods.

Well known manufacturing companies (ZEISS of Germany, and WILD of Switzerland) of geodetic instruments are also the important manufacturers of photogrammetric plotting machines. NAMRIA has acquired a number of reliable instruments for the Photogrammetry Division such as: four (4) B8S Wild Heerbrugg, one (1) Wild Autograph A10, three (3) ZEISS Planicart E3, one (1) ZEISS Planimat D3, one (1) ZEISS Orthocomp, one (1) ZEISS C100-Planicomp Analytical Plotter and one (1) ZEISS SEG 6 Rectifier/Enlarger.

The present Japan Photogrammetric Society (Nippon Syashin Sokurjo Gakkai) was founded in 1961. Its quarterly technical journal informs its members about the photogrammetric field and related fields of ground, air and space developments.

China's Central Bureau of Land Survey introduced photogrammetric practices soon after the appearance of the first European plotters. It opened its first training school for stereo-plotter operators in 1930.

Countries of the British Commonwealth have widely replaced the traditional surveying practices in the post-war period by photogrammetric technology.

Saudi Arabia has become a major user of manpower, particularly contract workers in technical fields. The Philippines is one of their main sources of workforce due to the educational qualification and training of Filipinos and because there is no language barrier as compared to other Asean counterparts.

Various Applications of Photogrammetry

The principal use of photogrammetry at present is still in mapmaking, particularly in topographic mapping. Other applications are steadily increasing in importance. Whatever the purpose of the photogrammetric work, the general principles remain the same. A few of the well- known applications

Continued on p.15 Photogrammetry . . .

Zeiss Planimat D3

NAMRIA - Developed Computerized Systems

By Virginia Sicat - Alegre
Information Management Department

A big boost in data processing and project implementation, *computer technology* makes tasks easier, more efficient and more accurate than it was possible before. It evolved from simple calculators to mainframes, minicomputers and micro-computers (or personal computers including the laptop version). Computer systems may be "stand alone" or single-user models, multi-users models, and networks (workstations, local area networks, wide area networks). They have varied uses such as word processing, electronic spreadsheets, graphic display and processing and database management.

An organization making full use of computers for their daily tasks would, more often than not, be engaged in *sysyem development*. A system development cycle starts from conceptualization to preliminary investigation, detailed system design, program specifications, program development, users training, pilot testing, final system documentation and culminates in system maintenance. A succesful information systyem must be able to provide a user with timely, reliable and accurate information.

NAMRIA has harnessed its expertise in the development of computer-based systems that would facilitate storage, processing, retrieval and analysis of environment and natural resources (ENR) information. These systems are intended to ease the work load of NAMRIA units and the DENR and its bureaus. More than ten systems have already been developed by the agency over the past few years.

The *Survey Verification System* (SVS) is a micro-based system designed and developed for the Land Management Sector of the DENR Regional offices. It aims to computerize the process of verifying cadastral and isolated survey returns submitted by the contractors. The system outputs both graphical and textual information in the form of lot sketches and technical descriptions, respectively.

The *Public Land Application* System (PLAS) is a microcomputer-based system designed and developed for the Land Management Bureau. It aims to monitor the status of a public land application and the application's whereabouts at any particular point in the processing period. It also aims to improve access to public land application information which can help management in the fast resolution of application and land-related conflicts. PLAS can also provide inputs regarding public lands to CARP planners and decision-makers.

The *Land Survey Records Inventory System* (LSRIS), designed and developed for the Lands Sector of the DENR Regional office, aims to facilitate storage, processing and retrieval of land survey records data. It also aims to protect survey documents from direct and constant physical handling, thus minimizing damage to and loss of documents.

The *Geo-based Information Holdings Inventory System* (GIHIS) is especially designed and developed to facilitate the process of recording, storing, updating, maintaining and retrieving geographic-based information holdings data contained in maps, charts, aerial photos, satellite imageries and cartographic-related equipment.

The *Philippine Remote Sensing Inventory System* (PRSIS) is a bibliographic query system designed to store and retrieve various information on remote sensing (RS) which include RS experts and practitioners, projects, trainings, and other information dissemination activities, facilities, publications and mapped information. This system supports the Regional Remote Sensing Programme/Regional Information Services (RRSP/RIS) of the Economic and Social Commission for Asia and the Pacific/United Nations Development Program (ESCAP/UNDP) for inventory and dissemination of remote sensing information.

The *Referral System for Computerized Environment and Natural Resources Statistics* was developed primarily to provide for a centralized and quick responding query system to give data users ready information on the contents, scope and location of available computer-based files and projects; provides background information regarding computer-based files and projects developed by the different technical divisions of DENR and its attached agencies, and also gives basic information on direct users and managers/custodians of computer-based projects and files where actual statistics and other details are available.

The Research on the Application of GIS in the Land-Based Statistics project has developed a computer-based system called the *GIS for Makati*[1], an application of GIS for municipal planning. This is a prototype system developed using GIS technology for the following applications: Street Information System (SIS), Tax Mapping Information System (TMIS), Building Permit Monitoring System (BPMS) and Business Establishment Monitoring System (BEMS).

The *Provincial ENR Planning System* (PEPS) is a system developed under the Statistical Mapping Project. It aims to utilize GIS technology in providing maps and statistics needed in planning and policy formulation on land use and environment management. The system models two macro-level applications which would provide tools for provincial planners: Environment Conservation Land Use and Agricultural Production Land Use Applications. The project covers the Province of Tarlac and aims to strengthen planning capabilities at the provincial level which will be an integral part of Regional Physical Framework Planning (RPFP) activities.

The Natural Resources Management and Development Project (NRMDP) with the cooperation of NAMRIA has developed two other systems called the *Land Classification Query Program* and *Species Suitability Evaluation System*. Both projects are being pilot tested in Regions II and VII. The Land Classification Query System's overall objective is to "delineate the area of the final public domain," as well as the physical profile of the watershed area. The Species Suitability Evaluation System determines the suitability rating of the upland, agroforestry and reforestation species for various land utilization types within the technical planning units: Ganano River and Sapangdaku River watersheds.

Apart from these systems which largely target outsiders as potential users, NAMRIA has also developed several systems for internal use.

The *Personnel Information System* (PIS) facilitates processing of personnel data. The system supports the major activities of the Personnel and Financial Sections of the Administrative Division by providing a faster way of generating reports and answering queries about personnel. Reports that can be generated include the updated plantilla, payroll, service record, summary of leave credits, summary of trainings, and personal data sheet (PDS).

The *Supply Management System* (SMS) effectively monitors the receipts and issuances of supplies of NAMRIA. It is used for planning and managing its supplies.

The *Sales Recording and Reporting Stock Inventory System* (SRR/SIS) was developed for the NAMRIA Sales Offices to effectively monitor the receipts and issuances of NAMRIA products such as maps, charts, and books. The system generates timely reports such as Report of Receipts and Issuances of NAMRIA Products, Executive Summary, and Notices, among others. It also monitors which products are the most and the least saleable.

The *Budget Planning and Monitoring System* (BPMS) automates and improves the different processes involved in budget planning as well in the monitoring of the disbursements of the various projects of each department or division of NAMRIA.

The end-users and beneficiaries have already expressed satisfaction with these developed systems. The DENR offices in Regions II and VII have benefited from two NRMDP-NAMRIA systems, resulting in the efficient and more accurate project implementation. The GIS for Makati has been presented to the Bureau of Internal Revenue and is now scheduled for demonstration to determine its possible applications in real property valuation and tax assessment. The BPMS is expected to be useful in budget planning in NAMRIA. The other systems offer a great deal of challenge and opportunities to intended users in the execution of their working programs.

Hopefully, these developed computer-based systems will efficiently cater to the information management needs of various users for better policy making and project management in the future.●

[1] This project has been mentioned in Infomapper Vol.I No.1

Photo Essay

Forest

Forty five million pesos worth of natural forests and man - made plantation forests were razed to the ground by the month-long forest fires in Davao Oriental which by far has hit several municipalities in the region.

This was reported by the team from NAMRIA who monitored and documented the forest fires in several barangays of the municipalities hardest hit. The team composed of Remote Sensing and Resource Data Analysis Department foresters and Information Management Department personnel documented fires in Dinagsaan, Banaybanay, Lupon and Mati and also assisted DENR firefighting personnel and volunteers in putting out fire in the areas visited.

Field reports from foresters, CENRO and PENRO officials claim that recklessness, negligence and carelessness of farmers and upland natives were the main culprits in the said fires. Although there was evidence of deliberate setting, officials are still investigating and validating these evidences.

Based also on the reports gathered by the team, the DENR personnel and contractors are having a hard time controlling the fires due to ineffective firelines, on-going military operations in the area, the presence of foot trails within the maintained and protected plantations and the lack of firefighting equipment in the region . *

Aerial shot showing a portion of the burning mountain.

What was left of the natural growth forest during the fire.

Fire

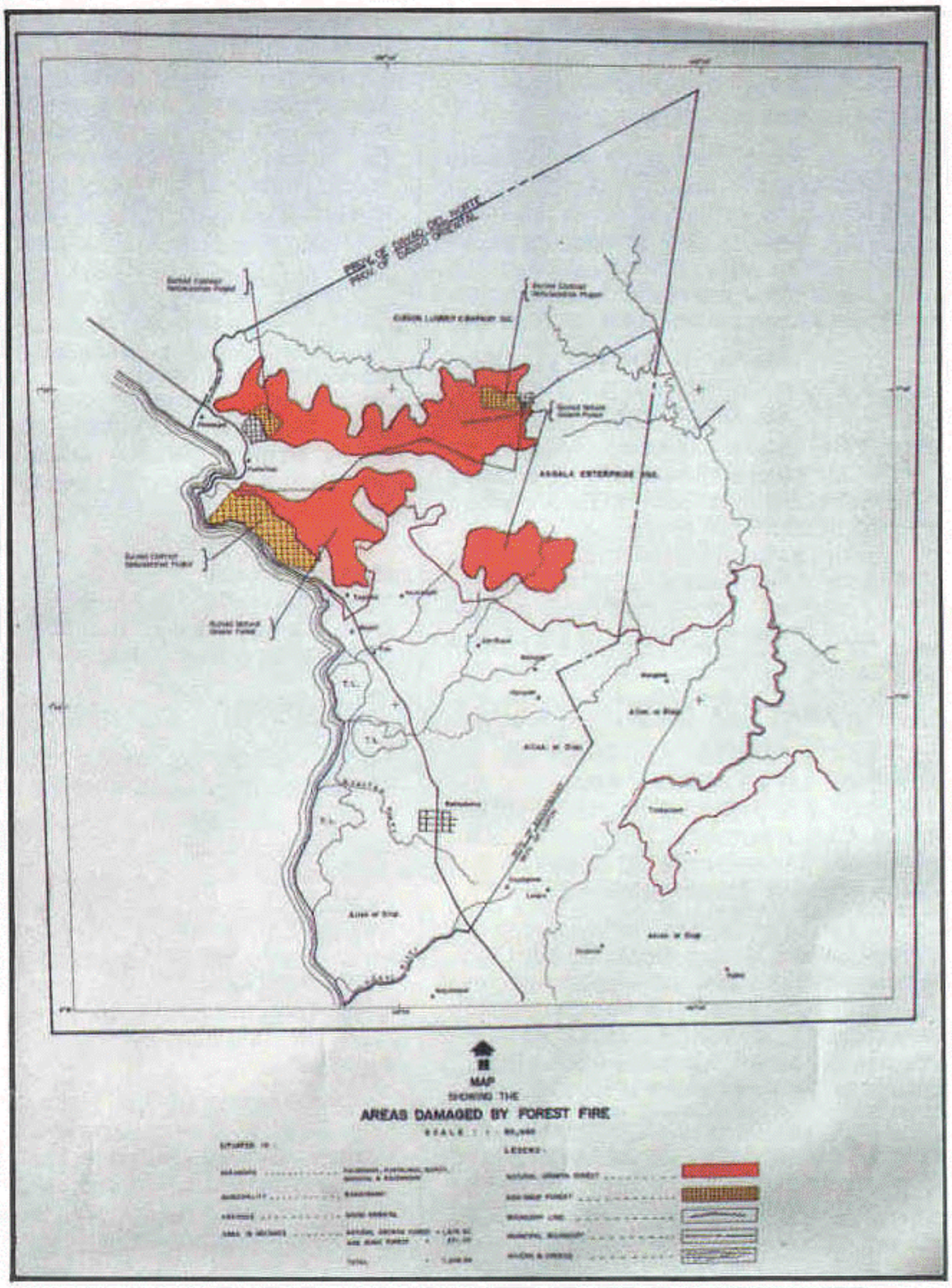
Volunteers and DENR foresters from Mati and Lupon, Davao Oriental assemble before going to the site.

Voluntee 's and PENRO /CENRO foresters construct a one-meter wide firebreak as a preventive measure to control the spread of fire.

CAUSES OF FOREST FIRE

- lightning
- logging/forest exploitation
- camp fires
- smokers
- kaingeros
- debris burning
- incendiary/deliberate burning

Volunteers use the chainsaw to cut trees which may obstruct the preparation of firebreaks.



Map showing the areas damaged by forest fire in the province of Davao Oriental (Approximate Scale 1: 250,000)

ASEAN-Australia Tides and Tidal Phenomena/ Regional Ocean Dynamics Project

The ASEAN-Australia Tides and Tidal Phenomena/Regional Ocean Dynamics Project is a regional cooperative program divided into two phases focusing on maritime sciences among ASEAN-member nations Brunei, Indonesia, Malaysia, Singapore, Thailand and the Philippines. It is funded by the Australian government, and coordinated by the ASEAN Marine Science Working Group.

Phase I of the project, entitled ASEAN-Australia Tides and Tidal Phenomena, involved the study and observation of tides in the ASEAN region which is noted for its complexity. The study aimed to provide knowledge of tidal phenomena for a broad spectrum of purposes ranging from safe navigation, harbor operations, marine pollution control, water transport, coastal development and resource management. It also aims to study the influence of tide and current variations on phenomena such as tsunamis, storm surges, and others.

Another aim is the enhancement of regional cooperation in navigation and port operation among participating countries.

The objectives of Phase I are:

1. Establishment of an adequate network of modern tide gauges in strategic locations to serve the maritime needs of the member countries in order to preserve interest on ASEAN marine research and monitor inter-ocean connections;

2. Training of selected personnel from member countries in the installation and maintenance of the said gauges;

3. Specialized training of selected personnel from each ASEAN country in the field of physical oceanography, with emphasis on the analysis of tides and current data and the use of numerical models and other techniques in the application of these data to the practical requirement of port and harbor development, pollution control, prediction of the effect of storm surges, tsunamis and other phenomena;

4. Development of numerical models to provide a basis for the application of these data in the abovementioned fields; and

5. Facilitation of the exchange of data and information on tides and tidal phenomena within the ASEAN region as they relate to coastal development and management.

The Philippines, in a Memorandum of Understanding with the government of Australia, implemented Phase I of the project thru the former Bureau of Coast and Geodetic Survey in November of 1986. However, the implementation of the project was carried out by the National Mapping and Resource Information Authority as a result of the government's reorganization program in 1986.

Within a period of three years, NAMRIA, as the implementing agency, was able to construct five new tide stations through this project. These are located at San Fernando Harbor in La Union, San Jose in Occidental Mindoro, Surigao, Port Irene in Cagayan, and Puerto Princesa in Palawan. This development increased the number of NAMRIA primary tide stations to ten. NAMRIA was also able to send two personnel to Australia for on-the-job training on tides and tidal phenomena with emphasis on manual and computer processing of tidal data. Moreover, NAMRIA acquired new pressure-type gauges which indirectly measure water levels through sensors registering hydraulic pressure.

Phase II of the project, known as the *Regional Ocean Dynamics Project*, is the continuation of the regional cooperative program. It started in 1 July 1989 and is expected to be completed by 30 June 1992.

One relevant factor which led to the continuation of the project is the institution of a training program on the analysis and interpretation of tidal data. Said program provides a convenient entry into the discipline of physical oceanography and an opportunity to create a nucleus of regional experts within the region.

The objectives of Phase II are:

1. To provide more complete scientific data about behavior of ocean currents in the equatorial straits;

2. To examine the relationship between observed currents in two phases of the monsoon with the topography of the regional sea surface as determined by the tide gauges;

3. To continue water level monitoring in order to obtain simultaneous data suitable for calibration, validation and initialization of the numerical models of the ASEAN seas and extraction of non-tidal and long period signals,

4. To deploy current meters in the equatorial regions of the ASEAN seas in both phases of the monsoon in order to assess the nature and characteristics of the Pacific-Indian Ocean through-flow;

5. To continue consolidation of tidal knowledge using tidal models to infer and to interpolate tidal information and to use models to produce tidal stream information where none is available; and

6. To mount a program of graduate training including Doctoral or Post-Doctoral level studies.

As of 1991, NAMRIA was able to collect, process , and analyze some 48 months of continuous water level data at each of the 5 tide stations established under the project. Preparations are now underway for two oceanographers to join the Current Metering Experiment in the equatorial seas of the region.●

NAMRIA participates in Disaster Planning and Management Workshop

The NAMRIA participated in the workshop on Disaster Planning and Management conducted by the Environmental Management Bureau (EMB), DENR last 11-14 Dec. 1992 at the Metropolitan Apartelle, Quezon City.

NAMRIA together with Bureau of Soils and Water Management (BSWM) took part in briefing the participants on the preparation of the guidelines in determining and mapping diasaters/hazards. Assistant Director Ponciano Ciceron and Macario del Rosario of IMD represented NAMRIA.

The workshop aims to prepare DENR senior officials in organizing and maintaining an adequate level of preparedness in the event of diasaters such as the occurrence of Luzon earthquake, the Mt. Pinatubo volvanic eruption and the Ormoc tragedy.

As part of the objective of the workshop, the participants should be able to provide guidelines in planning for disasters; establish close and good working relations with the emergency response agencies in the local community, and establish closer links with the local community officials and leaders regarding safety measures. Management plan and maps are the outputs of the workshop.

A member of the National Disaster Coordinating Council provided the participants with the Guidelines in Planning for Disasters in Establishments, and discussed the Rules and Regulations Implementing the Provisions of Presidential Decree No. 1566.

The speaker gave the participants a case study by which they gathered facts & opinions, assessed risks, established priorities, and evaluated approaches including how to organize people in the community. From the available resources, an emergency response program was formulated.

Other participants of the workshop were DENR Technical Directors, Chief of the Environmental Quality Division of all Regional DENR Offices and EMB Technical Staff.●

Technical Paper

Tidal Phenomenon/Ocean Dynamics[1]

Global warming and climate change phenomena have received increasing attention and their occurence have been accepted throughout the world as inevitable. One of the risks resulting from global warming is the rise of the world's ocean temperature. The Inter-Governmental Panel on Climate Change (IPCC) calculates that the present level of the world's ocean could rise by about 20 centimeters by year 2030, and about 65 centimeters by the end of the year 2100.

The IPCC also pointed out that island-nations in the Pacific and Indian Oceans, and in the Carribean, are threatened. Since our country is in the Pacific Ocean, it may therefore be one of the endangered island-nations.

History books and the encyclopedia have listed our island-nation as comprising about 7,100 islands and islets scattered over the Western Pacific.

The Philippines has an area of about 300,000 square kilometers and has about 20,000 kilometers of coastline.

When we talk of the imminent increase of the mean sea level of the world's ocean, then our people have reason to be concerned.

This paper discusses NAMRIA's observations and findings on the behavior of tides and current, and whether there have been abnormal changes in the mean sea level.

The NAMRIA is the government agency charged, among others, with the conduct of oceanographic, hydrographic and geophysical surveys, as well as observation of tides and current. For this purpose, NAMRIA maintains ten tidal gauging stations in strategic ports and/or harbors in Jolo, Sulu; Puerto Princesa, Palawan; San Jose, Mindoro; Manila; San Fernando, La Union; Cagayan; Legaspi, Albay; Cebu City; Surigao; and Davao City.

These tide stations monitor behavior of the sea surface level to determine the Mean Sea Level (MSL), which is the reference point of topographic mapping. This datum is important in tidal prediction, charting, and ship navigation. It is also used as reference datum in the design and construction of port and harbors, flood control projects, and in the fishing industry, particularly by fishpond operators and fishermen.

Has there been an increase in the Mean Sea Level attributable to climate change?

Station	MSL (m) Above Zero Tidal Staff		Variance (m)
	1951-1969	1970-1988	
Manila	2.228	2.541	+ 0.313
Legazpi	1.591	1.675	+ 0.084
Davao	1.887	2.020	+ 0.133
Cebu	1.728	1.744	+ 0.016
Jolo	1.993	1.988	- 0.005

From the records of five selected tide stations covering two periods, from 1951 to 1969; and 1970 to 1980, the MSL has been found to have increased in four stations and decreased in one station.

This chart shows that the MSL of Manila for a 20-year period ending 1969 was 2.228 meters. For a similar period ending 1988, the MSL was 2.541 meters, which is equivalent to an increase of 0.313 meters or about 31 centimeters.

The three other tide stations in Legaspi, Davao, and Cebu registered relatively insignificant increases in its MSL.

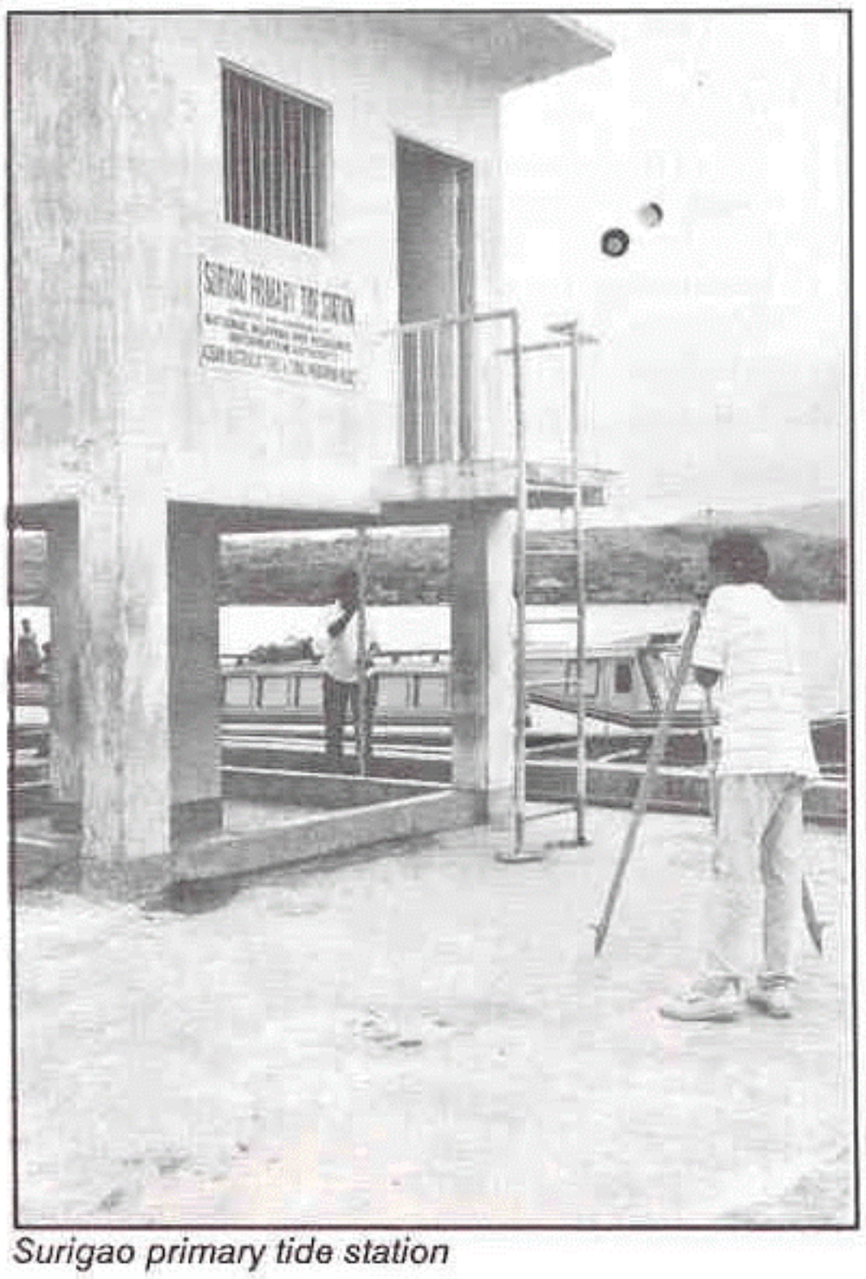
On the other hand, Jolo recorded a decrease in the MSL by 0.005 meters or 5 millimeters.

Records of the tide station in Manila show continuous rise in the MSL from 1965 to 1989 by an average increase of 1.75 centimeters.

Based on the records of the five tide gauge stations, it would appear that there was indeed an overall increase of the MSL in various parts of the country for the last 40 years. But the increase is far below the forecast level of IPCC and is therefore not alarming.

The rise in MSL may be due to any or a combination of the following factors:

1. *Increased volume of sea water as a consequence of global warming* - when this occurs,the world's oceans expand and rise due to increased temperature;
2. *Land subsidence as a result of the excessive withdrawal of ground water by deep wells* - withdrawal of ground water is a natural consequence of urbanization. Land subsidence has been experienced by urbanized cities like Bangkok, Tokyo, Osaka, Los Angeles, and Mexico Cities. In Metro Manila, land subsidence has been observed in San Juan, Pasay City, North and South Harbors, Navotas and Malabon. Land subsidence can also be due to liquefaction during earthquakes. This phenomenon happens when an earthquake passes through sub-soil that contains a high percentage of water. The shock produces a layer of underground water which collapses immediately after the quake, causing ground subsidence.
3. *Seawater surges and wind set-ups due to storms and typhoons* - tropical depressions can cause water level to rise accordingly with a decrease of barometric pressure. The phenomenon called "Inverse Barometer Effect" can disturb the sea level above the normal tide. For every decrease of one millibar of atmospheric pressure below the mean atmospheric pressure, there is a corresponding rise of one centimeter in water level. This phenomenon was observed in the NAMRIA tide station in Surigao Port from two tide gauge systems during typhoon Ruping in 1990.
4. *Ocean Surface Current* - the current systems on the ocean surface have a large heating effect, not only of the ocean water itself, but also on the climate of adjacent land.



Surigao primary tide station

The most popular ocean surface current that affects the country is the *Kuroshio Current*. It transports 50 million cubic meters of water per second from eastern Mindanao, travelling northward to Taiwan and then towards Japan. This flow consists of warm water (20 -28^{0}C) in the upper 200 meters, with a relatively high salinity of approximately 35 parts per thousand.

Studies of the Kuroshio Current showed that the entire current system is composed of fishing grounds which move about with changes in the flow of water. Various species of tuna, sardine, anchovy, mackerel, squid and others are found in specific zones in and near the Kuroshio Current.

Climate change, which is a logical consequence of global warming, is slowly being felt in our country today. People have started to ask why we have a lot of rainfall during summer, and drought in some parts of the country during the rainy season. Furthermore, typhoons are becoming stronger. In fact, we now have typhoon signal number 4, which PAGASA refers to as "super-typhoon".

Of whatever intensity a typhoon comes, it brings along rainfall that contributes to the swelling of inland waters and oceans. Add this water upsurge to the rising MSL; add the effects of recurring tides and ocean current, and flooding of the low-lying areas of our country, particularly Metro Manila, could occur.

Tides alone have caused flooding to certain areas in Metro Manila, notably Navotas, Malabon and Balut Island. The highest recorded tides measure an average of about 1.3 meters. When considered together with the MSL, this tide height can affect not only coastal areas of Metro Manila, but also certain low- lying areas in at least 28 provinces throughout the country.

Endangered areas total approximately 129,114 hectares with a total population of almost 2 million.

Flooding likewise endangers 200,000 hectares of fishponds along our coast lines. It will increase the salinity of estuaries, which are critical to our fishpond industry. The seawater level during floods will tend to move inland, which will jeopardize fertility of agricultural lands, due to erosion and soil salinity.

The productivity of agriculture and the fishing industry during the recent typhoons have been seriously affected. Taken together with the effects of other calamities like the earthquake last year and the eruption of Mt. Pinatubo, we then find our country in real distress.

It behooves the community of nations, particularly the developed and industrialized countries of the world, to muster their scientific acumen and vast resources to help avert a global catastrophe that is not the making of small, underdeveloped and developing countries like the Philippines. ●

[1] Briefing conducted by Administrator Jose G. Solis at the Asia-Pacific Climate Change Conference on 23 November 1991

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NAMRIA maps launched in Albay

The Information Services Division and the Media Production Division of IMD conducted last 24 April an information campaign highlighted by the launching/turn-over of completed maps of Albay province at the Provincial Disaster Coordinating Council in Legaspi City, Albay.

Launched were new NAMRIA maps: topographic maps of Pio Duran and Iriga City, land cover, provincial and administrative maps of Albay and regional map (Bicol Region).

Topographic maps of Albay covering Polangui, Bacacay, Manito, Legaspi City, Ligao, San Miguel Island, Tabaco and Rapu-Rapu were also turned-over by Head Executive Assistant (HEA) Rodolfo Yambao and Mapping & Reprography Department Director Jose Galo Isada to Cedric Daep, representative of the Governor, Dominica Lorbes, representative of the Mayor and Jerry Pasano of the Office of the Provincial Disaster Coordinating Council.

HEA Rodolfo Yambao delivered the opening remarks and cited the need to establish coordination with local officials of each region in updating maps.

The IMD staff discussed various topics: descriptions and usages of various NAMRIA products and how to acquire them; remote sensing and GIS technologies being used in the production of maps; databases being maintained and systems produced by the IMD; and specific services being provided by the NAMRIA such as hydrographic, geodetic, geophysical and photolaboratory services.

Director Isada talked about mapping projects being undertaken by NAMRIA such as the base mapping of Albay/Sorsogon and Mt. Mayon, large scale mapping of Legaspi City, and photo-tax mapping in Sorsogon. He also discussed the features and the information provided by the maps that were launched and turned-over to the local government officials.

Various NAMRIA publications such as Tides and Current Tables, Infomapper, nautical charts, flyers on the different systems produced, etc. were distributed.

Other activities of the program included the presentation of video productions on Remote Sensing technology, Geodetic Survey of the Philippines and NAMRIA Profile.

An open forum was held after the briefing and presentation which elicited a lot of comments, questions and suggestions. Among these were: 1) inaccurate names of barangays, towns and municipalities in the provincial map of Sorsogon; 2) upgrading of NAMRIA communication systems in the regions so that vital information could easily be disseminated to the people living in the coastal areas; 3) availing of NAMRIA photolaboratory services; 4) boundaries of each barangay to be reflected on the map necessary in making contingency plans.

IMD staff also set-up a two-day exhibit from 23-24 April showcasing various maps of the Bicol region and other NAMRIA products.

A tour of the exhibit site ended the info campaign activities.

The IMD personnel who conducted these activities were Connie Garcia, Connie Acosta, Jennie Cruz, Rolly Mendoza, Joselito Ranin, and Andy Marcelo. Joe Panes and Reccis Duraleza from the Engineering Services Department provided logistics support.

HEA Yambao assisted by Connie Acosta distributed NAMRIA publications to Mr. Cedric Daep, representative of Sorsogon Governor and to Mrs. Dominica Lorbes, representative of Legazpi Mayor,

These activities were undertaken to: 1) promote awareness on NAMRIA and its products and services in the regions; 2) provide data available at the NAMRIA to target users/ beneficiaries; and 3) establish linkages with other offices/agencies requiring maps and other related information.●

IMD conducts Third Technical Forum

A technical forum entitled "Remote Sensing (RS) for Environment and Natural Resources (ENR) Management" was conducted on 4 December 1991 by the IMD, NAMRIA in coordination with the National Remote Sensing Center (NRSC). This is the third of a series of technical fora which NAMRIA has been conducting since 1990.

The RS forum aimed to acquaint and assist environmental resource specialists on the feasibility of utilizing remote sensing technology as a tool in the acquisition of ENR information needed in the implementation of their projects.

About 52 participants from various government agencies and NGOs attended the event. The first part of the forum consisted of lectures on the fundamentals and various applications of RS technology and the planning and management considerations for the use of RS in ENR projects. Lecturers were Dr. Benjamin de Jesus, applications manager of the NRSC and Dr. Keith R. McCloy, one of the RP-Australia Remote Sensing Project team members from the University of the Philippines Training Center for Applied Geodesy and Photogrammetry (UPTCAGP).

A storyboard and slide presentation about the Center's products and services, facilities, functions and services were presented.

A workshop was held in the afternoon wherein participants were divided into different groups: Agriculture, Forestry, Coastal/Shallow/Marine and Urban Planning/ Tourism. Each group presented a project, identified and evaluated the information required in the project and the feasibility of utilizing RS technology in the acquisition of the required information. Some of the NRSC staff acted as head facilitators.

The panel of reactors was composed of the following: Deputy Administrator Ricardo T. Biña, IMD Director Linda SD. Papa, NRSC Applications Manager Dr. de Jesus, RSRDAD Assistant Director Virgilio Santos and RP-Australia team member Dr. Mc Cloy.

The last activity of the forum was the inauguration of the NAMRIA Photo Laboratory which was upgraded through the Remote Sensing Project (RSP). The Photo Lab is responsible for the processing and printing of Landsat and SPOT imageries. Through the RSP, the NAMRIA Photolab is now equipped with the state-of-the-art photolaboratory equipment and accessories, such as Colenta Roller Transport Processor for better quality print processing, revolving door which prevents the exposure of films and a photographic chemical/paper refrigerator, among others.●

Photo-tax mapping training starts

Administrator Jose G. Solis formally opened on 20 April the training on photo-tax mapping of 20 qualified personnel from the provincial and municipal assessor's offices of Sorsogon.

At the opening ceremony, Administrator Solis also turned over the responsibilities of conducting the training course to the faculty members of the UP College of Engineering. The course being conducted in Sorsogon consisted of formal lectures, on-the-job training and practical work.

The training was part of a Memorandum of Agreement (MOA) signed on 10 December 1991 by Administrator Jose G. Solis and Sorsogon Governor Cleto G. Arnedo.

Photo-tax mapping is being undertaken by the Geographic Information System Division of the RSRDAD of NAMRIA. The project was pilot-tested in Barangays San Isidro and Bibincahan in Sorsogon. Through this project, maps were produced depicting the sizes and owners of lots based on aerial photographs for the purpose of tax assessment.

Through accurate and updated property valuation, more revenues from land resources will be generated by the government. Modern technologies such as aerial photography and computer based data processing will be utilized in the execution of the tax-mapping project.●

Satellite-based topo mapping in Siquijor

Topographic maps at scale 1:50,000 of Siquijor, Cebu and Bohol are being prepared to provide basic data needed in the implementation of the Comprehensive Agrarian Reform Program (CARP).

The topo-mapping project which is jointly undertaken by the Swedish Space Corporation (SSC) and NAMRIA is funded by the Beredningen for Internationelt Tekniskt-ekonomiskt Samarbite (BITS) or Swedish Agency for International Technical and Economic Co-operation.

The SSC started implementing the project in late 1988 using the program for reception of cloud free Stereo SPOT Image. Due to cloudy weather, the SSC was unable to receive sufficiently cloud-free data for almost two years. Instead, cloud-free **mono-images*** were used and rectified with the **contour information*** taken from existing topo maps.

On 9-13 January 1992, **ground truthing*** in Siquijor was conducted by two SSC and four NAMRIA personnel. In connection with the project, four MRD personnel went on training in Sweden on 2-28 February, 1992. The training discussed the preparation and production of satellite based orthophotos at scale 1:50,000 using SPOT Imagery and the complete, integrated

Continued on p.15 Satellite . . .

Workshop on Standardization of ENR Statistical Terms and Definitions held at NAMRIA

The signing of the Declaration of Agreement was the culminating activity of the Workshop on the Standardization of Environment and Natural Resources (ENR) Statistical Terms and Definitions conducted by the NAMRIA last 5 December 1991. The workshop aimed to finalize the draft ENR Statistical Data Dictionary prepared by the Information Management Department (IMD) through its Database Management Division (DMD).

About 18 representatives from the Environmental Management Bureau, Forest Management Bureau, Lands Management Bureau, Mines and Geo-Sciences Bureau, and Parks and Wildlife Bureau signed the Declaration of Agreement affirming that the ENR statistical terms and definitions presented, discussed, reviewed and analyzed during the workshop are standard and declared as official/recommended for approval by the Statistical Executive Committee. Observers from the National Statistical Coordination Board and Planning and Policy Studies Office of the DENR also attended the workshop.

Gracia T. Padiernos of the DMD presented the Standardization of ENR Terms and Definitions Project. She discussed the background/rationale of the project, its objectives, expected outputs, scope of work, methodologies and sample outputs. Prisila Tan-Bacungan, DMD chief, explained the goals, objectives, methodology and outputs of the workshop and assigned the groupings of the participants.

Participants were distributed into four working groups namely: Group I - Environment and Protected Areas and Wildlife Sector; Group II - Lands Sector and Mapping Sector; Group III - Forestry Sector; and Group IV - Mines Sector.

Activities during the workshop proper included 1) the review of ENR statistical terms, specifically those with no definitions, and those with vague and conflicting definitions; 2) the provision of clear and consistent definitions to terms with insufficient or no definition; and 3) the determination of terms with conflicting definitions. Materials such as a draft compilation of ENR statistical terms and definitions by agency, statistical publication, statistical report in alphabetical order and copies of statistical publications/documents of DENR agencies were distributed to every group to facilitate the review and analysis of the draft compilation.

Some of the IMD's technical staff who served as facilitators during the workshop were: B. Balais, P. Bacungan, V. Tevez, E. Gayban, J. Alba, V. Reynoso, M. del Rosario and F. Palma. After a thorough review and analysis of the ENR statistical terms and definitions, each group presented a list of terms with acceptable definitions as well as a list of more appropriate terms and/or definitions.

The compilation of standard ENR terms and definitions done during the workshop will be submitted to the Statistical Executive Committee for approval. Once approved it will be published and disseminated to the various members of the ENR community and will serve as official reference in using ENR statistics.●

Seminar on the Geodetic Survey of the Philippines held

The Natural Resources Management and Development Project (NRMDP) in coordination with the Coast and Geodetic Surveys Department (CGSD) of NAMRIA conducted the seminar on the Geodetic Survey of the Philippines at the Hotel Nikko Manila Garden, Makati, Metro Manila on 2-3 April 1992.

The two-day seminar which aimed to present to the public an overview of the key elements of surveying used in the NRMDP Geodetic Component and its project methodology was attended by officials from DENR, NAMRIA, DPWH, NEDA, DBM, UP professionals and private and public practitioners. The seminar also acted as venue for discussing and identifying options for national datum

Continued on p. 15 Seminar . . .

NRMDP adviser Douglas Larden (inset) delivers a lecture on the geodetic survey of the Philippines during the seminar held at the Hotel Nikko Manila Garden on 2-3 April 1992.

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From p. 3

El Niño . . .

forecast and makes these information available to policy/decision makers, economic planners, and other persons and agencies involved in crisis management concerning food security, water and energy resources.

The El Niño, however, is only one of the many problems that have besieged our planet. The terms "greenhouse effect," "global warming" and "global climate change" have become synonymous with environmental degradation that has reached proportions alarming enough to garner worldwide attention. Concerned sectors all over the world are doing the best they can to stem the further worsening of an already alarming situation, but they should not be left alone in their fight to save the planet. This concern should be shared by every citizen of planet earth--and one step towards the right direction is awareness of the problems that are threatening the very existence of humankind. With the realization that such problems exist, efforts to avert further denigration of the earth's condition will be initiated by each individual.●

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From p. 13

Satellite . . .

production line from the reception of raw satellite data to the printed maps. The project estimated to cost SEK 5,356 million is expected to be completed by December 1992.●

From p. 6

Photogrammetry . . .

of photogrammetry other than mapping are in the following fields:

Geology - investigations of water resources, analysis of thermal patterns of the Earth's surface.

Forestry - basis of timber inventories, hectarage studies, and fire control.

Cadastre - for assessments, and for preparing large scale cadastral plots which are used for the reapportionment of land.

Planning of Cities and Highways - detailed design for construction contracts.

Environmental Studies - used by planners in land-use analysis and other environmental management studies.

Exploration - wide coverage type of photography and frequently repeated near-worldwide imagery and other data obtained via spacecraft are helping to unlock the secrets of the last unexplored areas of the earth.

Medical and Surgery - medial applications entail the use of a close-range photogrammetric systems in which the camera are placed at short distances from the subject.

Other Uses - it may be used in the fields of crime detection, traffic studies, oceanography, metereological observations, architectural and archaeological surveys and visual education.

Future Role

Photogrammetry is a comparatively modern science; many of its problems are still to be solved and many uses for it are still to be discovered. Yet it remains to be a dynamic, growing field, and as its range of applications increase, it is foreseen that photogrammetry will serve more user groups and provide better and more reliable end-products in the years to come.●

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From p. 13

Seminar . . .

and sustainability issues of spatial referencing.

Discussed topics also included project results and the Philippine experience, datum definition and ellipsoid selection, sustainability of the results of the Geodetic Survey, and practical uses of the geodetic reference systems.

The seminar adapted the presentation-open forum format wherein participants raised issues and suggestions to betterm improve the project and came up with agreements on certain issues. Among the issues raised were: the lack of standards, guidelines, policies and procedures for GPS survey and information dissemination on GPS technology and other spatial referencing and satellite geodesy applications; the need to integrate all spatial related data into one system; need to build-up technical expertise in NAMRIA and the perennial lack of funds for the densification of the GPS control points.

Lecturers and presentors included the team who conducted the geodetic survey of the Philippines headed by team leader and NRMDP adviser Douglas Larden, consultants Andrew Jones and Gary Rowe, CGSD Assistant Director Rodrigo Pascua and Engineers Enrique Macaspac and Natolic Punu.

The NRMDP, a joint Philippines-Australia project, aims to contribute to better economic and social conditions of the country through improved management of natural resources and land utilization. Geodetic survey being one of the project's component is a prerequisite to achieve the goals of the NRMDP.

Under the Geodetic Component, 210 geodetic control networks were established throughout the country using the state-of-the-art Global Positioning System (GPS) technology. These Control networks will serve as references for better surveying and mapping of natural resources and administrative and cadastral boundaries. It will also serve as a common reference for the accuracy of all surveys in the Philippines.●

CONTRIBUTIONS

The National Surveys, Mapping, and Resource Information Technology Quarterly (Infomapper) is accepting contributions for its forthcoming issues. Manuscripts should be typed, double-spaced and must indicate the author's name, position, and office/home addresses. Photographs and illustrations with captions are also welcome.

The Editors reserve the right to edit materials submitted.●

Project Profile

Application of Geographic Information System (GIS) to Soil Erosion Susceptibility Mapping

Geographic Information System or GIS technology has varied applications, and one of these is the determination of areas susceptible to erosion. Basically, this continuing Research and Development (R&D) project aims to develop procedures which will aid planners and decision makers in their analysis and identification of erosion-susceptible areas and present findings through decision maps and supplementary statistical tabulations.

Specific objectives include the operationalization and testing of the Comprehensive Resource Inventory and Evaluation System (CRIES) GIS software and hardware on soil erosion susceptibility mapping; the development of methodologies which would apply GIS technology in producing thematic and decision maps; and the recommendation of ways to prevent further soil loss in the study area.

This project was conducted on a pilot basis in 1990 at the Tamlang River Catchment, Brooke's Point, Palawan. For the year 1991, the selected study site was Taytay, Palawan, with an approximate area of 110,175 hectares.

Six layers of thematic maps were prepared. These were: a land use/vegetative cover map based on interpretation of 1985 aerial photographs used for the Palawan Integrated Area Development Project (PIADP); a slope/gradient map with gradient percentages based on US Department of Agriculture categories (ranging from 0 - 2% = level to nearly level up to 50% or more = precipitous to vertical) which was generated automatically using coded elevation data as input; a slope length map which was also automatically generated using the system's SURFAREA routine to compute slope length; a climate/rainfall map based on a PAGASA map showing the amount of rainfall per month; a soil conservation practices map in raster format; and a soil map based on soil samples collected from the study site and analyzed at the BSWM laboratory.

These maps were coded into a computer as raster files and were analyzed using CRIES, a GIS software using a grid-based or raster-based system. Data entry was done through the geocoding of map information (manual) or through digitization (computer-assisted). The EDITCELL module of the system was used for data capture and for editing or modifying the values of the raster files.

Results showed that the area was, in general, slightly susceptible to erosion, with an average soil loss of 30-49 tons/acre/year. About 88,898.27 ha were considered as non-susceptible to slightly susceptible; 14,033.59 ha, slightly susceptible; 3,112.29 ha, slightly to moderately susceptible; 3,451.81 ha, moderately susceptible; 565.87 ha, severely susceptible; and 113.17 ha, highly susceptible.

CRIES can be used for similar projects and the findings can serve as inputs in formulating effective soil erosion management policies and strategies. However, it was observed that this software is applicable only in areas where all the input parameters used for this study are available. The absence of any of these parameters will render invalid the mathematical models being utilized by the software. The reliability of this software package also depends to a large extent on the accuracy of data sources and of data coding and encoding.

The study came up with the following recommendations in preventing soil erosion: the determination of the most appropriate land use of an area before any conversion is attemped; the use of terracing; revegetation and reforestation; and the construction and use of gabion, a large, rectangular wire crate filled with stone and gravel to weigh down soil and prevent it from flowing with water.●

Glossary

Aerial photogrammetry - type of photogrammetry used when photographs are taken from an aircraft.

Aerial triangulation - triangulation procedure that uses a stereoscopic plotting instrument or establishes horizontal and/or vertical control data of the successive orientation of the stereoscopic pairs of photographs in a continuous strip.

Analog instruments - devices that represent numerical quantities by means of physical variables; for example, by translation; by rotation, as in a mechanical gear system; and by voltage of current as in analog networks that use resistance to represent mechanical losses, capacitors and inductors to store energy and simulate the action of springs.

Analytical photogrammetry - photogrammetry in which solutions are obtained by mathematical methods.

Block Adjustment - adjustment of strip coordinates or photograph coordinates for two or more contiguous strips of photographs.

Contour Information - details which define the vertical datum of a certain terrain (e.g., spot heights, rivers, ridges)

Ground Truthing - method of verifying on the field the data that have been interpreted from aerial photographs and satellite images.

Mono Images - images that can be seen using only one eye or by mono vision.

Stratosphere - region of the atmosphere found at about 11-50 km. from the earth's surface. Pollutants introduced intothe stratosphere can remain there for along time before being transported into another layer of the atmosphere.

Tilt - angular value by which the wings of the air plane deviate from the horizontal line perpendicular to the direction of flight.

Trade Winds - winds which blow toward the equator from either side of it.●

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