

greening the judiciary

Learning Modules on the Environment



A Project of the Philippine Judicial Academy
2005

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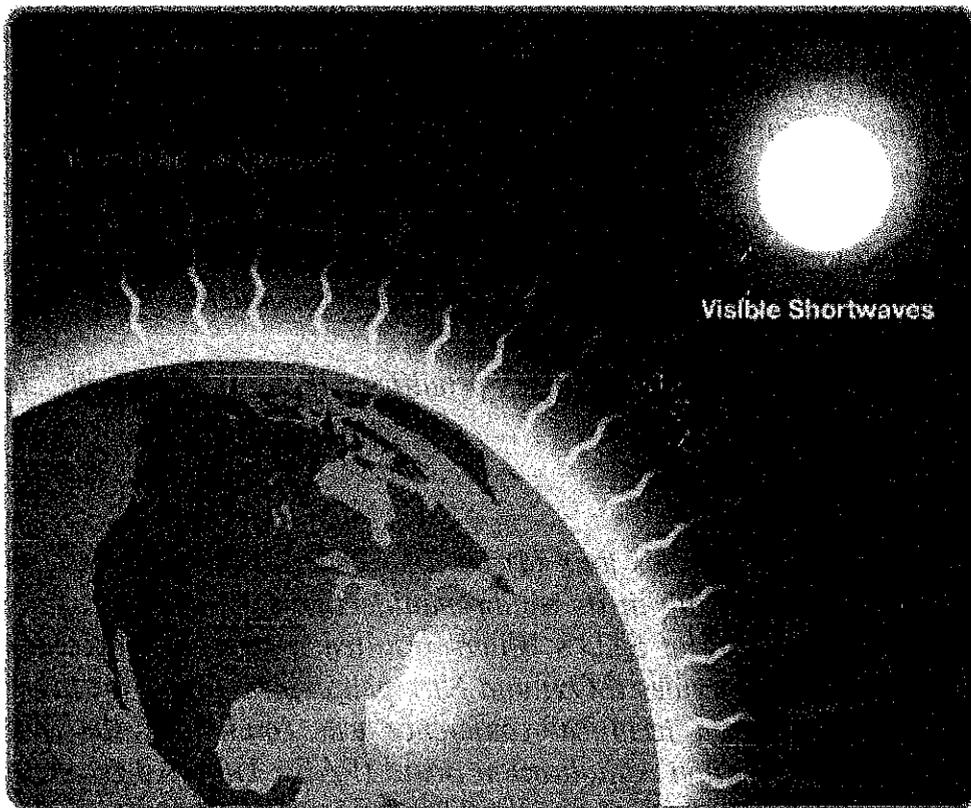
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Chapter 1

BASIC ENVIRONMENTAL SCIENCE CONCEPTS

legal cases and natural resource concepts
the earth as an isolated planet
the earth's cycles
concepts of growth and decay
anthropogenic activities and the earth's cycles
natural resources and the law



OVERVIEW OF NATURAL RESOURCE CONCEPTS

What kinds of legal cases require knowledge of natural resource concepts?

The following hypothetical cases are examples where a deeper background on the environment can help in the resolution.

Case 1: Solid Waste Management

An open dumpsite in Barangay Benite was converted by the City of Arkada into controlled dumpsite in compliance with the provisions of R.A. 9003. However, according to residents and the Waste Watch, a local NGO, neither the city nor the barangay has a Solid Waste Management Plan and no Solid Waste Management Board has been created. Further, foul smell and burning in some areas of the dump site continue unabated. Waste is still not segregated and continues to be transported and dumped into the dump site.

- What are the requirements/provisions under R.A. 9003 violated by the Barangay Benite and the City of Arkada?*
- What remedies are available to the residents and the Waste Watch NGO?*
- If administrative/court case/s is/are filed:
 - who should be the complainants and respondents in the case/s?*
 - where should the cases be filed?*
 - what are the possible penalties, if any, imposable to the respondents?"**

Case 2: Air Quality

STU Corporation operates four (4) oil-fired boilers that produce steam for sterilization and cooking in its candy manufacturing enterprise. In March 2005, stack sampling of STU's boilers resulted in emission exceedance of standards on sulfur oxides (SOx) and Nitrogen oxides (NOx) for three of its four stacks. After a technical conference was conducted, the case was elevated to the Pollution Adjudication Board (PAB). The PAB recommended that criminal charges be filed against STU Corporation claiming that failure of its three stacks to meet the standards constituted gross violation since three offenses were committed, one offense per stack. STU Corporation filed a motion to dismiss with the PAB on the ground that its air pollution control

facility is covered by a valid permit to operate issued by the Environmental Management Bureau and it has paid the permit fees. Further, STU claimed that offenses should refer to the entity not the act. How would you rule on this issue?

Case 3: Water Quality

A report from the local health clinic stated that incidence of skin diseases among children was increasing the Barangay Masikip and this can be linked to the presence of a manufacturing company. Effluent coming from the plant of Soft-Ade Company was sampled and failed the standards set by the DENR. Upon further investigation, it was discovered that although Soft-Ade Co. had an Environmental Compliance Certificate (ECC) for its wastewater treatment facility (WTF), it did not secure another ECC for the expansion of the said WTF. However, Soft-Ade claims it cannot be held liable since it is not discharging into any body of water, only into the sewage canal, and other companies are doing the same. Hence, it cannot be the source of the health problem in the area. The DENR, on the other hand, states that the sewage canal eventually leads to the Amila River, some 500 meters away.

Determine the liability of Soft-Ade Co., if any, under the Clean Water Act and the proper penalties that may be imposed on them.

Case 4: Environmental Planning

Chino and Tina Arceo and their four-year old daughter live in a townhouse located at Castle Ridge, Antipolo. After two days of heavy rains, the ground on which their townhouse was situated started to give way. Their townhouse and two more others collapsed into the side of the ridge, with the Arceos luckily able to escape with bruises in their bodies. The AJZ developer claims that they had secured an Environmental Compliance Certificate (ECC) for the townhouse development and had implemented their plan well. AJZ claims that it should be the DENR who should be liable for issuing the ECC in the first place.

What remedies are available to the Arceos in this case?

Determine the liability of AJZ Developer, if any, under the PD. 1586 and the proper penalties that may be imposed on them. Are there any other liabilities?

Why do we need to know the basic natural resource concepts?

These cases show that the decision-making process can be improved if the complex interrelationships in an ecosystem and the interconnectivity of actions are better understood.

It is also important to have tools for the valuation of the environment and natural resources, in order to assess damages and the effects of complex environmental issues on individuals or families. Judges, for example, have to be able to consider the direct and indirect costs to environment or even health.

Perhaps, the most basic reason is that any person needs to know these concepts because each one plays a role in the way that these resources are being recycled by the planet.

We have no infinite source of our natural resources, and the only way they can still be made available to generations of the human race is through the cycles of the planet.

What does it mean for the Earth to be an isolated planet?

The Earth is an isolated system. Generally, only energy (mainly coming from the sun) enters our atmosphere, part of which will be reflected back. Give or take a few meteorites and space ships, no mass (coming from matter) is added to or taken from the planet; the Earth's mass is generally conserved.

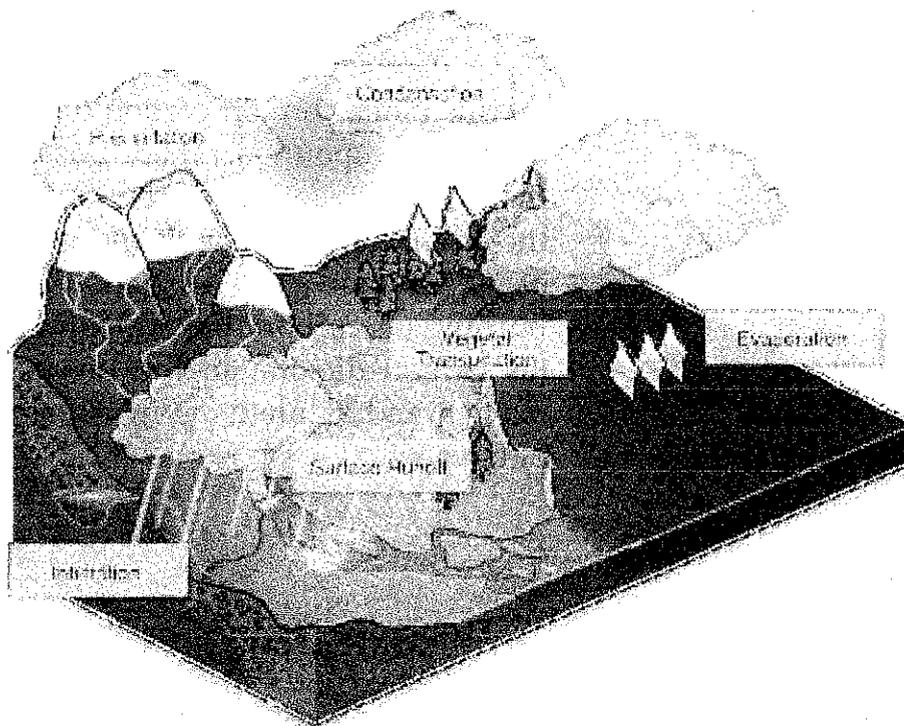
The matter that makes up the Earth is matter that has been there from its beginning. Its resources are recycled and reused over the entire earth and over time.

Why are the Earth's resources not completely used up?

The natural cycles of our planet make sure that the Earth's resources are not completely used up. They are extremely important for our survival.

The water cycle takes care of our needs for this life-sustaining liquid. The carbon-oxygen cycle takes care of our needs in the respiration process. The nitrogen cycle takes care of our needs for other nutrients. We can trace the way that different substances on Earth are cycled by natural processes.

Water cycle



Let us look at the water cycle. The sun helps in the process by providing the energy to allow for evaporation from bodies of water, where it is often in a used or polluted state. The water vapor eventually condenses as clouds and falls as precipitation, practically allowing water to be purified in the process.

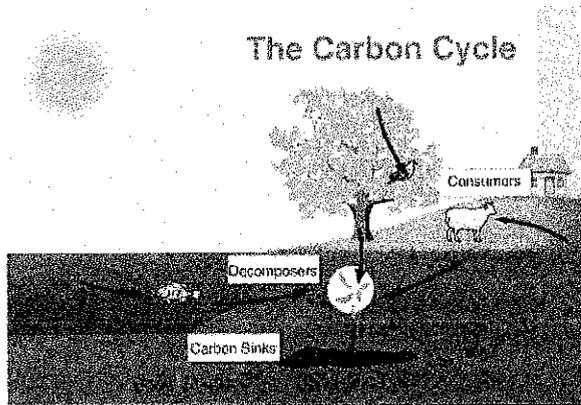
The precipitation, in the form of rain, snow, or hail falls into catchment areas and reservoirs, eventually becoming streams and rivers or reaching the groundwater table. This is the water that eventually is used in human activities.

After using water, it is generally disposed off: it can evaporate off our bodies as sweat; it can eventually join the sewage that reaches the ocean. There, its impurities partly get absorbed into the seabed or into other cycles while the liquid water is further evaporated as part of the water cycle.

Carbon-oxygen cycle

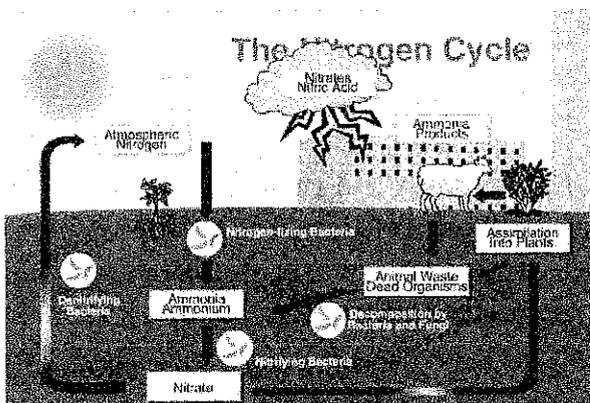
Life on Earth is often referred to as carbon-based life. In the carbon cycle, carbon is incorporated in compounds such as carbon dioxide (in the atmosphere and dissolved in water), carbonates (in

rocks, corals, and shells), hydrocarbons (in fossil fuels), and organic carbon compounds (in living organisms).



Plants, including algae and other marine biota, convert carbon dioxide to organic compounds. These pass on in the food web, and the carbon returns to the environment through the processes of respiration (as carbon dioxide), burning (as carbon dioxide), and decay (as carbon dioxide in the presence of oxygen and as methane in the absence of oxygen).

Nitrogen cycle



Just like carbon, nitrogen is also important for life, being part of compounds like proteins and DNA. While nitrogen gas makes up about 79% of air, organisms cannot use it in this form. Nitrogen has to be “fixed” or incorporated into compounds like nitrates, ammonia, and urea.

Nitrogen fixation can occur with the help of lightning (to form nitrates), bacteria (to form organic compounds like protein), and industrial processes (to form ammonia). Excretions and decay of organisms return nitrogen to the environment usually in the form of ammonia. Much of the ammonia formed from decay can be converted by other bacteria into nitrates for further use by plants. Finally, other bacteria convert nitrates to free nitrogen gas, to complete the cycle.

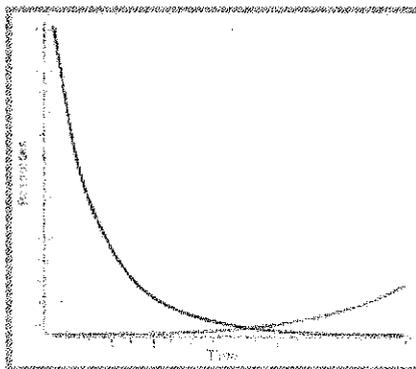
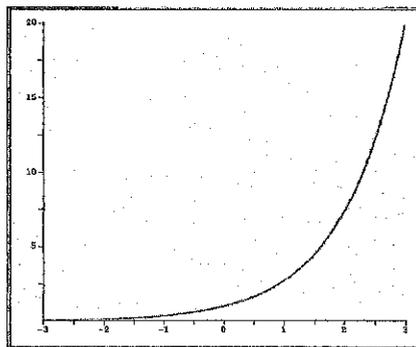
How are the cycles related to the concepts of growth and decay?

Populations tend to grow in an “exponential” manner. This means that the rate of growth is influenced by the current population. It also means that in the earlier stages of development, there is a tendency for smaller growth in a given time interval. However, as time passes, the rate of growth increases for the same time interval.

This tendency is seen in population charts. Those graphs that defy the trend are those countries that have taken steps to change the way their populations grow.

This exponential trend can also apply to resources. It is observed in the decay of population, as when resources are being used. But it is also the pattern observed when resources are replenished. Ideally, the two graphs should balance each other.

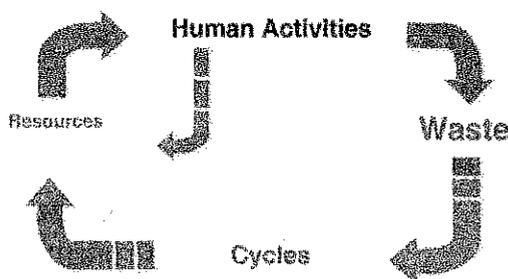
The problem arises when the rate of depletion is far greater than the rate of renewal. In this case, we consume more than we can replace. In some cases, as in fossil fuels, we cannot even replace them during our lifetime. Hence, these resources are referred to as "non-renewable" resources.



How do anthropogenic activities affect the Earth's cycles?

Through the cycles, the Earth is able to keep itself going. However, there are other factors that affect way the cycles are completed. Organisms are natural participants in these cycles. However, increased and/or short-sighted human activity can disrupt these cycles with destructive effects. This is what would be referred to as "dangerous anthropogenic interference", as used in the UN Framework for Climate Change. In this case, they are referring to the possible destructive effects of global warming and destruction of watersheds.

Human activities inevitably use natural resources and generate waste. It is this waste that eventually will enter the cycles; and the cycles, in turn, will eventually renew the resources that we need.



In some cases, human activities can help generate the natural resources, like when we do reforestation. However, we generally use

more resources than we are able to replenish. This is partly due to the numbers that require the resources and generate waste.



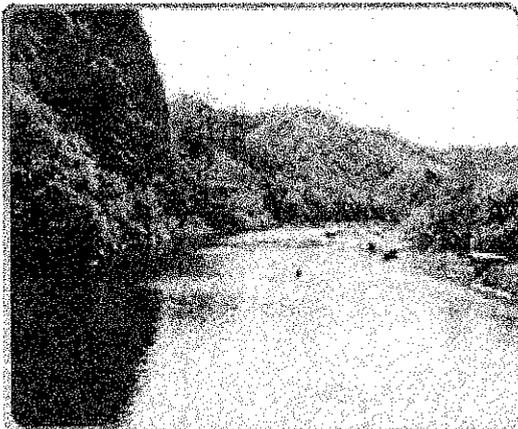
The question that environmentalists face is one that has no clear answer—what is the carrying capacity of this Earth? How far can we go exploiting the resources without experiencing serious backlash? Can we still manage sustainable development?

As early as now, we are experiencing extreme weather conditions, a signal of possible climate change.

Changing the quality of air and water

The Philippines is rich in watersheds, comprising 70%-77% of our total land area (21-23M ha.). Many watersheds are scattered through the many regions of the Philippines. In the example to be discussed here, several watersheds are close to each other: Angat-Ipo, La Mesa, Montalban.

Interestingly, not far from the La Mesa Dam (Novaliches Reservoir) is the Payatas Dumpsite. Not far from the Wawa River Park (named National Park, Wildlife Sanctuary, and Game Preserve) is the San Mateo Landfill. These garbage sites had been chosen because of their accessibility.



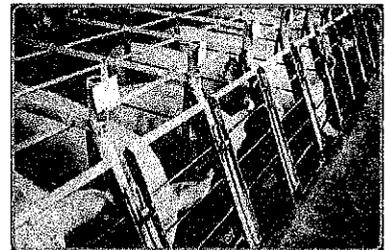
Let us consider the particular case of the Montalban Watershed. Montalban, or Rodriguez as it is now called, is a municipality in Rizal. It has lowland hills around a steep mountain area¹.

The migration trend to Metro Manila has forced movement of population into the area surrounding the watershed and even parts of it, particularly Rodriguez and San Mateo. Some forests were transformed into grassland, shrubs, pastures, and fields for cultivating rice, tubers, and vegetables. A number of farmlands were converted to housing subdivisions and industrial plants. Data from the 2000 Census of the National Statistics Office (NSO) show increase of population in the municipalities close to the watershed.

At present, human activities in the area include harvesting of forest products, *kaingin* system, livestock farming (hogs, chickens and other domestic farm animals), and industrial activities. Shoe manufacturing, textile factories, and quarrying are among the industrial activities in the area, with quarrying as the highest income-generating. Fifteen quarrying operators bring in a total of more than twenty million pesos annually. Among the complaints of residents are noise due to blasting and heavy machinery, landslide risks, and airborne particulates.

Migrants practice *kaingin* to clear the land for housing or for agricultural use. This has resulted in denudation of the grasslands, which in turn, lead to loss of topsoil and soil erosion. The increase in population has resulted to increase in waste generation, more pollution, and decrease in the quality of water and soil resources.

Because of its proximity to streams and rivers, poultry and livestock farming abound in the area. Because the area was considered provincial, there were lower wage costs, too. These factors have contributed to an increase in population, waste generation, and pollution levels (especially for water).



Because of the increased economic activity in Metro Manila, population has increased all the more. With this would come the problem of housing. The San Mateo-Montalban areas have been growth areas for both illegal settlers and new subdivisions. This means loss of forests or grasslands that originally cover the area, increased human activities leading to resource depletion and waste generation, and deterioration of air and water quality.



Industry is often welcomed by local governments because they are a source of income (taxes) and they can provide employment to many of the locals. Again, the proximity of the San Mateo-Montalban areas makes it attractive because of accessibility, even as wage costs are lower. Unfortunately, industrial activities tend to change air and water quality. Increased use of fossil fuel (both in the site and in transport) adds to the air pollution; effluents often decrease water quality of the surrounding rivers and streams. There are, of course, increased waste management problems.



Another valuable source of income for the local governments and enterprises is quarrying. The areas of Montalban, San Mateo, and Antipolo have been used for quarrying activities, literally moving hills and mountains from their natural location into buildings and houses. This activity has naturally decreased forest cover and grasslands, often leading to soil erosion and siltation of rivers and streams.



Siltation of rivers, which makes the rivers shallow, also drastically changes the biodiversity in the area. Residents have complained of noise and air pollution when heavy equipment is in use.



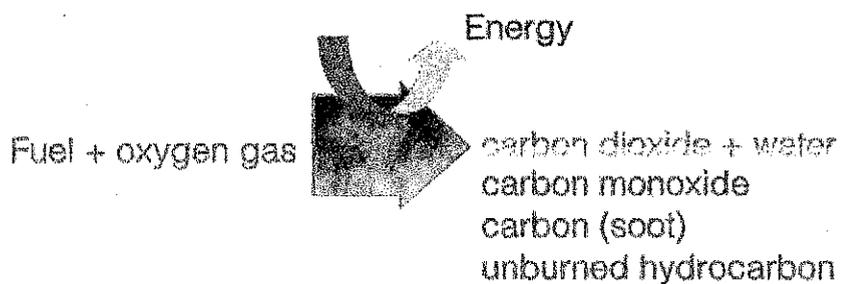
Just from this area of San-Mateo-Montalban-La Mesa, we see that several environmental issues come to the fore. Water pollution threatens the amount of potable water resources. Solid waste management remains to be one of the major problems of highly dense populations.

Parameter	Units	Limits**	Results
Color	TGU	15	25
Suspended solids	mg/L	50	12
Dissolved solids	mg/L	1000	188
pH		6.5-8.5	7.6
Dissolved oxygen	mg/L	5.00	7.6
Biochemical Oxygen Demand (BOD5)	mg/L	1.00	4.70
Surfactants (MBAS)	mg/L	0.50	0.30
Oil and Grease	mg/L	1.00	6.90
Nitrates	mg/L	10.00	26.40
Total Coliform	MPN/100 mL	1000	3000
Fecal Coliform	MPN/100 mL	100	2300

Water quality in Wawa Dam tells us a lot about land use in the area. While suspended and dissolved solids are within its threshold limits, the color of water overshoots the allowed value. BOD indicates the presence of organic waste thrown into the river. Oil and grease indicate that wastes of industrial activity and vehicle maintenance end up in the river. Nitrates are an indication of the agricultural activity in the area. Coliform is a measure of excrement in the river, perhaps, as a result of the many livestock farms and illegal settlers along the bodies of water.

Air quality is also affected by human activity. Emissions change the air quality and global temperatures.

Air is a mixture of gases; so, why does it make so much difference to add more components to that mixture? Particulates affect visibility and health. Unburned fuel and carbon monoxide are harmful to the human health, too. Nitrogen and sulfur oxides, when combined with water, ends up as acid rain.



These pollutants come largely from the burning of fuel. If the burning is inefficient, e.g., no engine tune-up, less of the expected products is formed. Instead, products like carbon monoxide, soot, and unburned hydrocarbon are formed. Less useful energy is derived from the fuel.

On the other hand, burning at very high temperatures can convert the nitrogen and sulfur impurities in fossil fuels into nitrogen and sulfur oxides, which can react with water leading to acid rain.

Managing solid waste

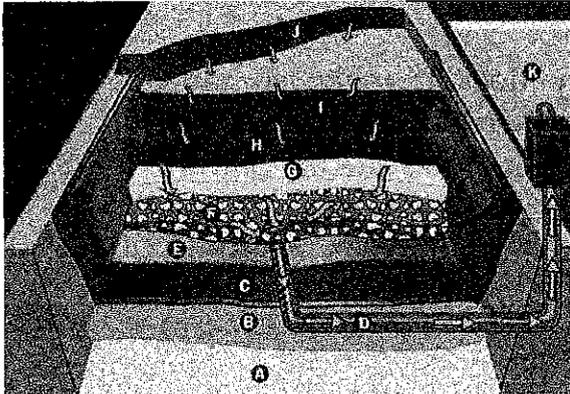
Of course, there is also the San Mateo landfill with its numerous problems—surface run-off, poor facilities, overuse. It is easy to see why this problem has persisted. With a population of about 11 million,



and waste generation of about 8,000 tons per day, Metro Manila has nowhere to put its garbage.

The cheapest option—because it needs no treatment facility—is the dumpsite. There are also social and economic considerations, with many settlers depending on the business generated from trash.

The Payatas dumpsite, despite the July 2000 tragedy, has been overused. Interestingly, if we are to compare the different modes of solid waste management, we see that dumpsites have problems and incineration would generally be problematic with the Clean Air Act.

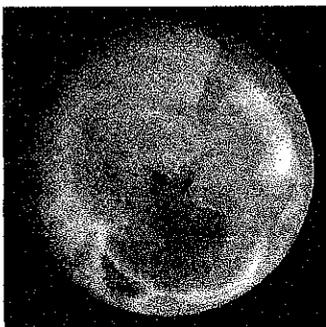


So, the landfill is still the best way to go, but the cost can be prohibitive. Without political will, it will be impossible to find a place which can be Metro Manila's dumping ground for the next ten years. (See exercise on landfill).

Even if we were to open another landfill or dumpsite, we still need to manage our waste. The data here shows that the amount of waste can be related to the income level, that food preparation can generate a lot of waste, and that we still dump a lot of trash anywhere that would be convenient to us.

It is, therefore, a challenge to our culture to manage the waste we produce, so that less garbage would end up in the landfill or dumpsite. If we are able to sort, we can divert collection to shorten the path to regenerating resources. Organic waste can end up as compost; recyclable materials can be re-processed; containers can be re-used.

Affecting global patterns



Another "air" problem is the thinning of the ozone layer, which protects us from the UV and cosmic rays of outer space. CFCs, which are used as refrigerants and aerosol agents, can release chlorine that further reacts with oxygen some thousand times over. The use of CFCs is now regulated by the Montreal protocol.

The alarm was raised because of the significant thinning of the ozone layer over Antarctica. When the

CFCs are carried into the ozone layer, the wind currents eventually bring them over Antarctica. Because of the very low temperatures in this area where other particles then tend to form, the reactions that break down the ozone molecules are more likely to happen.

The chlorine from CFCs reacts with ozone, is regenerated, and reacts again with other ozone molecules.

Another pressing issue that we often hear about is global warming. Normally, the greenhouse effect keeps our planet at the right temperature; however, changes in the amount of greenhouse gases can trap more heat, leading to the enhanced or runaway greenhouse effect.

Greenhouse gases can be the result of human activity. Carbon dioxide and water are formed when we burn fossil fuels. Methane is formed when organic waste is decomposed in the absence of oxygen, as in landfills and dumpsites.



Environment and Lifestyle

What we have seen happening in a small area of Metro Manila only emphasizes how our presence can change nature's way of dealing with limited resources. **Human activity** inevitably leads to resource depletion and waste production. **High population density** requires a system of waste management. **Lifestyle** can determine the amount of waste generated.

We are all interconnected. We need to realize this interconnectivity, in order to appreciate that we are responsible for preserving our own way of life.

Natural Resources and Legal Concerns

Because our personal lifestyles and economic choices translate into collective social concerns, the government needs to address effects of human practices on the environment as well as effects of environmental changes on people.

The following are a few examples where our lifestyles have translated into collective social concerns.

Case 1: Solid Waste Management

An open dumpsite in Barangay Benite was converted by the City of Arkada into controlled dumpsite in compliance with the provisions of R.A. 9003. However, according to residents and the Waste Watch, a local NGO, neither the city nor the barangay has a Solid Waste Management Plan and no Solid Waste Management Board has been created. Further, foul smell and burning in some areas of the dump site continue unabated. Waste is still not segregated and continues to be transported and dumped into the dump site.

- What are the requirements/provisions under R.A. 9003 violated by the Barangay Benite and the City of Arkada?*
- What remedies are available to the residents and the Waste Watch NGO?*
- If administrative/court case/s is/are filed:*
 - who should be the complainants and respondents in the case/s?*
 - where should the cases be filed?*
 - what are the possible penalties, if any, imposable to the respondents?"*

What can be used as basis for the ruling?

Republic Act No. 9003 (2000): Ecological Solid Waste Management Act

Scope

- *declares the adoption of a systematic, comprehensive and ecological solid waste management program as a policy of the State*
- *adopts a community-based approach*
- *mandates waste diversion through composting and recycling*
- *segregation of solid waste at source is mandatory*
- *places restriction on the use of environmentally non-acceptable packaging material*

Requirements violated by the Barangay and the City

- *Under Section 16 of the Act, all LGUs are required to prepare a 10 year SWM plan consistent with the SWM Framework to be submitted and evaluated by the National Solid Waste Management Commission.*
- *Under Section 32 of the Act, all barangays are required to establish a Materials Recovery Facility for secondary segregation of solid wastes.*

Administrative Sanctions applied to:

- littering, throwing, dumping of waste matters in public places;
- government officials who fail to comply with and enforce the rules and regulations of RA 9003

Penalty: Depending upon the gravity of the offense, as enumerated in Section 48 of RA 9003

Section 48: Prohibited Acts

- (1) Littering, throwing, dumping of waste matters in public places, such as roads, sidewalks, canals, esteros or parks, and establishment, or causing or permitting the same;
- (2) Undertaking activities or operating, collecting or transporting equipment in violation of sanitation operation and other requirements or permits set forth in or established pursuant to this Act;
- (3) The open burning of solid waste;
- (4) Causing or permitting the collection of non-segregated or unsorted waste;
- (5) Squatting in open dumps and landfills;
- (6) Open dumping, burying of biodegradable or non-biodegradable materials in flood-prone areas;
- (7) Unauthorized removal of recyclable material intended for collection by authorized persons;
- (8) The mixing of source-separated recyclable material with other solid waste in any vehicle, box, container or receptacle used in solid waste collection or disposal;
- (9) Establishment or operation of open dumps as enjoined in this Act, or closure of said dumps in violation of Sec. 37;
- (10) The manufacture, distribution or use of non-environmentally acceptable packaging materials;
- (11) Import of consumer products packaged in non-environmentally acceptable materials;
- (12) Importation of toxic wastes misrepresented as "recyclable" or "with recyclable content";

- (13) Transport and dumping in bulk of collected domestic, industrial, commercial and institutional wastes in areas other than centers of facilities prescribed under this Act;
- (14) Site preparation construction, expansion or operation of waste management facilities without an Environmental Compliance Certificate required pursuant to Presidential Decree No. 1586 and this Act and not conforming with the land use plan of the LGU;
- (15) The construction of any establishment within two hundred (200) meters from open dumps or controlled dumps or sanitary landfills; and
- (16) The construction or operation of landfills or any waste disposal facility on any aquifer, groundwater reservoir or watershed area and or any portions thereof;

Section 49: Fines and Penalties

Any person who violates Sec. 48 shall, upon conviction, be punished, depending on the specific violation and gravity of the offense:

- with a fine from a range of not less than Three hundred pesos (P300.00) to not more than One million pesos (P1,000,000.00),
- rendering community service for not less than one (1) day to not more than fifteen (15) days;
- imprisonment of not less than one (1) day to not more than six (6) years.

The fines herein prescribed shall be increased by at least ten percent (10%) every three (3) years to compensate for inflation and to maintain the deterrent function of such fines.

Any citizen may file an appropriate civil, criminal or administrative action in the proper courts/bodies against:

- (a) Any person who violates or fails to comply with the provisions of this Act or its implementing rules and regulations; or
- (b) The Department or other implementing agencies with respect to orders, rules and regulations issued inconsistent with this Act; and/or

- (c) Any public officer who willfully or grossly neglects the performance of an act specifically enjoined as a duty by this Act or its implementing rules and regulations; or abuse his authority in the performance of his duty; or, in any manner, improperly performs his duties under this Act or its implementing rules and regulations: Provided, however, That no suit can be filed until after thirty-day (30) notice has been given to the public officer and the alleged violator concerned and no appropriate action has been taken thereon.

The Court shall exempt such action from the payment of filing fees and shall, likewise, upon prima facie showing of the non-enforcement or violation complained of, exempt the plaintiff from the filing of an injunction bond for the issuance of a preliminary injunction.

In the event that the citizen should prevail, the Court shall award reasonable attorney's fees, moral damages and litigation costs as appropriate.

Section 53: SLAPP Suits

Suits and Strategic Legal Action Against Public Participation (SLAPP) and the Enforcement of this Act. - Where a suit is brought against a person who filed an action as provided in Sec. 52 of this Act, or against any person, institution or government agency that implements this Act, it shall be the duty of the investigating prosecutor or the Court, as the case may be, to immediately make a determination not exceeding thirty (30) days whether said legal action has been filed to harass, vex, exert undue pressure or stifle such legal recourses of the person complaining of or enforcing the provisions of this Act. Upon determination thereof, evidence warranting the same, the Court shall dismiss the case and award attorney's fees and double damages.

This provision shall also apply and benefit public officers who are sued for acts committed in their official capacity, there being no grave abuse of authority, and done in the course of enforcing this Act.

Case 2: Air Quality

STU Corporation operates four (4) oil-fired boilers that produce steam for sterilization and cooking in its candy manufacturing enterprise. In March 2005, stack sampling of STU's boilers resulted in emission exceedance of standards on sulfur oxides (SOx) and Nitrogen oxides (NOx) for three of its four stacks. After a technical conference was conducted, the case was elevated to the Pollution Adjudication Board (PAB). The PAB recommended that criminal charges be filed against STU Corporation claiming that failure of its three stacks to meet the standards constituted gross violation since three offenses were committed, one offense per stack. STU Corporation filed a motion to dismiss with the PAB on the ground that its air pollution control facility is covered by a valid permit to operate issued by the Environmental Management Bureau and it has paid the permit fees. Further, STU claimed that offenses should refer to the entity not the act. How would you rule on this issue?

What can be used as basis for the ruling?

Republic Act 8749 (Philippine Clean Air Act of 1999)

- DAO No. 81, Series of 2000 (Integrated Air Quality Improvement Framework/ Air Quality Action Plan)
- DAO No. 82, Series of 2000 (Implementing Rules and Regulations of the Philippine Clean Air Act)

Implementing Agencies: DENR, DOTC, DTI, DOE, DOST

Requirements & Permits Issued:

- For stationary sources
 - Authority to Construct
 - Permit to Operate
 - Emission Quotas, Emission Charge, Financial Guarantee Mechanisms
- For mobile sources
 - Certificate of Conformity (COC)
 - Certificate of Compliance to Emission Standards (CCES)
 - Accreditation by DTI of PETCs

Violations and Penalties:

- Actual exceedance of standards for stationary sources – imposition of fine not to exceed P100,000 for every day of violation

- Violation of standards for motor vehicles - fines not exceeding P6,000
- Other violations include misfuelling and prohibition on manufacture import sale of leaded gasoline and of engines and/or components requiring leaded gasoline

Case 3: Water Quality

A report from the local health clinic stated that incidence of skin diseases among children was increasing the Barangay Masikip and this can be linked to the presence of a manufacturing company. Effluent coming from the plant of Soft-Ade Company was sampled and failed the standards set by the DENR. Upon further investigation, it was discovered that although Soft-Ade Co. had an Environmental Compliance Certificate (ECC) for its wastewater treatment facility (WTF), it did not secure another ECC for the expansion of the said WTF. However, Soft-Ade claims it cannot be held liable since it is not discharging into any body of water, only into the sewage canal, and other companies are doing the same. Hence, it cannot be the source of the health problem in the area. The DENR, on the other hand, states that the sewage canal eventually leads to the Amila River, some 500 meters away.

Determine the liability of Soft-Ade Co., if any, under the Clean Water Act and the proper penalties that may be imposed on them.

What can be used as basis for determining liability and proper penalties?

Republic Act No. 9275 (2004): Philippine Clean Water Act

- The Act applies to water quality management in all water bodies
- It shall primarily apply to the abatement and control of pollution from land based sources
- The water quality standards and regulations and the civil liability and penal provisions under this Act shall be enforced irrespective of sources of pollution.
- DAO No. 2005-10 (Implementing Rules and Regulations of the Philippine Clean Water Act)

Implementing Agency:

- DENR - Environmental Management Bureau (EMB) and Regional Offices

Requirements & Permits Issued:

- Authority to Construct
- Permit to Operate
- Pollution Control Officers (PCOs) of firms required to submit quarterly reports on their operations and efficiency of their WTF

Section 27: Prohibited Acts – Among those that can be used are the following (the other items were omitted):

- a) Discharging, depositing or causing to be deposited material of any kind directly or indirectly into the water bodies which could cause water pollution or impede natural flow in the water body;
- c) Operating facilities that discharge regulated water pollutants without the valid required permits or after the permit was revoked for any violation of any condition therein;
- h) Undertaking activities or development and expansion of projects, or operating wastewater/sewerage facilities in violation of Presidential Decree No. 1586 and its implementing rules and regulations;
- i) Discharging regulated water pollutants without the valid required discharge permit pursuant to this Act or after the permit was revoked for any violation of any condition therein;
- n) Refusal or failure to designate pollution control officers whenever required by the Department in accordance with this Act

Case 4: Environmental Planning

Chino and Tina Arceo and their four-year old daughter live in a townhouse located at Castle Ridge, Antipolo. After two days of heavy rains, the ground on which their townhouse was situated started to give way. Their townhouse and two more others collapsed into the side of the ridge, with the Arceos luckily able to escape with bruises in their bodies. The AJZ developer claims that they had secured an Environmental Compliance Certificate (ECC) for the townhouse development and had implemented their plan well. AJZ claims that it should be the DENR who should be liable for issuing the ECC in the first place.

What remedies are available to the Arceos in this case?

Determine the liability of AJZ Developer, if any, under the PD. 1586 and the proper penalties that may be imposed on them. Are there any other liabilities?

What can be used as basis for determining liability and proper penalties?

Presidential Decree No. 1586 (1978): Establishing the Environmental Impact Statement System

- Declares the State policy to attain and maintain a rational and orderly balance between socioeconomic growth and environmental protection.
- Centralizes the EIS System under the then National Environmental Protection Council (NEPC).
- Authorizes the President and NEPC to declare certain projects, undertakings or areas in the country as environmentally critical.

Presidential Proclamation No. 2146 (1981)

- Proclaiming Certain Areas and Types of Projects as Environmentally Critical and Within the Scope of the Environmental Impact Statement System Established under P.D 1586

Environmentally Critical Projects

Heavy Industries
Resource Extractive
Infrastructure Projects

Environmentally Critical Areas

National parks, watershed reserves
Areas with critical slopes
Mangrove areas

Presidential Decree No. 1586 (1978): Establishing the Environmental Impact Statement System

- DAO 96-37 (Revising DAO 21, Series of 1992, To Further Strengthen the Implementation of the Environmental Impact Statement (EIS) System)
- DAO 2000-05 (Revising DAO 94-11, Supplementing DAO 96-37 and Providing for Programmatic Compliance Procedures within the EIS System)

- DAO 2000-28 (Implementing Guidelines on Engineering Geological and Geohazard Assessment as Additional Requirements for ECC Applications covering Subdivisions, Housing and Other Land Development and Infrastructure Projects)

Environmental Compliance Certificate (ECC)

- document issued by the DENR Secretary or RED
- certified based on the representations of the proponent and the preparer
- reviewed and validated by the EIA Review Committee, the proposed project or undertaking will not cause a significant negative environmental impact

Violations and Penalties:

- Projects established or operating without ECC - ordered closed through CDO and payment of fine of P50,000 for every violation
- Projects violating ECC conditions, misrepresentations in the IEE/EIS - suspension or cancellation of its ECC and/or fine not to exceed P50,000 for every violations/ misrepresentation

Environmental Damages

Articles 2195 - 2235, Civil Code on Damages

Damages may be actual or compensatory; moral; nominal; temperate or moderate; liquidated; or exemplary or corrective.

Articles 19 - 32, Civil Code on Human Relations

Supplemental and complementary to the rights established in the environmental laws, these are relevant to private environmental enforcement.

Articles 694 - 707, Civil Code on Nuisance

Defined as "any act, omission, establishment, business, condition of property, or anything else which:

1. Injures or endangers the health or safety of others; or
2. Annoys or offends the senses; or
3. Shocks, defies, or disregards decency or morality; or
4. Obstructs or interferes with the free passage of any public highway or street, or any body of water; or
5. Hinders or impairs the use of property

Articles 634 - 681

- Easements imposed by law have for their object either public use or the interest of private persons.
- Covers right of way, easements of light and view, drainage and falling waters, planting and construction.
- Water Code is a special law affecting easements involving flowing water.

Factors that can be considered in calculating the civil penalty:

1. The seriousness of the violation.
2. Maybe as an aggravating factor, the economic benefit derived by the violator, if any, resulting from the violation.
3. Any history of that violation.
4. Any good faith efforts to comply with the applicable requirements.
5. The economic impact of the penalty on the violator.
6. The duration of the violation as established by any credible evidence including evidence other than the applicable test method.
7. Payment by the violator of penalties previously assessed for the same violation.
8. Extent to which the violation was caused by a third party.
9. Other factors as the court deems relevant.

Damages to natural resources may include:

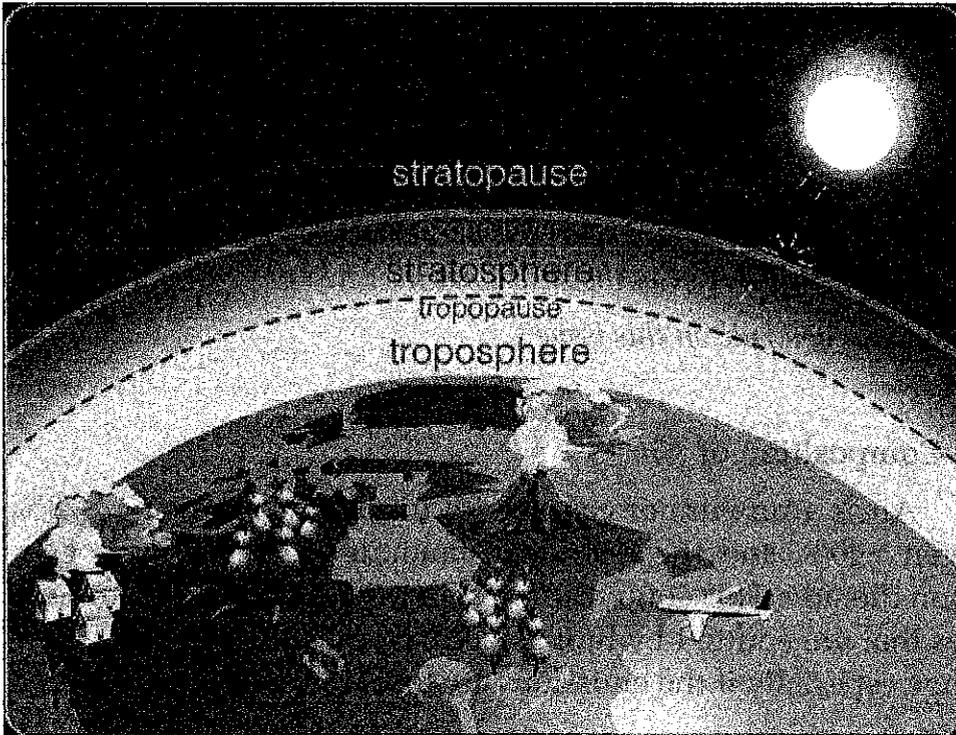
1. direct losses, such as reduction in active recreational use (*e.g.*, fishing and swimming), and impairing the structure and function of ecosystems;
2. indirect losses, such as "passive" birdwatching, and similar benefits from visual amenities;
3. the opportunity cost of potentially not being able to use a resource in the near term and longer term; and
4. damages to well-being stemming from the knowledge that a resource exists, without "use" of the resource.

¹ David, Ma. Agnes B., Anna Marie M. Hufemia, Paul Hector L. Segarra, and Jewel Racquel S. Unson (2003). "Understanding the Impact of Environmental Change" in Cuyegkeng, M.A., Ed., *Romancing Science: Readings in Science and Society*, QC: ORP, pp. 157-177.

Chapter 2

AIR QUALITY

a case of air quality
the composition of air
anthropogenic activities and air quality
the costs of air pollution
air quality and the law



UNDERSTANDING THE AIR WE BREATHE

What kinds of legal cases require knowledge of air quality concepts?

The following hypothetical case is an example where a deeper background on the atmosphere can help in the resolution.

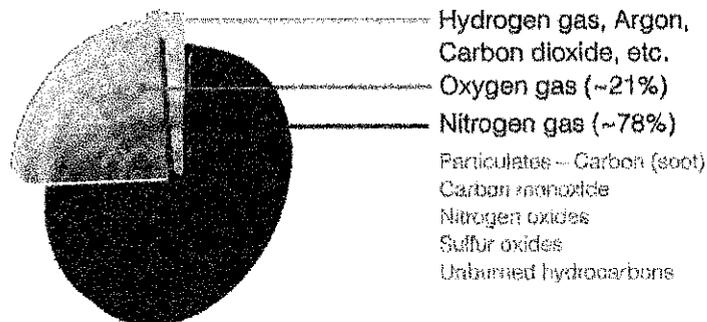
Case: Air Quality

STU Corporation operates four (4) oil-fired boilers that produce steam for sterilization and cooking in its candy manufacturing enterprise. In March 2005, stack sampling of STU's boilers resulted in emission exceedance of standards on sulfur oxides (SOx) and Nitrogen oxides (NOx) for three of its four stacks. After a technical conference was conducted, the case was elevated to the Pollution Adjudication Board (PAB). The PAB recommended that criminal charges be filed against STU Corporation claiming that failure of its three stacks to meet the standards constituted gross violation since three offenses were committed, one offense per stack. STU Corporation filed a motion to dismiss with the PAB on the ground that its air pollution control facility is covered by a valid permit to operate issued by the Environmental Management Bureau and it has paid the permit fees. Further, STU claimed that offenses should refer to the entity not the act.

How would you rule on this issue?

The Composition of Air

Air is a mixture of gases, with nitrogen comprising ~78%, and oxygen ~20%, and the rest small amount of argon, hydrogen, and carbon dioxide. This composition is modified by the presence of other gases that are emitted by human activities. The quality of the air may change especially if the emissions are toxic to living organisms.



The natural cycles of our planet make sure that the Earth's air is replenished. The carbon-oxygen cycle takes care of our needs in the respiration process. The nitrogen cycle takes care of our needs for other nutrients.

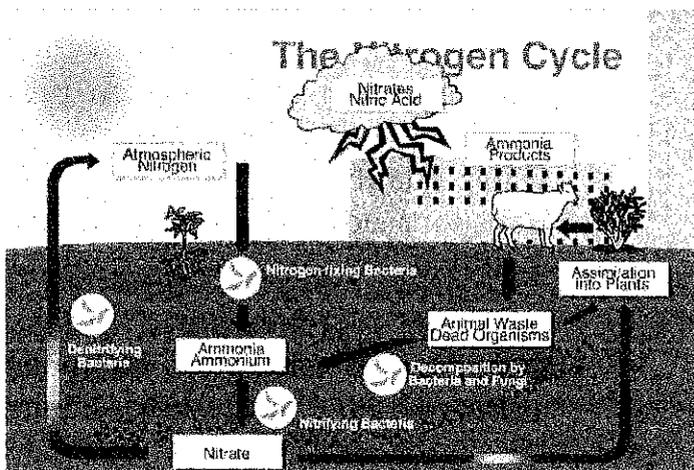
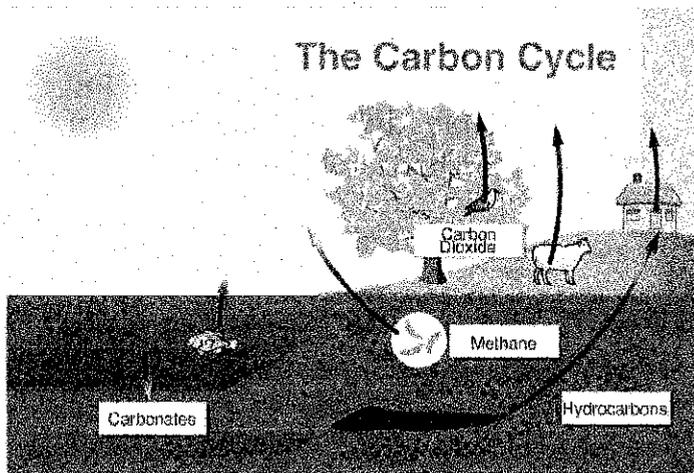
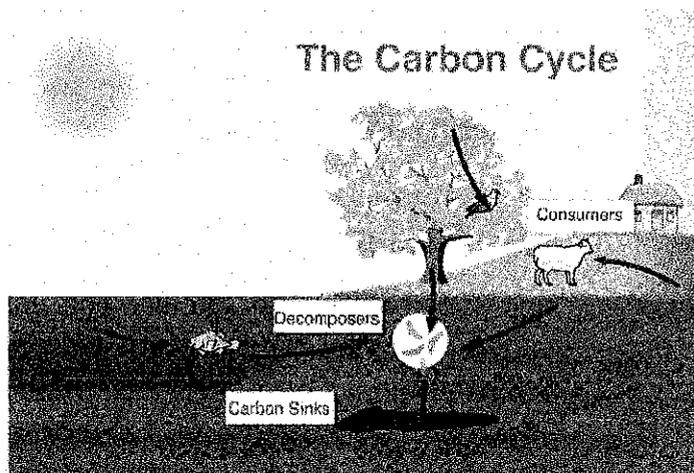
Carbon-oxygen cycle

Life on Earth is often referred to as carbon-based life. In the carbon cycle, carbon is incorporated in compounds such as carbon dioxide (in the atmosphere and dissolved in water), carbonates (in rocks, corals, and shells), hydrocarbons (in fossil fuels), and organic carbon compounds (in living organisms).

Plants, including algae and other marine biota, convert carbon dioxide to organic compounds. These pass on in the food web, and the carbon returns to the environment through the processes of respiration (as carbon dioxide), burning (as carbon dioxide), and decay (as carbon dioxide in the presence of oxygen and as methane in the absence of oxygen).

Nitrogen cycle

Just like carbon, nitrogen is also important for life, being part of compounds like proteins and DNA. While nitrogen gas makes up about 79% of air, organisms cannot use it in this

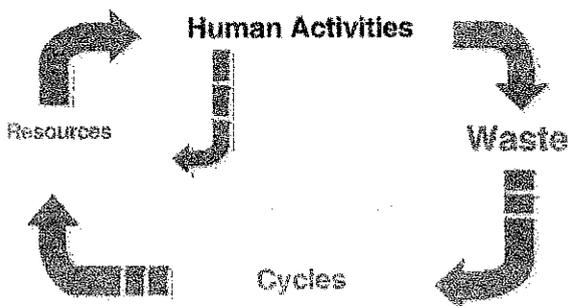


form. Nitrogen has to be “fixed” or incorporated into compounds like nitrates, ammonia, and urea.

Nitrogen fixation can occur with the help of lightning (to form nitrates), bacteria (to form organic compounds like protein), and industrial processes (to form ammonia). Excretions and decay of organisms return nitrogen to the environment usually in the form of ammonia. Much of the ammonia formed from decay can be converted by other bacteria into nitrates for further use by plants. Finally, other bacteria convert nitrates to free nitrogen gas, to complete the cycle.

How do anthropogenic activities affect the quality of air?

Through the cycles, the Earth is able to keep itself going. However, there are other factors that affect way the cycles are completed. Organisms are natural participants in these cycles. However, increased and/or short-sighted human activity can disrupt these cycles with destructive effects. This is what would be referred to as “dangerous anthropogenic interference”, as used in the UN Framework for Climate Change. In this case, they are referring to the possible destructive effects of global warming and destruction of watersheds.



Human activities inevitably use natural resources and generate waste. It is this waste that eventually will enter the cycles; and the cycles, in turn, will eventually renew the resources that we need.

Industry is often welcomed by local governments because they are a source of income (taxes) and they can provide employment to many of the locals. Unfortunately, industrial activities tend to change air and water quality. Increased use of fossil fuel (both in the site and in transport) adds to the air pollution; effluents often decrease water quality of the surrounding rivers and streams.

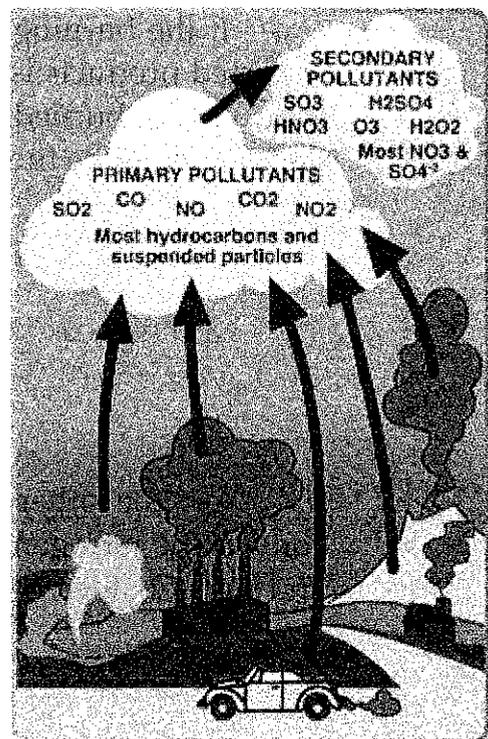
Air is a mixture of gases; so, why does it make so much difference to add more components to that mixture? Particulates affect visibility and health. Unburned fuel and carbon monoxide are

harmful to the human health, too. Nitrogen and sulfur oxides, when combined with water, ends up as acid rain.

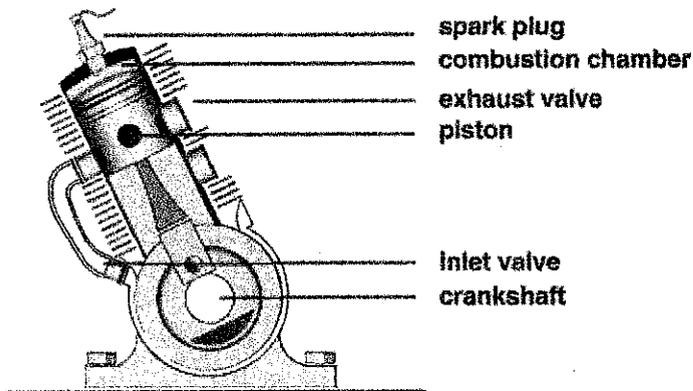
An air pollutant is a substance in the air that, in high enough concentrations, produces a detrimental environmental effect (EPA, US).

Presidential Decree No. 984 (REVISION OF REPUBLIC ACT NO. 3931) defines it as "any alteration of the physical, chemical and biological properties of any water, air and/or land resources of the Philippines, or any discharge thereto of any liquid, gaseous or solid wastes as will or is likely to created or to render such water, air and land resources harmful, detrimental or injurious to public health, safety or welfare or which will adversely affect their utilization for domestic, commercial, industrial, agricultural, recreational or other legitimate purposes." Pollutants can simply be thought to be substances that are in the wrong place at the wrong time and in the wrong amount. Thus, air pollutants are substances in the air, that, in high enough concentrations, produce detrimental environmental effects, including those on health.

Air pollutants can come from various sources, both natural (biogenic) or generated by humans (anthropogenic). "Indoor air pollution" has both biogenic and anthropogenic sources. Pollutants may come from chemicals released from the materials used in the home (paints, cleaning products, cigarette smoke, fuel), as well as from mold, bacteria, and animal hair. Biogenic sources include volcanoes spewing particulates, sulfur oxide, and other gases, lightning-initiated forest fires releasing gases and particles, decaying organic matter in swamps, wind storms whipping up dust, and pollen and spores from vegetation.



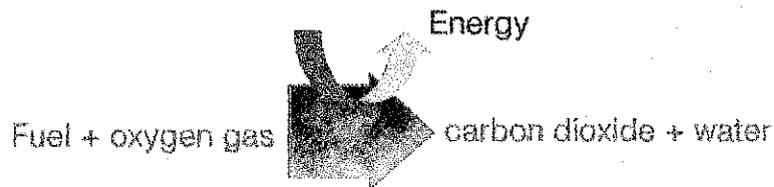
But the anthropogenic sources tend to create more impact because of the magnitude of the amounts of pollutants. They are present because of the lifestyle that humans have developed over the years.



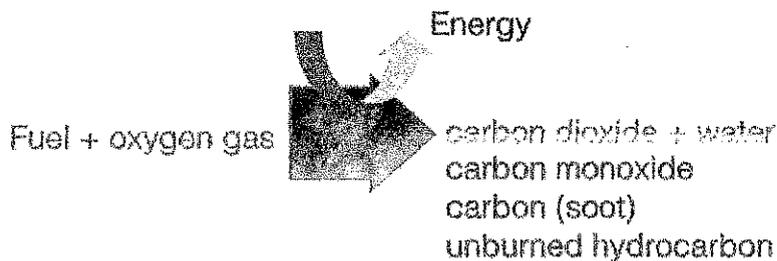
One of the main sources of such pollutants is the burning of fuel, especially from engines. Gasoline engines generally use internal combustion engines like in the following illustration.

Fuels are burned in these engines. They are mainly hydrocarbons, although there are other types such as alcohols. They

react with oxygen gas in the atmosphere to produce carbon dioxide, water, and energy (usually in the form of heat and light).



If the burning is inefficient, e.g., no engine tune-up, less of the expected products is formed. Instead, products like carbon monoxide, soot, and unburned hydrocarbon are formed. Less useful energy is derived from the fuel.



On the other hand, burning at very high temperatures can convert the nitrogen and sulfur impurities in fossil fuels into nitrogen and sulfur oxides, which can react with water leading to acid rain.



Emissions, therefore, change the air quality and global temperatures.

What are the “costs” of air pollution?

There are clear effects of such low air quality, particularly on health and economy.

Air pollution is often cited as the culprit for many respiratory diseases. The study of the UP College of Public Health is often cited to illustrate the low air quality of Metro Manila and how this is reflected in the health of drivers and commuters.

- Prevalence of Chronic Respiratory Illnesses, 1990-91

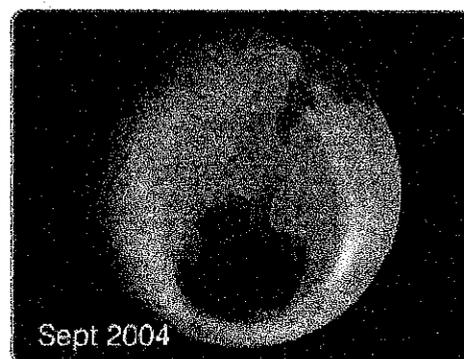
sample	COPD	PTD
jeepney drivers	32.5%	17.5%
aircon bus drivers	16.4%	11.5%
commuters	14.8%	9%

- COPD - chronic obstructive pulmonary diseases
PTB - pulmonary tuberculosis
- Source: Philippines Environment Monitor 2002 Air Quality (citing study conducted by UP College of Public Health with support from WHO)
- A follow-up study in 1994 found that the pulmonary functions of school children in Metro Manila are more compromised than those of children in rural areas.

Other Health Effects include acute and chronic effects. Among the acute effects (short-term, usually immediate and often reversible) are eye irritation, headaches, and nausea. Chronic effects (long-term) include chronic heart diseases, decreased lung capacity, and lung cancer.

Affecting global patterns: ozone depletion

Another “air” problem is the thinning of the ozone layer, which protects us from the UV and cosmic rays of outer space. CFCs, which are used as refrigerants and aerosol agents, can release chlorine that further reacts with oxygen



some thousand times over. The use of CFCs is now regulated by the Montreal protocol.

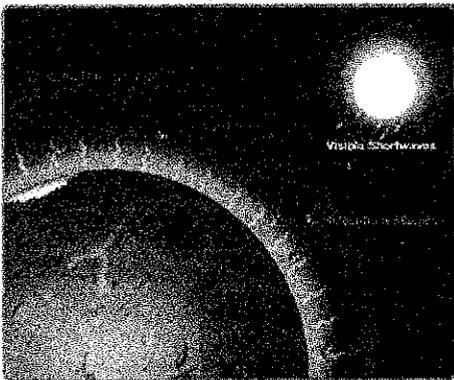
The alarm was raised because of the significant thinning of the ozone layer over Antarctica. The ozone hole is actually a significant thinning of the ozone layer over Antarctica that occurs each Antarctic spring. Up to 70% of the ozone normally found over Antarctica is destroyed.

When the CFCs are carried into the ozone layer, the wind currents eventually bring them over Antarctica. Because of the very low temperatures in this area where other particles then tend to form, the reactions that break down the ozone molecules are more likely to happen.

The chlorine from CFCs reacts with ozone, is regenerated, and reacts again with other ozone molecules. The Chlorine radical ($\text{Cl}\bullet$) is regenerated, and breaks down other ozone molecules. One chlorine radical stays in the atmosphere for about one to two years and destroys an average of 100,000 ozone molecules.

Affecting global patterns: global warming

Another pressing issue that we often hear about is global warming. Normally, the greenhouse effect keeps our planet at the right temperature; however, changes in the amount of greenhouse gases can trap more heat, leading to the enhanced or runaway greenhouse effect.



Greenhouse gases can be the result of human activity. Carbon dioxide and water are formed when we burn fossil fuels. Methane is formed when organic waste is decomposed in the absence of oxygen, as in landfills and dumpsites.

According to the United Nations Framework Convention on Climate Change (UNFCCC), the environmental precautionary principle involves the “stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system”.

Some of the effects that can be brought about by increasing global temperatures include sea level rise, coral bleaching, saline intrusion, ice cap melting, perturbed ocean currents, geographic expansion & temporal extension of vector-borne tropical diseases, prevalence of flooding and droughts, enhanced El Niño-La Niña episodes, and changes in typhoon frequency, trajectory, and intensity.

Environment and Lifestyle

What we have seen happening in a small area of Metro Manila only emphasizes how our presence can change nature's way of dealing with limited resources. **Human activity** inevitably leads to resource depletion and waste production. **High population density** requires a system of waste management. **Lifestyle** can determine the amount of waste generated.

We are all interconnected. We need to realize this interconnectivity, in order to appreciate that we are responsible for preserving our own way of life.

Air Quality and Legal Concerns

Because our personal lifestyles and economic choices translate into collective social concerns, the government needs to address effects of human practices on the environment as well as effects of environmental changes on people.

In the example below, we see how legal concerns arise from situations involving air quality.

Case: Air Quality

STU Corporation operates four (4) oil-fired boilers that produce steam for sterilization and cooking in its candy manufacturing enterprise. In March 2005, stack sampling of STU's boilers resulted in emission exceedance of standards on sulfur oxides (SOx) and Nitrogen oxides (NOx) for three of its four stacks. After a technical conference was conducted, the case was elevated to the Pollution Adjudication Board (PAB). The PAB recommended that criminal charges be filed against STU Corporation claiming that failure of its three stacks to meet the standards constituted gross violation since three offenses were committed, one offense per stack. STU Corporation filed

a motion to dismiss with the PAB on the ground that its air pollution control facility is covered by a valid permit to operate issued by the Environmental Management Bureau and it has paid the permit fees. Further, STU claimed that offenses should refer to the entity not the act. How would you rule on this issue?

What can be the basis for the ruling?

Republic Act 8749 (Philippine Clean Air Act of 1999)

- DAO No. 81, Series of 2000 (Integrated Air Quality Improvement Framework/ Air Quality Action Plan)
- DAO No. 82, Series of 2000 (Implementing Rules and Regulations of the Philippine Clean Air Act)

Implementing Agencies: DENR, DOTC, DTI, DOE, DOST

Requirements & Permits Issued:

- For stationary sources
 - Authority to Construct
 - Permit to Operate
 - Emission Quotas, Emission Charge, Financial Guarantee Mechanisms
- For mobile sources
 - Certificate of Conformity (COC)
 - Certificate of Compliance to Emission Standards (CCES)
 - Accreditation by DTI of PETCs

Violations and Penalties:

- Actual exceedance of standards for stationary sources - imposition of fine not to exceed P100,000 for every day of violation
- Violation of standards for motor vehicles - fines not exceeding P6,000
- Other violations include misfuelling and prohibition on manufacture import sale of leaded gasoline and of engines and/or components requiring leaded gasoline.

Chapter 3

WATER RESOURCES

legal cases and water resources
the properties of water
the water cycle
anthropogenic activities and water resources
the montalban watershed
water and the law



UNDERSTANDING THE WATER WE DRINK

What kinds of legal cases require knowledge of water resources?

The following hypothetical cases are examples where a deeper background on the environment can help in the resolution.

Case 1: Water Quality

A report from the local health clinic stated that incidence of skin diseases among children was increasing the Barangay Masikip and this can be linked to the presence of a manufacturing company. Effluent coming from the plant of Soft-Ade Company was sampled and failed the standards set by the DENR. Upon further investigation, it was discovered that although Soft-Ade Co. had an Environmental Compliance Certificate (ECC) for its wastewater treatment facility (WTF), it did not secure another ECC for the expansion of the said WTF. However, Soft-Ade claims it cannot be held liable since it is not discharging into any body of water, only into the sewage canal, and other companies are doing the same. Hence, it cannot be the source of the health problem in the area. The DENR, on the other hand, states that the sewage canal eventually leads to the Amila River, some 500 meters away.

Determine the liability of Soft-Ade Co., if any, under the Clean Water Act and the proper penalties that may be imposed on them.

Case 2: Environmental Planning

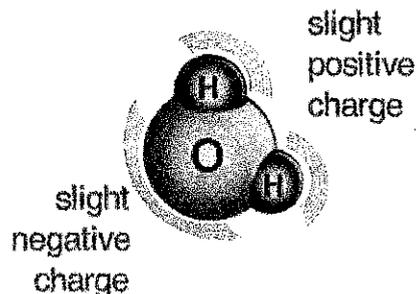
Chino and Tina Arceo and their four-year old daughter live in a townhouse located at Castle Ridge, Antipolo. After two days of heavy rains, the ground on which their townhouse was situated started to give way. Their townhouse and two more others collapsed into the side of the ridge, with the Arceos luckily able to escape with bruises in their bodies. The AJZ developer claims that they had secured an Environmental Compliance Certificate (ECC) for the townhouse development and had implemented their plan well. AJZ claims that it should be the DENR who should be liable for issuing the ECC in the first place.

What remedies are available to the Arceos in this case?

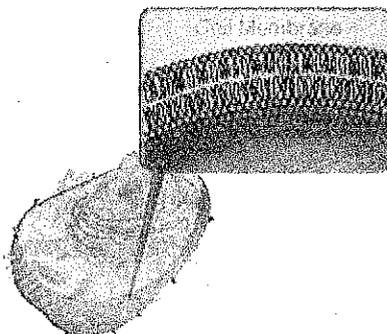
Determine the liability of AJZ Developer, if any, under the PD. 1586 and the proper penalties that may be imposed on them. Are there any other liabilities?

Properties of Water

Water is a compound or substance made of two elements, hydrogen and oxygen. Each oxygen atom has two hydrogen atoms attached to it. If a model of the water molecule is built, it would show that the geometry is not symmetric. This asymmetry leads to certain important properties of water. For example, it is a polar molecule, i.e., part of the molecule is positive and another part is negative. This enables water to be attracted to other molecules that also have charges in them. This is the reason why many acids, bases, and salts dissolve in water, and why some people refer to it mistakenly as a universal solvent.



However, water does not dissolve everything, e.g., It does not dissolve fatty or oily substances. This is an important property of water, because it allows membranes or boundaries to be formed between living organisms and their environment.



Water is an important component of the environment as well as the living organisms in it. Hence, there is an active exchange of water between the organisms and the environment: living organisms use water as part of their biochemical and physicochemical processes, and release water to the environment as part of their waste products.

Water quality is important, if living organisms depend on them for survival. Poor water quality can intervene with the proper functions of the biochemical processes.

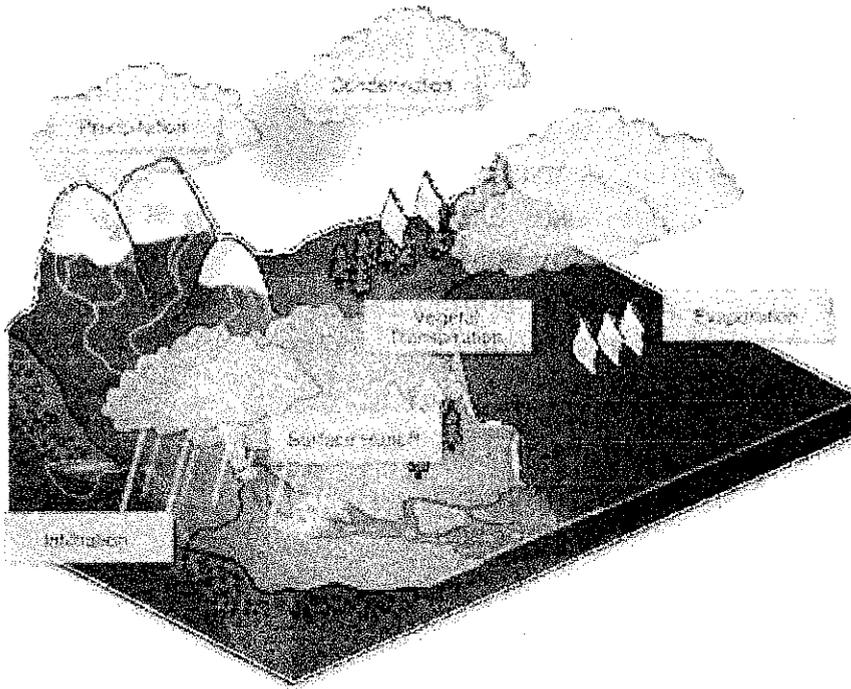
The Water Cycle

Although the Earth and its organisms consume water, it is not totally depleted because of the water cycle. Heat from the sun provides the energy for evaporation from bodies of water, where it is often in a used or polluted state. Living organisms, especially plants also contribute by releasing water vapor in the process of transpiration. The water vapor eventually condenses as clouds and falls as precipitation, such as rain, snow or hail. This combination of

evaporation-condensation practically allows water to be purified in the process.

The precipitation, in the form of rain, snow, or hail falls into catchment areas and reservoirs, eventually becoming streams and

rivers or reaching the groundwater table. This is the water that eventually is used in human activities¹.



After using water, it is generally disposed off: it can evaporate off our bodies as sweat; it can eventually join the sewage that reaches the ocean. There, its impurities partly get absorbed into the seabed or

into other cycles while the liquid water is further evaporated as part of the water cycle.

The time it takes for water to stay in a particular stage of the cycle is referred to as residence time and it can range from a few days to more than 10,000 years.

How do anthropogenic activities affect the water cycle?

Increased and/or short-sighted human activity can disrupt the water cycle and destroy watersheds. Human activities inevitably use natural resources and generate waste. It is this waste that eventually will enter the cycles; and the cycles, in turn, will eventually renew the resources that we need.

We need water for different purposes—drinking, bathing, washing, processing goods, etc. We take this from reservoirs, either through deep wells or through water distribution systems. Human intervention in the water cycle can be for the following uses:

- a. Domestic (residential)
- b. Agricultural (crop irrigation)
- c. In-stream (hydroelectric power, recreation, navigation)
- d. Industrial (cooling, dissipating and transporting waste materials)

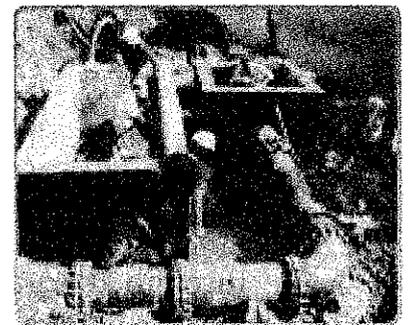
After using the water, they are discharged into other bodies of water directly or through sewage systems. These bodies of water are exposed to the atmosphere for the process of evaporation, in order that the cycle might continue.

In these processes, water quality can be affected. Water quality refers to the physical, chemical and biological characteristics of water, in relation to the existence of life, esp. the activities of humans.

All natural water contains substances derived from the environment, both natural and artificial. The amounts of these constituents in water as determined by various indicators determine its quality.

For example, water pollution can come from the decomposition of organic matter, dissolved matter, industrial and residential effluents, toxic wastes (heavy metals, solvents), and solid wastes. There is even a concept of thermal pollution, which indicates changes from the normal temperature range of a body of water.

The flow of water in Metro Manila can also be traced from our sources to its exit into the sewage. It starts from the Angat Dam (at least, most of it) and ends up in Manila Bay.



97% from the Angat Dam (Bulacan), 3% from groundwater



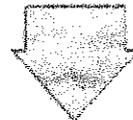
Bigte Settling Basin



Treatment and Distribution

East Zone	West Zone
Balara	La Mesa Dam
Manila Water	Maynilad

Effluent from septic tanks (86% of registered residents), industry effluent, gray water, storm drainage, untreated waste



San Juan River, Esteros of Binondo, Quiapo, San Miguel, Pandacan



Manila Bay

Case study: the Montalban Watershed²

The Philippines is rich in watersheds, comprising 70%-77% of our total land area (21-23M ha.). Many watersheds are scattered through the many regions of the Philippines. In the example to be discussed here, several watersheds are close to each other: Angat-Ipo, La Mesa, Montalban.

Interestingly, not far from the La Mesa Dam (Novaliches Reservoir) is the Payatas Dumpsite. Not far from the Wawa River Park (named National Park, Wildlife Sanctuary, and Game Preserve) is the San Mateo Landfill. These garbage sites had been chosen because of their accessibility.

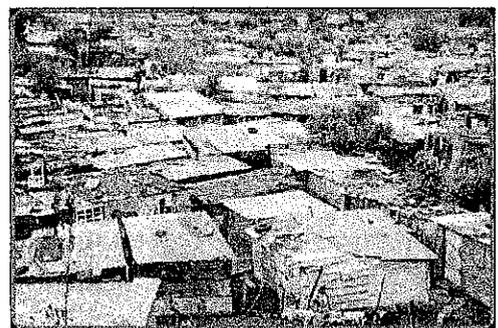
Let us consider the particular case of the Montalban Watershed. Montalban, or Rodriguez as it is now called, is a municipality in Rizal. It has lowland hills around a steep mountain area (David et al., 2003).

The migration trend to Metro Manila has forced movement of population into the area surrounding the watershed and even parts of it, particularly Rodriguez and San Mateo. Some forests were transformed into grassland, shrubs, pastures, and fields for cultivating rice, tubers, and vegetables. A number of farmlands were converted to housing subdivisions and industrial plants. Data from the 2000 Census of the National Statistics Office (NSO) show increase of population in the municipalities close to the watershed.

At present, human activities in the Montalban area include harvesting of forest products, *kaingin* system, livestock farming (hogs, chickens and other domestic farm animals), and industrial activities. Shoe manufacturing, textile factories, and quarrying are among the industrial activities in the area, with quarrying as the highest income-generating. Fifteen quarrying operators bring in a total of more than twenty million pesos annually. Among the complaints of residents are noise due to blasting and heavy machinery, landslide risks, and airborne particulates.

Migrants practice *kaingin* to clear the land for housing or for agricultural use. This has resulted in denudation of the grasslands, which in turn, lead to loss of topsoil and soil erosion. The increase in population has resulted to increase in waste generation, more pollution, and decrease in the quality of water and soil resources.

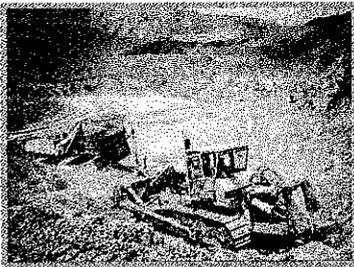
Because of its proximity to streams and rivers, poultry and livestock farming abound in the area. Because the area was considered provincial, there were lower wage costs, too. These factors have contributed to an increase in population, waste generation, and pollution levels (especially for water).



Because of the increased economic activity in Metro Manila, population has increased all the more. With this comes the problem of housing. The San Mateo-Montalban areas have been growth areas for both illegal settlers and new subdivisions. This means loss of forests or grasslands that originally cover the area, increased human activities leading to resource depletion and waste generation, and deterioration of air and water quality.



Industry is often welcomed by local governments because they are a source of income (taxes) and they can provide employment to many of the locals. Again, the proximity of the San Mateo-Montalban areas makes it attractive because of accessibility, even as wage costs are lower. Unfortunately, industrial activities tend to change air and water quality. Increased use of fossil fuel (both in the site and in transport) adds to the air pollution; effluents often decrease water quality of the surrounding rivers and streams. There are, of course, increased waste management problems.



Another valuable source of income for the local governments and enterprises is quarrying. The areas of Montalban, San Mateo, and Antipolo have been used for quarrying activities, literally moving hills and mountains from their natural location into buildings and houses. This activity has naturally decreased forest cover and grasslands, often leading to soil erosion and siltation of rivers and streams.



Siltation of rivers, which makes the rivers shallow, also drastically changes the biodiversity in the area. Residents have complained of noise and air pollution when heavy equipment is in use.

Changing the quality of water

Just from this area of San-Mateo-Montalban-La Mesa, we see that several environmental issues come to the fore. Water pollution threatens the amount of potable water resources. Solid waste

management remains to be one of the major problems of highly dense populations.

Water quality in Wawa Dam tells us a lot about land use in the area. While suspended and dissolved solids are within its threshold limits, the color of water overshoots the allowed value. BOD indicates the presence of organic waste thrown into the river. Oil and grease indicate that wastes of industrial activity and vehicle maintenance end up in the river. Nitrates is an indication of the agricultural activity in the area. Coliform is a measure of excrement in the river, perhaps, as a result of the many livestock farms and illegal settlers along the bodies of water.

Parameter	Units	Limits**	Results
Color	TGU	15	25
Suspended solids	mg/L	50	12
Dissolved solids	mg/L	1000	188
pH		6.5-8.5	7.6
Dissolved oxygen	mg/L	5.00	7.6
Biochemical Oxygen Demand (BOD5)	mg/L	1.00	4.70
Surfactants (MBAS)	mg/L	0.50	0.30
Oil and Grease	mg/L	1.00	6.90
Nitrates	mg/L	10.00	26.40
Total Coliform	MPN/100 mL	1000	3000
Fecal Coliform	MPN/100 mL	100	2300

Of course, there is also the San Mateo landfill with its numerous problems—surface run-off, poor facilities, overuse. It is easy to see why this problem has persisted.

Environment and Lifestyle

What we have seen happening in a small area of Metro Manila only emphasizes how our presence can change nature's way of

dealing with limited resources. **Human activity** inevitably leads to resource depletion and waste production. **High population density** requires a system of waste management. **Lifestyle** can determine the amount of waste generated.

We are all interconnected. We need to realize this interconnectivity, in order to appreciate that we are responsible for preserving our own way of life.

Water Resources and Legal Concerns

Because our personal lifestyles and economic choices translate into collective social concerns, the government needs to address effects of human practices on the environment as well as effects of environmental changes on people.

In two examples below, we see how legal concerns arise from situations involving water quality and the water cycle.

Case 1: Water Quality

A report from the local health clinic stated that incidence of skin diseases among children was increasing the Barangay Masikip and this can be linked to the presence of a manufacturing company. Effluent coming from the plant of Soft-Ade Company was sampled and failed the standards set by the DENR. Upon further investigation, it was discovered that although Soft-Ade Co. had an Environmental Compliance Certificate (ECC) for its wastewater treatment facility (WTF), it did not secure another ECC for the expansion of the said WTF. However, Soft-Ade claims it cannot be held liable since it is not discharging into any body of water, only into the sewage canal, and other companies are doing the same. Hence, it cannot be the source of the health problem in the area. The DENR, on the other hand, states that the sewage canal eventually leads to the Amila River, some 500 meters away.

Determine the liability of Soft-Ade Co., if any, under the Clean Water Act and the proper penalties that may be imposed on them.

What can be used as basis for determining liability and proper penalties?

Republic Act No. 9275 (2004): Philippine Clean Water Act

- The Act applies to water quality management in all water bodies

- It shall primarily apply to the abatement and control of pollution from land based sources
- The water quality standards and regulations and the civil liability and penal provisions under this Act shall be enforced irrespective of sources of pollution.
- DAO No. 2005-10 (Implementing Rules and Regulations of the Philippine Clean Water Act)

Implementing Agency: DENR – Environmental Management Bureau (EMB) and Regional Offices

Requirements & Permits Issued:

- Authority to Construct
- Permit to Operate
- Pollution Control Officers (PCOs) of firms required to submit quarterly reports on their operations and efficiency of their WTF

Section 27: Prohibited Acts

- a) **Discharging, depositing or causing to be deposited material of any kind directly or indirectly into the water bodies which could cause water pollution or impede natural flow in the water body;**
- b) Discharging, injecting or allowing to seep into the soil or sub-soil any substance in any form that would pollute groundwater, except when specifically allowed by the Department
- c) **Operating facilities that discharge regulated water pollutants without the valid required permits or after the permit was revoked for any violation of any condition therein;**
- d) Disposal of potentially infectious medical waste into sea water by vessels unless the health or safety of individuals on board the vessel is threatened by a great and imminent peril;
- e) Unauthorized transport or dumping into sea waters of sewage sludge or solid waste as defined under Republic Act No. 9003;
- f) Transport, dumping or discharge of prohibited chemicals, substances or pollutants listed under Republic Act No. 6969;
- g) Operate facilities that discharge or allow to seep, willfully or through gross negligence, prohibited chemicals, substances or pollutants listed under R. A. No. 6969, into water bodies or

wherein the same shall be liable to be washed into such surface, ground, coastal, and marine water;

- h) **Undertaking activities or development and expansion of projects, or operating wastewater/sewerage facilities in violation of Presidential Decree No. 1586 and its implementing rules and regulations;**
- i) **Discharging regulated water pollutants without the valid required discharge permit pursuant to this Act or after the permit was revoked for any violation of any condition therein;**
- j) Noncompliance of the LGU with the Water Quality Framework and Management Area Action Plan. In such a case, sanctions shall be imposed on the local government officials concerned;
- k) Refusal to allow entry, inspection and monitoring by the Department in accordance with this Act;
- l) Refusal to allow access by the Department to relevant reports and records in accordance with this Act;
- m) Refusal or failure to submit reports whenever required by the Department in accordance with this Act;
- n) **Refusal or failure to designate pollution control officers whenever required by the Department in accordance with this Act; and**
- o) Directly using booster pumps in the distribution system or tampering with the water supply in such a way as to alter or impair the water quality.

Case 2: Environmental Planning

Chino and Tina Arceo and their four-year old daughter live in a townhouse located at Castle Ridge, Antipolo. After two days of heavy rains, the ground on which their townhouse was situated started to give way. Their townhouse and two more others collapsed into the side of the ridge, with the Arceos luckily able to escape with bruises in their bodies. The AJZ developer claims that they had secured an Environmental Compliance Certificate (ECC) for the townhouse development and had implemented their plan well. AJZ claims that it should be the DENR who should be liable for issuing the ECC in the first place.

What remedies are available to the Arceos in this case?

Determine the liability of AJZ Developer, if any, under the PD. 1586 and the proper penalties that may be imposed on them. Are there any other liabilities?

What can be used as basis for determining liability and proper penalties?

Environmental Planning

Presidential Decree No. 1586 (1978): Establishing the Environmental Impact Statement System

- Declares the State policy to attain and maintain a rational and orderly balance between socioeconomic growth and environmental protection.
- Centralizes the EIS System under the then National Environmental Protection Council (NEPC).
- Authorizes the President and NEPC to declare certain projects, undertakings or areas in the country as environmentally critical.

Presidential Proclamation No. 2146 (1981)

- Proclaiming Certain Areas and Types of Projects as Environmentally Critical and Within the Scope of the Environmental Impact Statement System Established under P.D 1586

Environmentally Critical Projects

Heavy Industries

Resource Extractive

Infrastructure Projects

Environmentally Critical Areas

National parks, watershed reserves

Areas with critical slopes

Mangrove areas

Presidential Decree No. 1586 (1978): Establishing the Environmental Impact Statement System

- DAO 96-37 (Revising DAO 21, Series of 1992, To Further Strengthen the Implementation of the Environmental Impact Statement (EIS) System)

- DAO 2000-05 (Revising DAO 94-11, Supplementing DAO 96-37 and Providing for Programmatic Compliance Procedures within the EIS System)
- DAO 2000-28 (Implementing Guidelines on Engineering Geological and Geohazard Assessment as Additional Requirements for ECC Applications covering Subdivisions, Housing and Other Land Development and Infrastructure Projects)

Environmental Compliance Certificate (ECC)

- document issued by the DENR Secretary or RED
- certified based on the representations of the proponent and the preparer
- reviewed and validated by the EIA Review Committee, the proposed project or undertaking will not cause a significant negative environmental impact

Violations and Penalties:

- Projects established or operating without ECC – ordered closed through CDO and payment of fine of P50,000 for every violation
- Projects violating ECC conditions, misrepresentations in the IEE/EIS – suspension or cancellation of its ECC and/or fine not to exceed P50,000 for every violations/misrepresentation

Environmental Damages

Articles 2195 - 2235, Civil Code on Damages

Damages may be actual or compensatory; moral; nominal; temperate or moderate; liquidated; or exemplary or corrective.

Articles 19 - 32, Civil Code on Human Relations

Supplemental and complementary to the rights established in the environmental laws, these are relevant to private environmental enforcement.

Articles 694 - 707, Civil Code on Nuisance

Defined as “any act, omission, establishment, business, condition of property, or anything else which:

1. Injures or endangers the health or safety of others; or

2. Annoys or offends the senses; or
3. Shocks, defies, or disregards decency or morality; or
4. Obstructs or interferes with the free passage of any public highway or street, or any body of water; or
5. Hinders or impairs the use of property

Articles 634 - 681

- Easements imposed by law have for their object either public use or the interest of private persons.
- Covers right of way, easements of light and view, drainage and falling waters, planting and construction.
- Water Code is a special law affecting easements involving flowing water.

Factors that can be considered in calculating the civil penalty:

1. The seriousness of the violation.
2. Maybe as an aggravating factor, the economic benefit derived by the violator, if any, resulting from the violation.
3. Any history of that violation.
4. Any good faith efforts to comply with the applicable requirements.
5. The economic impact of the penalty on the violator.
6. The duration of the violation as established by any credible evidence including evidence other than the applicable test method.
7. Payment by the violator of penalties previously assessed for the same violation.
8. Extent to which the violation was caused by a third party.
9. Other factors as the court deems relevant.

Damages to natural resources may include:

1. direct losses, such as reduction in active recreational use (e.g., fishing and swimming), and impairing the structure and function of ecosystems;
2. indirect losses, such as "passive" birdwatching, and similar benefits from visual amenities;
3. the opportunity cost of potentially not being able to use a resource in the near term and longer term; and
4. damages to well-being stemming from the knowledge that a resource exists, without "use" of the resource.

According to Carter et al.³:

“Businesses go through a similar process when they decide on new production processes or a location for a factory. Sometimes, though, choices affect others in ways that create conflict. The smokestack emissions from a new factory, for instance, might soil laundry drying on the clotheslines of neighboring households. If the factory is required to replace the soiled clothes or purchase dryers for the affected households, then the business might choose to relocate elsewhere. Alternatively, if the households know that there will be a factory nearby with damaging emissions, they might pick a different place to live. The identification of the responsible party in such cases is typically considered a legal question, but the example shows how difficult it can be to make satisfying decisions in the absence of information on the *full* range of costs and benefits of the relevant choices.

In general, the term "full cost accounting" refers to the process of collecting and presenting information to decision-makers on the trade-offs inherent in each proposed alternative. The process can be especially important for government agencies that represent a variety of interests when deciding how to allocate public funds and/or natural resources.”

¹ <http://www.ghcc.msfc.nasa.gov/overview/watercycle.html>

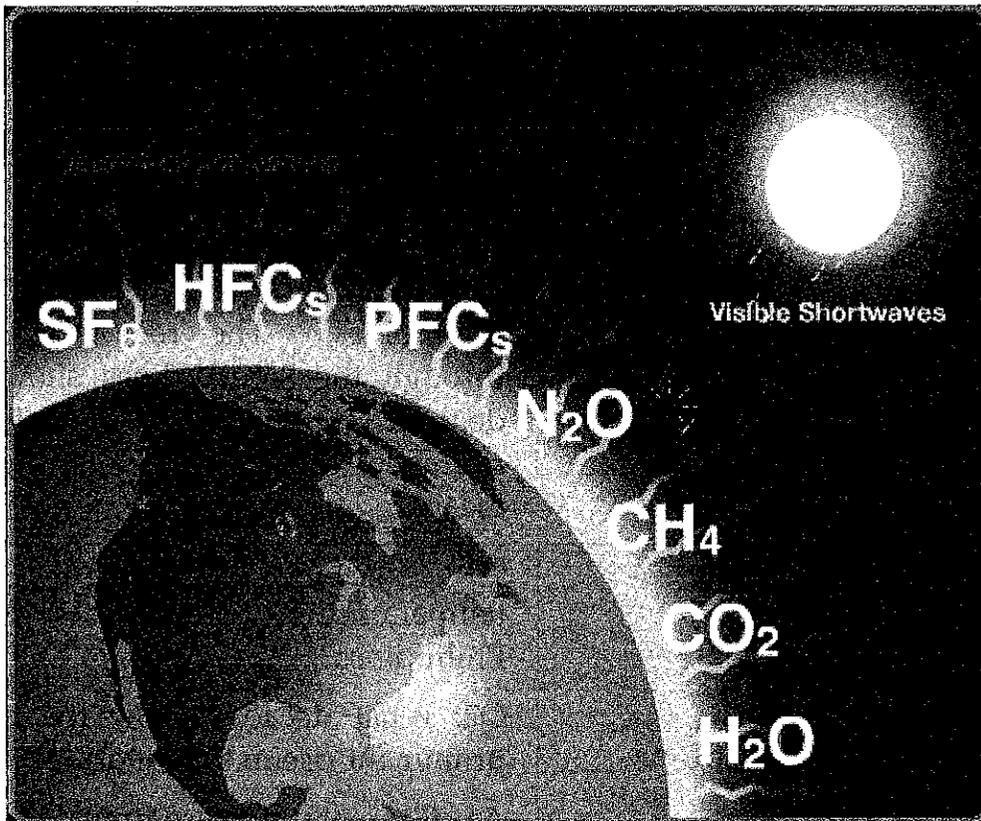
² David, Ma. Agnes B., Anna Marie M. Hufemia, Paul Hector L. Segarra, and Jewel Racquel S. Unson (2003). "Understanding the Impact of Environmental Change" in Cuyegkeng, M.A., Ed., *Romancing Science: Readings in Science and Society*, QC: ORP, pp. 157-177.

³ Carter, David W., Larry Perruso, and Donna J. Lee. *Full Cost Accounting in Environmental Decision-Making*

Chapter 4

DANGEROUS CLIMATE CHANGE

global fever
the greenhouse effect
changes and threats
the Kyoto protocol



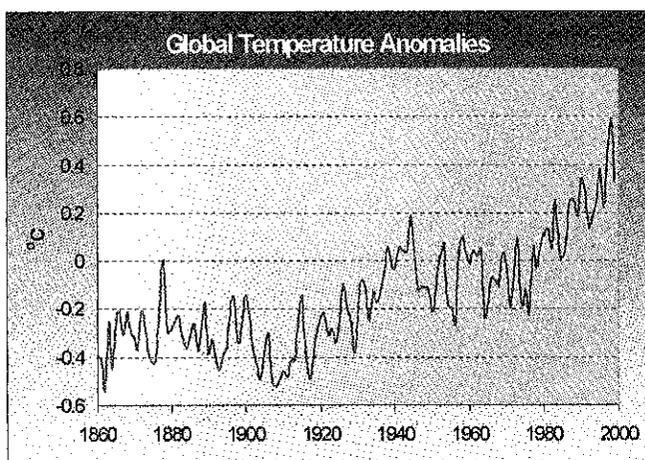
DANGEROUS CLIMATE CHANGE¹

WHAT'S IT ALL ABOUT?

Global fever

Surface temperatures are known to dramatically rise and fall with the seasons, or even within a day. However, when averaged over the globe, and over long time scales, such as decades, surface temperatures are quite constant. In recent decades, scientists have discovered an alarming rise of about 0.6 degrees Celsius in a span of about 150 years.

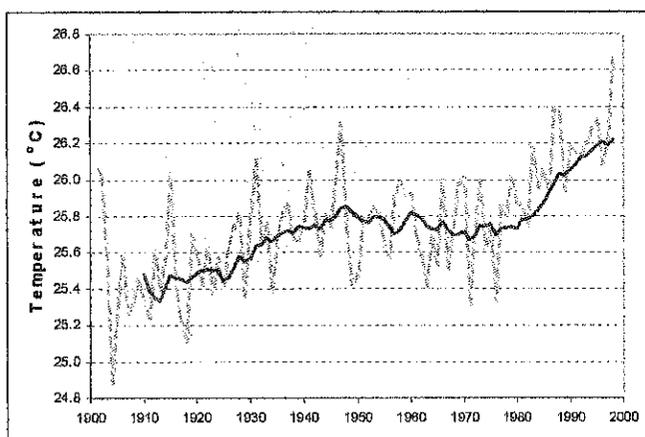
The plot shows global temperature anomalies, or deviations from the climate mean of about 0.6 degrees.



Q: When was the temperature rise most rapid in the last century?

A: 1950 to 2000, or the last fifty years

The plot below shows the temperature trends over the Philippines. The red bold line through the jagged lines shows a decadal trend (i.e. temperatures averaged over 10 years, running mean).



Q1: By how many degrees did temperature increase in the Philippines?

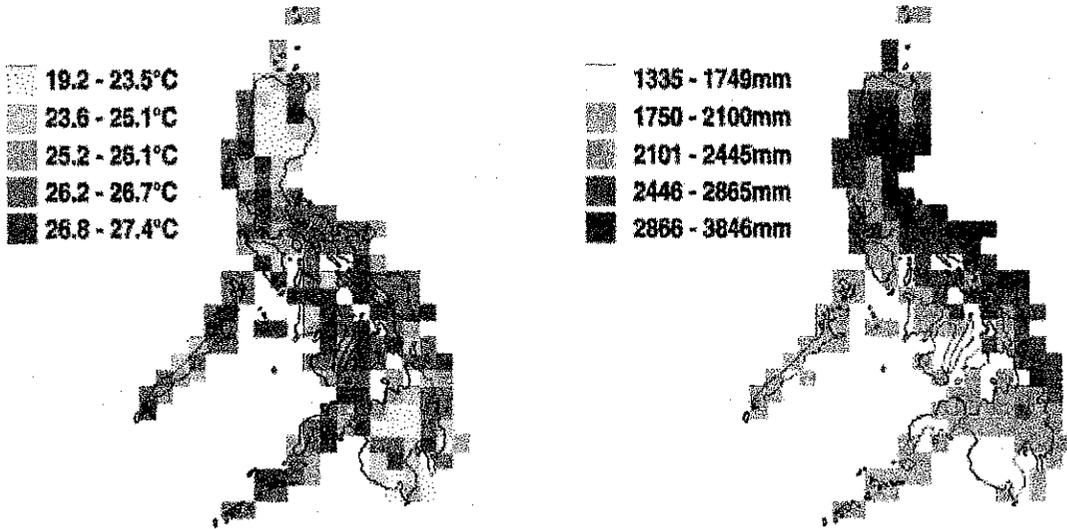
Q2: What decades show the most prominent rise in temperature?

A1: Temperature rose from 25.4 to about 26.2, or by about 0.8°C.

A2: 1980s to 2000

Know your climate

Try to answer the following questions using the maps below:



Questions:

- Which region in the Philippines do you think is the warmest on an annual basis? (Luzon, Visayas, or Mindanao)
- Which region is the rainiest, again on an annual basis?

Answers:

- Warmest region is Visayas; rainiest region is Luzon.
- The rainiest parts of the Philippines are in Central, East, and Southeast Luzon and in Eastern Visayas.

Wilting Rice

Rising temperatures can have adverse impacts on various sectors of human society. As an example of climate impacts, a recent study (2004) shows that a 1°C-increase in nighttime temperatures leads to a 15% decrease in rice yield.

The prognosis by the world's scientists (Intergovernmental Panel on Climate Change) is that global surface temperatures are expected to rise by 1.4 to 5.8 °Celsius in the 21st century. They are able to make this prediction by looking at the historical record and running what are called general circulation models of the atmosphere, ocean, and land.

The magnitude of this increase over a mere hundred years should be cause for concern. Judging from the historical record, the earth takes hundreds to thousands of years to cool down or heat up by a mere 5 degrees.

Q: Based on the study above of decreasing productivity with increasing temperature, and assuming rice behaved in a linear fashion, by how much would rice yield decrease if temperature rose by 5 degrees C?

A: 75%

Q: If you were a skeptic, how would you qualify this unbelievably high value?

A: Perhaps, the 75% can represent an upperbound value, because rice may not behave linearly and can adapt to changing conditions. Besides, there are other factors that affect rice productivity.



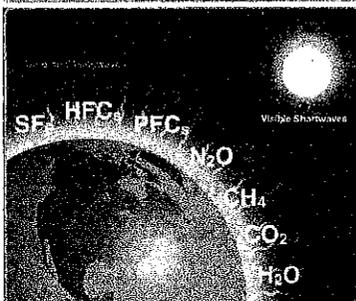
The Greenhouse Effect

We are kept warm by a thin veil of gases that keep the planet's warm infrared (IR) rays from all going out into space. Were it not for the IR trapping ability of these minute amounts of gases, planetary temperatures would plunge to about -18°C , far below water's freezing point.



Q: What do you think is the global average temperature? 13, 17, 21 $^{\circ}\text{C}$?

A: 17 $^{\circ}\text{C}$



Some greenhouse gases (GHGs) are water vapor, carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O). The most important is water vapor but because it is both naturally occurring and human-made, it is not subject to control. The next significant GHG is CO₂ which comes mostly from energy, industrial, and deforestation activities. Methane or CH₄ comes from decomposition of organic matter in poor oxygen conditions (such as dumpsites, sewage treatment systems, rice fields, etc.) Nitrous oxide or N₂O mainly

comes from agricultural activities such as fertilizer application, animal waste treatment, etc. Perfluorocarbons, Hydrofluorocarbons, and sulfur hexafluoride (PFCs, HFCs, SF₆) are gases associated mostly with industrial processes (e.g. coolants, insulators).

The term "climate change" is used to refer to anthropogenic, i.e. human-induced, interference with the climate system. Natural shifts in climate have been detected before, e.g. ice ages and interglacial or warm periods. These planet-wide shifts in temperature are thought to be due to astronomical variables such as changes in the tilt of earth's axis, ellipticity of earth's orbit around the sun, etc. These shifts happen on time scales that are of the order of thousands of years. We are now in a warm phase, i.e., an interglacial (between Ice ages) period.

Q: What is the difference between "global warming" and "climate change?"

A: No difference. "Global warming" is a popular term that has been used to refer to the observed and predicted increases in surface temperatures. On the other hand, "climate change" is technical, yet more comprehensive in scope since the issue is not just about temperatures rising. When "climate change" happens, winds shift, rainfall patterns change, sea levels rise, ocean currents shift, etc.

Are there other GHGs out there? Yes, chlorofluorocarbons (or CFCs or freon) used for coolants and propellants that deplete the ozone layer are also greenhouse gases. These have been excluded in the climate issue because they are already regulated by the Montreal Protocol.

Nota bene: The ozone layer issue is often confused with climate change/global warming.

Q: What is the difference between the ozone layer and global warming issues?

A: The depletion of the ozone layer (by CFCs) leads to more harmful ultraviolet rays coming through our atmosphere. Climate change, on the other hand, is about increasing surface temperatures (caused by rising GHG levels in the atmosphere) which may have dangerous consequences on our food and water supplies, public health, biodiversity, etc.).

A dangerous experiment

Climate change has happened before. The peaks and valleys of the temperature record can be seen in the middle line of this graph.

Almost in tandem with this temperature pattern are the crests and troughs of CO₂. This correlation of temperature and carbon does not say something about causality, i.e. it is difficult to say which is causing which, since it is also quite possible that a warm world will trigger a release of more CO₂ from the surface.

Even if we cannot determine causal connections here, we note that current CO₂ levels in our atmosphere are unprecedented, at least in the last 400,000 years. Prior to the Industrial Revolution, carbon levels were pegged at around 280 parts per million (ppm). In 2000, these shot up to about 370 ppm.

In a Business-As-Usual (BAU) scenario, in which nothing is done to mitigate emissions, CO₂ is expected to double its pre-Industrial Revolution level by mid-century.

This dangerous experiment is something we cannot confine to a test tube in some small laboratory. Even if we can say that carbon levels in the past did not cause climate change, we still need to know how the planet will react to these unparalleled levels of carbon in the atmosphere. Unfortunately, this is an experiment that can only be conducted outside, in our atmosphere. Our only means of knowing what will happen is the computer which can run a range of possible scenarios and simulations.

Recent international scientific opinion has converged on the conclusion that the recent warming of the last fifty years can be attributed to human activities (read: carbon emissions).

Furthermore, the IPCC projects a rise of about 1.4 to 5.8 degrees in this century alone.

To summarize...

- **World has gotten warmer.**
- **It will continue to get hotter in this century and beyond.**
- **We are causing this dangerous trend.**

The first two points are no longer argued. There are remnants of scientific dissent but these have been on the margins of late.

The third and last point is the most controversial. There are still those who contend that the warming signal is just part of the natural variation of climate.

Computer models that incorporate a range of conservative and non-conservative (i.e., BAU or highly regulated) emission scenarios show that carbon levels do affect the earth's temperature, and that the rise of carbon levels are mainly associated with human activities.

The trend is considered dangerous mainly because of the unprecedented rate of increase in temperature. A rise of 3 or 4 degrees (mid-range) in a matter of 100 years is dangerously fast.

HOW BAD WILL IT BE?

Direct physical changes

- **Temperature**
- **Rainfall**
- **Sea level**
- **Wind and Typhoons**
- **Ocean circulation**

Climate change impacts can be divided into two categories: direct physical changes and societal impacts (arising from these direct physical changes).

Direct physical changes include shifts in temperature, wind speed and direction, rainfall, sea level, and extreme weather events such as typhoons.

Societal impacts will be discussed under vulnerable sectors.

Other physical impacts include the change in rainfall, due to a warming surface which will affect the water cycle; the change in sea level due to expanding warm oceans and melting land ice; changes in wind and typhoons due to warmer sea surfaces; changes in ocean circulation due to shifts in salinity and temperature.

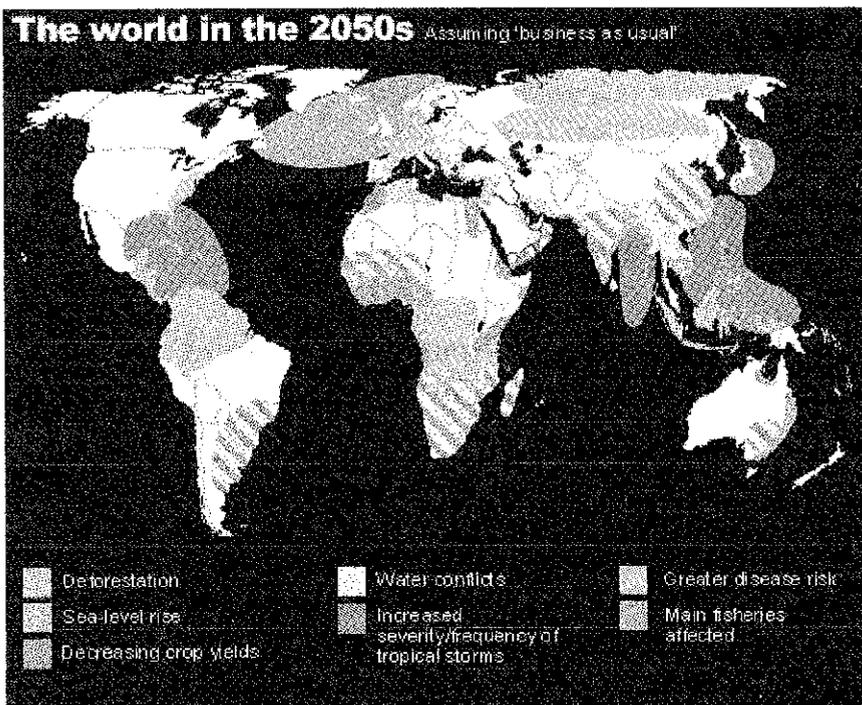
Direct physical changes

• Temperature • Rainfall • Sea level • Wind and Typhoons • Ocean circulation

0.5	0.6	1.1	1.0	2.1	2.1
0.6	0.6	1.1	1.1	2.1	1.1
0.6	0.6	1.1	1.2	2.1	2.1
0.6	0.7	1.2	1.1	2.2	2.1
Scenario 2020		Scenario 2050		Scenario 2080	

Across the globe

This is a global picture of projected impacts of a warmer world in the 2050s.



Q: According to this graphic, what would be the projected impact in the Philippines?

A: Increased severity/frequency of tropical storms

Q: In Asia, where do you see decreasing crop yields and potential water conflicts?

A: India and China

<http://www.guardian.co.uk/globalwarming/graphic/0,7367,397048,00.html>

Water from the sky, Earth rushing to sea

Recent events show us what prolonged rains (lasting a week) can do. A warmer world can lead to more frequent rainfall events like this.

Q: For debate, discuss the issue, "deforestation caused this landslide."

Points to consider:

- a. Note that land is covered with coconut trees (agro forestry)
- b. The role which the soil (land stability) plays
- c. Climate change may lead to sustained rainfall events but it is still difficult to attribute this particular tragedy to climate change. Why? It is possible to attribute the prolonged rainfall event to natural variation.
- d. Deforestation does increase the risk of harm to the communities but we should be careful not to pin the blame solely on this.
- e. In brief, deforestation + geological hazards + meteorological hazards = landslide disaster.
- f. Q: After discussion, and noting the three factors above, what disaster mitigation measures would you recommend? A: For these three factors, we can adopt measures such as: reforestation or forest conservation (for deforestation), proper settlement planning, zoning, and implementation (for geo and met hazards), monitoring and early warning systems (for all three), etc.

Water from the sky, A river of Earth

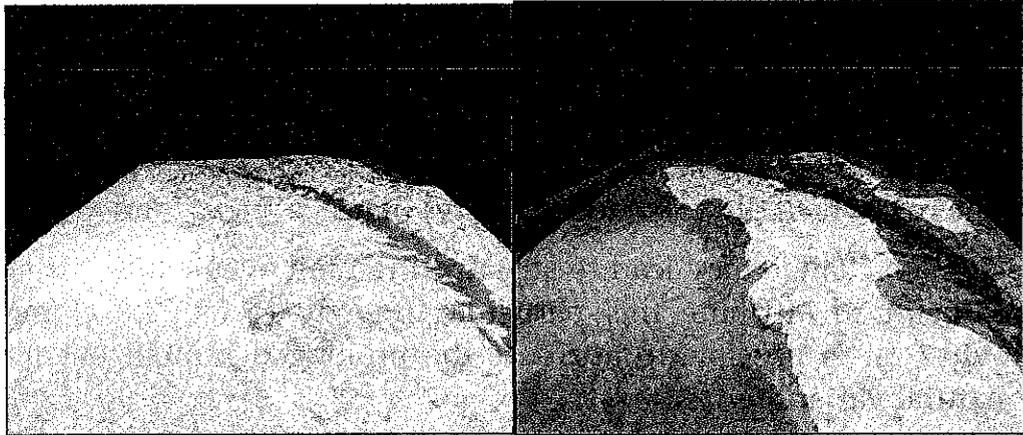
Tragedy can also be occasioned by the huge amount of water unleashed by a typhoon.

Global warming may indeed cause more intense and frequent typhoons. In this particular case, again, the causal linkages are not clear cut.

One can continue the previous "deforestation" discussion with this graphic. The met hazard here is no longer prolonged rainfall but intense rainfall from a typhoon (or typhoon flooding). The previous points for consideration remain.

Changing coastlines/communities

Another direct physical effect of climate change is sea level rise. The community of Navotas is shown in these two pictures. The first picture shows the present water-land boundaries, while the second picture shows land areas that may be inundated by global warming.



Sea level rise is not just about the loss of coastal real estate. Salt water intrusion into our underground aquifers (water supplies) may happen as a result of sea level rise. Coastal communities will also be more vulnerable to storm surges (heightened violent water waves during storms).

Sea level rise is however complicated by other potential causes such as siltation (the influx of silt from polluted rivers and deforestation), land reclamation, ground subsidence (the sinking of land due to groundwater extraction).

The global warming of oceans alone is projected to lead to sea levels rising to about 0.88m on the average.

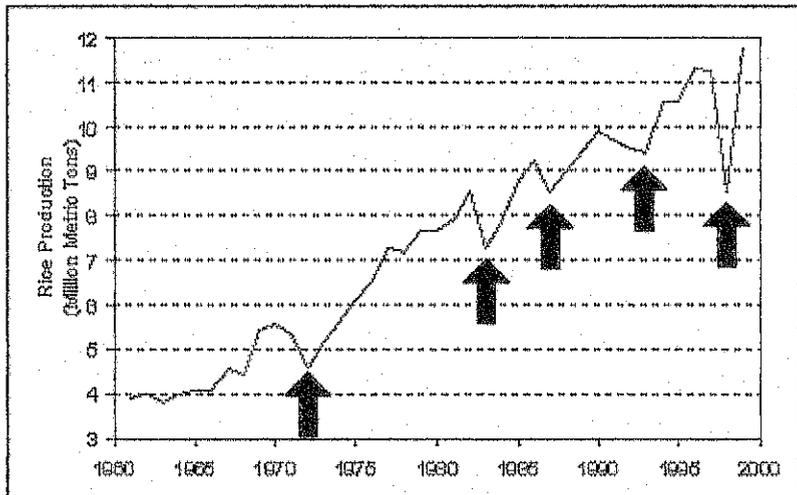
Across society

Vulnerable sectors

- Agriculture
- Freshwater
- Health
- Biodiversity
- Forests

The direct physical effects of climate change will affect various sectors in society. In the Philippines, the vulnerable sectors will most probably be the ones enumerated here.

The graph shows the climatic effects of the El Nino Southern Oscillation (ENSO) phenomenon on rice production in the Philippines. While ENSO is not directly linked to climate change, the former may be affected by the latter since ENSO is largely attributed to the warming of the sea surface



off the waters of Peru. The warming due to ENSO shifts rainfall patterns in the Western Pacific (where we are) towards the central Pacific, thus depriving countries such as Indonesia, Australia, and the Philippines of rain. CO₂-induced global warming may intensify this pattern.

Q: Judging from the picture, which year (or years) was ENSO most severe?

A: 1997-98

Q: What threats to public health are likely to arise from global warming?

A: mosquito-borne diseases such as malaria and dengue, which are moisture/temperature dependent

Q: How would marine biodiversity be threatened by climate change?

A: At least two answers here: coral bleaching, or the dying of corals due to rising sea temperatures, will undermine marine life; mangrove forests will be affected by rapid sea level rise.

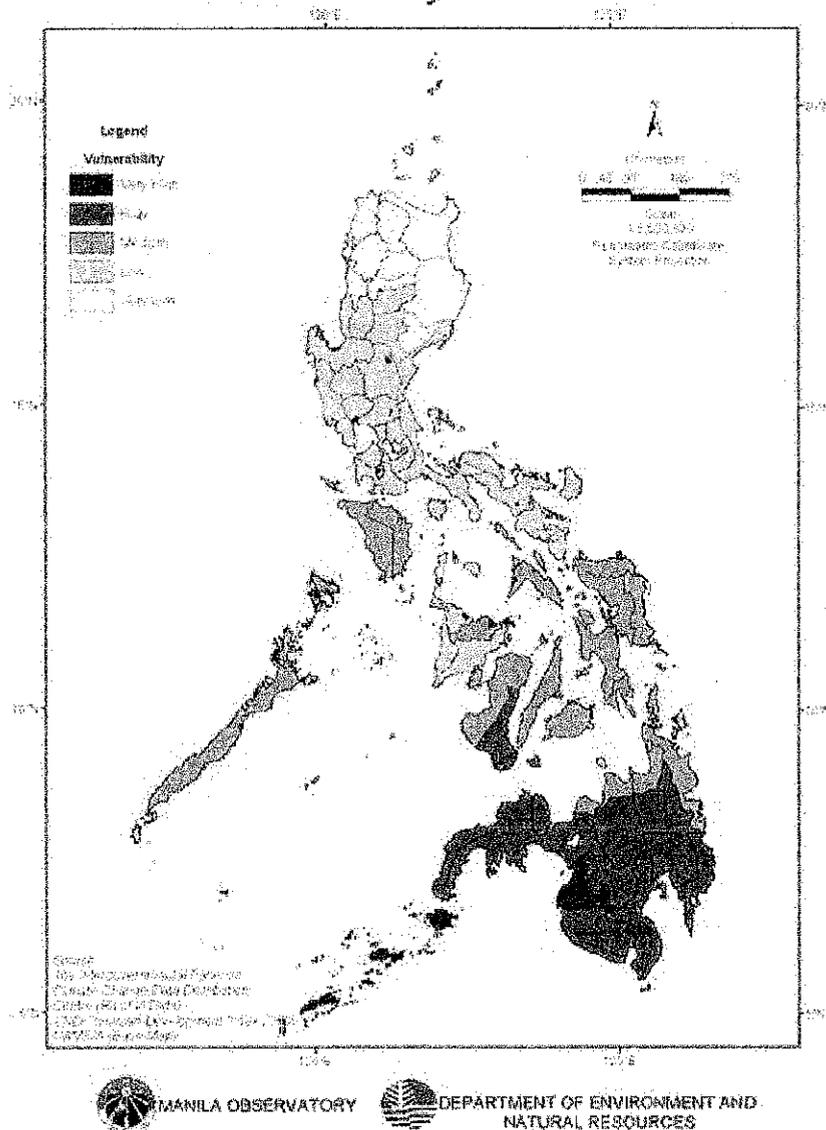
Typhoon vulnerability

Global warming may also increase the intensity and frequency of extreme weather events such as typhoons.

Vulnerability takes into account the incidence of hazards coupled with the capacity of communities to absorb and recover from hazards (as measured by a development index).

El Nino vulnerability

Vulnerability to El Niño



The map shows vulnerability.

Q: Which region shows the least impact of ENSO?

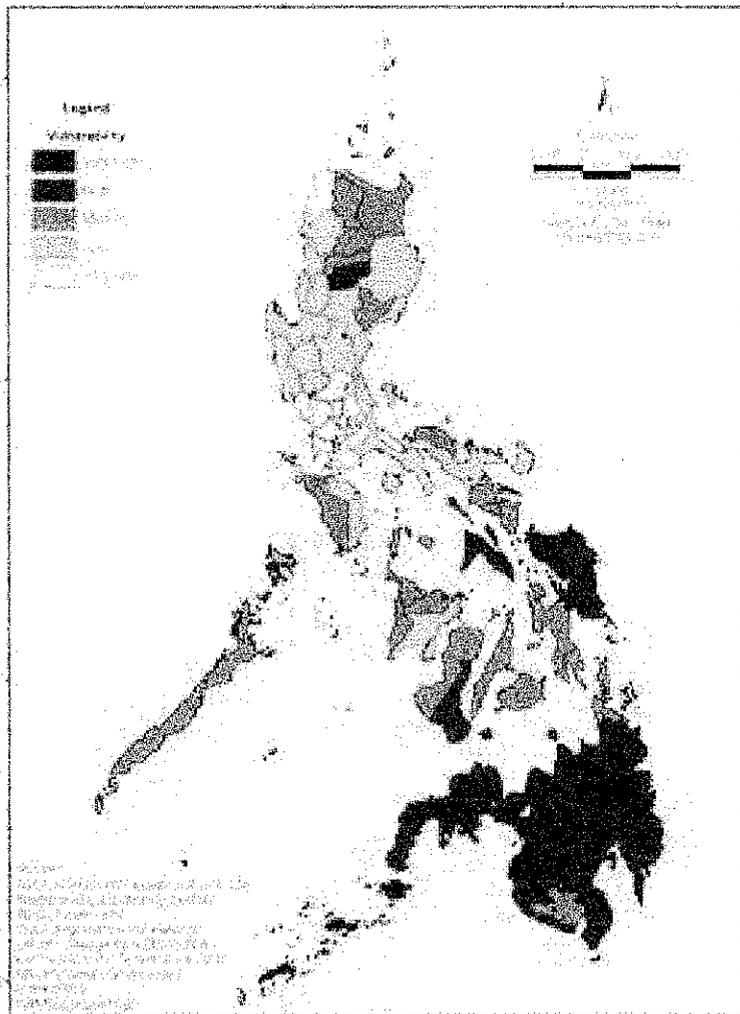
A: Northern Luzon

Temperature vulnerability

The map shows vulnerability to global warming.

Q: Which region shows greatest vulnerability due to rising temperatures?
A: Mindanao

Vulnerability to Projected Temperature Increase



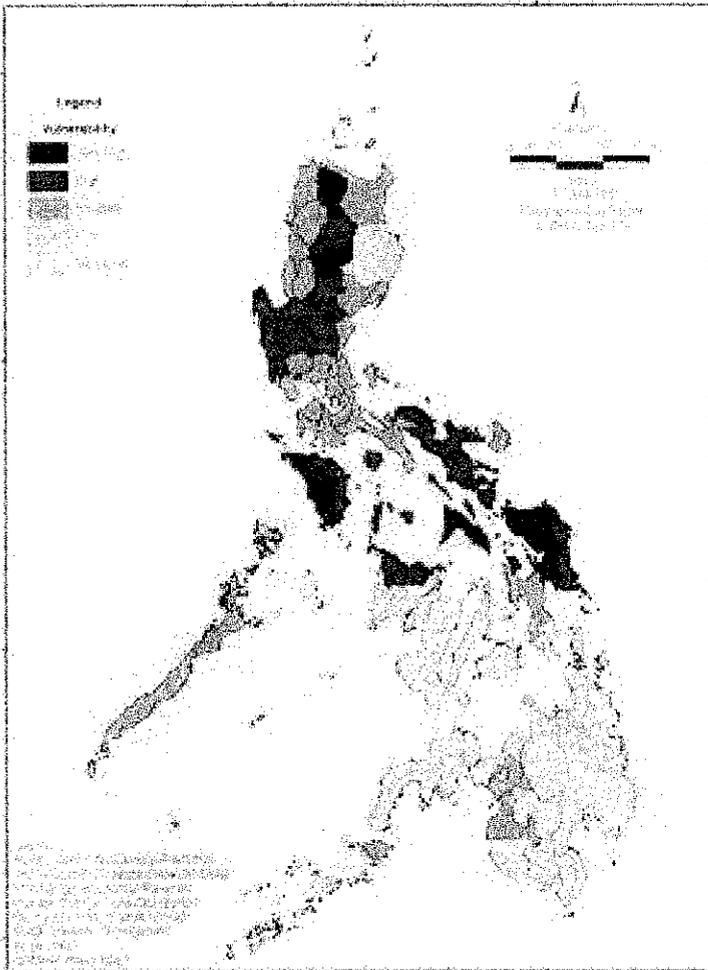
MINDANAO OBSERVATORY



DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES

Rainfall Vulnerability

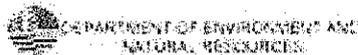
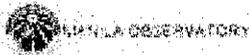
Vulnerability to Projected Rainfall Change



The map shows vulnerability to rainfall change.

Q: Which region shows the greatest vulnerability to rainfall change in a globally warmer world?

A: Central Luzon, Southeastern Luzon, Mindoro, Eastern Visayas



How bad will it be?

- Threats to our ecosystems, our food and water supplies are real.
- Impacts can become dangerous and difficult if changes are rapid, abrupt.
- Disaster vulnerabilities will be uneven geographically and temporally.

These points summarize the impacts of global warming.

On the second bullet point, the pace of the change will be crucially important.

Question for discussion: How would you decide on differentiated vulnerabilities as in the case of Mindanao, where it seems least vulnerable to typhoons yet most vulnerable to ENSO or temperature increase? What would be the implications to agriculture development in this region?

WHAT CAN/SHOULD WE DO?

There are two basic approaches to responding to climate change: mitigation (the reduction or limitation of GHG emissions) and adaptation (the coping or adjustment activities that must be undertaken to limit the adverse impacts of climate change-related disasters).

The five sectors responsible for the release of GHGs into the atmosphere are energy, industry, waste, agriculture, and forestry.

Q: Which sector do you think emits the most GHGs?

A: Energy

Q: How does the forestry sector emit GHGs?

A: Deforestation leads to reduced carbon sequestration (carbon absorbing) capacity of the land, and increased carbon emissions from the burning of forest biomass when land is cleared for agricultural and other uses).

Q: In the Industry sector, which two industries you think are the largest sources of GHG emissions?

A: Cement and Steel

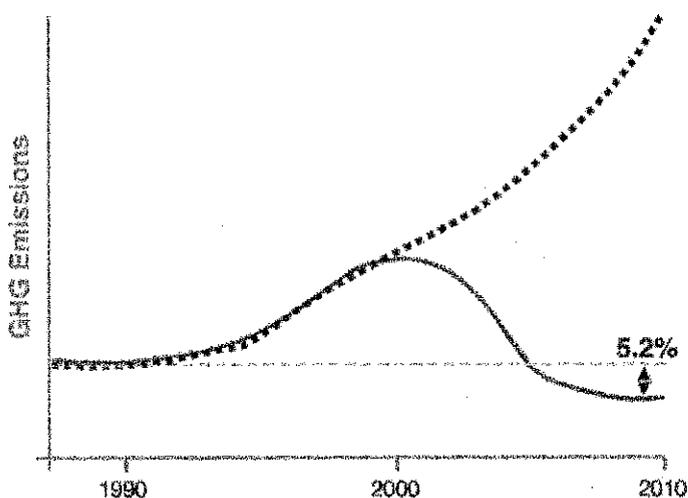
In terms of process, three points are highlighted here.

Individual mitigation efforts will be nullified if there is lack of integration and coordination, among countries, among entities within a country.

Local measures need to be seen as having a global benefit; global goals need to be localized as well.

Fairness or equity will have to characterize the differentiation of responsibilities and commitments related to mitigation of GHG emissions. Those who emit more should bear greater responsibility in reducing more. Those who stand to suffer more should be given more resources to withstand the potentially adverse impacts of climate change.

The Kyoto Protocol



The Kyoto Protocol is an example of an international agreement to reduce GHG emissions. It stipulates a specified amount to be reduced over a particular time frame. In the first commitment period (2008 to 2012), only developed countries and countries in transition (e.g. Eastern European parties) are committed to reduce their emissions by an average of 5.2% of their 1990 levels.

There is no second commitment period yet. Negotiations are underway and one important issue here is the inclusion of select developing countries.

Mitigation measures and strategies

These are possible mitigation measures that can be scaled up at an institutional level.

1. Energy and Transport: What are the relative merits and difficulties of measures outlined under Energy sector? Which would you prioritize? What criteria would you use for prioritization?

- a. Renewable energy(solar, wind, biomass, tide, hydro, etc)
- b. Energy efficiency, conservation
- c. Alternative fuels (e.g. biofuel)
- d. Public and alternative transport, traffic mgt

2. Waste

- a. Solid waste and wastewater management
- b. Methane capture - methane is released when solid waste and wastewater are treated. (This is because of the mostly anaerobic or oxygen-depleted environments in which such treatment takes place.) In developing countries, most waste is not treated. Thus, from a global warming perspective, the non-treatment of waste seems to be beneficial to the climate.

Q: Would you therefore encourage the non-treatment (e.g. scattered random dumping) of waste?

A: Hopefully, participants will realize the importance of waste treatment especially for health and sanitation purposes, and the fact that methane can be captured and converted to energy, as practised in some developed countries.

3. Land use and forestry

- a. Reforestation, afforestation (refers to the planting of forest in areas that have not been forest land for some time)
- b. Urban land use planning

4. Agriculture

- a. Agricultural residue management
- b. Animal waste management

These are possible adaptation measures and response strategies:

Agriculture

- New suite of crops
- Improved water management in irrigation, diversification, integrated pest management
- Improved land management and use,

- Soil conservation
- Economic options: liberalization of trade barriers, subsidies/incentives,
- Traditional agriculture and agroforestry,
- Quarantine, monitoring/surveillance of invasive and introduced species

Coastal zones

- hard options (seawall)
- soft options (beach nourishment)
- coral reef protection
- marine conservation
- coastal planning
- zonation
- shoreline stabilization
- restoration
- rehabilitation
- reclamation

Water resources

- flood control/mitigation
- conservation
- increase reservoir capacity
- groundwater resources
- watershed management
- desalination plants
- better management of water demand for irrigation

In sum...

- **Change our carbon-based way of working and living.**
- **Manage (conserve, optimize) our food and water and energy supplies.**
- **Move people out of harm's way.**

These bullets summarize our response to climate change.

Question for discussion: How doable is the first bullet? Can it happen on an institutional level? What difficulties are you likely to encounter in decoupling carbon from economic development?

Question for discussion: The third bullet has implications for landuse planning (e.g. zoning). How would you implement this in the case of typhoon or landslide hazards, so common in the Philippines? What difficulties will you likely encounter in moving people and communities out of harm's way?

Last time a global flood happened, a man and his family built a huge ark which was a boatful of biodiversity as well. Underneath a rainbow, God relented and God promised there would be no more such flood to make us suffer. The floods that drench us seasonally, the deluge that a globally warmer world might bring will not be an act of God.

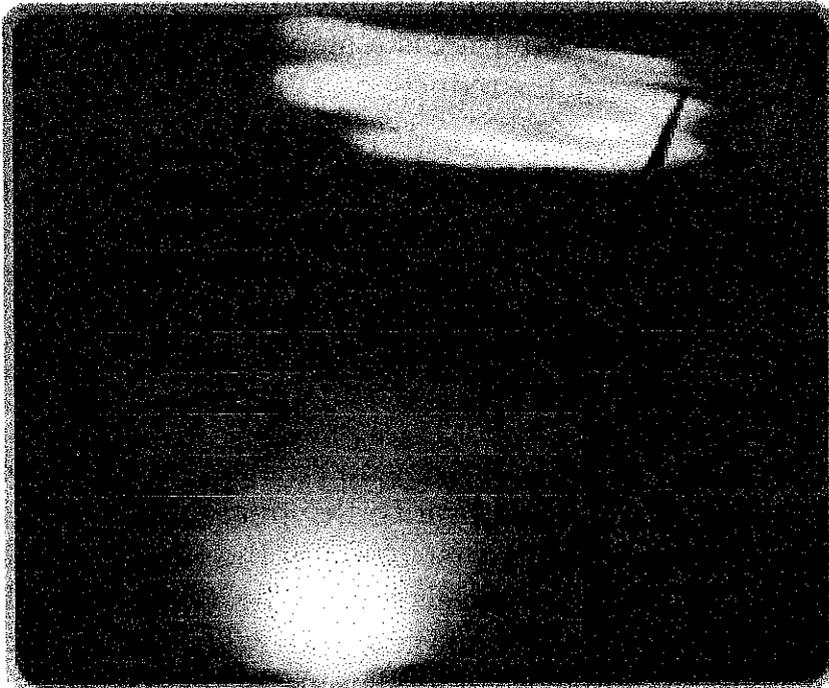
This one's our act, solely ours. Together, we can turn this dangerous tide. For the sake of our children, we must.

¹ From the notes and presentation of Fr. Ramon Jose T. Villarin, S.J., Director of the klima Climate Change Center.

Chapter 5

THE CARBON TRADING GAME

a response to global warming
the economics of carbon trading
the mechanics of the game
analyzing the results



THE CARBON TRADING GAME¹

CARBON TRADING AS A RESPONSE TO GLOBAL WARMING

In the module on climate change, we see how the enhanced or runaway greenhouse effect can affect global temperatures. In the same module, we also see the correlation between the amount of greenhouse gases, such as carbon dioxide, and the global temperatures.

The UN itself is concerned with how our we can stabilize the GHG concentrations. The UN Framework Convention on Climate Change (UNFCCC) states these concerns very clearly, especially in relation with the intervention of human activities with the systems of our planet. The Kyoto Protocol is an amendment to the UNFCCC and this agreement among countries is a step in addressing the issue of global warming through the reduction of GHG emissions²:

To achieve ... stabilization of GHG concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.

Such a level should be achieved within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to insure that food production is not threatened, and to enable economic development to proceed in a sustainable manner.

The Kyoto Protocol is an international treaty on global warming. The countries who ratify the treaty commit to reducing their GHG emissions. In the first phase of the treaty, the target is to reduce global emissions to levels below the 1992-values. However, this is not simple, especially for countries whose are economies are largely dependent on the use of fossil fuels.

The Annex I Parties, or also the Annex B (as they are found in the Kyoto Protocol). These include the developed countries and the emerging economies:

Australia / Austria / Belgium / Canada / Denmark / EC / Finland / France / Germany / Greece /Iceland / Ireland / Italy / Japan / Luxembourg / Netherlands / New Zealand / Norway / Portugal / Spain / Sweden / Switzerland / Turkey / United Kingdom / USA

Belarus / Bulgaria / Croatia / Czech Republic / Estonia / Hungary / Latvia / Liechtenstein / Lithuania / Monaco / Poland / Romania / Russian Federation / Slovakia / Slovenia / Ukraine

Because it is not very simple for developed countries and emerging economies to meet their emission targets, the Kyoto Protocol provides for flexibility mechanisms. Although a good amount of the reductions will have to take place domestically, there are possibilities other possibilities (UNFCCC):

- a. Joint implementation - Annex I Parties can implement projects that reduce emissions, or remove carbon from the atmosphere, in other Annex I Parties, in return for emission reduction units (ERUs)
- b. Clean Development Mechanism - Annex I Parties can implement projects that reduce emissions in non-Annex I Parties, or absorb carbon through afforestation or reforestation activities, in return for certified emission reductions and assist the host Parties in achieving sustainable development and contributing to the ultimate objective of the convention
- c. Emission Trading - Annex I Parties can acquire units from other Annex I Parties

The Clean Development Mechanism (CDM) allows Annex I Parties to implement projects that reduce emissions in non-Annex I Parties, or absorb carbon through afforestation or reforestation activities, in return for certified emission reductions and assist the host Parties in achieving sustainable development and contributing to the ultimate objective of the Convention. These emission reduction projects must assist developing countries in achieving sustainable development generate carbon reduction credits for the investors from developed countries.

CDM is a type of carbon trading. Developed countries (Annex B) countries want to buy carbon credits generated by CDM projects in developing countries. Developing countries want to sell carbon credits generated by CDM projects hosted in their countries. If the projects are able to reduce emissions, the developing countries can get certificates for emission reductions, which they can then sell as carbon

credits to developed countries. Hence, carbon trading is a response to the problem of global warming and climate change.

ECONOMICS OF CARBON TRADING

Why do we engage in carbon trading? Meet emission reduction targets at a least possible cost. By giving countries the flexibility to reallocate (trade) emission credits or allowances among themselves, trading can reduce compliance costs of achieving emission reduction targets

Under Kyoto, all countries are required to have permits to emit. Kyoto Authority issues exactly the number of permits needed to produce the desired emission level. The number of permits of each country specifies exactly how much it is allowed to emit (e.g., each permit allows a country to emit 1 million tons of CO₂). The number of permits is computed according to the commitment for emission reductions.

- $\text{Current Emissions} - \text{Required Reductions} = \text{Total PERMITS}$

Example: If CE of Country A is 100M tons and it needs to reduce by 10%, then

- $100 \text{ metric tons} - 10 \text{ metric tons} = 90 \text{ metric tons}$
 $= 90 \text{ permits (1 metric tonne or ton} = 1 \text{ tonne} = 1,000 \text{ kg)}$

A country can meet its Kyoto reduction targets (without paying penalties) by controlling its emissions and/or buying permits to emit (trading). There is a table cost of controlling their own emissions. Hence, if the country can buy permits from another country at lower cost, they end up with savings. On the other hand, the country that sells the permits can do so at a profit.

There is also an incentive to meet the targets because if a country is found to have emissions in excess of those allowed by the permits, that country will face severe monetary sanctions.

Thus, if a country emits more than its permits and what it can control, it needs to buy additional permits. If a country emits less than its permits by controlling its emissions, it can sell surplus permits.

Carbon trading is driven by the different marginal costs of countries in reducing emissions. If a country has a high marginal cost

for controlling its emissions, it may want to look for a country with lower marginal costs and with permits to sell.

Marginal Cost is the additional cost of producing one more unit of a commodity. The marginal abatement cost (MAC) refers to the additional cost of reducing one more unit (e.g. 1M ton) of CO₂e emissions in the atmosphere. In emission reduction, the MAC increase with increasing number units.

Total Cost is the sum of all the marginal costs (in the long run). The total abatement cost (TAC) refers to the sum of all the MACs, or $TAC = MAC_1 + MAC_2 + MAC_3 + \dots$. As in the MAC, the TAC increases with increasing number units.

If Country 1 (C1) and Country 2 (C2) each emit 15M tons of carbon dioxide and they are only allowed 7.5 metric tons each, they both need to reduce by 50% to meet the Kyoto target. Suppose when Kyoto is enforced each country is assigned 7.5 permits each. The countries have different marginal costs in reducing emissions.

MECHANICS OF THE GAME

The players of the game include Kyoto Protocol "officials" (authority that controls the market) and Countries to the Protocol who need to reduce (Annex II countries) or help reduce emissions through trading (countries in transition and all Non-Annex 1 countries).

Each player/team is given a kit containing information about their countries and the rules on how to trade. Materials include:

- Country name tags
- Information about emissions of the country and Kyoto commitments
- Number of Emissions Controlled, MAC and TAC (tabular and graphical forms)
- Rules on how to trade
- Transactions Log Book

Let us take the country profiles of the Philippines and Netherlands.

Country: **PHILIPPINES**

Present Situation: Current CO₂ emissions at **50 million tons** per year

Kyoto Commitments: 1st period: reduce current emissions to **50 million tons** per year

What does your Kyoto Commitments mean? For the 1st commitment period, you have **50 permits**, each permit allowing you to emit one million tons of CO₂. You do not have to make any emission reductions.

In the table on the right, we see the different Marginal Abatement Costs and Total Abatement Costs. If the Philippines controls only 2 units, each unit only costs \$5 to control.

But as the Philippines controls more units, the MAC increases. Controlling 4 units will now have a Total Abatement Cost of \$30, broken down as follows: the first 2 units are at \$5 each and the next 2 units are at \$10, for a total of \$30.

Now, suppose Philippines Controls 10M tonnes or 10 permits, it would spend \$180M. If the 10 permits were sold to another country at \$250M, it would gain \$70M.

PHILIPPINES			
emission	Units controlled	MAC	TAC
26	24	123	1330
28	22	111	1084
30	20	99	862
32	18	77	664
34	16	65	510
36	14	55	380
38	12	45	270
40	10	35	180
42	8	25	110
44	6	15	60
46	4	10	30
48	2	5	10
50	0	0	0

Country: **NETHERLANDS**

Present Situation: Current CO₂ emissions at **230 million tons** per year

Kyoto Commitments: 1st period: reduce current emissions to **200 million tons** per year

What does your Kyoto Commitments mean? For the 1st commitment period, you have **200 permits**, each permit allowing you to emit one million tons of CO₂. You have to reduce **30 million tons** either by domestic action or by buying permits from other countries.

In this example, the Netherlands spends

NETHERLANDS			
emission	Units controlled	MAC	TAC
165	65	490	14450
170	60	440	12000
175	55	390	9800
180	50	340	7850
190	40	290	6150
195	35	250	4700
200	30	210	3450
205	25	170	2400
210	20	130	1550
215	15	90	900
220	10	60	450
225	5	30	150
230	0	0	0

\$30/unit to control the first 5 units, \$60/unit to control the next 5 units, etc.

Hence, if NETHERLANDS commits to reduce emissions by 30 units, it would spend \$3,450M. If the 30 permits were bought instead at \$2,400M, it would save \$1,050M.

At the start of the game, each country is expected to submit a price indicating their willingness to pay for a million tons (1 permit) of Carbon. Bid prices will be shown on the screen. This is to give the players an idea which country is interested to buy.

Countries to the Protocol negotiate trade agreements with other countries. They have to assess how many permits other countries would want to sell or buy and how much. They have to negotiate trade agreements that will benefit their country.

Parties with sealed trade agreements should fill out the Certification Form (only 1 per transaction) and submit to the Kyoto Officials to register their contract and get their official transactions ID number. Information will be shown on the board for reference. Parties should also record their transactions in their individual logbooks.

At the end of the "1st commitment period" no trading will be allowed. It is assumed that all emissions not covered by permits must be done through domestic actions.

ANALYSIS OF RESULTS

In the following example, let us look at how the different "countries" traded. In the table below, Canada, EU, Germany, Japan, and US need to reduce emissions. All but US opt to buy; US opts to control its emissions.

On the other hand, China, India, Indonesia, Russia, and Ukraine do not need to reduce. China, India, and Indonesia opt to control some emissions and sell the earned permits to other countries.

Country	Current emissions	No. of permits issued	Permits bought/(sold)	No. of permits after trade	No. of units controlled
Canada	100	90	10	100	0
China	1400	1400	(178)	1222	178
EU	800	700	100	800	0
Germany	100	90	10	100	0
India	1000	1000	(60)	940	60
Indonesia	100	100	(20)	80	20
Japan	300	270	15	285	15
Russia	500	500	0	500	0
Ukraine	100	100	0	100	0
US	1400	1200	0	1200	200
TOTAL	5800	5450	0	5450	350

From the transactions below, China, India, and Indonesia earn from the transactions. Meanwhile, Canada, EU, Germany, and Japan opt to buy their permits. Because they bought it from countries where cost of control is lower, they ended up with savings, too.

Country	No. of units controlled	gross cost of control	Permits bought/(sold)	cost/(revenue) of permits	net cost of control/(revenue) w/ trading	Cost w/out Trading	savings/income
Canada	0	0	10	91	91	210	119
China	178	716	(178)	(4500)	3784	0	3784
EU	0	0	100	2750	2750	3680	930
Germany	0	0	10	500	500	600	100
India	60	120	(60)	(1500)	1380	0	1380
Indonesia	20	280	(20)	(500)	220	0	220
Japan	15	540	15	350	890	1800	910
Russia	0	0	0	0	0	0	0
Ukraine	0	0	0	0	0	0	200
US	200	4080	0	0	4080	4080	0
TOTAL	350		0			10370	

We see, therefore, that both the developed countries and the developing/underdeveloped countries can benefit from the trading scheme.

The added advantage of the scheme is that, in the process, the developing countries are able to use these Clean Development Mechanisms for their own sustainable growth.

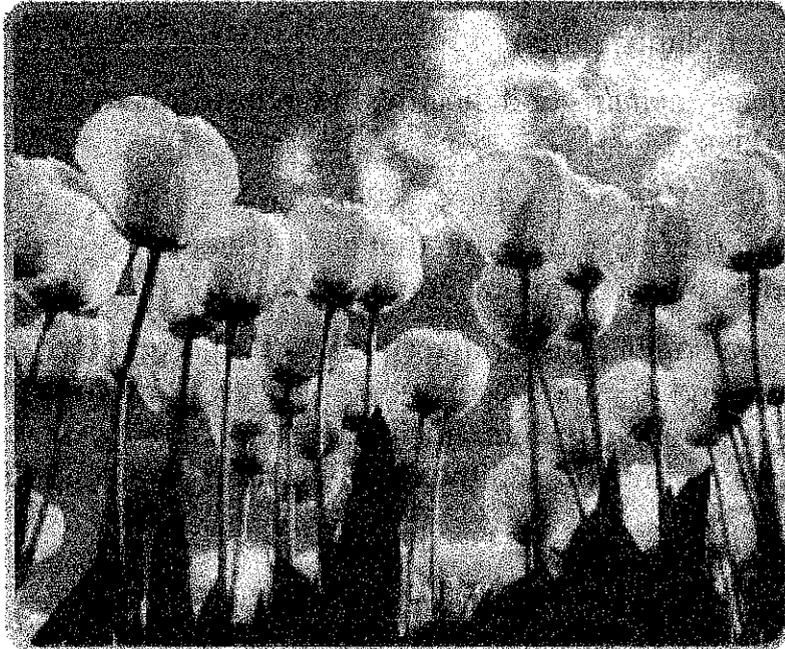
¹ Used with permission from Fr. Roberto C. Yap, S.J.

² The United Nations Framework Convention on Climate Change

Chapter 6

AN INTRODUCTION TO ENVIRONMENTAL ECONOMICS

economics and the environment
the economic value of the environment
incentive-based instruments



AN INTRODUCTION TO ENVIRONMENTAL ECONOMICS¹

What is sustainable development?

It is "development that meets the needs of the present without compromising the ability of future generations to meet their own needs."²

What are the key perspectives to making development sustainable?

According to The World Bank³:

1. *Financial capital*: sound macroeconomic planning and prudent fiscal management
2. *Physical capital*: infrastructure assets (buildings, machines, roads, power plants, ports)
3. *Human capital*: good health and education to maintain labor markets
4. *Social capital*: people's skills and abilities; institutions, relationships, and norms that shape the quality and quantity of a society's social interactions.
5. *Natural capital*: natural resources (both commercial and non-commercial) and ecological services which provide the requirements for life, including food, water, energy, fibers, waste assimilation, climate stabilization, and other life-support services

Why do we use economics in environmental policy?

Economics can be described as "the study of allocating limited resources, in the face of unlimited wants"⁴.

Economics deals with the production, distribution, and consumption of goods and services⁵, with the goal of understanding the production of goods and services in the most efficient way.

Because the environment has become a scarce resource, economics can often be useful in looking for solutions to environmental problems⁶. The environment can be seen to have economic value.

What does economic value mean?

Because resources are scarce, using them in one way means that these same resources cannot be used in an alternative way, i.e. the opportunity to use the resource in a different way is lost. The cost associated with this lost opportunity is called *opportunity cost*.

Economic value is what we associate with the benefits that could be enjoyed if a resource is used in a particular way.

Example: If a pineapple plantation is converted to a golf course, the judgement implies that the value that is attached to economic gains of the golf course is higher than the value of preserving the land for agriculture.

Example: If a mountain area is declared to be a national park, it cannot have mining activities. The judgement in this case implies that the benefits of preserving the unique national resources of that area is higher than the economic activity derived from mining.

What is environmental economics?

Environmental economics considers "the value of the environment as well as the value of economic activity in making choices, with the goal of balancing economic activity and environmental impact"⁷.

It aims to address pollution and natural resource depletion by correcting prices so they take into account "external" costs⁸, since the current model of market systems fails to do so.

External costs: uncompensated side effects of human actions. For example, if a stream is polluted by runoff from agricultural land, the people downstream suffer a negative external cost or externality.



What are the assumptions of environmental economics?

The environment provides resources, assimilates waste, and provides aesthetic pleasure to humans. These are economic functions

because they have positive economic value and could be bought and sold in the market place.

Traditionally, their value was not recognized because there is no market for these services (to establish a price), i.e., there is “market failure”⁹, which is defined as the inability of markets to reflect the full social costs or benefits of a good, service, or state of the world.

Market failure leads to inefficient or unfavorable allocation of resources¹⁰. Since economic theory wants to achieve efficiency, environmental economics is used as a tool to find a balance in the world’s system of resource use¹¹.

Historically, goods and services provided by the environment were seen to be limitless, having no cost, thus not considered scarce.

In what sense does the environment have economic value?

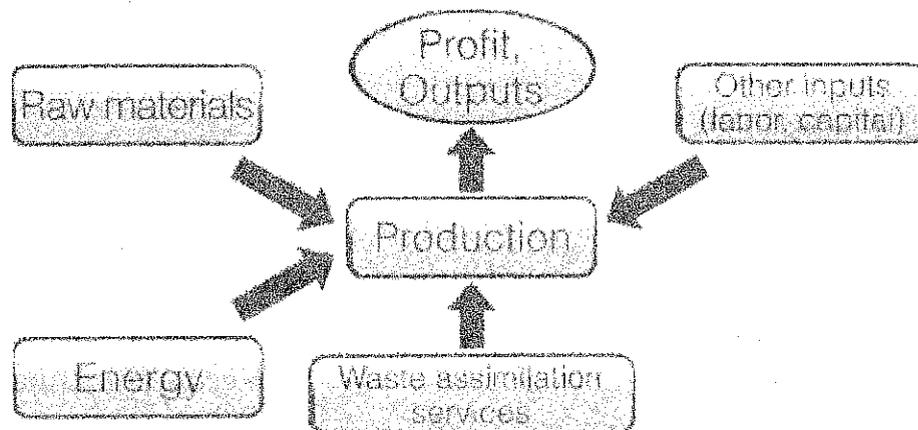
The environment provides four services to the economy¹²:

- As a source of energy and material resources (inputs to production)
- As a waste sink
- As a direct source of amenity
- As the provider of global life-support services

The value of environment or resource can be from marginal productivity:

- Energy and material resources: Change in input from env/resource ~ change in profits
- Waste: Change in output to env ~ change in profits

There are indirect environmental values¹³

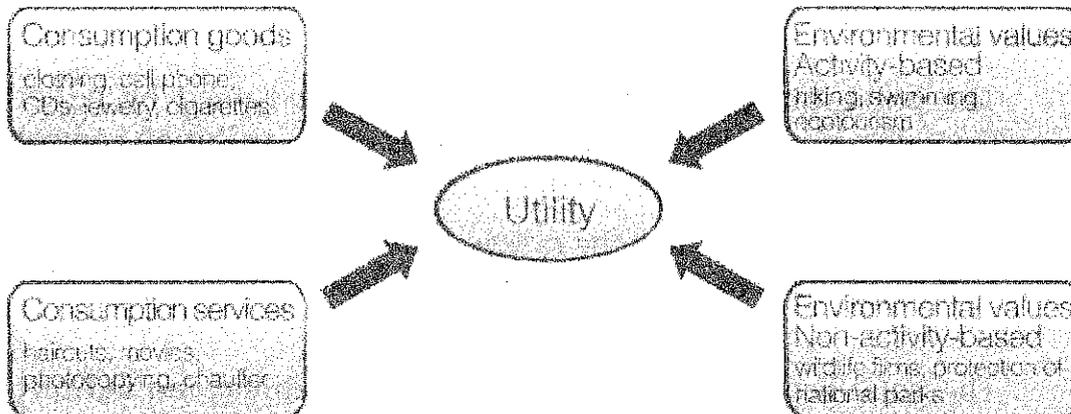


Monetary value of the output is equal to net benefit:

net benefit = (price - production cost) (quantity of goods produced)

As a direct source of amenity, the individual may derive utility, such as happiness and satisfaction from the environmental good. This refers to direct environmental values, as shown in the next diagram.

There are also direct environmental values¹⁴:



If the level of the environmental good (such as air quality) changes by a small amount, the resulting change in the utility (happiness, satisfaction) is known as the *marginal utility*.

Environmental goods are not equally valuable to everyone. Some goods do not offer or may offer less utility to different individuals.

The environment offers life-support services to the economy, such as those that are very basic to sustaining life—global climate regulation, global atmospheric chemistry, global water processes. While their value is infinite because they are basic to all life (and thus, more difficult to cost as such), it is useful to look at the value of preventing changes in these services¹⁵. The environment can have economic value even it has no market price.

For example: If we look at the costs and benefits resulting from a change in greenhouse gas emissions, this would help measure the value of preventing further changes in the global climate through enhanced global warming.

The total direct benefit(s) for preserving a section of the environment is the sum of its use and existence values.

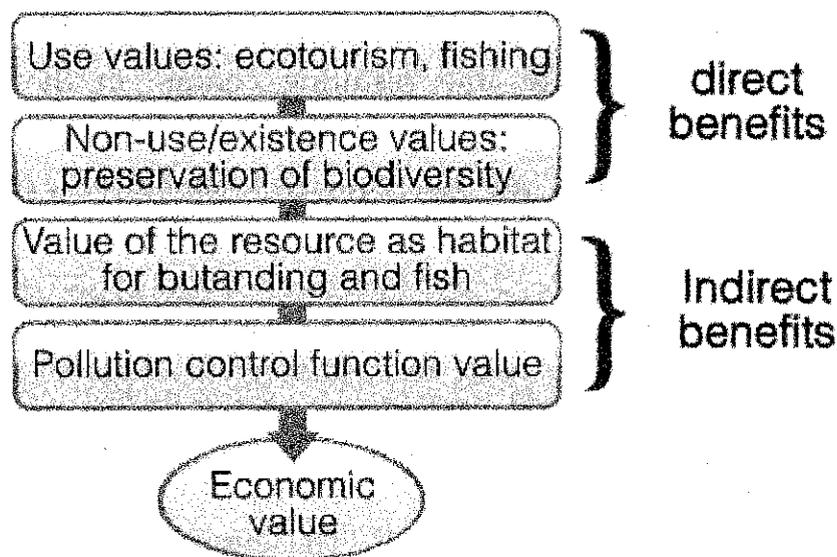
Use value is a direct benefit that is derived from the actual participation of the beneficiary, e.g., the coastal areas of Sorsogon has a use value to those who benefit from ecotourism in the area.

Non-use or existence value is an indirect benefit derived from simply knowing that the area is preserved, e.g., the existence value of the Banaue Rice Terraces is high because of its unique, irreplaceable features.

The pollution control in that area could be valued by either using the value of avoided pollution damages or the pollution control costs that would be incurred to replace the entire system.

Sometimes there is also the *option value*, which is the price that we are willing to pay to make sure that the resource is still available for the future.

The Total Economic Value is the sum of the direct and indirect benefits.



What are ways by which we calculate the value of the environment?

There are different categories of environmental valuation methods: stated preference methods, revealed preference methods, and production-function methods.

The most common method being practiced is one of the stated preference methods, namely, the contingent valuation method (CVM)¹⁶.

CVM asks respondents how they would behave if a market for the environmental goods existed. It would measure the respondents' willingness to pay (WTP) or willingness to accept compensation (WTAC).

For example: The only way of improving the water quality of the Pasig River is for all local residents to pay a surcharge on their community certificate tax. What is the maximum would they be willing to pay to have these water quality improvements?

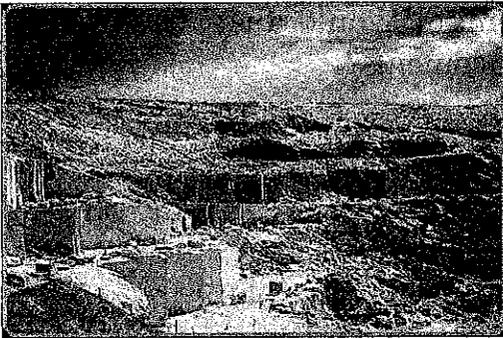
An actual case: The Exxon Valdez Incident¹⁷. Exxon Valdez oil tanker was wrecked off the coast of Alaska in 1989. Prior to this, introduction to damage claims for environmental losses were seen in the Comprehensive Environmental Response, Compensation and Liability Act regulations of 1980, and the Oil Pollution Act of 1990. The DC Court of Appeals (*State of Ohio vs. Department of Interior*): persons could sue responsible parties for lost passive use (non-use/existence) values. The environmental damage from the Valdez spill was likely passive use; active use of the area was modest.

To counter the potentially large damage claims, Exxon funded studies to discredit CVM as a method for valuing losses in passive use values. The National Oceanic and Atmospheric Administration (NOAA) convened their panel of independent and distinguished economists to conduct hearings in 1992 on validity of CVM. The panel cautiously accepted CVM with the following recommendations:

1. A dichotomous choice format should be used
2. A minimum response rate from the target sample of 70% should be achieved.
3. In-person interviews should be employed, with some role for telephone interviews in the piloting stages.
4. WTC, not WTAC, measures should be sought.
5. After excluding protest bids, a test should be made of whether WTP is sensitive to the level of environmental damage.

6. CVM results should be calibrated against experimental findings; otherwise a 50% discount should be applied to CVM results.
7. Respondents should be reminded of their budget constraints.

CVM has also been used to assess quarrying in UK¹⁸. The government wanted to impose an environmental tax on quarrying to reduce its environmental effects. The tax rate was to be determined by the local residents living near the quarry and visitors to national



parks with significant quarrying activity. There were 9,631 responses from residents and 1,019 from visitors to national parks. Around 80% of residents were not bothered by the quarry. The local and national surveys gave mean WTP values that would be used by the government in determining the environmental tax for quarrying.

Why do we need to place economic values on the environment?

They may be useful in the following contexts¹⁹:

1. Policy appraisal
2. Project appraisal
3. Environmental management
4. Environmental damage assessment
5. Setting environmental taxes
6. National accounting

The following parts are taken from "Incentive-Based Policies for Environmental Management in Developing Countries" by Robert C. Anderson²⁰

What are incentive-based instruments for environmental management?

Incentive-based instruments, such as pollution charges and tradable permits, use financial means, directly or indirectly, to motivate polluters to reduce the health and environmental risks posed by their facilities, processes, or products.

These instruments typically provide monetary and near-monetary rewards for polluting less, and impose costs of various types for polluting more.

Why should we use incentive-based instruments for environmental management?

According to economic theory and modeling exercises, they are more cost-effective than traditional forms of regulation.

They can address small sources of pollution such as households that are not easily controlled with traditional forms of regulation; polluters have a reason to improve performance relative to existing regulatory requirements.

They can provide a stimulus for technological change and innovation in pollution control.

Because of their limited resources and often-severe pollution problems, developing nations increasingly are being asked by multilateral development organizations (e.g., the World Bank and the Asian Development Bank) and by individual donor agencies (e.g., USAID) to consider and implement incentive-based regulations for managing the environment in order to improve the environmental effectiveness of traditional regulatory strategies as well as to reduce compliance costs.

How different is this approach from the traditional enforcement of regulations?

The approach differs in terms of their information and enforcement requirements, as well as institutional, political, and other demands. Among incentive-based instruments, there is tremendous variation in the prerequisites necessary for successful implementation.

How do incentive-based instruments improve cost-effectiveness of controlling pollution?

The range among costs per ton incurred to control pollution can vary by several orders of magnitude. Pollution charges and tradable permits offer a means of improving cost-effectiveness relative to purely command and control approaches by allowing control efforts to be effectively targeted where they are less costly.

Case: Air pollution in Cairo, Egypt

Cairo experiences some of the highest particulate matter readings in the world. Annual mean readings are 5 to 10 times U.S. and World Health Organization norms (depending upon the measure).

Egyptian authorities have required electrostatic precipitators at some but not all of the local cement plants (average cost \$9 per ton of PM reduction) and begun a vehicle inspection and maintenance and old taxi scrapping programs (average cost well over \$5,000 per ton of PM and other pollutants).

For political reasons, other cheaper control measures are not under consideration—such as emission controls at large state-owned steel and fertilizer plants and elimination of subsidies for high sulfur fuel oil.

What kinds of economic incentives have been implemented to help manage the environment?

1. Fees/charges/taxes on pollution - much simpler to impose, though rarely are they seen at levels high enough to affect behavior

2. Subsidies for pollution control; removing subsidies for environmentally harmful programs
3. Deposit-refund systems
4. Performance bonds
5. Marketable permits/pollutant trading - imposes demands for pollutant dispersion modeling, monitoring, tracking, and enforcement that exceed capabilities of developing countries
6. Liability - unattractive for controlling routine releases
7. Information disclosure
8. Voluntary action

What factors affect implementation of these incentives?

1. political will - augmented through information campaigns and pollution reporting to garner popular support
2. external drivers - lending by international institutions comes with conditional terms for price or subsidy adjustments
3. presence of command and control measures

Table 1. Economic Instruments for Managing the Environment

Instrument	Examples	Situation Where Instrument Works Best
Pollution charges, taxes and fees	<ul style="list-style-type: none"> • Emission charge: China, Central & Eastern Europe, FSU • Effluent charge: all above plus Philippines • Sewage charge: widespread • Solid waste: widespread application 	<ul style="list-style-type: none"> • Damage caused by pollution is directly proportional to the amount of pollution. • Monitoring data available
Input or output charges, taxes and fees	<ul style="list-style-type: none"> • Carbon tax: no developing countries yet • Leaded gas tax: Thailand, Philippines • Fertilizer tax: no developing countries • Water user fee: widespread • Sewer fee: widespread • CFC tax: no developing countries 	<ul style="list-style-type: none"> • Numerous sources • No monitoring data • Damage caused by pollution is directly proportional to the amount of pollution. • Linkages between input or output and environment
Subsidies for environmentally friendly activities	<ul style="list-style-type: none"> • Industrial pollution control: many examples • Agricultural activity: many examples • Municipal sewage plant: many examples 	<ul style="list-style-type: none"> • Monitoring data available • Subsidy is not likely to stimulate new entrants
Removal of environmentally harmful subsidies	<ul style="list-style-type: none"> • Fuel subsidies: China • Agricultural subsidies: Egypt and others 	<ul style="list-style-type: none"> • Environmental harms from the subsidies can be documented • Political will exists to remove subsidies

Instrument	Examples	Situation Where Instrument Works Best
Deposit-refund	<ul style="list-style-type: none"> • Beverage container: many voluntary examples, mandatory in Korea • Lead-acid batteries: many voluntary examples • Automobile bodies: Greece 	<ul style="list-style-type: none"> • No monitoring data • Recyclable product
Performance bonds	<ul style="list-style-type: none"> • Mining: Indonesia • Timber harvesting: Philippines 	<ul style="list-style-type: none"> • Specific actions desired
Tradable permits	<ul style="list-style-type: none"> • Emission: Santiago, Chile • Effluent: no developing countries • Water rights: Chile • Fisheries access: several 	<ul style="list-style-type: none"> • Few, if any, pollution "hotspots" • Precise control over amount of pollution important • Marginal control costs vary across sources
Liability	<ul style="list-style-type: none"> • Natural resource damage assessment: Russia, FSU, others on case-by-case basis 	<ul style="list-style-type: none"> • Large impacts
Information provision	<ul style="list-style-type: none"> • Toxic releases: Mexico, India, others • Product characteristics: Korea, Thailand, others 	<ul style="list-style-type: none"> • Recipients understand information
Voluntary mechanisms	<ul style="list-style-type: none"> • Energy conservation: many under development • Water conservation • Pollution prevention: many cleaner production pilot projects 	<ul style="list-style-type: none"> • Firms willing to exceed applicable standards

FEES, CHARGES, AND TAXES

What kinds of fees, charges, and taxes are involved in this?

1. Environmental levies may be imposed on inputs, outputs, or on pollution generated by sources. Levies on inputs and products generally are the simplest to collect but are more removed from the actual decision to pollute, weakening the incentive.
2. Emission and effluent fees impose requirements on regulators and the regulated community:
 - a. Measurement of mass emissions or effluent – difficult to measure for air emissions; most emission standards are in terms of concentrations, not mass, so that only fairly crude estimating techniques normally are used to calculate payments due.
 - b. Setting appropriate fee level
 - c. Collecting amounts due, and
 - d. Disposition of the amounts collected

What are some examples of levies?

1. Case: *The Chinese Pollution Levy System*
 - a. Most comprehensive emission charge system in the developing world
 - b. Charges are too low to directly affect polluting behavior
 - c. About three-fourths of levy payments were returned to sources for pollution control investments; believed to have had an impact on emissions.
 - d. The remainder pays for environmental management at the local and regional level.
 - e. Thus, the Chinese levy can be thought of as a hybrid policy with a substantial subsidy component.
 - f. China is moving from concentration-based discharge limits toward mass-based permitting to make the pollution levy more effective, starting first with mass-based effluent

charges and only recently adding mass-based charges for sulfur dioxide.

- g. Devising acceptable means to measure mass emissions and the attendant increase in regulatory burdens have slowed the process.

2. Case: *Laguna Lake in the Philippines*

- a. Water effluent discharge is different in that sampling and flow measurement are relatively inexpensive.
- b. A sophisticated effluent discharge fee system with high fee levels has proven effective in limiting BOD discharge

3. Charges are sometimes levied on products—e.g., chlorofluorocarbons, low-efficiency automobiles, fertilizer, motor oil, and packaging—that are believed to have harmful effects on the environment.

4. Other fees are charged for activities that are potentially damaging to the environment. Gasoline taxes in Thailand and the Philippines that differentiate between leaded and unleaded are an example.

SUBSIDIES FOR POLLUTION CONTROL

What are the types of subsidies for pollution control?

1. Monetary payments to encourage environmentally friendly actions
2. Existing subsidies for energy, water, and other resources that have environmentally harmful consequences.

What forms of subsidies are available for supporting reductions in pollution?

1. Grants
2. low-interest loans
3. favorable tax treatment
4. preferential procurement policies for products believed to pose relatively low environmental risks

What activities are supported by these subsidies?

1. private-sector pollution prevention and control activities
2. cleanup of contaminated industrial sites
3. farming and land preservation
4. consumer product waste management
5. alternative automobile fuels
6. clean-running cars
7. municipal wastewater treatment

Why are subsidies for environmental management criticized?

1. The government entity and, ultimately, the taxpayers, which provide the subsidy, help to bear the costs that should be the responsibility of the polluter. However, sometimes the subsidy is paired with a tax, leaving the taxpayer burden unchanged.
2. Other environmentally related subsidies, such as federal support for timber harvesting in the national forests, have proven harmful to the environment. Nonetheless, subsidies have become a fairly common tool to manage the environment at every level of government.

How else are subsidies used for environmental management?

Elimination of environmentally harmful subsidies, e.g., when the World Bank made the phase-out of pesticide subsidies a condition for new lending to Egypt in the early 1990s. The use of pesticides dropped by nearly 70% over the next five years.

DEPOSIT-REFUND SYSTEMS

What are deposit-refund systems?

Deposit-refund systems require a monetary deposit at the time of sale of a product. The deposit is returned when the item is returned at the end of its useful life.

How are they implemented?

1. Most appropriate for discrete, solid commodities that would cause environmental harm through their improper disposal (e.g., beverage containers, batteries, and car bodies).
2. Widespread use is limited because of the high cost of implementation.
 - a. Collecting and refunding deposits on the sale of individual products tends to be expensive
 - b. Additional costs are involved in collecting and returning used products for disposal.
3. Case: *US*
 - a. Products
 - i. lead-acid batteries
 - ii. aluminum and glass cans
 - iii. pesticide containers
 - iv. tires
 - b. Creation and management of disposal system (usually privately managed), especially for used valuable products, e.g., lead-acid batteries. The fees charged by this system help subsidize the return of recyclable products.
4. Case: *South Korea*
 - a. 1991 amendment to its Solid Waste Management Act
 - b. Comprehensive deposit program
 - i. packaged paper
 - ii. metal cans
 - iii. glass and PET bottles
 - iv. batteries
 - v. tires
 - vi. lubricating oils
 - vii. televisions
 - viii. washing machines.

PERFORMANCE BONDS

What are performance bonds?

Performance bonds are fees levied upon companies that extract certain natural resources, such as timber, coal, oil, and gas, and on construction activities; they can be refunded when the payer fulfills certain obligations, similar to a deposit-refund system.

How do performance bonds help in environmental management?

1. They give companies an economic incentive to reclaim mining sites, follow logging regulations, and perform construction activities in compliance with applicable rules.
2. A firm's ability to obtain future mineral leases, timber harvesting contracts, or construction permits is dependent in large part on satisfying today's regulatory requirements.
3. Case: *The People's Republic of China environmental protection*
 - a. "three simultaneous" policy, which seeks to have projects designed, constructed, and operated in compliance with all environmental regulations
 - b. overseen by the Ministry of Finance or by the relevant economic sector institution
 - c. Because PROC has limited experience with performance bonding to ensure sufficient financial resources for environmental management, the bond is intended to guarantee that an enterprise designs, builds, and operates its pollution control facilities in a manner that's consistent with applicable regulatory requirements.
 - d. Provincial and local environmental protection bureaus administer the bond.
4. Case: *Indonesia's mining operation*
 - a. In 1997, mine operators were required to post a reclamation guarantee reflecting the value of the potential environmental damage the mining operation could cause.

- b. The amount of the guarantee is set at the estimated reclamation cost should the damage be caused.
- c. The Indonesian government refunds the guarantee upon satisfactory performance by the operator.

5. Case: *Philippines Forest Guarantee Bond*

- a. In 1991, a returnable performance bond was required for use of forests
 - i. encourage responsible long-term management by leaseholders
 - ii. offer a means for promptly penalizing lessees if there is a violation of the agreement
 - iii. provide a market-based measure of profitability of a forest lease with harvesting rights by having would-be leaseholders bid against one another for the right
- b. Floor price for leases: about 10% of the value of the standing timber
- c. Scheme suspended in 1995: bid amounts were not sufficient to discourage clear-cutting and did not produce the desired investments in planting and protecting forests. Instead, the bonds simply were forfeited.

MARKETABLE PERMITS

What are marketable permits?

1. The broad objective of emissions trading is to lower the total costs of achieving a given environmental goal.
2. The general principle of emissions trading systems is that sources may satisfy their obligations by one of two means:
 - a. limiting the releases of pollution to no more than the permitted amount, or
 - b. releasing more (or less) than the permitted amount and exchanging credits representing any deficiency (or surplus) in the quantity of emissions

Who would be involved in the trading of credits?

1. Producers with average incremental costs of pollution control are likely to meet their obligations without trading.
2. Producers with relatively high incremental control costs are likely to be buyers of pollution reduction credits.
3. Sources with relatively low incremental costs of control are likely to be sellers of excess credits.

What are the technical and regulatory requirements of emission trading?

1. the legal and regulatory framework, including the delineation of the roles and responsibilities of the different parties (regulators, emission sources, and others);
2. the overall cap on emissions and the decision of which sources to include;
3. the determination of emission quotas;
4. timing and spatial issues, such as how long the program will run, whether credits can be saved in one period and used in subsequent periods, and whether there will be adjustments to account for differences in the environmental impact of emissions from different locations;
5. the mechanism (or mechanisms) for measuring emissions (often a sophisticated and costly continuous emission monitoring device);
6. tracking and enforcement requirements.

Why do developing countries have difficulty with emission trading?

1. Requirements are considerably more challenging than the requirements for emission fees:
 - a. greater precision of measurement desired
 - b. determining initial allocations
 - c. tracking needs
 - d. the question of allowing banking

Examples

1. *United States*: emission trading
2. *Germany*: offset program that allows new sources to be located in areas with poor air quality without causing further deterioration in air quality
3. *Santiago, Chile*: program in tradable particulate credits in 1992
4. *Taipei, Taiwan*: 1993 revision of Air Pollution Control Act included provisions under which individual sources may be exempted from emission standards if they can control sufficient amounts of the same types of emissions elsewhere in the same air pollution control region
5. *Slovakia*: established the foundation for trading in SO₂ emissions, with actual trading not slated for another couple of years
6. *Ontario Canada*: pilot emission reduction trading program dating from 1997 that includes VOC, SO₂, CO₂, and NO_x
7. *People's Republic of China*:
 - a. nationwide trading of SO₂ emissions from electric utilities, patterned after the U.S. Acid Rain program
 - b. trading of SO₂ emission reduction requirements in the city of Taiyuan (Shanxi Province). Many countries have started to design programs in tradable greenhouse gas emission credits.

LIABILITY

How is liability a powerful incentive?

1. Liability for damage to human health and the environment encourages corporations to engage in safe environmental practices and compensate those who are injured.
2. Liability for pollution (payment for damage caused) forces polluters to control pollution to the point where the marginal pollution damage equals the marginal costs of control; total payments for controlling pollution and compensating victims are minimized.

What are the forms of liability?

1. Civil law - Civil liability is expressly written into law; many environmental statutes worldwide have civil liability provisions
2. Common law

What are the problems of liability?

1. No universal rule on jurisdiction: Should a case be brought in the developing country where the spill occurred or in the home country of the concern that had the spill?
2. Unclear liability rules or inadequate financial guarantees prior to the start of operations: Individuals harmed by spills may not be compensated.
3. High cost of pursuing liability claims and highly uncertain outcomes: liability is most appropriate only for large incidents and not routine polluting activities.
4. Option of bankruptcy: attractive for smaller and under-capitalized enterprises in the event of a large pollution incident.
5. Performance bonding or some other type of guarantee may be desirable for enterprises that have the potential to cause significant environmental harm.
6. *Case:* On April 4, 1996 Cunard Lines' *Royal Viking Sun* strayed from course and ran into a coral reef off Tiran Island near Ras Mohammed in the Red Sea. Before the vessel was freed, it damaged approximately 2,000 square meters of reef. Egyptian authorities impounded the vessel and demanded \$23.5 million in compensation for lost tourism revenues and damage to the environment. Cunard Lines settled for that amount (equivalent to more than \$10,000 per square meter of reef).

INFORMATION DISCLOSURE

Why is the collection and public availability of information on environmental performance a strong incentive for producers to reduce their emissions of pollution?

1. The act of collecting emissions information lead to better understanding about the nature and magnitude of their emissions.

2. Public accessibility to information gives workers and local communities have a much better idea of the environmental risks they face, so they are more prone to support or demand actions to reduce emissions.
3. Decline of a source's emissions over time leads to better relationships with its employees and with the local community.
4. Proven, long-term record of environmental stewardship makes a company's products more desirable to consumers.

What are the forms of information disclosure?

1. Release and transfer reporting
2. Color-coding of firms
3. Product labeling

Example

1. *Indonesia*: the Environmental Impact Management Agency created the Program for Pollution Control, Evaluation, and Rating (PROPER)
 - a. rate factories on their compliance with national wastewater discharge standards
 - b. disclose the ratings to the public
2. PROPER uses five color categories to rate environmental performance:
 - a. gold - firms that use best technology and reduce pollution to 5% of the national standard
 - b. green - firms that reduce pollution to 50% of national standards
 - c. blue - compliance with national standards
 - d. red - firms that fail to meet national standards
 - e. black - those without pollution controls
3. Formal as well as informal sanctions:

- a. Indonesian stock exchange will not list securities of firms that fall short of the blue classification
 - b. Cultural factors - such as shame avoidance and citizen lawsuits
 - c. June 1995: 35.3% of the 187 factories were in compliance with the government's water pollution regulations
 - d. 1997: 49.2% of the factories were in compliance.
4. Similar programs are being developed in the Philippines, Mexico, Columbia, and the People's Republic of China.

VOLUNTARY ACTIONS

1. Regulators seek ways to motivate firms to go beyond compliance with existing environmental regulations.
2. *Indonesia: PROKASIH* (or Clean Rivers Program)
 - a. The largest polluters are encouraged to sign agreements to reduce pollution by specific amounts over a specific time period.
 - b. In 2.5 years: about 1,000 polluters signed agreements, the majority of which took measures to reduce pollution.
 - c. The government released information on which signatories have complied and which have not. It encouraged press coverage of signatories' performance under the program:
 - i. Those who do not participate receive no publicity.
 - ii. Those who join the program and follow through on commitments receive a reward in the form of a public commendation.
 - iii. Those who fail to follow through on their commitments receive adverse publicity.

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Chapter 6

THE ENVIRONMENTAL LEGAL FRAMEWORK

evolution of environmental activities
evolution of Philippine environmental law
private sector initiatives



ENVIRONMENTAL LEGAL FRAMEWORK¹

EVOLUTION OF ENVIRONMENTAL ACTIVITIES

History of Environmental Movement: Civil Society & International Development Organizations

The Greenies

These militant groups are true huggers. Their methods included lying down on roads and railroad tracks. Examples of these groups are Greenpeace, Friends of the Earth. There are also some moderate groups among them.

World Conservation Union (IUCN), 1948

The mission of this "semi-governmental NGO" is "to influence, encourage and assist societies throughout the world to conserve the integrity and diversity of nature and to ensure that any use of natural resources is equitable and ecologically sustainable".

World Wide Fund for Nature (WWF), 1961

WWF works together with the IUCN "to harness public opinion and educate the world about the necessity for conservation". Today, it works for the conservation of biological diversity, sustainable use of resources and the reduction of pollution and wastes.



This concern was first raised in the book *Silent Spring (1961)* by Rachel Carson. This book warned that unless the use of the environment was controlled, many species of animal life will vanish. Pesticides used to kill insects were also affecting the birds feeding on these insects.

United Nations Environment Programme (UNEP) 1972

The UNEP is the focal point for environmental action and coordination within the United Nations organization.

Environmental Defense Fund (1967)

It helped spearhead the drive to end pollution, conserve energy, and improve public health by removing harmful additives from food.

Sierra Club

This group is concerned with land use, air pollution and energy conservation.

World Commission on Environment and Development (WCED) 1983

The Brundtland Commission published "Our Common Future", 1987 and elaborated on the concept of "sustainable development".

Overview of International Environmental Conventions

International Environmental Principles

- Principles shaping global environmental and development instruments
- Principles relating to transboundary environmental disputes
- Principles for developing national environmental laws
- Principles governing international institutions

General Agreements

- UN General Assembly Resolution 1803 on Permanent Sovereignty over Natural Resources (1962)
- Stockholm Declaration of the United Nations Conference on Human Environment (1972)
- UN General Assembly Resolution 37/7 on a World Charter on Nature (1982)
- United Nations Conference on Environment and Development (1992)

Multilateral Environmental Agreements

- Global Environmental Agreement
- Regional Environmental Agreements

Early Conventions

- International Convention for the Regulation of Whaling (1946)
- International Convention for the Protection of Birds (1950)
- Vienna Convention on Civil Liability for Nuclear Damage (1963)
- Ramsar Convention on Wetlands of International Importance (1971)

The UNEP Conventions

- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)
- The Bonn Convention on Migratory Species of Wild Animals (CMS)
- The Vienna Convention and Montreal Protocol on Substances that Deplete the Ozone Layer
- Basel Convention on Transboundary Movements of Hazardous Wastes and their Disposal
- Rotterdam Convention on Prior Informed Consent (PIC)

The UNECE Conventions

- Convention on Long Range Transboundary Air Pollution (LRTAP)
- EMEP Protocol
- Protocol on the Reduction of Sulphur Emissions by at least 30%
- Protocol on the Control of the Emissions of NOx
- Protocol Concerning the Control of VOC
- Protocol on Persistent Organic Pollutants (POPs)
- Protocol on Heavy Metals
- Convention on Environmental Impact Assessment in a Transboundary Context

Global Environmental Agreements

United Nations Conference on Environment and Development (UNCED), 1992

- Earth Summit at Rio de Janeiro
- Signed the UNFCCC & CBD
- Endorsed the Rio Declaration & the Forest Principles
- Adopted Agenda 21

The Rio Conventions

- UN Framework Convention on Climate Change
- Kyoto Protocol to the Convention on Climate Change
- Convention on Biological Diversity (CBD)
- United Nations Convention to Combat Desertification (UNCCD)

Regional Environmental Agreements

- Convention Relative to the Preservation of Fauna and Flora in their Natural State, 1933
- Earth Summit at Rio de Janeiro
- Signed the UNFCCC & CBD
- Endorsed the Rio Declaration & the Forest Principles
- Adopted Agenda 21
- ASEAN Agreement on the Conservation of Nature and Natural Resources (Kuala Lumpur), 1985
- Treaty on the Southeast Asia Nuclear Weapon-Free Zone (Bangkok Treaty), 1995
- ASEAN Agreement on Transboundary Haze Pollution, 2002

Other International Agreements

- FAO Code of Conduct on Distribution and Use of Pesticides



EVOLUTION OF PHILIPPINE ENVIRONMENTAL LAW

Hierarchy of Laws and Regulations

- Law
- Presidential Decree
- Executive Order
- Administrative Order
- Proclamation
- Memorandum Order
- Implementing Rules and Regulations
- Ordinance

1987 Philippine Constitution

- “The State shall protect and advance the right of the people to a balanced and healthful ecology in accord with the rhythm and harmony of nature.” (Section 6, Article II, State Policies)
- “All lands of the public domain, waters, minerals, coal, petroleum, and other mineral oils, all forces of potential energy, fisheries, forests or timber, wildlife, flora and fauna and other natural resources are owned by the State. With exception of agricultural lands, all other natural resources shall not be alienated. The exploration, development, and utilization of natural resources shall be under the full control and supervision of the State.” (Sec.2, Article XII, National Economy and Patrimony)

Environmental Laws

General Environmental Laws

Overview

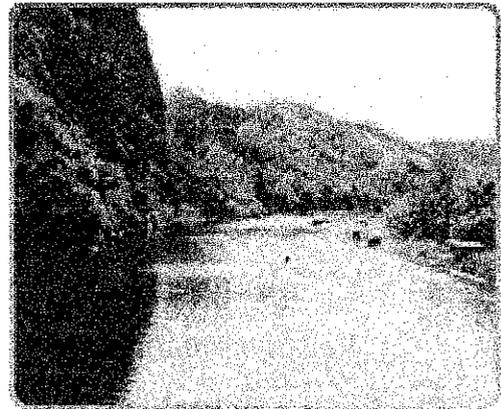
- Presidential Decree No. 1151 (1977) Philippine Environment Policy
- Philippine Agenda 21

Presidential Decree No. 1151 (1977) Philippine Environment Policy

This decree declares a continuing policy of the State (a) to create, develop, maintain and improve conditions under which man and nature can thrive in productive and enjoyable harmony with each other, (b) to fulfill the social, economic and other requirements of present and future generations of Filipinos, and (c) to insure the attainment of an environmental quality that is conducive to a life of dignity and well-being.

It establishes specific environment management policies and prescribing environment quality standards in terms of the following concerns:

- (a) air quality management;
- (b) water quality management;
- (c) land use management;
- (d) natural resources management & conservation;
- (e) waste management;
- (f) miscellaneous provisions like population-environment balance & environmental education



Philippine Agenda 21

This was made operational on September 1996 by virtue of Presidential Memorandum Order No. 399. It was part of the country's response to fulfill its commitments in the historic Earth Summit in 1992. The Philippine Council for Sustainable Development (PCSD) was created to oversee and monitor operationalization of PA 21.

Air Quality Management

Republic Act 8749 (Philippine Clean Air Act of 1999)

- DAO No. 81, Series of 2000 (Integrated Air Quality Improvement Framework/Air Quality Action Plan)
- DAO No. 82, Series of 2000 (Implementing Rules and Regulations of the Philippine Clean Air Act)

Implementing Agencies:

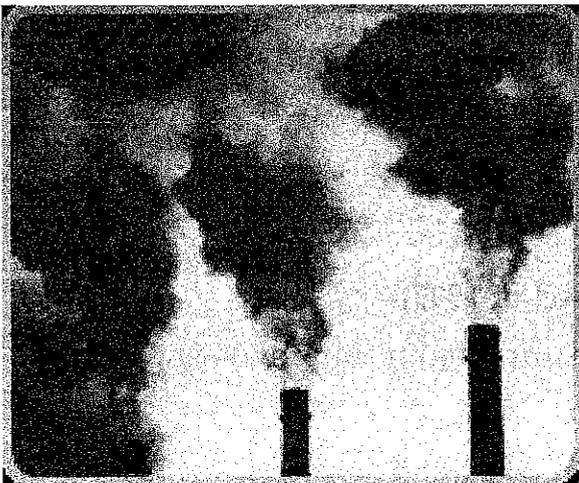
- DENR
- DOTC
- DTI
- DOE
- DOST

Requirements & Permits Issued:

- For stationary sources
 - Authority to Construct
 - Permit to Operate
 - Emission Quotas, Emission Charge, Financial Guarantee Mechanisms
- For mobile sources
 - Certificate of Conformity (COC)
 - Certificate of Compliance to Emission Standards (CCES)
 - Accreditation by DTI of PETCs

Violations and Penalties:

- Actual exceedance of standards for stationary sources - imposition of fine not to exceed P100,000 for every day of violation
- Violation of standards for motor vehicles - fines not exceeding P6,000



- Other violations include misfuelling and prohibition on manufacture import sale of leaded gasoline and of engines and/or components requiring leaded gasoline

Water Quality Management

Presidential Decree No. 984 (National Pollution Control Decree of 1976)

- DAO No. 34, Series of 1990 (Revised Water Usage and Classification/ Water Quality Criteria amending Section Nos. 68 and 69, Chapter III of the 1978 NPCC Rules and Regulations)
- DAO No. 35, Series of 1990 (Revised Effluent Regulations of 1990, Revising and Amending the Effluent Regulations of 1982)

Implementing Agency: DENR – Environmental Management Bureau (EMB) and Regional Offices

Requirements & Permits Issued:

- Authority to Construct
- Permit to Operate
- Pollution Control Officers (PCOs) of firms required to submit quarterly reports on their operations and efficiency of their WTF



Violations and Penalties:

- Prohibition against disposing into any water and/or land resources any organic or inorganic substances and gaseous or liquid form that shall cause pollution
- Not securing a permit for the construction, installation, modification, or operation of the WTF
- Person found violating or failing to comply with any order, decision, or regulation of the PAB for the control or abatement of pollution – fine not to exceed P5,000 per day

Environmental Planning

Presidential Decree No. 1586 (1978): Establishing the Environmental Impact Statement System

This decree declares the State policy to attain and maintain a rational and orderly balance between socioeconomic growth and environmental protection. It centralizes the EIS System under the then National Environmental Protection Council (NEPC) and authorizes

the President and NEPC to declare certain projects, undertakings or areas in the country as environmentally critical.

Presidential Proclamation No. 2146 (1981)

This proclaims certain areas and types of projects as Environmentally Critical and within the scope of the environmental impact statement system established under P.D 1586.

- DAO 96-37 (Revising DAO 21, Series of 1992, To Further Strengthen the Implementation of the Environmental Impact Statement (EIS) System)
- DAO 2000-05 (Revising DAO 94-11, Supplementing DAO 96-37 and Providing for Programmatic Compliance Procedures within the EIS System)
- DAO 2000-28 (Implementing Guidelines on Engineering Geological and Geohazard Assessment as Additional Requirements for ECC Applications covering Subdivisions, Housing and Other Land Development and Infrastructure Projects)

Environmental Compliance Certificate (ECC)



This document is issued by the DENR Secretary or RED. The certification is based on the representations of the proponent and the preparer. It is reviewed and validated by the EIA Review Committee, the proposed project or undertaking will not cause a significant negative environmental impact.

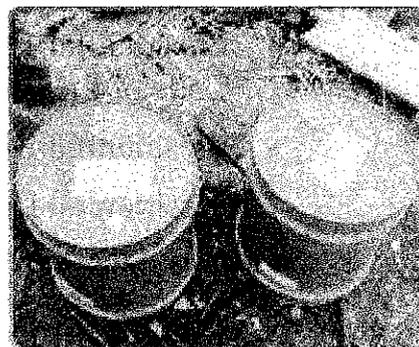
Violations and Penalties:

- Projects established or operating without ECC – ordered closed through CDO and payment of fine of P50,000 for every violation
- Projects violating ECC conditions, misrepresentations in the IEE/EIS – suspension or cancellation of its ECC and/or fine not to exceed P50,000 for every violations/misrepresentation

Waste Management

Chemicals and Hazardous Waste

- Republic Act No. 6969 (1990): Toxic Substances and Hazardous and Nuclear Waste Control Act of 1990
- DAO No. 29, Series of 1992 (Implementing Rules and Regulations of Republic Act No. 6969)
- DAO No. 28, Series of 1992 (Importation of Recyclable Materials containing Hazardous Substances)



Solid Waste

- Republic Act No. 9003 (2000): Ecological Solid Management Act
- DAO No. 38 Series of 2002 (Implementing Rules and Regulations of Republic Act No. 9003)
- Presidential Decree No. 856 (1975): Sanitation Code

Republic Act No. 6969 (1990): Toxic Substances and Hazardous and Nuclear Wastes Control Act of 1990

This declares the policy to regulate, restrict or prohibit the importation, manufacture, processing, sale, distribution, use and disposal of chemical substances and mixtures that present unreasonable risk and/or injury to health or the environment; to prohibit the entry, even in transit, of hazardous and nuclear wastes and their disposal into the Philippine territorial limits for whatever purpose; and to provide advancement and facilitate research and studies on toxic chemicals.

Republic Act No. 9003 (2000): Ecological Solid Waste Management Act

This law declares the adoption of a systematic, comprehensive and ecological solid waste management program as a policy of the State. It adopts a community-based approach and mandates waste diversion through composting and recycling. The segregation of solid

waste at source is mandatory. It places restriction on the use of environmentally non-acceptable packaging material

Other Environmental Legislation

- Presidential Decree No. 705, as amended (1975): Forestry Reform Code of the Philippines
- Presidential Decree 979 (1976): Marine Pollution Decree of 1976
- Presidential Decree 1067: Water Code of the Philippines
- Republic Act No. 7586 (1992): The National Integrated Protected Areas System Act of 1992
- Republic Act No. 7942 (1995): The Philippine Mining Act of 1995

Civil Code Provisions concerning the Environment

Human Relations

- Articles 19 - 32
- This is relevant to private environmental enforcement.

Nuisance

- Articles 694 - 707
- It is defined as "any act, omission, establishment, business, condition of property, or anything else which:
 1. Injures or endangers the health or safety of others; or
 2. Annoys or offends the senses; or
 3. Shocks, defies, or disregards decency or morality; or
 4. Obstructs or interferes with the free passage of any public highway or street, or any body of water; or
 5. Hinders or impairs the use of property

Damages

- Articles 2195 - 2235
- These may be actual or compensatory; moral; nominal; temperate or moderate; liquidated; or exemplary or corrective.

Quasi-Delict

- Articles 2176 - 2194

Legal Easement

- Articles 634 - 681
- Easements imposed by law have for their object either public use or the interest of private persons.
- Covers right of way, easements of light and view, drainage and falling waters, planting and construction.
- Water Code is a special law affecting easements involving flowing water.

Government Agencies involved in Environmental Concerns

- DENR
- LLDA
- DOE
- DOTC
- DTI

Executive Order No. 192 (1986)

This is the Reorganization Act of the Department of Environment and Natural Resources. It created the Environmental Management Bureau (EMB) by the integration of the NEPC, the National Pollution Control Commission (NPCC) and the Environmental Center of the Philippines (ECP).

Republic Act No. 4850 (1966): Laguna Lake Development Authority Act of 1966

- Executive Order No. 927 (1983): Further Defining Certain Functions and Powers of the LLDA
- Presidential Decree No 813: Amending RA 4850
- LLDA Board Resolution No. 96-33: Approving the Rules and Regulations Implementing the Environmental Users Fee System in the Laguna de Bay Region

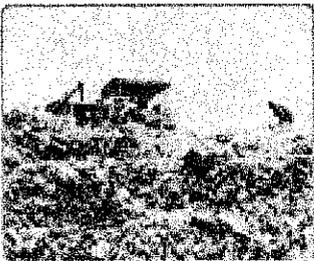
Environmental Powers of the Local Government Units

Constitutional Provisions - 1987 Philippine Constitution

- “The State shall ensure the autonomy of local governments.”
Section 25, Article II, State Policies
- “Local governments shall be entitled to an equitable share in the proceeds of the utilization and development of the national wealth within their respective areas, in the manner provided by law, including sharing the same with the inhabitants by way of direct benefits.” Section 7, Article X, Local Government

Local Government Code (Environment-related Provisions)

Republic Act No. 7160 (1991): Local Government Code:



This prescribes, among others, the devolution, transfer and implementation of certain national environmental management functions, programs and projects to the local government units.

PRIVATE SECTOR INITIATIVES

Environmental Management

- In response to external (legislation, civil society, market) and internal (shareholders/investors) pressures
- Resource Conservation and Waste Management

Civil Society & International Development Organizations

- **Civil Society-led Industry-level charters**
 - UNEP Financial Institutions Initiative
 - UNEP Insurance Initiative
 - ICC Business Charter for Sustainable Development

- **Third-party certification** - Certifies processes or products
 - ISO 14001 International Environmental Standard
 - European Eco-Management and Audit Scheme (EMAS)
 - UK BS7750
 - Forest Stewardship Council/Marine Stewardship Council
 - International Federation of Organic Agricultural Movements certifications
 - ECO-OK Program
 - SmartWood Program
- **Private Sector Environmental Associations**
 - World Business Council for Sustainable Development (WBCSD)
 - International Petroleum Industry Environmental Conservation Association
 - Green Hotels Association
 - Prince of Wales Business Leaders Forum
 - "Friends of World Conservation"
- **Environmental Awards for Industry**
 - Reuters-IUCN Media Awards
 - British Airways Tourism for Tomorrow Awards
 - Green Globe Awards



Philippine Scene

- **Philippine Business for the Environment (PBE)**
 - Industrial Waste Exchange Program (IWEP)
 - Business and Environment Magazine
 - Environtech trade exhibitions
 - Environmental Training/Manuals

- **Business Agenda 21**

This “living document” was developed by at least 73 industry associations through an exhaustive process of consultations from 1998 to 1999 across the country. It is the private sector’s blueprint for sustainable development. It consists of a set of industry association’s environmental charters and action plans. The medium to long-term plan of the business sector consists of initiatives principally involving their operations that will ultimately protect the environment but also ensure their economic viability.

- **DTI-UNDP**

This Private Sector Initiative in managing the Environment (PRIME) Project is a four-module program that aims to strengthen private sector initiatives in reducing industry’s environmental impacts. Modules include Business Agenda 21 and Urban Tech 21, Industrial Ecology, Environmental Management Systems and Environmental Entrepreneurship.

- **Philippine Business for Social Progress - Center for Corporate Citizenship**

- Research and Advocacy on Corporate Environmental Management concerns
- Scoping
- Interactive Sessions
- Program Piloting on Corporate Environmental Management concerns
- Project Blue Sky
- Small & Medium Enterprise Environmental Response Project (SMERP)

- **Metropolitan Environmental Improvement Program (MEIP)**

- **Industrial Environmental Management Project (IEMP)**

- **Environmental Management Systems (EMS)/ISO 14000**

¹ From the notes and presentation of Atty. Angela Consuelo Ibay, Program Coordinator of the klima Climate Change Center.

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