SOCIAL SCIENCE INFORMATION

Philippine Social Science Council
P.O. Box 205 UP Post Office, Diliman, Quezon City, 1101

May be opened for postal inspection

ISBN 0115-1160

THE PSSC SOCIAL SCIENCE INFORMATION

The ***PSSC Social Science Information*** is published twice a year by the Philippine Social Science Council (PSSC), with offices at PSSCenter, Commonwealth Avenue, Diliman, Quezon City; U.P. Post Office Box 205, Diliman, Quezon City 1101, Philippines.

In line with the mandate of the PSSC, the PSSC Social Science Information seeks to promote the dissemination of social science knowledge and research findings and their use in public policy-making.

The views expressed by the authors do not necessarily reflect those of PSSC or the authors' institutions.

Technical Assistance	:	JOANNE B. AGBISIT, ISAGANI A. LACHICA, ELVIRA S. ANGELES
Cover Design	:	ARIEL MANUEL
Circulation	:	MILAGROS J. TOLENTINO, ERNESTO S. ACOSTA

SOCIAL SCIENCE INFORMATION

VOLUME 30 NUMBER 1 JANUARY - JUNE 2002

LECTURE 5

Welcome Remarks

CAYETANO W. PADERANGA JR.

It is my pleasure to welcome each one of you to this inaugural lecture of the Philippine Social Science Council (PSSC) and the UP School of Urban and Regional Planning (SURP) Public Lecture Series. I should mention that some 30 years ago, when it was first established, the PSSC also sponsored several public fora and lectures on a range of social, cultural, economic, and political topics—but largely in the tradition of social scientific and academic discussions where our social scientists would present the results of their latest studies or research work to an audience of fellow social science scholars, teachers and students.

But reflecting on the responsiveness of the Council to the sociopolitical and economic changes in national life, the nature of the PSSC public lectures and fora also changed in the mid 1980—towards supporting and catalyzing specific movements, programs and policies that were thought to advance the development of democratic and egalitarian processes in the country.

A Social Issues Committee (SICom) was in fact created within PSSC precisely to ensure that social scientists became involved in the so-called "burning issues of the day." Several such SICom fora were convened in the mid- and late 1980s and soon, it became difficult to draw the line between the "explanation or explanatory" value of social science work and the simplistic use of the social sciences as tools for advocating one or the other side of social policy.

Interestingly, by the early and mid-1990s, attendance in the lectures/fora under the SICom had also begun to decline, perhaps because of the rise of several other fora for public discussions as the ubiquitous "kapihan" sponsored by various groups and organizations and covered extensively by the media, particularly television.

Compared to 30, 15 or even two to five years ago, national conditions have changed and continue to change. Social scientists are again challenged to promote public lectures that would make a difference—lectures that will affirm the social sciences' role and responsibility to study and provide some understanding of the complex responses and processes of human societies and to disseminate their knowledge of these to help develop effective and equitable public policies. Today's social science public lectures cannot involve only social scientists and academics, but also social development practitioners, policy-makers, and a wider segment of the public. Even as social scientists draw heavily on their skills and the rigor of their academic disciplines in discussing today's issues, we also envision the promotion of intellectual exchanges among them, social practitioners and the public; and that this interactive process would further the generation of new insights and ideas. It is in promoting reason and excellence in public discourse and discussions that we can hope also to promote informed and enlightened social programs and policies.

I am hopeful that this public lecture series which we are inaugurating this afternoon, will mark a new phase in PSSC's and the social sciences' involvement in social policymaking—one in which social scientists are more deeply aware of their own roles and responsibilities and of the importance of their partnership with policymakers and responsiveness to the public's concerns.

Welcome again and we hope to see you in the succeeding lectures of our series. Thank you very much and good afternoon.

Opening Address

BENJAMIN V. CARIÑO

Let me just join Dr. Paderanga in welcoming you all to this year's public lecture series. The public lecture series is actually a regular and continuing program of the UP-SURP. Beyond the graduate education research, consultancy and short-term training program of the school, we conduct this public lecture series every year as a means of improving public awareness of issues in planning and development, a means of information dissemination, and in general to provide a forum for discussion and debate on various issues in planning and development. This is the first time, however, that we are cosponsoring this public lecture series with the PSSC, and I certainly welcome this opportunity for SURP to be working with the PSSC. I would like to thank the working committee headed by Virginia Miralao, Lorna Makil, Dickton Rye and Rosario Jimenez who have worked hard in launching this public lecture series. I think that the partnership with the PSSC in many ways broadens the audience of this public lecture series to include our colleagues in the social science disciplines. Truth to say that while this is a public lecture series, which means that this is open to the public, in previous years, we have traditionally been targeting or traditionally attracted professional planners, and representatives of various national government agencies and local government units and of course our students and alumni but only a sprinkling of representatives from the various social science disciplines.

I think that we are going to have a very interesting and timely lecture series focused as it is on environmental security in the 21st century. In many ways, this public lecture series extends the SURP public lecture series last year which was more focused on methodological issues and approaches in environmental and social impact assessment. I suppose this year, our public lecture series will be more focused on substantive and policy issues. I think that the importance of this year's theme "environmental security" cannot be overemphasized in the light of research findings which show that while economic growth in the Philippines has resulted somewhat in a reduction in poverty, it has also at the same time led to a fast deterioration of our environment. I think that it is no exaggeration to say that environmental problems in this country have reached alarming proportions. In terms of urban environmental problems for example, I think the recent Payatas disaster is probably a grim and stark reminder for all of us that we have not done much in terms of dealing with our urban environmental problems.

You will note that this lecture series covers both the so-called natural and green environment as well as the built and brown environment. I suppose the lecture of Dean Ben Malayang today would provide us with an overall perspective (I understand that he will talk about global environmental security instead of Philippine environmental security). But in general, I suppose we would be moving from the so-called natural ecosystem to the built ecosystem, ending with our most familiar habitat—the Metropolitan Manila. There would be plenty of occasions in this lecture series in which we would discuss the linkages between these two ecosystems. Certainly, I think that we should not and we could not treat them as independent ecosystems. I think that the developments and actions in one ecosystem will certainly have impacts on the other ecosystem.

And so, it is on this note that I welcome you all. I join Dr. Paderanga in welcoming you once again, and let me reiterate our pleasure in having you all with us this afternoon and for future lecture series to come. I look forward indeed to a very productive and fruitful public lecture series with you.

The State of Our Global Environmental Security

BEN S. MALAYANG III

INTRODUCTION

Environmental security refers to the freedom from threats to life, lifestyles, health, or to property and well-being, that are due to ecological stress and degradation or to altered states of ecosystems.

The key to the concept of environmental security is *altered ecosystems*. Environmental security does not encompass normal predator-prey relationships or exposures to natural stressors like earthquakes, typhoons or volcanic eruptions. But it would if the extent and severity of the events are increased because of alterations in the rhythms of nature.

[I had earlier referred to this phenomenon as *enviromagnification* (*IESAM Bulletin* 1992). Naturally stressful events are made even more stressful because of the diminishment of mitigating conditions due to ecological distress. For example, floods and typhoons which are themselves deadly events, are made even deadlier and able to wreak more havoc on properties because forests, which otherwise could stabilize riverbanks and surface water flow, have been lost.]

Environmental security relates the well-being of life-forms to ecological distress. It may be viewed in different levels of observation: individuals, communities, landscapes, regions, nations or global.

SECURITY IN OUR WORLD

Our world offers much to support life. It gives us security in that it offers vast amounts of matter, energy, and information to support the continued existence of our kind.

- It has 7 billion cubic kilometer of continental and oceanic crust holding vast reserves of fossil fuel, minerals, soil nutrients, moisture and genes, from which we may derive food, energy and shelter.
- It has 1.4 billion cubic kilometer of fresh and sea water on its surface, and millions more underground and in the sky in the form of clouds (which are really "oceans temporarily on loan to the atmosphere" Edberg 1998).
- It has 5.7 million square kilometer of land, lakes, rivers and seas that offer a diversity of habitats for about 13 million species of organisms that keep life viable on our planet.

Our world has much to support life—the generic phenomenon that allows us to live and to maintain our sentient existence. But earth's resources—and its diverse biogeochemical processes that allow life to continue in the planet—are not inexhaustible. The vast body of events and resources in our planet which we need for our survival—ours and of other life-forms on whose survival our own is intractably linked—have finite quantity and a limited range of quality. Here lies the core of our environmental security concerns: the processes and resources can get altered—in form or quality—that they may cease to be available or useful to us, to the extent that our life or its quality get endangered. Either the dangers are engendered by the altered states of our environment, or the probability of the occurrence of dangers is increased. These are the threats that we deal with when talking of environmental security.

THE CONDITION OF OUR GLOBAL ENVIRONMENT

Environmental conditions are often assessed in terms of three areas of concern: the state of natural resources; the quality of air, water and human habitations; and governance (or the controls on human behavior toward the environment). The three, together,

shape the state of life support systems in any place and time.

Globally, the state of life support systems are for the most part in *critical or endangered* levels (Table 1). In these regions, either or all of the following conditions are prevalent: natural resources have either receded or have declined in quality that their ability to support life has been diminished to a point that they are hardly able to recover. Air and water pollution is widespread and toxicity is high in many areas. Governance is poor so that recovery and restoration are not likely prospects in the immediate to medium term.

Vulnerable regions have only slightly better prospects for recovery or restoration than critical ones. The levels of their ecological degradation are not as severe and, in general, they are still at the lower thresholds of their carrying capacity that they may yet bounce back to their climax conditions with little help from humans. *Relatively stable and intact* regions still have high levels of ecological integrity, but they are only about a fourth of our world's surface.

Much of our troubled regions are in the tropics (Table 2). This is where we have lost most of our forests, fisheries and genetic reserves, and where soil, water, and air conditions have deteriorated to alarming levels.

GLOBAL ENVIRONMENTAL SECURITY CONCERNS

The Global Environment Facility (GEF), a worldwide funding institution supporting efforts of countries to control planetary environmental stress, lists four major concerns that imperil the life and well-being of all living things in our world today: biodiversity loss, climate change, the quality of the earth's waters, and the breakdown of the ozone layer (GEF 2000, Al-Ashry 1998).

BIODIVERSITY LOSS

This is serious because it is widespread and because genetic, species or habitat extinction are direct losses of life and living things, being mutually dependent, and need each other to maintain the viability of their existence.

Biodiversity loss affects all that have life for good because extinction is permanent and is accelerating in what seem to be runaway rates. The GEF predicts that if present trends continue, there will likely occur in the next century "the largest mass extinction in the past 60 million years and one of the six largest since life first evolved in the oceans some 3.5 billion years ago." It estimates that present rates of extinction are from

Table 1. Ecological status of 200 priority ecoregions in the world

General Locations	% of Total Earth Area	Status
Northern Canada; Arctic; Central Africa; NW/N So America; N/NW Australia; Himalayan plateau; Thailand-Malaysian peninsula; C Borneo; Timor highlands; New Guinea	~ 25	Rel. stable and intact
N Alaska; SW US and NE Mexico; N, W central So America and S Argentina; central and SE Africa; SE/NE Arabian coasts; eastern regions of the Black Sea; SW regions of the Caspian Sea; regions south of Russia; NW India; mainland SEAsia; SE Australia	~ 25	Vulnerable
West US and Canadian coasts; north-midwest and eastern US; central highlands and west coast of central America; NW coasts of S America; western Andean regions; central wetlands and southwestern coasts of Brazil and Paraguay; Iberian peninsula; N, SW and S African coasts; coastal Madagascar; SW banks of the Red Sea; northern Tanzania and Ethiopia; western regions of the Caspian Sea; SW coasts of India and Sri Lanka; southern Malaysian peninsula and SE Sumatra; NW Borneo; northern and southern Philippines; S and SW coasts of Australia; Balkans; southeastern Europe	~ 50	Critical or endangered

Source: GEF 1998 c.f. Olson and Dinerstein 1997

Table 2. Status of resources across regions in the world

Region	Land/ Soi	Forests	Bio-diversity	Fresh Water	Coasts/ Seas*	Air Quality	Wastes
Africa	4	4	4	4	3	3	3
Asia-Pacific	4	4	4	4	4	4	4
Europe**	3	3	4	3	4	3	3
LatAm-Carib	4	4	4	4	4	4	4
No America	2	3	3	3	3	3	3
West Asia	4	4	4	4	4	3	3
Polar Regions	3	1	3	3	3	3	1

Source: UNEP 1997
1 = not applicable/not known; 2 = improving Ql/Qt; 3 = remaining relatively stable; 4 = continuing to deteriorate
*Includes fisheries; ** Includes the former USSR

1-10 thousand times higher than historical rates, noting that most extinctions occur "among less obvious organisms, some of which have ranges restricted to a single rainforest tree" or isolated geographic areas like islands, mountain tops, and intertidal zones. It believes that even if all causes of biodiversity loss were halted today, extinction rates would remain high for another 100 years (GEF 1998, 69). Among the life forms that are threatened by extinction are many that are yet unknown to science (Table 3).

Table 3. Estimated number of described and undescribed species

Taxa	Described Species (in Millions)	Undescribed Species (in Millions)
Viruses	< 0.001	0.40
Bacteria	< 0.001	1.10
Nematodes	0.025	0.40
Crustaceans	0.050	0.20
Protozoa	0.075	0.21
Algae	0.075	0.40
Vertebrates	0.075	0.08
Mollusks	0.090	0.20
Fungi	0.090	1.50
Arachnids	0.090	0.75
Plants	0.250	0.35
Insects	0.950	8.00

Source: GEF 2000, 1998 c.f. UNEP 1995

One alarming aspect of biodiversity loss is that it is not restricted to wild biota. It is hitting near home, so to speak, in agriculture. Incessant crossbreeding and varietal manipulations that have been mostly intended to make crops "perfect" for how we want our food to be and how we wish to protect our food supplies, have led to the reduction of their genetic variability. The Food and Agriculture Organization (FAO) notes, for example, that 30 percent of the world's breeds of cattle, sheep, hogs and chickens are now threatened by extinction (Table 4, FAO 2000).

Deforestation is probably the most extensive single cause of biodiversity loss in the world in the past 50-100 years (GEF 1998). And it is continuing. In 1990, the earth had 3.51 billion hectares of natural and plantation forests; it went down to 3.45 billion hectares in 1995, which is a loss of almost a million hectares in five years (Moya 2000 c.f. WRI 1999).[1] Forest loss seems to have occurred in all regions of the world (Table 5).

CLIMATE CHANGE

This is a threat that is often deemed to have the most comprehensive global impact. It affects the biogeochemical processes of the earth, in all the earth. Biodiversity loss often occurs in pockets, but climate change affects every nook and cranny of the planet.

A major driver of this threat is CO_2 concentrations in the atmosphere. These have been estimated to have

Table 4. Estimated number of known and extinction-threatened breeds of four farm animals, worldwide

Animals	Known Breeds* (With Available Population Data)	Estimated No. of Breed* Classified as Critical or Endangered
Cattle	600	150
Sheep	680	120
Hogs	280	80
Chicken	520	280

Source: FAO 2000 (http://www.fao.org/NEWS/FACTFILE/FF9601-E.HTM 13 Aug 2000)
**Estimates culled from a bar chart*

Table 5. Current forests as percent of original forests in different regions of the world

Region	Land Area (000 hectares)	Original Forests (% of land area)	Current Forests (% of original forests)
Africa	2,963,468	22.9	33.9
Europe*	2,260,320	72.7	58.4
North America	1,838,009	59.7	77.3
Central America	264,835	67.2	54.5
South America	1,752,925	55.6	69.1
Asia	3,085,414	49.1	28.2
Oceania	849,135	16.9	64.9

Source: WRI-UNEP-UNDP-WB 1998:294–295

increased by about 28 percent in the past 200 years, from about 280 ppm prior to the industrial revolution to about 360 ppm today. Consequently, average surface temperature in the planet has increased by about 0.3–0.6° C in the last 140 years.[2]

Climate change is linked to a host of phenomena that are themselves grave threats to the environmental security of the world (Table 6). Together, they pose tremendous costs to human life and property in many countries (Table 7).

For some time, it was not clear how much of present climate changes are due to human action. But in 1996, the Intergovernmental Panel on Climate Change supervised by the World Meteorological Organization (WMO) and the UN Environmental Program (UNEP), concluded in its second assessment of global climate change that, "the balance of evidence suggests that there is a discernible human influence on global climate" (GEF 1998, 99). Much of the influence, it seems, is from emissions of greenhouse gases into the atmosphere (Table 8), which tend to be associated with economic activities across the planet (Table 9).

DEGRADATION OF INTERNATIONAL WATERS AND WATER RESOURCES

Water covers over three-fourths of the earth's surface. And water *is* life (Habito 1998). Wetlands, aquifers, rivers, and oceans are sources of food, materials, and energy for industry and genetic information that keep the biosphere viable. Yet much of these ecosystems and resources are threatened by overexploitation, unwise use, and pollution. Today, about a billion of the world's population have no regular water supply. About another 1.2 billion have some regular supply, but the water they get is unsanitary. Most others have waters that are contaminated with wastes and silt.

Water degradation is expanding beyond national borders, "linked through the global hydrologic cycle to urbanization, watershed degradation, deforestation, biodiversity loss, and climate change. These interrelationships often involve geopolitical concerns, regional and global markets, and monetary and other policies that support subsidies, exports and trade" (GEF 1998, 111).

Table 6. Environmental security threats associated with global climate change[3]

Threat	Characteristics	Indications and Impacts
El Niño Southern Oscillation (ENSO)	Unusually high rainfall in east Pacific; severe drought in west Pacific; weather disruptions reach as far as Africa	1982–1983: Indonesia suffered $500 million in drought and fire damages; 1991–1992: wheat fields and thousands of sheep killed in Australia and Zaire and Zimbabwe had to import millions of tons of grains to feed their people; fires and crop failures in SE Asia and New Zealand; severe flooding in US, Mexico and So. America; 1997: fires in Indonesia and Australia and famine in Papua New Guinea.
Emergence and resurgence of diseases	Malaria, asthma, encephalitis, TB, leprosy, cholera, dengue, and measles will be more common	In last 20 years, 30 diseases new to medicine emerged. In last 5 years, malaria incidence quadrupled and cholera is now more widespread than before (Epstein 1998).[3]
More pests	Pest population will explode including innocuous household pests that pose risks to crops, forests, and human health	1991: whitefly plague in southern California; 1992: populations of spiders, cat fleas, head lice and other pests exploded after warmer-than-usual summers in US, and in Australia outbreak of locust and maggot swarms due to drought-breaking rains; 1992–1993: outbreak of bark beetle in Austria and Germany; 1993: first locust plague in Hungary.
Intensifying storms	The intensity and severity of storms are likely to increase in both mid-latitude and tropical regions	Unusually intense storms in last 10 years: 1990: Trudy (eastern Pacific); 1991: Mireille (worst in Japan in 30 yrs) and Val in W Samoa; 1992: Andrew ($30 billion damage in Caribbean and US), Omar (in Guam) and Iniki in Hawaii; 1993: Yancy and Kina; 1994: Gordon ($400 million damage); 1996: Fran ($3.2 billion damage).
Spreading drought	Considered to pose the greatest risk to agriculture; moisture scarcity will likely lead to reduced global food outputs	1990: world grain reserves dropped to 60 days after 1988 drought in US and India in 1987; severe 5-yr drought in California reached most serious level; food and water shortages in Peru; 1992: severe drought in France, Spain, Denmark, Austria and Greece; also in S. Africa and in Zambia where dams dried up; 1993: food looting in Brazil after 4 yrs drought; drought spreads in Zimbabwe, Zambia, Malawi, Angola,

Threat	Characteristics	Indications and Impacts
		Namibia, Mozambique, Botswana and S. Africa.
Extensive fires	Since mid-1980, big fires destroyed forests and properties in many countries	Mongolia (600,000 ha; 1990); Indonesia and California (1991); Siberia, Zimbabwe and Canada (1992); California (1993); Australia (1994); Western US (1999, 2000)
Worsening floods	Short periods of intense rains	Severe flooding in Burma, Bangladesh and India (1990); Iran, India, Chile, China, Burma, Austria, Cambodia, Egypt and Israel (1991); US and China (1992); US, France, Italy, Switzerland, Europe and New Zealand (1993); China (1998).
Rising seas	Sea level will rise at global average of 3–10 mm/yr	1990: reports say UK preparing for "managed retreat" from coast; 1992: UNEP reports large areas in Thailand threatened by sea rise; 1993: sea encroaches into roads 2 km from coast in Mozambique; 60-m sea defense is breached in Guyana
Coral bleaching	Coral deaths associated with sea temperature rise	Since 1991, bleaching reported in Caribbean, Strait of Hormuz (50 percent), French Polynesia (85 percent), Thailand (up to 8 m depth) and Tahiti (100 percent in 1 lagoon in 1994).

Source: Mainly from http://www.greenpeace.org; also GEF 1998 and various news reports

Threats to earth's waters include contaminants like mercury, dioxin, polychlorinated biphenyls (PCBs), acids, and pesticides. These involve so-called persistent organic pollutants (POPs). The GEF notes that "atmospheric deposition and ocean surface currents such as the Kuroshio Current have been found to contain elevated amounts of dioxins, furans, DDT, and PCBs" (GEF 1998, 115). Such POPs are found in albatrosses in Midway Island in the Pacific and in eagles and sea otters on the Aleutians. Their presence in these organisms often exceed levels known to cause reproductive problems.

"Nutrient overenrichment accompanying increased nitrogen and phosphorous discharges from sewage, livestock, and fertilizer has become a global environmental problem. Devastating algae blooms and toxic algae afflict most corners of the globe where people, industry, and agriculture are concentrated" (GEF 1998, 114).

Much of the world's freshwater resources and seas (Table 10) are vulnerable to these threats. Freshwater availment (Table 11) may go down if the water drawn turns out too contaminated for safe human use. Our fish harvests have started to level off (Figure 1).

Table 7. Impacts of heightened natural disasters on insurance systems: selected countries

Country	Reported Cases*
Australia	1991: "The chief executive of FAI Australia says that natural disasters were a major reason behind its $191 million underwriting loss. He warns that some parts of Australia are 'bordering on the uninsurable.'"
Barbados	1992: "Leading Barbadian insurer General and Marine warns of a crisis in the Caribbean as policyholders reduce or cancel coverage in response to dramatic cost increases."
W. Samoa	1992: "In the aftermath of cyclones Ofa and Val, Western Samoa's only general insurance company, the National Pacific, announced that it will remove all cover once existing cover runs out."
U. S.	1993: "Nine insurance companies are driven out of business by Hurricane Andrew and Cyclone Iniki. The two storms had devastated the industry with a $16.5 billion damages bill."
	1994: "Franklin Nutter, President of the Reinsurance Association of America, says, 'The insurance business is first in line to be affected by climate change...it could bankrupt the industry."

*All quotes from source: http://www.greenpeace.org/-climate/ctb/insurance.html

Table 8. Major greenhouse gasses and their characteristics

Gas	Atmospheric Concentration (ppm)	Annual Increase (%)	Life Span (yrs)	Current Greenhouse Contributor (%)	Principal Sources
CO_2	355	0.40	50–200	55	Coal, Natural Gas,
(Fossil Fuel)				43	Oil, Deforestation
(Biological)				12	
CFCs	.00085	2.20	50–102	24	Foams, Aerosols, Refrigerants, Solvents
Methane	1.714	0.80	12–17	15	Wetlands, Rice, Fossil Fuels, Livestock
Nitrous Oxide	. 31	0.25	120	6	Fossil Fuel, Fertilizers Deforestation

Sources: GEF 1998 c.f. Goldenberg 1996; Percival et al. 1996; WMO 1994

Table 9. Relative global emissions of carbon dioxide

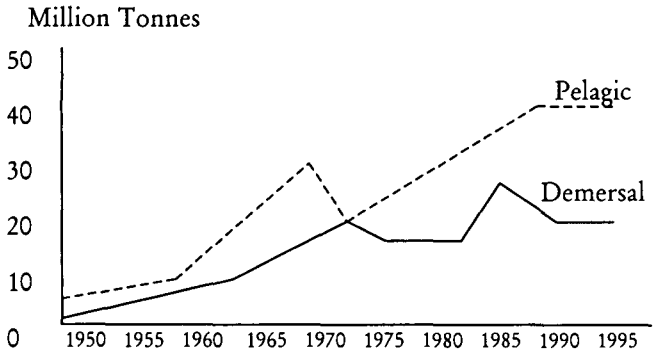
Countries Grouped by Economic Status	Relative Emissions (% of Total)	
	1995	2035
Developing	27	50
Developed	73	50

Sources: GEF 1998 c.f. OSTP 1997; IPCC IS92A Emission Scenario

BREAKDOWN OF THE OZONE LAYER

The *stratospheric* ozone layer is a protective canopy over the biosphere. It protects it from high solar UV radiation. Since Rowland and Molina in the 1970s first linked chlorofluorocarbon (CFC) emissions into the atmosphere and ozone destruction, much is now understood about how ozone loss can be harmful to biota. For each percent rise in UV-radiation due to ozone loss, there can follow a 1 percent rise in eye cataract cases and 2 percent rise in skin cancer, worldwide (GEF 1998 c.f. UNEP/WHO 1996).

Figure 1. World catch of pelagic and demersal open sea fisheries, 1950–1995



Source: FAO 2000 (http://www.fao.org/NEWS/FACTFILE/FF9707-E.HTML and http://www.fao.org/NEWS/FACTFILE/FF9706-E.HTML)

Both loss and increased concentration of ozone can be harmful to biota. Stratospheric ozone loss exposes the biosphere to higher levels of solar radiation while increased tropospheric ozone concentration caused by industrial and agricultural emissions of nitrogen oxides, carbon monoxide and methane, affect animal and plant health and, because it is a greenhouse gas, causes global warming as well (Cruzen 1998).

Previous efforts to control stratospheric ozone loss and tropospheric ozone rise have focused on reducing their anthropogenic causes (reducing CFC, halon and industrial and agricultural emissions into the atmosphere). Their production had been reduced in recent years (Table 12) following the aggressive implementation of the Montreal Protocol, but the threat continues because of their long lifetimes (e.g.,

Table 10. Major international marine water ecosystems and water basins

Marine Water Ecosystems			Basins	
Eastern Bering Sea	Gulf of Alaska	California Current	La Plata	Amazon
Gulf of California	Gulf of Mexico	SE U.S. Cont. Shelf	Rio Grande	Colorado
Scotian Shelf	Caribbean Sea	NE U.S. Cont. Shelf	Fraser	Yukon
Newfoundland Shelf	Humboldt Current	Brazil Current	Lawrence	Orange
W Greenland Shelf	Petagonian Shelf	NE Brazil Shelf	Zambezi	Congo
Insular Pacific-Hawaii	E Greenland Shelf	Iceland Shelf	Volga	Niger
Barents Sea	Norwegian Shelf	North Sea	Rhine	Danube
Celtic-Biscay Shelf	Mediterranean Sea	Baltic Sea	Caspian	Yenisey
Iberian Coastal	Canary Current	Black Sea	Yangtze	Mekong
Guinea Current	Benguela Current	Agulhas Current	Tigris-Euphrates	Ob
Somali Coastal Current	Arabian Sea	Red Sea	Lake Chad Basin	Columbia
Bay of Bengal	S China Sea	Indonesian Seas	Ganges-Brahmaputra	Mackenzie
Sulu-Celebes Sea	Great Barrier Reef	New Zealand Shelf	Orinoco	Okavango
Northern Australia Shelf	E China Sea	Kuroshio Current	Nile	Senegal
Sea of Japan	Oyashio Current	Sea of Okhotsk	Volga	Amur
W Bering Sea	Faroe Plateau	Antarctic	Indus	

Source: GEF 1998

Table 11. Annual freshwater withdrawal of large countries and country groups

Country groups	% of Gross Annual Availability	m^3/capita
OECD (excl. Czech Rep., Hungary, Korea & Poland)	12.3	1,140
Russian Federation	2.6	740
Indonesia	1.0	96
India	18.0	612
China	16.0	461
Brazil	0.5	246

Source: OECD, UNEP (1997); Global Environment Outlook I

CFC is 50–100 years). Full recovery is not expected until about 2050 or later (GEF 1998).

Table 12. Worldwide production of ozone depleting substances (1940–1995)

Period	Annual Production (x1000 tons)
Before 1940	Almost zero
1940–1965	Less than 300
1968	600
1975	900
1985	1,300
1990	800

Source: GEF 1998 c.f. Ozone Action Special Supplement 1995

OTHER SECURITY CONCERNS

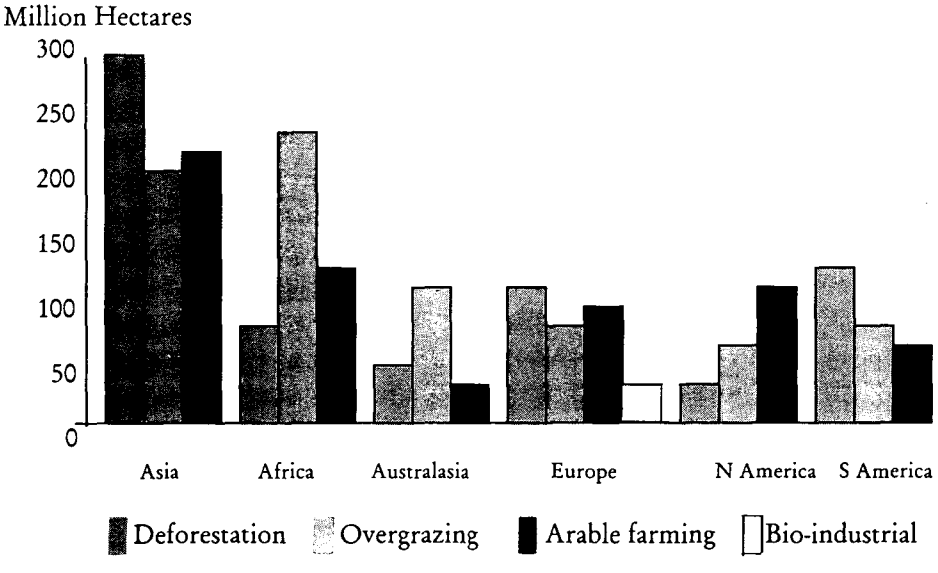
The GEF did not include two other environmental security concerns—pollution and soil degradation—mainly because they often occur in pockets and they are deemed to be still within countries to control. Yet, their threats to human health and to the earth's biota are serious enough to be of concern in many parts of the world, where they occur.

The concern with *pollution* is mainly about the uncontrolled dissipation of substances that pose serious chronic (and in some acute) toxicity to living organisms. They are found in different concentrations in many areas of the environment and in our foods; they include among the most toxic and hazardous substances known to humans (Table 13).

The threat posed by soil degradation centers on the fact that most primary production upon which humans depend for sustenance, energy and materials, are land-based. Soils are thus critical elements to human survival, as well as to the myriad life-forms that live on land. Soils provide the primary cache of nutrients from which most land-based organisms—particularly humans—derive fiber and foods. Yet, in many places in the world, soils are getting degraded. "Desertification," a phenomenon that, according to FAO, "does not just refer to the moving forward of existing deserts but also to the formation, expansion or intensification of degraded patches of soil and vegetation cover" (FAO 2000 in http://www.fao.org/NEWS/FACTFILE/FF9710-E.HTML) is occurring in many countries—most severely in Asia and Africa—due to different causes (Figure 2).

One other major environmental security concern in our world today is our unabated consumption of energy. Worldwide energy demand continues to rise (Figure 3) and this is often associated with increasing dependence on nonrenewable resources, mainly fossil fuels. The disproportion of our dependence against the efforts we are exerting to wean ourselves from them

Figure 2. Main causes of dryland soil degradation by region



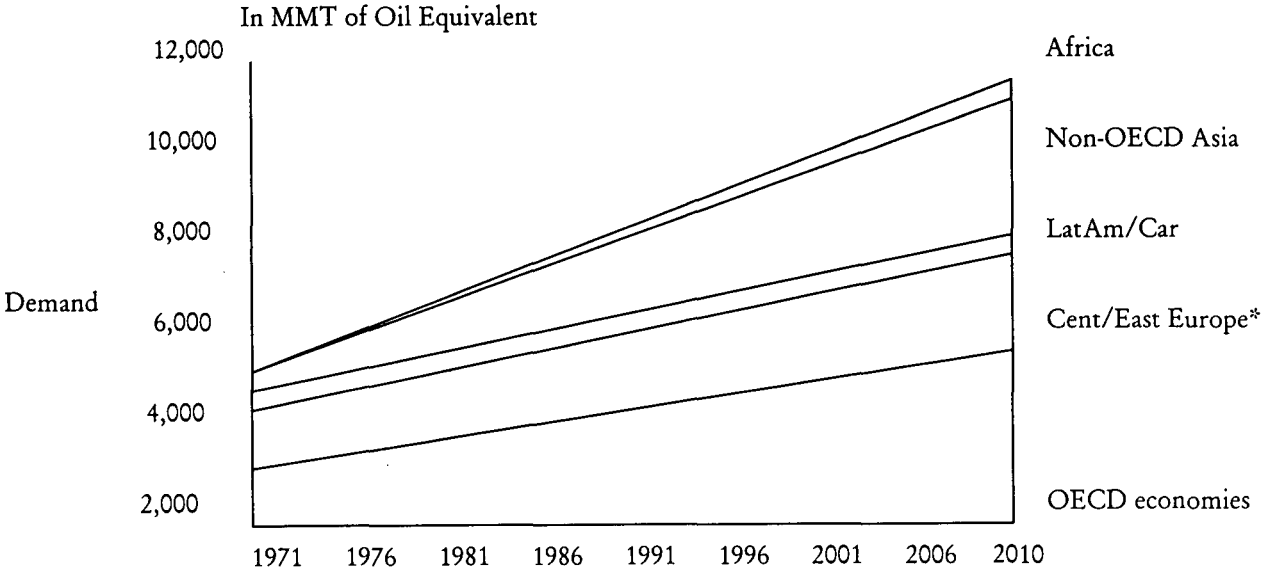
Source: FAO 2000 (in http://www.fao.org/NEWS/FACTFILE/FF9710-E.HTML)

Table 13. Common chemicals in our environment

Substances	Food and Water	Indoors	Urban Outdoors	Contaminated Lands	Indoor and Outdoor
Pb	x	x	x		
Aflatoxins	x				
Nitrates	x				
Halogenated organics	x				
Al	x				
Hg	x			x	
Arsenic	x			x	
Carbon monoxide		x	x		
Asbestos		x			
Smoke from biomass burns		x			
Tobacco smoke		x			
Formaldehyde		x			
Sulphates and SO			x		x
NO			x		x
Hydrocarbons			x		
Ozone			x		
Volatile organic compounds			x		
Cd				x	
Dioxins				x	
PCBs				x	
Organochlorines				x	
Other micropollutants					x
Mixtures of trace elements					x

Source: WRI-UNEP-UNDP-WB 1998:29 c.f. Satterthwaite et al. 1996

Figure 3. Generalized past and projected trends in worldwide energy demand



Source: WRI-UNEP-UNDP-WB 1998, 171

*Includes the former USSR

poses danger of their rising scarcity that can have severe impact on human society. Even hydropower, otherwise dependent on a renewable resource, water, is imposing serious strains on our ecological base, mainly by way of rising siltation of our surface waters.

POPULATION AND ENVIRONMENTAL SECURITY

There continues to be a serious debate as to whether or not, or to what extent, if at all, human population can be associated with our environmental security risks. Many will argue that it is, because it represents a change in the level of demand for environmental endowments. Others would say not so, because the root cause of irrational consumption is the maldistribution of the resources. Both cite different interpretations of Malthusian and Ricardian theories which offer support for one or the other contention. Whatever, it remains a fact that resource degradation seems to occur most in areas where human population is high (across regions comprised by different countries and economies where presumably distributive conditions differ; Figure 4). Thus, it does appear that resource conditions are closely linked to the number of us humans seeking to live from them.

FAO data likewise suggest that global hunger tends to be more severe in regions where population growth is high (Figure 5).

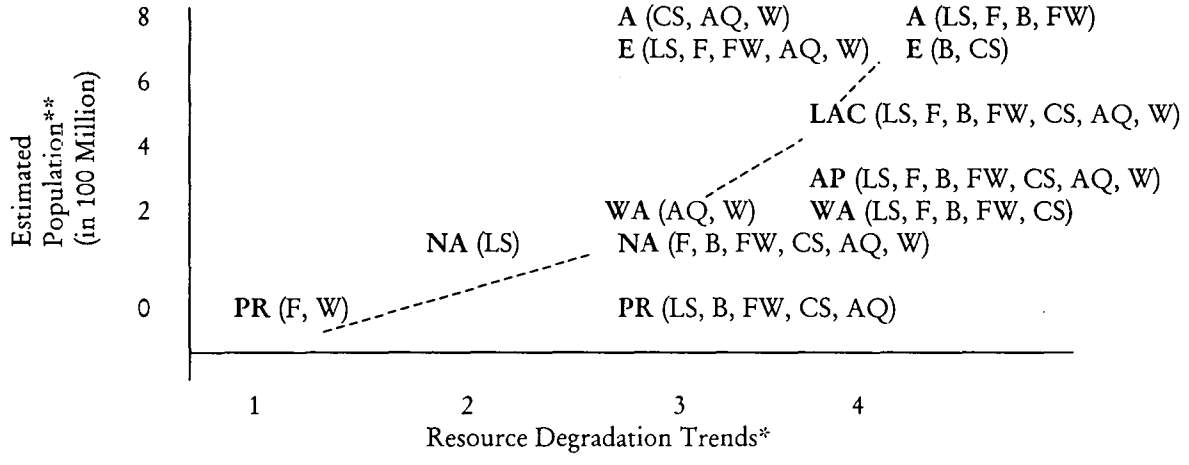
We may allow the facts to speak for themselves.

PROSPECTS AND POSSIBILITIES

Efforts are being exerted to address the environmental security threats of the world today. In the past 20 years alone, multilateral environmental agreements have been forged to effect concerted international action on the threats. Among these are:

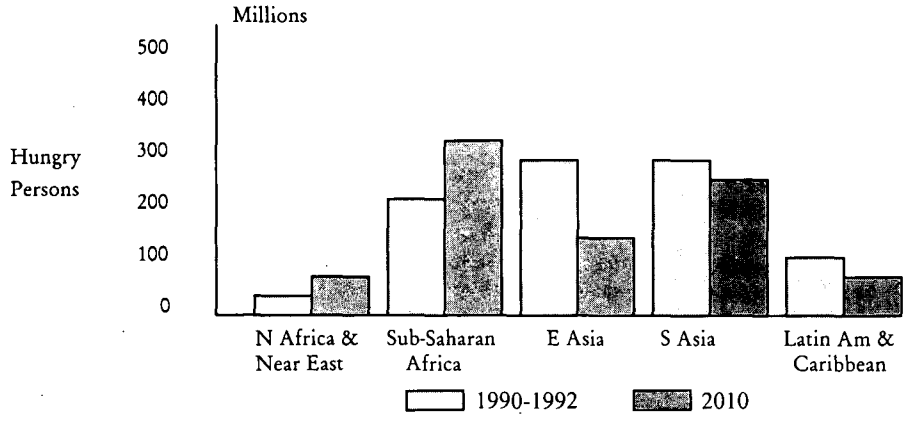
- The Convention on Biological Diversity which commits countries to protect, conserve and properly use their biotic assets;
- The Convention on Climate Change which establishes national targets to reduce their CO_2 emissions to certain levels compared to their emissions in 1990;
- The Basel Convention to control the movement of toxic and hazardous substances across countries;
- United Nations Convention on the Law of the Sea (UNCLOS), which regulates nations' use of ocean-based resources;
- The International Tropical Timber Trade Organization Agreement, which seeks to control the use of the world's tropical forests;

Figure 4. Distribution of the world's region across population and resource degradation levels



* From Table 2: 1 = Not applicable/not known; 2 = Improving; 3 = Remain relatively stable; 4 = Deteriorating;
** A = Africa; AP (Asia-Pacific); E (Europe incl. the former USSR); LAC (Latin America and Caribbean); NA (North America); WA (West Asia); PR (Polar Regions); LS (Land and Soils); F (Forests); B (Biodiversity); FW (Fresh Waters); CS (Coasts and Seas incl. fisheries); AQ (Air Quality); W (Wastes)
Source: UNEP 1997; PRB 1999.

Figure 5. Number of persons chronically hungry in developing countries



Source: FAO 2000 (http://www.fao.org/NEWS/FACTFILE/FF9602-E.HTML

- The Ramsar Convention which encourages national efforts to protect wetlands; and
- Montreal Protocol, to reduce global use of ozone-depleting (OD) substances, in which developed countries have pooled technology and money to help developing countries phase down their use of OD substances.

In Southeast Asia, regional efforts have been exerted to achieve collective gains in protecting the environment. There is the ASEAN Haze Agreement, mainly to control forest fires and their impact on the region.

These efforts indicate a heightened global commitment to control the environmental security threats of the planet. But real gains have yet to be seen. The Convention on Biological Diversity, for example, leaves it mostly to countries to effect the intentions of the agreement. In the case of the Philippines, we have indeed produced a National Biodiversity Strategy and Action Plan, but it is yet to be fully implemented. And even with much fanfare, the Kyoto meeting of the Parties to the Convention on Climate Change have not produced the commitments needed to control global greenhouse gas emissions in the near future (Table 14).

Will there ever be effective global measures to control our environmental threats? This remains to be seen because while the efforts to do so are there and gains have been made (Table 15, Figure 6, Mercado 2000), national commitments to needed measures—at levels commensurate to the severity of the threats—seem still frail and weak at this point.

CONCLUDING REMARKS

The causes of environmental threats are many and complex. But there's one that seem to cut across causes. This is governance, or the ineffectiveness of it.

State and non-state controls have to be combined in some mutually reinforcing way to effect a realignment of human behavior toward patterns that would be consistent with our changing environmental circumstances. To fail to do this would only mean pushing humanity into even deeper trouble.

Our environmental crisis is ultimately linked to our failure of governance. We have failed to be a positive rather than a bad influence on the conditions of our planet. Pollution, for instance, is not as much a condition of our environment as it is ultimately our failure to properly use the earth's matter and energy. We use them but just as routinely waste them and throw what we waste to our land, waters and air. Biodiversity loss is not as much as the deterioration of the earth's habitats and genetic pool as it is our failure to temper our actions that result in assaulting the other creatures in the planet. And climate change is happening because of what we have been throwing as wastes into the atmosphere.

Indeed, it is uncanny that we, human beings, endowed with much of the earth's resources to support our existence— and the intelligence to know it—have been in fact living a life that destroy the very endowments that allow us to live. We have made it our life to assault not only the life of other creatures, but the very phenomenon of life itself, as it exists on

Table 14. Country Kyoto commitments to reduce greenhouse gas emissions by 2012 as percent of 1990 levels

Country	Commitment	Country	Commitment
Australia	+8	Monaco	-8
Bulgaria	-8	New Zealand	0
Canada	-6	Norway	+1
Croatia	-5	Poland	-6
Estonia	-8	Romania	-6
European Union	-8	Russian Federation	-8
Hungary	-6	Slovakia	-8
Iceland	+10	Slovenia	-8
Japan	-6	Switzerland	-6
Latvia	-8	Ukraine	0
Liechtenstein	-8	United States	-7
Lithuania	-8		

Source: United Nations (1998) in http://www.unfccc.de

Table 15. Per capita income ranges when marginal changes of selected environmental events approach zero

Events	"Turning Point" Range*	Trajectory Change
SO_2	3,000–10,700	decreasing
Suspended PM	3,200–9,600	decreasing
NO_x	5,500–21,800	decreasing
CO	9,900–19,100	decreasing
CO_2	12,800–35,482	increasing
CFC	12,600	decreasing
Fecal coliform	7,955	-
BOD	7,623	-
Arsenic	4,900	-
Nitrates	15,600	-
Global deforestation	823–2.049	-
Deforestation in Latin America	5,420	-
Deforestation in Africa	4,760	-
Heavy metals in free environment	10,800	-
Toxic intensity	12,790	-

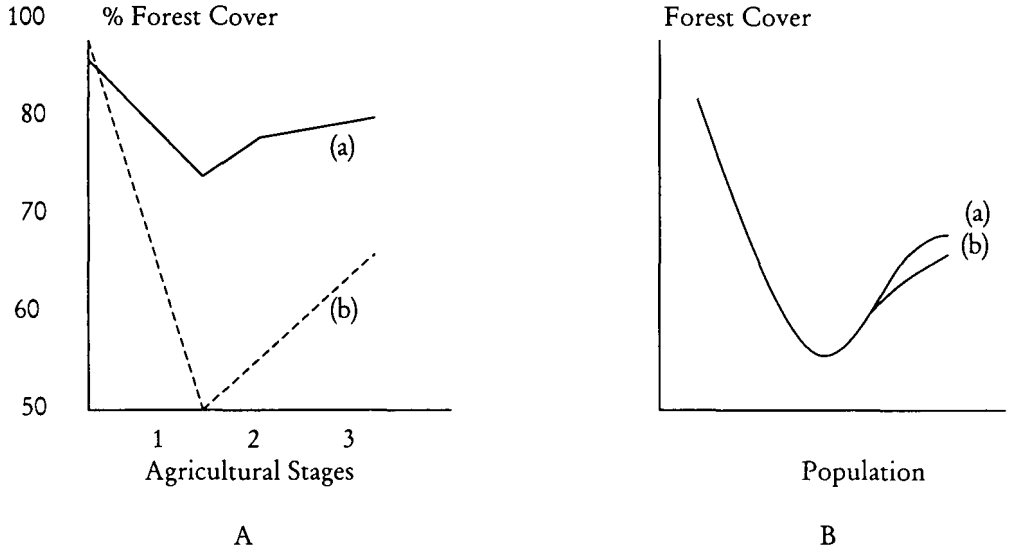
Sources: Barbiers 1997 c.f. Ansuategi et al. 1997; McConnell 1997; Antle and Heidebrink 1995; Cole et al., 1997; Cropper and Griffiths 1994; Grossman and Kreuger 1995, 1993; Hettige et al. 1992; Moomaw and Unruh 1997; Panayotou 1997, 1995; Rock 1996; Selden and Song 1994; Shafik 1994; Vincent 1997

*In 1985 US$

our planet. This is the tragedy of our global environment: it has so much to support life, yet life itself, human life in particular, is ripping it apart. *We* are the tragedy of our environment. *We* are the threats to our environmental security.

There are conceivably many reasons for why our governance of ourselves and of our global environment have been apparently more a failure than a success so far. First, perhaps because we do not yet fully understand the complex dynamics of the earth's biophysical and geochemical processes. Or second, we have yet to truly understand the intricate web of conflict and cooperation among ourselves and with those around us. In both instances, it seems that our science and technologies, and methods of understanding our behavior, may be failing us in telling us exactly what we must do so that our actions are fully in synchrony with how Nature works as a self-sustaining system.

Figure 6. A: Mather's (1998) simulated forest transition for (a) 100 and (b) 50 units of food production;
B: Washburn's and Romm's (1984) curves for (a) private non-industrial and (b) State forests, in California



Sources: Mather 1998; Washburn and Romm 1984

But one other possibility exists. That is that our view, understanding and contemplation of who we are in relation to the world around us is fundamentally flawed. We seem to see ourselves as being distinct and apart from other living and nonliving things in the planet which, as a world view, make us see our environment as a reality that is separate from ourselves. It is a world view that looks at and constructs our environment as a realm of objects and events that are *around* us (and hence an isolate of who we are) which makes us assume that what we do with the things in our environment has nothing to do with us, that is, except for how they give us pleasure or fulfillment.

This could be our fundamental error. It is an error of failing to see ourselves as being defined by our environment and as beings that fully embody the environment. We have assumed that we *relate* to the environment when perhaps the more proper world view to hold is that our environment *is* us. We are not an isolate of our environment nor is the environment an isolate of ourselves. *We* are our environment and the destruction of our forests, loss of our fisheries, the dirt around us and the pollution of our water and air, much like our bedroom and toilets at home, are all reflections of who we are. If our environment is fractured it just might be because we have a fractured sense of ourselves.

This view follows from a fundamental recognition of the organic oneness of beings and the environment which demand from us a sense of self extension beyond our body. The world around us is not apart *from* us but a part *of* us. This differs from the world view of many in our world today which is anchored on alienation as the paradigm of our relations with the "others" in the world. This other view demands an identification of others as integral to ourselves. The loss of a tree or of a species, the degradation of the air or of a lake, becomes a loss of a part of ourselves. When a butterfly is lost, a part of us is lost.

In this sense of environment—that it is us and not anything apart from us—our moral obligation to it shifts from contingency to necessity. It shifts from being a matter of our willingness and goodwill to do something about it, to being a requisite exercise of life. It shifts from being a matter of convenience to being a part of living. Taking care of the environment becomes a personal obligation to ourselves which, the sooner ingrained in our sense of self, might demand from us an ethics of self-extension in which we identify with the fate of all other creatures in our planet. Their pain becomes our pain as are their pleasures and joy. Consequently, we shall need to ensure that no pain is unnecessary and that no pleasure is excessive—a behavior which, when practiced, may then redound to

improving the conditions of our global environmental security.

We are our global environmental security. Our destiny is not an endless permutation of possibilities that unfolds without being affected by how our environment turns out to be. What happens to anything in our environment *is* our destiny. For when all is said and done, the ultimate question about our environment is not *what* it is, but *who* it is. It is not so much about what we must do to improve our environmental security, as it is about how we must develop and improve ourselves.

In brief, we must liberate ourselves from being the threat to our environmental security.

NOTES

[1]A report by J. Mercado in *The Philippine Star*, August 13, 2000, page 23 cites the *Global Forest Resource Assessment, 2000* (unpublished) as indicating that the earth's forests today, natural and plantation, totals about 3.5 billion ha; the assessment is based on a 1995 inventory.

[2]From http://www.greenpeace.org/-climate/ctb/risetemp.html; it notes that the 8 hottest years on record in 140 years all occurred after 1980.

[3]Epstein notes that "the resurgence of infectious disease is multifactorial, but climate circumscribes the distribution of insect-borne diseases, while weather affects the timing and intensity of outbreaks...Enhanced climate variability, instability, and extreme weather events are also bad for health. Floods foster fungal growth, support insect breeding, and spread chemicals and microorganisms in water supply. Prolonged droughts encourage agricultural pests (like locusts, aphids, and virus-transmitting whiteflies), and they reduce protective predators—the owls, snakes, and coyotes that consume rodents transporting Lyme disease ticks, hemmorrhagic viruses, and human plague." See also McMichael et al., eds. 1996.

REFERENCES

Al-Ashry, M.
1998 "Valuing the Global Environment: Actions and Investments for a 21st Century." In *Valuing the Environment*. Global Environmental Facility, Washington, D.C.

Barbiers, E.
1998 "Introduction to the environmental Kuznets curve special issue." *Environment and Development Economics* 2: 369-381.

Burger, D.
1998 "The vision of sustainable development." *Agriculture + Development* v. 5 n. 1.

Crutzen, P.
1998 "Atmospheric Chemistry and the Tropics" In *Valuing the Environment*. Global Environmental Facility, Washington, D.C.

Edberg, R.
1998 Quoted in GEF.

Epstein, P.
1998 "Positive Incentives for an Energy Transition." In *Valuing the Environment*. Global Environmental Facility, Washington, D.C.

Food and Agriculture Organization
2000 http://www.fao.org/news/factfile/e.html

Goldenberg, J.
1996 *Energy, Environment, and Development*. London: Earthscan.

Greenpeace
2000 http://www.greenpeace.org/html

Hodge, T., S. Holtz, C. Smith, and K. H. Baxter
1995 *Pathways to Sustainability: Assessing our Progress*. National Roundtable on the Environment and the Economy, Canada.

Inter-Governmental Panel on Climate Change
1996 "Technologies, policies, and measures for mitigating climate change." IPCC Technical Paper I. IPCC, Geneva.

Mather, A.
1997 "Sustainability in Global Forest Management: Implications from the French Forest Transition." In R. Epps (ed.) *Sustaining Rural Systems in the Context of Global Change* (Proceedings of the Joint Conference of the IGU Commission for the Sustainability of Rural Systems and Land Use/Cover Change Study Group), Armidale, Australia).

Mercado, J.
2000 "New satellite images show better state of RP forests." *Philippine Star*, August 13.

McMichael, J. et al. (eds.)
1996 *Climate Change and Human Health*. Geneva: World Health Organization.

Organization for Economic Cooperation and Development
1997 *The World in 2020: Towards a New Global Age*. OECD, Paris.

Percival, R., A. Miller, C. Schroeder, and J. Leape
1996 *Environmental Regulation: Law, Science, and Policy*. New York: Little, Brown and Company.

Population Reference Bureau
1998 *World Population Mid-1998*. Washington, D.C.
United Nations Environment Programme
1995 *Global Biodiversity Assessment*. NY: Cambridge University Press.
1997 *Global Environment Outlook*. New York: Oxford University Press.
1998 Kyoto Protocol to the United Nations Framework Convention on Climate Change, Article 3, Annex B. In http://www.unfccc
2000 "World Population Growth from Year 0 to 2050." Population Division, Department of Economic and Social Affairs. In http://www.popin.org/pop1998/4.html
Vitousek, P., H. Mooney, J. Lubchenco, and J. Melillo
1997 "Human domination of earth's ecosystems." In *Science* v. 277: 494-499.
Washburn, C. J. and Romm
1984 Personal communications.
World Bank
1994 *Making Development Sustainable: The World Bank Group and the Environment, Fiscal 1994*. Washington D.C.
World Commission on Environment and Development
1987 *Our Common Future*. Report of the World Commission on Environment and Devel-opment. London: Oxford University Press.
World Resources Institute, The United Nations Environment Programme, The United Nations Development Programme, and the World Bank
1998 *World Resources 1998-1999*. New York: Oxford University Press.

Reaction

J.R. Nereus O. Acosta

Magandang, magandang hapon po sa inyong lahat. Ako po si Neric Acosta, kinatawan po ng First District *ng lalawigan ng Bukidnon.* I like to claim that I am a resident Environmental Legislator, or one of those in the Congress today, because 80 percent of my bills are all on the environment, seven of which have passed the third reading in the House of Representatives and are now pending in the Senate apart from the landmark Clean Air Act. But I am very happy to be here, first of all to listen to Dr. Malayang and to be with you all here in UP. It is always heartwarming to be back in the academe, where I really belong, where I first began. Someone introduced me in one of these fora as an academic by profession, an activist by persuasion, and a politician by accidental election. So I guess you know where my priorities lie, and if I am in Congress, I am there largely because I have been given the opportunity to expand my advocacies and to put it into play in the policymaking arena. I do not think I always have the guarantees that each and every initiative will be a success. The Clean Air Act was my baptism of fire, and I am not sure that I am excited about what is ahead for clean water, for solid waste management, for biodiversity, wildlife and all that, which incidentally I also was able to defend. But I know that it is always like a feeling of déjà vu—you are always going back and forth with all of the conflicting interests and demands on the environment and the different sectors at play.

Before I give a brief reaction, and some of my comments/reflections on Dr. Malayang's paper, I would like first to greet all our very distinguished sponsors *magandang, magandang hapon.* And of course to the illustrious Dr. Malayang who I met first in the East-West Center in Hawaii.

I have to confess that I have nothing as detailed as Dr. Malayang's paper for my reaction because I only received this a couple of days ago, but I will say that his paper on the state of global environmental security needs no counter-argument. I brought some books here that will only serve to reinforce what Dr. Malayang has presented to us. We will not have to belabor them but the bottom line is we are in trouble—and this is not a doomsayer's type of an academic, alarmist, doomsayer, pessimistic type of prognosis—but it is really what is staring us in the face. The first book is *The Last Hours of Ancient Sunlight* which I hope will be recommended reading to our students especially in urban planning. This is a new book and it is a wake-up call to personal and global transformations. It is a very powerful book that basically points in some philosophical sense to what Dr. Malayang said about our excessive use of energy—the finiteness to it. Ancient sunlight in this book simply refers to fossil fuels; sunlight is what gives us energy and therefore what gives us life, and everything that we use for energy comes from ancient sunlight—photosynthesis, oil, coal and all that is buried in the earth. Again, it is not doomsday scenario but it is really a wake-up call for all of us because we are down to 40 or 50 years of fossil fuels in the world today as far as supplies go. And beyond that, if we do not have adequate alternative sources that we can tap, especially renewable sources, then we are in real trouble and we are facing a catastrophic future.

The second book is *Managing for the Environment* which is about understanding the legal, organizational and policy challenges for environmental management. Much of the data and points presented to us today by Dr. Malayang are also reflected in this book, especially in his concluding remarks about personal and collective responsibility to the earth we live in and the kind of shift to an environmental ethic that is imperative for all of us to understand and especially embrace. That is a very tall order for many, especially when we speak in societal terms, but nonetheless that needs to be constantly repeated.

The third book I have here is *The State of the World* from the World Watch Institute in Washington, D.C. and it replicates/resonates with the paper of Dr. Malayang. If any of you are interested in more of what we are saying in this lecture series, these are some of the books that we can recommend which you could also look into for a deeper analysis of all these problems that are highlighted in Dr. Malayang's paper.

I would like to react first by saying that there is really no argument to the general view/picture/situationer of global environmental security which Dr. Malayang presented and largely focused on. The data may not be as collated or updated as we want it to be, but there are a lot of websites that we can look into and books like the ones I just mentioned. It is just a matter of bringing them all together from international and multilateral agencies that have these different sets of data. But I would like to focus on the local perspective, the kind of local problems that the Philippines has on environmental security. I will start by saying that if there is anything that should point to the urgency (in fact, to the abyss) that is before us, it is in studies conducted recently that point to the Philippines as one of the rather dismal cases of environmental security. There are quite a number of these studies, but I will focus on the most recent which is the "Environmental Sustainability Index" that has come out of the World Economic Forum held in Switzerland. The forum is a yearly gathering of supposedly movers and shakers in world business, governments, nongovernmental organizations (NGOs), and civil societies. A pilot study ranking 56 countries in the developing world which came out April last year revealed that the Philippines ranked as one of the poorest in terms of five components. The five components are: (1) current conditions of environmental systems—land, air, water, etc.; (2) stresses to the environmental systems such as population, industry, business, governance, etc.; (3) vulnerability of communities and human beings to environmental disturbances and disasters; (4) social and institutional capacity to respond to environmental problems which necessarily include governance; and (5) global stewardship and degree to which the economy behaves responsibly. Have you seen this environmental sustainability index? As Severino said in one of his columns "Dubious distinctions have their uses," this should give us a slap on the face and wake us up to reality, because we rank 55 out of the 56 the countries studied, next to Zimbabwe.

I will just go through it in a broad sweep: we have the poorest air quality in the region, measured among other variables by sulfur concentrations in urban areas. We have the 4th dirtiest megacity in the world, in terms of concentrations of lead, total suspended particulates and the likes. As Dr. Malayang would agree, lead damages the brain and it makes people intellectually deficient. Poor air quality is fairly obvious, *lahat naman tayo lumalanghap ng hangin* (all of us breathe air): thirty-three (33) micrograms per cubic meter of sulfur content which is heavily coming from jeepneys/buses diesel in the Philippines, compared to 2.2 in the US; and 200 micrograms per cubic meters of total suspended particulates in the Philippines compared to 7.8 in Canada.

We have one of the world's worst rates of land degradation when it comes to deforestation—we end up last among 56 countries in that component alone. In the Department of Environment and Natural Resources (DENR) budget hearing of August 2001, I raised this, and as is the normal reaction of bureaucrats, the response of the good DENR Secretary Antonio Cerilles was "Oh no, that's not true, I'm sure that's inaccurate," so I did not pursue it. You know how budget hearings are, bureaucracy will always attempt to say that they are never wrong, but that they are always doing their best. No one was willing to accept this data on the part of the DENR in their budget hearing, at least not readily. And the Secretary said they have not heard about the World Economic Forum.

We have one of the highest growth rates in the world. We are the 9th most populous country in Asia, the 14th in the world for a land size that ranks the 126th in the world. We can fit all of the 78 million Filipinos into a land size of the state of Arizona, and we are growing at an average of 2.4 percent. So you see Payatas, you see our garbage everywhere, and you see overflowing schools. (By the way, from the policy experiences of the Congress' Committee of Appropriations, shortages are clear for everyone to see. Shortage in classroom is in the 40,000 range, over 30,000 in teachers, 2 million in textbooks, and student textbook ratio is 1 is to 4 [in some areas like Bukidnon we still have 1 is to 8], so there it is).

Our population growth being one of the highest therefore, the pressure on the land is quite severe. Dr. Malayang spoke of the Malthusian and Ricardian correlations and the theories on whether population has a direct impact on the environment and vice versa. That is a subject of debate, but I throw to you just as an added datum here that there is no denying that the more people, the more pressure on the environment. The pressure on the land is quite severe, in this country 98.2 percent of our land has more than 5 people per square kilometer—the same figure as that of Japan which has 120 million people.

In terms of vulnerability to environmental impact, we fared badly on 2 measures: (1) the prevalence of infectious diseases—700 per 100,000 people, and (2) the number of deaths each year from natural disasters—an average of 35 per 100,000 people, which is the highest number of deaths among the 56 countries studied. Talk about environmental insecurity. Of course, we have typhoons, floods, earthquakes, and that type of aggravating circumstances which Dr. Malayang terms as the "enviromagnification," the problem is magnified because of the stresses on the environment. Payatas is a perfect example of a community where deaths are occurring because of disasters that have to do with the vulnerability that human beings and communities have due to environmental disturbances and ecological unsustainability.

In terms of social and institutional capacity to deal with environmental problems, two variables are abysmal. First, our expenditures for scientific research and development is equivalent to only .2 percent of the GNP of this country (if I remember right, the GNP now is $30 billion) compared to 1.1 percent of Singapore's GNP and 2.2 percent for science research and development in the United States. Second, we have one of the world's lowest ratios of researchers with only 157 per million people, compared to 3,732 per million people in the United States, 2,728 in Singapore and 350 in China. Where are the 157, are they all in the International Rice Research Institute (IRRI) in Los Baños, or are they abroad? If we do produce more than this, many of them are not here, so then how can you expect us to solve environmental insecurities? The Environment Management Bureau (the equivalent of the US Environment Protection Agency) has a budget of around P100 million a year, and they only have one or two scientists. This is the agency that is supposed to take care of the country's land, air and water pollution. So where do you find the 157? Let us not get into these rather depressing facts and figures.

I would like to connect with what Dr. Malayang said about governance, and how, towards the end of his concluding remarks about individual responsibilities, he tied it with the shift of a paradigm, the shift to a new ethic which sees humanity as part of the biosphere and its faithful steward and not just the resident master and economic maximizer. I am lifting this, by the way, from articles of an Earth Day special issue on how to save the earth of the *Time* magazine this year. It says that "we have to fundamentally have a shift to a new ethic which sees humanity as part of a biosphere and its faithful steward, not just the resident master and economic maximizer." I am, in this sense therefore, corroborating and reinforcing what Dr. Malayang said in his concluding remarks. However, let me just add a little note here, that while we can talk endlessly about individual responses and behaviors and community-based approaches to the problems that we face on the environment and ecology, we must go beyond just talking about consciousness, although that is key, to looking at the realities and facing them squarely. And I go back to social and institutional capacities because these have a very strong correlation with human vulnerability to all of these stresses that happen to the environment. We have to speak of the policy dimensions of population and demographics of food security, agriculture, health, education, and the economics of environmentalism. Of course, it is good if we can all segregate our garbage, have compost pits, change our consumption habits and the like, but if we are talking about the vastness of our environmental insecurity, which Dr. Malayang has shown and presented to us today on the global scale and myself showing you a reflection of what is happening to the Philippines today, then we have to get into responsibility on a wider scale especially as they impact policy and as they have to do with leadership, governance, state actions, and civil society responses.

The reach of the level of policies and corporate social responsibilities is very important because that is where we can have a wider, deeper and more meaningful impact. I would like to add this to Dr. Malayang's concluding remarks. We have to face major challenges this way, because while we can recycle individually, it has to take a policy on the part of

McDonald's for instance, not to use styrofoam. We need to have a vaster reach for that is where the urgency and the convergence should be. We can not just say let us start doing it by household or community. But given the timeframe and given the utter pressing urgency that we are faced with, there have to be real shifts also not only in the paradigms that we talk about but in the paradigms of governance as well. And when I say social and institutional capabilities, I do not necessarily just mean training more scientists and increasing the 157 per 1 million people. But, we are also getting into the fundamentals of civil liberties, democracy, transparency, accountability and all of the infrastructures of governance that we need so that we can have a climate, (pun intended) to really create the kind of policy environment that will be conducive to the solutions that we need for these problems. Corruption is a big issue, which the DENR and any other bureaucratic agency is subject to, just as Congress is also subject to all too often. Therefore, if we want to clean up the earth, it is as simple as that. As Prof. Michael Tan wrote in one of his missives, "if we want to clean up the earth, then we must first clean up government." We must first clean up governance (hello Malacañang, Congress, Senate, hello all of us).

I would like to shift at this point and read you something that is not ponderous and technical; I just want to be a little philosophical. Many of you may have heard or read this and I have just added a bit here and there because I find it very appropriate to the topic/theme that we are having today. It is called the "paradox of our times" and it ties in to all of these shifting of paradigms, shifting of mindsets, shifting of ethics, vis-à-vis the earth, vis-à-vis one another, vis-à-vis the bounties that we see around us, vis-à-vis governments, vis-à-vis societies and cultures. This is a way of wrapping things up, so with your indulgence, here it is—the paradox of our times:

> We have taller buildings but shorter tempers; wider freeways but narrower viewpoints. We spend more but have less; we buy more but we enjoy it less; we have bigger houses but smaller families; more conveniences but less time. We have more degrees perhaps but less sense; more knowledge but less judgment; more experts but more problems; more medicines but less wellness. We drink too much, we smoke too much, we spend too recklessly, we laugh too little, we drive too fast, we get angry too easily, we stay up too late, we get too tired, we read too seldom, we watch TV too much, and we pray too sparingly. We have multiplied our possessions but reduced our values, we talk too much, we love too seldom, and we lie too often. We've learned how to make a living but not a life, and we've added years to life but perhaps not life to years. We've been all the way to the moon and back but we have trouble crossing the street to meet our new neighbors. We've conquered outer space but not inner space. We've done larger things but not necessarily better things. We've tried to clean up the air but we've polluted the soul. We've split the atom but not our prejudices. We write more but we learn less, we plan more but we accomplish less. We've learned to rush but not to wait. We have higher incomes but lower morals. We have more food but less appeasement. We have more acquaintances but fewer friends. We have more effort but less success. These are the days of quick trips, disposable diapers, throwaway morality, one-night stands, overweight bodies and every pill that does everything from cheer to quit to kill. It is a time when there's so much in the show window and nothing in the stockroom. We build more computers to hold more information to produce more copies than ever before but we have less and less of real communication. We've become long on quantity but short on quality. These are the times of fast foods and slow digestion, tall men and short characters, steep profits and shallow relationships. These are the times of world peace but of domestic warfare, more leisure but less fun, more kinds of food but less nutrition. These are the days of two incomes but more divorce, of fancier houses but broken homes. Indeed it's all true, these are the paradoxes of our time.

And if we need to really change the way we treat the earth, and our selves and our communities, as Dr. Malayang's paper elucidates, then we must face and deal with this kind of paradoxes that exists among all of us and in the lives that we lead.

I would like to end, however, with a note of levity, lest you say this is way too somber. I was in a conference abroad a few months ago on the problems that countries face. There were different parliamentarians sharing problems of their own and I spoke for the Philippines. A British parliamentarian I met said, "I have a fairly comparative sense of the region—I am convinced that the problems of Singapore, Thailand, Malaysia, Japan, Taiwan and the others are very, very serious but not hopeless; but in the Philippine case, it is all hopeless but not serious." *Magandang hapon po sa inyong lahat.*

Lecture 2

Philippine Terrestrial and Water Resources Management: Policy Shifts for Sustainable Development

RAMON J.P. PAJE

Resource utilization and environmental degradation have indeed reached critical proportions demanding the serious attention of all sectors of the society.

Especially for countries like the Philippines where population and poverty incidence are relatively high, unsustainability of resource utilization is a common occurrence, thus precipitating the vicious cycle of environmental degradation—low productivity—and poverty; an ultimate formula for plunder.

Considering the extensive literature on the state of our environment, this paper therefore will not dwell much on the environmental implications of natural resources utilization. Instead, it shall simply present the factual status of our natural resources and expound on policy directions and action agenda the government has pursued. It will likewise discuss some critical "crossroad" decisions and clarify misperceptions on certain policy options.

I. THE PHILIPPINE TERRESTRIAL AND WATER RESOURCES

Land Resources

The Philippines has a total land area of 30 million hectares. Of these, 15.8 million are classified as forestlands. The rest are alienable and disposable (A and D), of which 10.3 million are devoted to agriculture (5 million hectares are planted to rice and corn). The balance are devoted to industrial, residential and other urban land uses. There has been a steady change however in our land utilization. According to an Australian International Development Assistance Bureau (AIDAB) study in 1993, farmlands have been converted to nonagricultural uses at an average rate of 2,300 hectares per year. The upward trend of conversion is attributed to the increasing population and demand for land for industrialization and urbanization.

Similarly, soil quality which substantially determines land productivity and crop yield, is dramatically deteriorating. Erosion resulting from unabated inappropriate cultivation remains a major problem due to nutrient loss and soil degradation. As of 1993, some 5.2 million hectares of the country's total land area were classified as severely eroded, 8.5 million hectares as moderately eroded and 8.8 million hectares as slightly eroded. Inappropriate management approaches and absence of management regime in certain areas, are likewise considered major factors to land deterioration.

Forest Resources

Of the 15.8 million hectares classified as forestland, about 6.5 million hectares are considered forested. Around 51 percent of these is second growth dipterocarp forest (open canopy); 15 percent old growth (closed canopy) dipterocarp forest; 19 percent mossy forest; 4 percent pine forest; 2 percent mangrove forest and some 9 percent is considered submarginal. The remaining forestlands consists of grasslands, open and barren lands, cultivated uplands and the like.

The old growth (closed canopy) dipterocarp forests totaling to about 0.9 million hectares are considered primary forests. They have been declared part and parcel of the National Integrated Protected Areas

System (NIPAS) for biodiversity conservation and environmental protection. Timber harvesting in these areas is prohibited.

The most serious threat to forest resources is land use conversion. This entails the complete eradication and the changing of the land use either to agriculture, settlement, industrial development and similar uses. The most common practice observed in the Philippines is slash and burn or kaingin.

Mineral Resources

The country's rich metallic and nonmetallic resources make us one of the world's leading producers of gold, copper, metal and chromite. As of 1996, it was reported that the country had a total of 6.671 billion metric ton (MT) of metallic and 78.472 billion metric ton (MT) of nonmetallic reserves. Seventy-two percent (72 percent) of the metallic reserves is copper, followed by nickel at 16 percent. Limestone and marble account for 47 percent and 37 percent of the nonmetallic reserves, respectively.

Because of the process of extracting these resources, mining has been identified as a major source of land degradation due to vegetation clearing, earth moving and effluent generation. Mine wastes and tailings are considered pollutants. A total of 47.44 million metric ton of mine wastes were generated in 1991 alone. However, for the period 1990–1996, the volume of mine wastes decreased by 17 percent.

Water Resources

Water is a vital yet finite resource. For every one percent increase in the country's population, water demand is increased by 2.2 percent. As of 1996, it is estimated that a total of 975 million cubic meters of water coming from the watershed areas, rainfall, and ground water (absorbed by the soil) is supplying the country's daily needs. Water demand is about 310 cubic meters (MCM) per day. This is divided among the three major water users, the agricultural sector (86 percent), commercial and industrial sector (8 percent) and domestic use (6 percent). This accounts to merely one-third of the actual supply. This figure indicate that there should be, theoretically, no water shortage. Overall demand is expected to increase to 8 percent per year or 507 MCM this year.

Extraction of ground water for industrial and domestic water supply is a growing concern, particularly those in the coastal areas. In Metro Manila, groundwater levels have gone down at a rate of 5 to 12 meters per year. In some areas in Metro Manila, Cebu and Bulacan, this has led to subsidence and saltwater intrusion significantly affecting the availability of water not only from the aquifers but also from surface.

About 60 percent of the Philippine population suffer scarcity of safe and treated water amidst abundance of the commodity. In fact, six regions, Regions 3, 5, 6, 7, 11, and 12 are already having distressed water levels.

Of the 207 rivers which have been classified as to their best use, only 50 percent still meet their classification standard. A study of the Environment and Natural Resources Accounting Project (ENRAP) in 1996, funded by the US Agency for International Development (USAID) estimates that over 40 percent of the organic pollution of the surface waters of the Philippines come from domestic sources. This is easy to understand considering that except for Metro Manila and Baguio City, the rest of the country does not have any sewerage system.

For the Pasig River, a study in 1996 by the Danish Development Assistance (DANIDA)-funded Pasig River Rehabilitation Program found out that industries contribute 35 percent of the Biochemical Oxygen Demand (BOD) load, domestic wastewater, 60 percent, and solid waste, 5 percent.

Laguna Lake, the biggest freshwater lake in the country at 90,000 hectares is besieged by pollution coming from domestic, industrial, and agricultural sources. The Master Plan for Laguna Lake and Mt. Makiling has estimated that 72 percent of the BOD load of Laguna Lake and its tributaries come from domestic sewage, 14 percent from industries, 10 percent from agricultural run-off and 4 percent from the Pasig inflow (which occurs during dry months when the water level of the lake is lower than Manila Bay).

The state of the country's freshwater ecosystem is considered dismal.

Coastal and Marine Resources

Our marine and coastal areas consist of our coastal waters, estuaries, and seas. The Philippine marine

territorial jurisdiction representing the Exclusive Economic Zone (EEZ) cover about 2.2 million square kilometers, of which 1,934,000 are oceanic waters and 266,000 square kilometers are coastal waters.

Coastal and marine ecosystems perform ecological services such as buffer, erosion control, nutrient cycling, and beach sand deposition in addition to important resources, including mangroves, coral reefs and seagrass beds, which are rich breeding grounds and habitat for fish and other marine wildlife.

For the period 1990–1994, the average annual decline in mangrove areas is about 3,000 hectares. Of the total 132,500 hectares in 1990, only 120,500 hectares remained in 1994. Among the country's regions, Region 9 has the highest percentage of mangrove areas left (45 percent). This is followed by Regions 4 and 10 with 24 percent and 16 percent, respectively. The decline in mangrove forest can be attributed to the conversion of mangrove areas to fishpond and other agricultural activities, land reclamation, wood extraction, and uncontrolled tourism development.

Seagrass beds are known to serve as food, nursery and shelter for fish, invertebrates and marine species. They also reduce sediments and interact with coral reefs and mangroves in reducing wave energy and regulating water flow. It is this ecological role of seagrasses that links them directly to the livelihood of many coastal inhabitants of the Asia-Pacific region including the Philippines. Seagrass ecosystems are being threatened by both natural and human-induced disturbances such as typhoons, volcanic activities, population and community interactions (grazing and competition), mining activities, inappropriate coastal land conversion, deforestation and the resulting run-off, and to some extent, blast fishing.

Moreover, the Philippines has one of the largest areas of coral reefs in the world which is estimated at 27,000 square kilometers and produce at least 10–15 percent of the country's marine fisheries production. Out of the 742 monitored areas nationwide, only 5.3 percent are in excellent condition (with 75–100 percent living coral cover), while about 30.5 percent are in poor condition (0–24 percent coral cover). Siltation is found to be the major cause of the degradation of coral reefs. Other causes are attributed to mine tailings, pollution, direct extraction, coastal development, overfishing, and destructive and illegal fishing methods like *muro-ami*, use of cyanide and dynamite.

Biodiversity

Based on recent estimates, the Philippines is home to about 13,500 plant species (flora) and around 170,000 animal species (fauna). Some 44 percent of the flowering plants are endemic and are mostly found in primary forests. High endemism is also observed among mammals (64 percent), reptiles (68 percent), amphibians (38 percent), and birds (44 percent).

The number of endangered species though, due to constricting material habitat, pollution, and over-exploitation, increased from 212 in 1980 to 284 in 1988.

However, consistent with the NIPAS Law, the government has already declared some 281 protected areas covering about 2.7 million hectares, of which 36 percent is watershed/ forest reserve; 30 percent national parks, national marine parks/reserves; 25 percent mangrove swamps and tourism zones; 6 percent wilderness areas; and 3 percent game refuges and bird sanctuaries.

II. POLICY DIRECTIONS, ACTIONS/ DECISIONS TOWARD SUSTAINABLE DEVELOPMENT

As the mandated agency for the protection of the environment and sustainable management of natural resources, the DENR is the primary institution responsible for achieving long term environmental sustainability. It is the prime mover of sustainable development efforts and has adopted the same as the centerpiece of environmental and natural resources policies and programs.

As provided for in the current Medium Term Philippine Development Plan, the Department has embarked on six policy directions—all geared toward the attainment of the objectives of sustainable development.

Policy Directions

1. Adopt the Philippine watershed management strategy as an overarching framework for the management of upland and coastal resources.

This is a departure from the traditional sectoral approach in environment and natural resources management. It calls for a more holistic approach in which the watershed is seen as a spatial planning unit in the management of the environment and the natural resources.

Watershed planning and management involves the holistic, multiple use and sustainable management of all the resources present in the watershed area. It allows economic activities within the area provided these are consistent with the overall management plan for the watershed. It is not limited to the management of the physical resources but also involves the management of people living within or are affected by the watershed.

This policy is concerned with the underlying causes of environmental degradation and the types of the degradation being experienced in the watershed areas. It advocates shared responsibility and improved coordination allowing use of appropriate tenurial instruments for its management.

2. Strengthen local environmental management systems through integrated air and water quality and solid waste management.

This policy is directly related to the objective for environmental improvement. The aim is to capacitate local governance to assist the Department in environmental management efforts with special emphasis on air and water quality as well as solid waste management. This is being done cognizant of the provisions of the Local Government Code which has partially devolved environmental management to local government units and local authorities.

The policy entails the provision by the DENR of the necessary standards and monitoring in the implementation of environmental programs. The capability of local governments, local authorities, other government organizations, and local communities to implement said programs will, similarly, be strengthened.

3. Adopt local and community-based resource management, public-private partnership and integrated multi-stakeholder approach to attain sustainable natural resources management and social justice.

While DENR is the mandated agency to ensure sustainable management of the country's resources, it also recognizes the roles of other stakeholders in the attainment of sustainable development objectives. As such, it recognizes the need to involve various stakeholders such as local communities, civil society as well as public and private organizations in order to achieve greater impact. The involvement of local communities and less privileged segment of the society in resources management also provides them with access to resources significant to the upliftment of their living conditions.

4. Develop and institutionalize a system for environmental valuation and accounting of natural resources.

The core idea behind this policy is to effect proper valuation of environmental goods and services which are often overlooked. Environmental costs and benefits arising from economic activities are normally not included in the traditional income accounting system. By estimating the value of environmental services and damages resulting from economic activities that occur during a particular year, a more realistic estimate of the level of development of the country is arrived at. It is envisioned that proper valuation of the environment and natural resources would result in more efficient utilization of resources.

5. Expand DENR's institutional mandate from regulatory agency to development-oriented assistance and service agency.

The policy intends to effect a shift in the DENR mandate and would entail provisions of technical assistance to private investors in terms of information and preparation of management plans, upgrading the capability of local partners and providing the policy climate conducive to private initiatives. With a shift in the mandate, the Department is now looking into the private sector and the civil society as its partner in the management of the environment and natural resources. Consequently, DENR intends to fully harness institutional and individual capacities of its partners in terms of extending the necessary technical expertise and transfer of technology that would facilitate

development and strengthen environmental partnerships. Consequently, DENR intends to fully harness institutional and individual capacities of its partners in terms of extending the necessary technical expertise and transfer of technology that would facilitate development and strengthen environmental partnerships.

6. Refocus ecosystems research and development towards the generation of more responsive, field oriented and replicable environment and natural resources management technologies.

The Department envisions to harness its ecosystems research and development effort by giving more emphasis and importance to the generation of applied and more responsive, field oriented and replicable technologies and practices. Research and development (R and D) studies will be properly screened to ensure that the results they generate would be useful and fully adaptable at the local levels by the various stakeholders.

ACTION AGENDA

1. Promote sectoral/policy complementation in the implementation of environment and natural resources programs and projects.

There is a felt need to harmonize the various environment and natural resources (ENR) laws and regulations and promote policy complementation toward effective implementation of ENR programs and projects.

Specifically, conscious efforts are needed to harmonize various ENR-related laws like the Indigenous People's Rights Act (IPRA) vis-à-vis the Mining Law and the NIPAS Law. NIPAS Law vis-à-vis Forestry Code, the Agriculture and Fisheries Modernization Act (AFMA) and the Fisheries Code.

Even the sectoral policies within the ENR agencies have to be reviewed to promote complementation. The DENR itself often experiences sectoral "policy collision" due to conflicting land uses, especially in the forestry, land and mining sectors.

2. Simplify the Environmental Impact Assessment (EIA) system and strengthen compliance monitoring to Environmental Compliance Certificate (ECC) conditions.

This is intended to reverse the current situation where emphasis is on the EIA/ECC processes and not on the relatively weak compliance monitoring.

Self-regulation of industries is also encouraged. Likewise, programmatic ECC will be issued to sectoral industries or group of industries located in a common area like ecozones, petrochemical plants, industrial estates and the like.

3. Delineate the permanent forest boundaries, conserve/protect the existing forests and rehabilitate the degraded areas.

Article XII, Section 4 of the Constitution provides that:

> "The Congress shall, as soon as possible, determine by law the specific limits of forest lands and national parks, marking clearly their boundaries on the ground. Thereafter, such forest lands and national parks shall be conserved and may not be increased nor diminished, except by law."

Rehabilitation of degraded areas as production forests either through industrial plantation or community-based arrangement approach should be encouraged to meet at least the local demands for wood products.

4. Revitalize the forest-based industries, enhance private sector investment and strengthen partnership with upland communities.

Production forests must be established. Just like the banana, mango, sugar cane, pineapple plantations and the like, tree plantation for wood production should be strongly encouraged.

Compared to boreal and temperate forests which entail about 50–70 years to produce timber to harvestable size due to climatic conditions, the Philippines is blessed with a climate that allows us to grow timber in 10–15 years. It is therefore quite perplexing for some sectors to discourage commercial logging in the Philippines.

Forest-based industries, however, must ensure partnership with the upland/forest occupants numbering about 6 million households. Resettlement is an impractical option.

5. Complete the establishment and development of the NIPAS.

Apart from production forests, protection forests for environment and biodiversity protection must be established.

Consistent with Republic Act No. 7586 (NIPAS Law), all primary/old growth forests have been declared protected areas and placed under NIPAS. These areas, together with about 200 sites of national parks, marine parks/reservations, bird sanctuaries, game refuges and similar areas are considered protected and prohibited from exploitation (i.e., timber harvesting).

The required delineation, mapping, proclamation and legislation of these areas, however, need to be completed.

6. Enhance environmental protection and strengthen local community/indigenous people's participation in mining activities.

Responsible mining, with strong considerations to indigenous peoples and local communities has been adopted in the National Mineral Policy. Under this policy, pro-people, pro-environment mining strategies have been incorporated to discourage traditional mining.

An Environmental Protection and Enhancement Program, which requires mining industries to conduct rehabilitation at every stage of the mining process has been adopted. The program has a Contingent Liability Rehabilitation Fund—an environmental financial guarantee fund—which is a ready replenishable fund intended for progressive mine rehabilitation and environmental protection measures.

7. Upgrade the land records management and information system and purge fake land titles.

Land management hinges strongly on efficient and effective land record and information system. The inadequacy and inaccuracy of land records/information are fertile grounds for fake titling. It also facilitates the illegal conversion of forestlands, with the assistance of unscrupulous and corrupt government personnel/ authorities.

Fake land titling is a major factor to the wavering investor's confidence in the Philippines. Thus, the Land Administration and Management Program was launched by the government to develop a coherent land management system, policies, and legislations. The program is also geared toward easing the pressure from the high and competing demands for limited land resources.

A Unified Projection System to detect conflicts and overlaps in the issuance of permits, tenurial instruments, and other licenses/agreements in particular geographical areas has been implemented. A unified/simplified patenting system for public A and D is also encouraged.

8. Strengthen capacity toward sustainable management of coastal and marine resources.

Coastal and marine ecosystem are among the most fragile ecosystems. They are also among the most endangered. Coastal and marine ecosystems are the recipients of pollution from land-based sources/ activities.

Although coastal and marine ecosystems have sufficient capability to regenerate due to the interconnectivity of the resources, capability toward proper care and management of said resources should be strengthened. A holistic management approach to coastal and marine resources through integrated management should be initiated by the local government units. Greater involvement of local government units (LGUs) and communities are encouraged to ensure program sustainability. Enforcement capacity of LGUs should be upgraded. The municipal waters, being part of the LGU jurisdiction should be funded, thus factored into the computation of their respective Internal Revenue Allotment (IRA).

Overall, the government should define the guidelines/procedures for the implementation of the Unit UNCLOS which was ratified as early as 1984. It must also resolve as soon as possible the significant issues affecting its implementation, particularly the definition of the countries baseline/basepoints and the implication of the Exclusive Economic Zone.

9. Upgrade capability and encourage private participation in environmental and natural resources research and development.

Natural resources in the Philippines, though limited, are considered significant to the overall global ecosystem. Its flora and fauna are among the most diverse in the world. The marine species of Sulu-Celebes Sea alone comprise about 30 percent of the world biodiversity.

Sustainability management and utilization of these resources, however, requires significant researches which the government can ill-afford. Private sector participation therefore should be encouraged through appropriate incentives and partnership mechanism.

10. Enhance water utilization and management.

Water is considered scarce in certain areas and periods of the year. However, this is not due to lack of water per se but to inappropriate and inadequate management regime and capability. As discussed above, the country's water demand is only a little over than one-half of the estimated available water supply.

The real problem actually is how to make water available at a certain area, at the proper time, when one needs it. This problem is not precipitated by lack of supply but by lack of management capability to make water available at a certain place and time, when it is needed.

When precipitation is high, as evidenced by heavy rains and common occurrence of flash flooding, surface water goes directly to the rivers and the seas, thus wasted. We are unable to catch and store them naturally or artificially in the watersheds or catch basins/ impounding dams, which we lack.

Infrastructure and upland rehabilitation are therefore vital to the effective management of water resources. Infrastructure is also vital for water distribution for either domestic, industrial or agricultural uses.

Efficient utilization of surface water will save groundwater which takes decades to perculate and avoid occurrence of saltwater intrusion.

What further complicates the artificial water scarcity problem is pollution. Rivers and lakes, which are major sources of water, are mostly polluted and are thus unable to provide the necessary solution to the scarcity. The Pasig River and Laguna Lake are classic examples.

"CROSSROAD DECISIONS"

1. To Mine or Not to Mine

Known to many, the clamor for a mining ban especially from some environmental advocates is escalating. The Mining Act of 1995 was, in fact, questioned before the Supreme Court by environmental advocates.

Though a finite resource and relatively pollutive due to the extraction processes, mineral resource is a vital capital of the state. It is a significant component of the economy and almost an indispensable part of physical environment.

Thus, should we mine or should we not mine?

We should mine. Not only because the law allows or encourages mining, but also because it is almost impossible for physical and economic development to occur without the mining industry.

The opinion to import the country's mineral resources is unacceptable. It is not only impractical because we cannot afford it, but also environmentally unsustainable. Globally, we have a NIMBY (not-in-my-backyard) syndrome. We do not want to extract our mineral resources; instead we want to extract the minerals of other countries without regard to their environment.

It is more sustainable to produce what we need and use.

Without sacrificing intergenerational equity, inasmuch as minerals are a finite resource, it is still appropriate to mine our minerals now lest they will be rendered obsolete by fast improving technologies. In fact, one of the major reasons for the dramatic decline of the demand for certain metal ores is the abundance of substitutes, like synthetic materials which perform the same or even better serviceability than minerals.

Mining activities, however, should ensure minimal impact to the environment. A substantial part of the revenue should be reinvested to the environment for intergenerational equity.

2. Total Logging Ban or Sustainable Forest Management (SFM)

A total logging ban policy is not a guarantee that our forest will be conserved. In the late 1980s, the RP-German National Forest Resource Inventory (NFRI) Project studied the rate of deforestation/denudation in the provinces where logging was banned (Zambales, Mindoro, Marinduque, Romblon, etc.) vis-à-vis other areas where logging was allowed. It was found out that forest denudation was faster in areas where logging had been banned. The rate of denudation in these areas ranged from 3–5 percent per year as against the 0.5–2 percent rate per year in areas where legitimate timber harvesting was allowed.

A total logging ban policy is not sustainable and is self-defeating. Like the squatting law, it is impractical to implement. With the tremendous demand for wood and the inadequacies of government to enforce the ban, forest resources will be virtually a common property, an open-access resource available to everybody. In the absence of a management regime and support of the private sector, the government will remain ill-equipped to enforce said ban. The ban will also remove the incentives for the private sector and upland communities to participate in forestry development programs.

The ban will also be a formula for insurgency. Given the more or less 6 million families in the uplands who are beneficiaries of the Community-Based Forest Management Program and who serve as government partners in forest protection, a total logging ban will not only marginalize said communities but drive them into insurgency. Not to mention the foreign exchange drain that it will incur, wood importation, like mineral importation, is a NIMBY in the global ecological sense.

SFM therefore remains the most viable management regime for our forest resources.

SFM, a pending bill in both houses of Congress, is a science-based management approach that aims to ensure continuous production of forest products and services without impairing the inherent productivity of the forest. It is a "Logging Ban Plus" policy. SFM also bans logging in the protection forests which are designated for environmental and biodiversity protection purposes. However, SFM encourages sustainable production of wood in the production forest and promotes partnering with the upland communities especially in protection and development.

In short, the solution is to produce wood, and not to ban or discourage its production, and encourage importation and the use of substitutes.

Wood, being a renewable resource, is the most sustainable construction material. Again, like other crops (i.e., banana, mango, pineapple, sugar cane, etc.) wood should be allocated land areas for its production.

In conclusion, the Philippines has developed enough policies to put forward sustainable development. The real challenge however is their operationalization. This observation is not unique to our country. It is global. The same observation was in fact raised at the Rio + 5 and is expected to be made again at the coming Rio + 10 (2002).

The decision therefore of the present dispensation to place more emphasis on the ground or the actual implementation of the policy directions toward sustainable management of the environment and natural resources, particularly the required fundamentals—like the delineation of the final forest boundaries—is more practical and acceptable.

Sustainable development was not meant to be a myth. It can be realized.

Reaction

Ecosystem-Based Management Approach

CANDIDO A. CABRIDO

My reaction to the paper presented by Undersecretary Ramon Paje will focus on the policy and strategic aspects of shifting DENR's management approach to natural resources from commodity-based to ecosystem-based. However, I will not delve on details, considering the limited time given for me to react in this forum.

We are all aware of the fact that DENR manages natural resources by treating them as commodities for exploitation, development and conservation. In particular, these natural resources, which are closely managed by the DENR, include forest, minerals, water, land, air, corals, mangroves and biodiversity. In the process of developing and conserving these resources, DENR's managers are oftentimes confronted by local communities concerning the curtailment of their access to natural resources as a source of their livelihood. DENR tries to address the social and economic problems brought to their attention by resource users (both local communities and private corporations) by redefining their policies and strategies in managing the resources under contention.

To balance exploitation with conservation, the DENR has aligned its policy thrusts with the sustainable development goal of the government. Hence, innovations in its planning and management of resources were recently introduced. I worked with DENR as a Technical Advisor in shaping their sustainable development program during the last four years, so I personally cannot contradict what Undersecretary Paje presented because many of those policies and strategies came from consultants or technical advisors like us.

There are, in my opinion and from the perspective of planning and resource management, four critical aspects that have to be managed by DENR in resolving present problems in the use and development of natural resources. First is *resource use and allocation for various uses.* This was partly presented by Undersecretary Paje but let me add some more. Right now, we do not know the threshold for forest cover. For example, how much forest cover do we need to keep? Do you have any idea whether we need to maintain 30 percent, 40 percent, or 60 percent of our forest cover? If you ask the DENR, most likely they will not also be able to give you any definite figure about forest cover threshold. Moreover, how much coral cover do we need to strictly preserve or how much mangrove cover do we need to maintain? We do not have reliable and empirical figures on these. These are just examples of critical thresholds, which until now we do not know and therefore we cannot easily move forward and clearly chart our policy directions and strategic options. We are constrained in our planning and allocation of resources because of the lack of basic yet vital information on thresholds or carrying capacity limits of natural resources.

Second critical aspect is the management of *urban and agricultural encroachment.* There is a pull and push battle now among different land uses especially forest, urban and agriculture and this problem has to be addressed by DENR in tandem with the Department of Agriculture (DA) and the Department of Agrarian Reform (DAR), among others.

The third critical aspect that has to be managed by DENR is *sustaining the impacts of government interventions.* I must admit the fact that many of our government projects are not sustained. When the project is finished and funding is cut off, everything stops. We keep on investing in projects but these projects do not effectively become capital infusion but mere subsidies. In effect, our government is losing a lot of money in nonviable projects while the real losers are the poor communities themselves because they fail to seize the opportunity to improve their lot.

The fourth factor that has to be addressed by DENR is *the concern of people living in the uplands to be gainfully employed.* It is the aspect of promoting sustainable livelihood programs that is critical in improving the economic status of uplanders. Because of too much focus on resource management, sometimes we tend to forget that what people need is not so much of land but more of better paying jobs.

Because the present DENR configuration may not be able to respond adequately to these management concerns, there is a need for policy shifts to address sustainable development of our natural endowments.

DENR is now shifting its focus from resource to ecosystem management. This shift requires changes in strategies and approaches. Its planning approach will have to shift from resource-based to ecosystem-based which is very much complicated. The question now is whether DENR is ready for these shifts and how long the transition period will take. Present planning and management units have divided the landscape into two categories as manifested in major ongoing projects of the government particularly the DENR. These two popular units are the Watershed and the Coastal Zone.

Forest resources development projects involving millions of dollars such as the ADB-OECF-WB projects focus on watershed rehabilitation while another equally supported project falls under the Coastal Zone category such as those supported by the USAID, the International Maritime Organization, the United Nations Development Programme (UNDP) and the ADB. But in an ecosystem-planning approach, this division seems inadequate to me if one will consider the dynamics between population, development and environment. The influence and impacts of terrestrial activities do not stop on land. As a matter of fact, they are felt more strongly in the coastal waters. Examples are water pollution and sediment flow. These are serious problems now being manifested in the coastal area. The coast and marine ecosystems serve as sinks of any terrestrially based activities whether it is mining, logging, agriculture, industries, domestic or household activities. Therefore, we should not simply divide the landscape because it creates illogical discontinuity in our planning and management. Cross-boundary issues and problems are not properly addressed in plans and management policies if the two ecosystems (i.e., Watershed and Coastal Zone) are not treated as a continuum.

There is now a debate on whether we should expand the watershed to include the coastal zone or extend the coastal zone to cover the watersheds. It depends on whose perspective we are examining. The DA would like to expand the coastal zone to include the watershed but the DENR would like to expand the watershed to cover the coastal zone. Again, it also depends on what we are dealing with—whether small islands or large basins. For small islands, the coastal zone should be expanded to cover the watershed and the other way around for large basin. This is an operational matter for the DENR, but clearly it has to redefine the coverage of watershed to consider the terrestrial and aquatic continuum at least for planning purposes. Holistic management seems to be out of context within the Philippine bureaucracy and prevailing political climate. Right now it is not viable to adopt a holistic management in this landscape continuum because of so many political hurdles. It is very difficult to integrate efforts of sectoral agencies inasmuch as it is almost impossible to harmonize conflicting political interests of local government leaders.

DENR's new watershed definition has to take into account ecosystem dynamics such as water flow, sediment transport, and population movement, which is an often neglected factor, and settlements build-up. Watershed planning should shift its focus from the forest to the dynamics of population and forest resources just like the social forestry model now being adopted by the DENR. It needs also to totally shift from family to community-based forestry, which it is doing right now.

Shifting from resource to ecosystem planning and management means several things for the DENR. First, its personnel who are resource managers have to be retrained in ecosystem management. That is why I think they are not fully ready by now. Maybe the top management of DENR is ready but I am not sure about its field lieutenants. This means that DENR has to strengthen the social and economic aspects of their management operations. They now have to look at the community vis-à-vis the resource and the environment. DENR has to shift its focus from family to community

just like when it administers the use of land and property rights. And it has to reformulate its tenurial instruments to adapt to shifts in its management approach.

Second, it has to mainstream socioeconomic concerns in resource and environmental planning. This means also undertaking projects that combine livelihood and environmental protection through the application of "work for nature" scheme. This involves giving the upland and coastal poor communities work through the infusion of capital investment with the agreement or condition that they protect a certain resource or a particular ecosystem. The livelihood project introduced to the resource-dependent communities should also be intended to steer them away from destructive practices or technologies. On the other hand, part of the returns on invested capital will have to be paid back by the beneficiaries for further investment in other communities. This pay back scheme has to be instituted by DENR to sustain its capital investment on livelihood projects.

Third, the DENR has to tap more the LGUs, NGOs and the private sector in the planning and management of communities and ecosystem. This means that DENR has to formulate and institute new coordination schemes and mechanisms. This will also prompt DENR to pursue more vigorously the devolution of some of its functions and at the same time involve more the private sector in small and medium scale enterprises that will employ uplanders and poor fishing communities. We will see DENR in the near future to be managing people rather than resources, because if you can manage the people well then there will be less problem with their use of resources. We are having problems with the use of resources because we are not properly handling the people who are using these resources.

Fourth and last, the DENR has to refocus its research and development program from resource commodities towards the central theme of population development and environment to be responsive to sustainable development challenges. Ecosystem management has to cover the dynamics of population, environment and development to be successful.

Thank you and good day.

Reaction

MARY MAI A. FLOR

Allow me first to thank Professor Jimenez to have included me in such an elite group of scientists. As you can see, I am the lone lawyer here; but it appears so far from the discussions that where we are today is caused by too many lawyers in this country. So allow me to try to reverse that sad plight that some of my colleagues have contributed to.

As has been said, my background has always been on freshwater resources. I would like to focus my reactions on those points which Undersecretary Paje discussed with respect only to freshwater resources and management.

First is the issue of jurisdiction. The first action agenda that Undersecretary Paje talked about was the shifting into a watershed management approach. The issue that I would like to bring up now is what kind of institutional arrangements does the DENR pursue in order for this kind of strategy to be implemented? As already discussed, watershed and water for that matter, cut across jurisdictions of geography, politics, etc. For example, you have town mayors over a given area where a river cuts through and where the watershed exists. How then are you able to implement the so-called watershed management with all of these players involved? This is essentially the problem that we meet in trying to push for a freshwater agenda, or what we call the integrated water resources management approach. You have an area with mayors, with water districts, and with all other national agencies involved in water, and a turf war ensues. This, I suppose, is one of the things that I would like to have more discussion on—what kind of institutional arrangements can be established for water management to be truly implemented on the ground?

Undersecretary Paje stated that the policies that cover freshwater are a little vague. All of the natural resources fall under the DENR except freshwater. The jurisdiction on freshwater lies with another agency which is called the National Water Resources Board. A portion of its coverage somewhat lies with the DENR through the Laguna Lake Development Authority (LLDA).

The LLDA is the only true river basin organization that exists in the country today. In a sense, it operationalizes the river basin management concept or the IWRM. Only one authority handles all of the development projects and activities within the lake, as well as in its 22 tributaries. At the time that we were in the task force, we saw that this is the only kind of arrangement where water resources management can be sustainable. The rest of the country's water resources are not being managed because they do not have any organization similar to the LLDA.

The NWRB that is mandated to implement the Water Code is an agency, strangely enough, which is not attached to the DENR, but to the Department of Public Works and Highways (DPWH). It is currently chaired by the DPWH Secretary, and has several members including water users who have conflicting interests, such as the Metropolitan Waterworks Sewerage System (MWSS), Local Water Utilities Administration (LWUA) with all of its water districts, the National Irrigation Administration (NIA), etc. So, on this issue of water rights application, as Undersecretary Paje had mentioned, the water rights application process has become quite tedious just like the application for an ECC. Because of the absence of data, granting of this water right has become a simple matter of yes or no, depending on whom you ask, and without technical considerations. You go to the Board requesting a water right in a particular area, and you have all of the studies backing you up to show that the intended project is not going to affect the quality or the ecosystem in that area. But in every case, there is a water district that will object because "Aha, it's within my franchise area; ah, it can't be because that area is mine..." It has always been that kind of system in the NWRB in fighting

for this water right and it truly hampers development.

A case in point in which I had personal experience was in Subic Bay. In 1995, the World Bank had identified a large water supply project to supply bulk water to Subic Bay Freeport Zone as well as Olongapo City. Olongapo and Subic Bay did not have the existing water resources to be able to provide the required volume. Consultants were hired who looked at an area which was in the neighboring province of Zambales. But because there is a political turf war going on between the mayors, governors, congressmen, etc. of Zambales and Subic, the former were not willing to share its water with Subic, claiming that it was going to affect the water requirements of Zambales. But we have the technical data to show that it is not going to affect the requirements and development of Zambales. If they do need the water in the future, there is enough for everybody to share. Unfortunately, the Board could not decide because strangely enough like I said, it is decided not on its technical merit but more on whoever says yes or no, it has to be an unanimous decision for all of them. And this has become really a major problem.

My company right now is in partnership with Benpres and together we are running Maynilad. But do not talk to me about your water problems in Maynilad because I am not involved in the operations of Maynilad. I work with another part of the company which is trying to look for new water sources for Metro Manila. We cannot provide a 24-hour water supply because there is not enough raw water provided to the system. Under our contract, we are supposed to have been provided by MWSS with an additional 300,000 cubic meters a day by January 1, 2000. It is already September 2000 and the project has not begun. The project will take two years to build. San Roque dam which is supposed to be the long-term solution for the water problems of Metro Manila is something that has been identified in 1979. It is a dam that will provide 1,900 million liters per day to Metro Manila. We need two dams to solve the long-term problems of Metro Manila. The water security issue as well will be solved, in the sense that during El Niño if Angat dam is in trouble, we will still have another dam to depend on. It will take seven years to build that dam, and it has been how many years from 1979 when it was supposed to have begun?

So, you can see the issues with respect to water resources management in this country. It is whom you talk to, and DENR does not seem to be that group, it appears. Although I am quite heartened to hear that the Department is trying now to move towards that direction. In 1996, President Ramos named the Secretary of the DENR as the water czar and this is precisely why the Presidential Task Force was created. But, it is a little unclear as to where the DENR is trying to move with this new role that was given to them in 1996. Again, as I said, watershed management is well and good, but I get the feeling that as far as DENR is concerned, watershed is really very central to forest rather than water. *Puno palagi, puno ng puno, hindi tubig* (it is always trees, not water). That is what I used to keep telling the people in the Department; I explained to them that, really, the orientation of the Department is forest, not water, from day 1 of its operations. These are some of the policy shifts that I hope the department will address.

I welcome this talk about environmental valuation. Actually that project started even when I was still with the department. The cost of Angat dam which was built 20 years ago was not imputed in that cost because all of the infrastructures that are existing today were not imputed in that cost. These were essentially viewed as grants from government, and already the government is seeing that this is not a sustainable way of developing these kinds of large infrastructure projects. And this is why even in domestic water supply, we are trying to introduce this concept of resource valuation. For instance, if and when Laguna Lake is going to be developed, already LLDA is talking of a raw water charge. The raw water charge may be used to subsidize the poor who can not afford to pay the full cost of water. It may go to poorer communities who may be able to develop level 2 systems (not piped but pumped kind of arrangements for their water supply). The fund can be used for many things to be able to address the water supply issues and problems. And this is something that is really most welcome. My only question is, how is this fund going to be treated? If this fund is collected and will go back to the national treasury, then each year the DENR has to beg Congress for its share of that fund. And here, it becomes a taxation, in effect, a simple taxation on the part of the

people, which is not the intent of this resource accounting or this resource valuation. We envisioned the idea of resource valuation after we met with the Polish Ambassador, who explained to us that in Poland, there is an environment fund coming from fees charged for things like abstraction of water ways, putting a power plant in certain areas, or anything that will harm or have effects on the environment. The fees should easily be afforded by you and me, and it should spread to whoever is the eventual user of such a good. Water is an economic good, and that is something that has to be said time and again.

This kind of fund in Poland is deposited in a trust fund for a specific program. We tried coming up with a similar scheme in the proposal to create the water resources authority of the Philippines, but we already met resistance from all national government departments, the Budget Department and of course, Congress had a big problem with that. Because as you know, Congress has the power of the purse under the Constitution and they felt that it will be limiting their power if they were to give up the right over this fund. So yes, it would be great to have something like an environmental fund to be able to make use of it for cross-subsidies in whatever form or nature with respect to environmental concerns, but how to access that fund has to be carefully crafted.

I would like to touch a little bit on LLDA. The LLDA is supposed to be the authority handling Laguna Lake. You know that there exists a Napindan Channel, and that Napindan Channel is supposed to be closed at times when the Pasig River is going to overflow. It is supposed to be a flood control measure to stop too much water from flowing into Laguna Lake. What is happening today is that the Napindan Channel is perennially open; nobody dares close the channel for fear of their lives literally. We hear people from the DPWH saying that if we try to close it even for a few days, they will be attacked literally by the fisherfolk who believe that if they close the channel, the saline waters are not going to enter the lake, and the fish will die. Strangely enough, there was a study that came out with the finding that the higher the salinity of the water, the higher the yield of fish. It does not help our cause to keep Laguna Lake as a freshwater body. The reason why we would like to keep it as a freshwater resource, as pointed out by Undersecretary Paje, is that it is going to be the cheapest source of water for Metro Manila. It is close, it is surface, and it is easily accessible, if only the water quality were in a better shape. The cost of treating water in Laguna Lake today would be at least P15 to a cubic meter. Not to distribute it, mind you, just to treat it of all the heavy metals, the salinity, the pollution coming from every-where, and raw sewage that directly flows into the lake. And to think that this has already improved after the DENR has introduced the user-free system. Today, we would like to use that as a potential water source, and LLDA is willing to guarantee its water quality in the next 25 years. So where does that leave us? From the private sector's standpoint, we are going to pour in at least US$300 million to build a water treatment plant to harness water from that area. But 10 years from today, that water treatment plant may not be the proper treatment plant to treat the water quality because it may have deteriorated, and the technology may no longer be able to do anything. So who is going to take that risk? It cannot be the private sector, but it should be the government since that is something that government can control.

So these are some of the issues that are happening on the ground that we can not seem to be able to address on our end. We would like to call the attention of those in government to look at the bigger picture on a long term basis. The Marine Sciences Institute (MSI) in fact had a chance to help MWSS in Laguna Lake and found some very interesting things on water quality in that area. But again, even armed with that study from MSI, LLDA is still not willing to really commit itself to keep that water in such a level of quality. These are some of the frustrations that we are looking at.

Lastly, it is correct that water, as far as the Philippines is concerned, is not so much a problem of availability. It just so happens that it is not evenly distributed across time and space and of course across populations. Water stresses are beginning to be felt in areas with large urban population and where there is a lot of migration. As discussed earlier, Region 3, Region 4, and the National Capital Region (NCR) as well as Region 7/Cebu all have a major water problem. This is not a phenomenon limited to us but is, in fact, worldwide. In the last global water forum which I attended, the Southeast Asia vision and framework for action were presented. We did see that population has

a lot to do with this issue of water scarcity. It was also noted there is limited investment not only to improve water supply for consumption but more importantly, for agriculture. Agriculture is accountable for more than 80 percent of the world's water requirement, including in the Philippines. During the El Niño for instance, we found that all of the irrigation canals of the NIA were not properly lined. And everybody knows that at least 60–70 percent of water is lost to seepage before it gets to the rice paddy.

These are some of the things that hopefully will be addressed by government. It is good that Secretary Edgardo Angara (Department of Agriculture) was the country representative to The Hague last March. After that experience I think, he can see really the value of trying to save or be more efficient in the use of water in irrigation, much more required than that in water supply. In Israel for instance, the use of drip irrigation can water several hectares with just a few drops. Of course, with us, because we are spoiled and it rains all the time, we feel that there is enough water for everybody. But like I said, it is not evenly distributed, with El Niño coming back more fiercely and more often with global climate change, it is high time we look at the way we use our water not just in the domestic area but really more on the irrigation side as well as on the pollution aspect of water resources management.

So with that, thank you very much for your attention.

Reaction

RHODORA V. AZANZA

As Undersecretary Paje explained, I received the paper at nine this morning and I was able to read it in between my meetings. I have been very busy also preparing for a paper which I will deliver next week in an international conference, so forgive me if I just look into my notes as I deliver my reaction to the paper.

The Undersecretary has provided a very comprehensive account of the state of the Philippine terrestrial and water resources, hence I will not dwell on this anymore. I would like to dwell on the policy directions that he has mentioned, as, for example, item 1 regarding the Watershed Management Strategy. Until recently, many development programs have supported sector-focused development as in fisheries, mineral extraction and urban infrastructure development. Often these initiatives have failed to recognize cross-sectoral impacts on poor communities, for example on women and even or especially the environment. While these efforts often generated short-term economic growth, this growth frequently was at the cost of sustainable development. Now, most development agencies here and abroad are gradually moving towards community-focused, environmentally responsible, and integrated management initiative.

So I congratulate the DENR for moving towards this integrated watershed management approach. One consideration however, that must be given rate is the political aspect of the watershed management scheme. But I think the Undersecretary has emphasized this, that there are conflicting interests between the communities surrounding this watershed. This conflicting resource use of adjacent local communities should be resolved carefully and clearly to avoid failure in this very promising policy direction.

For the policy directions 2 and 3 (i.e., strengthening local management systems through integrated air and water quality and solid waste management, and adopting local and community-based resource management, public-private partnership and integrated multistakeholder approach to attain sustainable natural resources management and social justice, respectively) that the Undersecretary has mentioned, most resource monitoring effort, if ever done, are done mostly by supporting nongovernmental organizations or the academe that facilitates scientific backstopping. Scientific assessment of marine resources development, for example, is important especially if results are published and made available to others. However, it is restricted by lack of funds and personnel, or unavailability of qualified personnel (There are personnel of course, but most of them are unqualified). Furthermore, scientific reports do not meet, in most cases, the understanding of the involved communities. So there is usually the gap, and I think that the MSI has done collaborations with institutes not only in the University but also outside of the University to make possible the transfer of scientific knowledge that we have to make them more understandable to the local communities. I remember we were quite successful in putting down the effort to come up with the Bolinao Cement Factory (I think the Undersecretary mentioned this). The MSI was able to make the people understand the impacts that the Bolinao Cement Factory would have on the watershed and also on the coastal marine environment.

This I have to say on item 4 (i.e., developing and institutionalizing a system for environmental valuation and accounting of natural resources), most of the natural scientists, especially the "idealists," wonder if proper monetary or economic valuation of environmental goods and services could ever be achieved. Or would the valuation really do some good, would the people better appreciate the natural environment, or would some/most of them think that since monetary or economic values could be attached to these resources, they are easily replaceable? For all its worth, valuation of natural resources has been attempted, especially abroad. I think there are a number

of people doing this in the University also. I think that some people in the School of Economics are working with the MSI in doing this. But it takes a lot of modeling, and it is a very complicated ecosystem that we have to model. For example, there is one concept that I would like to mention which is being used by the land and ocean interconnection project, and it is called the Functional Diversity Concept which has a key feature. The key feature is that there is a link between ecosystem processes and functions with outputs of goods and services, which can then be assigned monetary and economic values. Functional diversity can be defined as a variety of different responses to environmental change, in particular the variety of spatial and temporal scales in which organisms react to each other and to the environment. So therefore, in the ecosystem modeling, you not only consider differences of reactions between space and time but how they really affect each other—meaning the different ecosystems if you consider watershed, and it is going to be a really complex modeling.

Marine and terrestrial ecosystems differ significantly, as pointed out by the Undersecretary, in their functional responses to environmental changes, and these will have practical implications for management strategies. Thus, although marine systems may be much more sensitive to changes in the environment, they may also be resilient, meaning more adaptable in terms of recovery responses to stresses. The Functional Diversity Concept encourages analyst to take a wider perspective and examine changes in large-scale ecological processes together with relevant socioeconomic driving forces. The focus then is on the ability of interdependent ecological and economic systems to function under a range of stress and shock conditions.

Now on item number 5 (i.e., expanding DENR's institutional mandate from the regulatory agency to development-oriented assistance and service agency), I would like to say that this is a very progressive shift but I just hope that the regulatory role will not be completely forgotten but can be enhanced by this scheme.

On item 6 (i.e., refocusing ecosystems research and development towards the generation of more responsive, field oriented and replicable environment and natural resources management technologies, I would like to say that ecosystem research and development and management projects abound throughout the Philippines, each with its own peculiar situation, approach and criteria for success. These have been implemented by such diverse organizations as universities, grassroots organizations or people's organizations, even foreign-assisted, etc. Almost all of these share the overall goal of sustainable development, but what success means in practice depends on the various emphases of the initiating and implementing organizations. But I am happy to hear that the DENR is approaching a multi-agency R and D approach that addresses the generation of applied and more responsive, field-oriented and replicable technologies and problems. The University, I would like to mention, is coming up with a science and technology (S and T) part that could really help the DENR in this regard. We are going to collaborate actively with the NGOs and even locators from the business sector and help in the S and T development of the country. The Undersecretary has mentioned that a time will come when many materials coming from natural products could be replaced by artificially-developed products. At the College of Science, I have one program that is being implemented together with the College of Engineering. This is the Materials Science and Engineering Program which is a program that makes possible the development of new materials from natural products. And Biotechnology is one very important field that needs to be enhanced in terms of replacements of natural products from molecularly-engineered or biotechnically-engineered products.

On the action agenda, I think the Undersecretary has discussed well and even pointed out the problems involved in the implementation of these actions. A number of researches and initiatives have been done here and abroad in connection with all these, but the problem again lies in the implementation and the regulation in relation to all these action points. Most of the time I am called by the Environmental Management Bureau (EMB) to act as an EIA expert reviewer and I am happy that they are very open to suggestions coming from the experts and they have always considered new findings and developments from abroad, like things I learned from abroad they consider

here in the EIA review and the ECC, and so on. But always as the Undersecretary has said, '*yung* follow-up *ang nagiging problema, ang ganda-ganda nung* ECC, *ang ganda-ganda nung mga nilagay naming* considerations (the follow-up is the problem; the ECC itself is well-crafted because we included many important considerations)—I remember once we had 46 conditions but I wonder how the DENR-EMB could follow these up.

On the "crossroad decisions" (of course I am not a geologist; neither am I a forest management expert), I do not wish to give specific comments on these 2 items but I agree with most of what the Undersecretary has shared with us. As a member of the academe and a scientist, we will be very actively working on what we need to do and cooperate with the DENR to be able to help them in these new policy directions. I thank you for your attention.

Lecture 3

Food Security in the 21st Century

ARSENIO M. BALISACAN*

Over the last three decades, there have been marked increases in food supplies for developing countries and for the world as a whole. Food supply per capita in developing countries rose from an average of about 2.0 kilocalories per day in the early 1960s to about 2.5 kilocalories per day in the early 1990s; the availability for the world increased from 2.3 kilocalories to 2.9 kilocalories during the same period.

East Asia had the lowest food availability (1.7 kilocalories per day) in the early 1960s, but ended the 1990s with higher than the average for all developing countries. The progress was slower in South Asia where the incidence of poverty is higher than that in East Asia. In the early 1990s, average food supply per capita in South Asia was lower than those for East Asia and the developing world.

In the Philippines, food availability has also been rising from around 1.7 kilocalories in the early 1960s to 2.3 kilocalories in 1998.

While regional or national food availability is an important dimension of food security, the critical issue is whether all population groups in a country have access to affordable food at all times. Indeed, famines in recent memory (e.g., India's in the 1970s) were not always associated with severe shortages of aggregate food supplies.

There are three main factors to consider in explaining food security. One is the adequacy of food supplies. Available food supply, if evenly distributed, covers overall nutritional needs. A second critical factor is the stability of sources of food. There is a need to ensure environmental sustainability so as not to compromise future sources of food security. Finally, food security involves enabling households to have access to food of sufficient quantities. Household entitlement to food supplies is influenced by income distribution, returns to the poor's productive assets, and the presence of marketing system and formal and informal safety nets.

Clearly these factors suggest that food self-sufficiency does not necessarily imply food security. In most cases of hunger, the problem is usually "food entitlement" failure for certain population groups, either because they do not have sufficient resources to acquire the basic food requirement, or because market imperfections, especially in credit and insurance markets, and government failures prevent them from accessing food and building assets (including human capital), or both.

One has to move beyond a macro approach to looking at food security (for example, by simply looking at nationally available food supplies), and seek as well a microeconomic understanding of the nature of food insecurity, especially in rural areas where poverty and hunger are usually concentrated.

RURAL FOOD INSECURITY

Consider the probability that a rural household is food insecure. Following Anderson and Roumasset (1996), this can be represented by:

$$Pr\,(Z < 0),\ Z = P(Q - C^m) + A$$

where:

Z = level of food insecurity
P = price of food
Q = farm output
C^m = minimum household consumption to meet nutritional requirement

A = household incomes from other sources (off-farm employment, remittances, public transfers, etc.)

For simplicity, assume that C^m is not dependent on P. The household is a net supplier of food if $(Q-C^m) > 0$; it is a net buyer if $(Q-C^m) < 0$. Any net purchase of food is covered by A. While quite simple (and obviously ignoring dynamic effects of food insecurity), this representation of food insecurity problem is useful in understanding the stochastic aspects of food insecurity and poverty as well as in identifying specific areas for public action.

Clearly, a household is food insecure if net production falls short of minimum food requirement and A is not adequate to cover the shortfall. What are the chances that this occurs? Assume first that P and Q do not covary (as might be the case if transport costs are low or if the local economy is integrated with the urban/global economy). Also assume that A&Q are uncorrelated.

Rural household income varies directly with farm income, which tends to fluctuate from season to season owing to vagaries of weather. Low yield and variability of farm output increase the chance of households to become food insecure. It follows that public action focusing on raising farm productivity and reducing farm profit variability enhances rural food security.

Turn next to sources of household incomes other than farming (i.e., A). For the large majority of the poor, the only significant asset that they have is their own labor. Thus, a key factor enhancing household food security in a risky farm environment is the return to this asset in nonfarm activities. A major part of the strategy for reducing food insecurity should therefore involve generating conditions for sustained employment expansion opportunities in rural nonfarm (as well as urban) areas.

Consider next agro-climatic shocks, with P co-varying with Q. The effective price of food faced by rural households distantly located from market centers includes the price quoted in these centers plus transport and time-costs (or generally, transaction costs). If the transaction costs are high, the divergence between the effective price received and the effective price paid may be very high in relation to the market price. High transaction costs, resulting from poor rural infrastructure, could lead to isolation of farm households from food markets (i.e., households choose to become subsistence-oriented). For these households, local supply shocks, owing to either drought or crop pest infestation, are disastrous to their food security. Although there may be indigenous communal insurance schemes that serve as imperfect substitutes for credit markets, these schemes may not be sufficient to prevent them from experiencing hunger.

Even food surplus from other areas will, in the absence of public action, not help much in alleviating the situation. Precisely the same transaction costs, combined with reduced income-earning capability, prevent this surplus from becoming accessible to those in hunger.

From a policy viewpoint, it is useful to distinguish long-run vs. short-run food security (Roumasset 1982, Ravallion 1992). The former has to do with the development of human capabilities for meeting basic needs; economic growth enhances the attainment of these capabilities. The latter recognizes social concerns other than growth; support systems (e.g., food aid programs) reflect the society's aversion to starvation and other less terminal forms of nutritional deprivation.

The distinction is important because it highlights possible trade-offs between short-run and long-run benefits (and costs) of public action for enhancing household food security. UNDP's Human Development Report series reflects a stronger preference for support-led security measures. It deemphasizes the presence of these trade-offs. On the other hand, the World Bank's approach to poverty alleviation underscores the long-term opportunities foregone with short-term security measures. For most developing countries, fiscal bind demands a serious recognition of these trade-offs.

POVERTY AND FOOD INSECURITY

Did the recent episodes of growth in Asian countries benefit the poor? Put differently, is household food insecurity essentially a poverty problem?

Evidence suggests that for a number of countries, periods of growth were accompanied by improvements in income distribution as well as on the incomes of the poor. On the other hand, periods of decline were marked by worsening of income inequality.

In the case of the Philippines, contrary to popular perception recent episodes of growth did not bypass the country's poor. At the very least, growth was neutral to the rich and the poor. But when the economy stagnated or contracted, the poor had the greater burden: the proportionate declines in their incomes were greater than those of the rich (Balisacan 1999a, 2000).

In our country, poverty incidence—or the percentage of population deemed poor has been decreasing from 49.2 percent in 1985, to 45.2 percent in 1991, to 37 percent in 1997. Over 90 percent of poverty reduction observed from 1985 to 1997 was due to increases in average income or consumption of the population. For every 10 percent increase in average real income of the population, poverty incidence falls by approximately 17 percent.

While poverty responds to growth, the economy's ability to translate growth to poverty reduction appears somewhat weaker than for the "average" East Asian country. From 1985 to 1997, the Philippines attained an average GNP per capita growth of only 1.7 percent. During the same period, poverty incidence fell by an average of one percentage point a year—or from 45 percent to 37 percent over a period of 12 years. On the other hand, all East Asia and Pacific countries taken together (except China and Indonesia) achieved high average GNP per capita growth of 6.9 percent, and reduced their people's poverty by 1.6 percentage point a year. Clearly, we are less able than other countries to reduce poverty simply because of our inability to achieve and sustain high growth.

Poverty in the Philippines—as well as virtually all Asian developing counties—is a rural phenomenon. Three out of every four poor households live in the rural areas, majority of them dependent on agriculture and agriculture-related industries for employment and income.

Even urban poverty is an indirect effect of rural poverty since low rural incomes push migrants into the cities.

Thus, agricultural and rural development is central to a strategy aimed at alleviating poverty and food insecurity. Expansion of cultivable area is no longer a practical option. Increases in agricultural productivity hold the key to sustained rural development.

ATTACKING POVERTY AND FOOD INSECURITY

Food security has long been an issue that the DA has been wrestling with. The sad fact though is that much still remains to be done to ensure that everyone has access to affordable food in sufficient quantities.

In recent decades, agricultural production growth has failed to keep in step with our population growth. Growth in the sector has slowed down from 4.3 percent in the 1960s and 1970s to only 1.4 percent in the 1980s and 1990s. From 1995 to 1999, the sector grew by an average of only 1.5 percent.

What has gone wrong? The low-level performance of the sector has been attributed to the following:

- Serious underinvestment in rural infrastructure
- Neglect of R&D in agriculture and in small and medium-scale industrial sector
- Downward trend in international commodity prices of the country's traditional crops
- Macroeconomic and political constraints

Further, the following policy and investment biases have also contributed to the under-performance of the sector:

- Small farmers received less attention and support from government in comparison to large farmers and agribusiness enterprises.
- Benefits of public investment in agricultural research, input and output subsidies, and infrastructure accrued disproportionately to large farms.
- Public spending was heavily biased in urban areas.
- The unfavorable effects of foreign trade restrictions, the low interest rate policy, and the effective rationing of institutional credit impinged much more heavily on small farmers.

With about 60 percent of the population dependent on agriculture and some 40 percent employed by it, the low-level performance of the sector is undermining our hopes of winning the war against poverty and ensuring food security for our people.

The inability of the sector to raise productivity has resulted in higher food prices, aggravating the insecurity

of the urban poor, landless agricultural workers and even the majority of small farmer families, since they are net buyers of food. Owing to the scarcity and high cost of food, per capita consumption has been reduced from 900 grams a day ten years ago to 800 grams today.

Thus, addressing poverty and food security requires long-term solutions that increase average food production and incomes. These include measures that raise farm productivity and reduce farm profit variability such as investments in agricultural research, infrastructure and other ingredients of rural development.

DA STRATEGIC INTERVENTIONS

The Agriculture and Fisheries Modernization Act or AFMA outlines the strategic interventions needed to modernize the sector, raise farm productivity, ease poverty, and promote food security. While modernization should be pursued for the growth of the sector, this should be made compatible with maintaining the sustainability of our farming ecosystems. And while productivity is our priority, still efforts are made to strike a balance between promoting growth on the one hand, and environment protection and sustainability on the other hand.

Guided by the AFMA, the Department has embarked on the following:

Irrigation and Water Management

An important strategy towards enhancing productivity and diminishing farm variability in the sector is the provision of adequate infrastructure. Even when modern technologies are available, farmers are less inclined to adopt these if there is no proper infrastructure that will help reduce their yield risks.

In light of this, the DA has focused on expanding irrigation facilities to benefit more farmers. In 1999, DA's irrigation and water resources development generated an additional 320,031 hectares benefiting 257,000 farmers. As of June this year, we have irrigated and rehabilitated an additional 45,659 hectares.

We intend to further expand our country's total irrigated land through the following measures:

- phased devolution to LGUs of communal irrigation facilities, and privatization of systems and facilities
- focus on small-scale, farmer-operated systems
- design of location-specific and efficient systems
- strengthening the institutional capacity to plan, monitor, and deliver irrigation support services
- restoration and improvement of dilapidated communal irrigation systems through the implementation of counterparting schemes with LGUs and irrigator's associations
- allowing the optimum use of irrigation water for joint or multiple uses, such as inland fishery, electric power generation, and home consumption.

We shall further ensure that irrigation projects shall be well-prepared considering the protection and sustainability of watershed areas, with emphasis on erosion control, sediment transport, reservoir sedimentation, water yield enhancement, and the development of cost-effective and socially acceptable watershed rehabilitation measures.

Research and Extension

Another important measure towards ensuring long-term food security is research and development. Our various researches, including pest management and disease control, can help farmers maintain stable production levels.

Our budgetary support for R and D increased by 21 percent to P471 million in 1999. In 2000, this has been increased by 57 percent to P738 million. We are determined to increase the level of support to at least 1 percent of gross value added (GVA) in agriculture (or P5 billion a year).

We have also rationalized and consolidated our R and D system under the "one system, one program" strategy. R and D networks at national, regional, and local levels are being set-up in pursuit of this strategy.

We have also formulated a comprehensive human resource development program for farmers, fishers, farm technicians, scientists, academicians and policy-makers. This includes a P100 million a year Local Scholarship Program, a 5-year US$2.7 million a year DA-Fulbright graduate scholarship program, and a US$7 million biotech capability-building program.

With much enthusiasm, we look forward to the full implementation of a biotechnology program. Here, we may find the solution towards addressing food

inadequacy to meet the demands of the growing population while at the same time ensuring environmental sustainability.

Through our extension work, we are aiming for more and more farmers to be able to access technological developments in farming. As areas devoted to agricultural production are slowly diminishing, the adoption of modern and better technology becomes even more critical in raising production and productivity. We will continue to promote the use of high-yielding varieties to maximize returns from farming and ensure production of sufficient quantities.

We shall likewise increase the availability of modern planting materials. The high-quality seeds have the capacity to raise the current yield of farmers by as much as 50 percent. Our target for rice is to increase the use of certified seeds from a low of 15 percent to 80 percent over a 5-year period.

Heightened extension support for farmers will help ensure the wide adoption of high-yielding varieties. There will be continuous provision of training for farmers and fishers on the use of advanced genetic materials.

Our extension workers will also continue to promote the use of improved farming techniques that are not only high-yielding but contributing to environmental sustainability. In watershed areas, we are encouraging farmers to adopt conservation-guided farming which includes contour farming, agro-forestry and controlled grazing.

Post-Harvest Facilities and Other Infrastructure

Each year, the sector experiences substantial losses from either the lack of or poor provision of post-harvest facilities. In view of this, the DA is targeting to reduce post-harvest losses by one-half. In order to better achieve this, we have already distributed some 2,346 assorted post-harvest equipment and facilities to LGUs and farmers associations.

To date, some 1,415 kilometers of farm-to-market roads and an additional 12 fishports have been constructed. The DA will advocate the shift in infrastructure priorities to the rural areas. It will also ensure relevant participation from the LGUs and beneficiary groups in the construction and maintenance of rural infrastructure.

The Strategic Agriculture and Fisheries Development Zones (SAFDZs)

To achieve greatest productivity and sustainability in the use of our land resources, we will match our country's most productive agricultural lands with the most viable products and production systems through the creation of SAFDZs. Basically, the SAFDZs are strategically located areas of prime agricultural land where agricultural modernization efforts are being focused. Each SAFDZ shall have an Integrated Development Plan covering production, processing, investment, marketing, human resources development, and environmental protection.

In line with the SAFDZs, we have identified and mapped food baskets or areas of comparative advantage in agriculture through close collaboration with LGUs. This year, some 1,367 municipalities have formally adopted and incorporated these food baskets into their land use plans.

Special Programs

While efficiency improvement (hence growth) is the key to long-term food security, production growth alone will not be sufficient to ensure food security for all. There are certain groups that are unable to participate during growth or are more vulnerable to adverse shocks due to physical disabilities and inadequacy of assets, including skills. These highly marginalized groups include upland farmers, indigenous communities, farmers and fishers in resource depleted areas. They are located in resource-poor, economically depressed and conflict-torn areas, and therefore have greater chances of being food insecure. There are also households falling into poverty traps owing to reinforcing effects of adverse shocks and imperfect capital markets, the latter leading to a failure to smooth consumption. The DA has initiated special programs to benefit these groups.

In most of these programs, an integrated approach to development is adopted to ensure sustainability of growth. Proper resource management that builds on the participation of stakeholders is also a major component of these programs.

a. *Upland Farmers*

Among the many significant projects we are implementing for upland farmers and indigenous communities is the Upland Development Program in Southern Mindanao. Costing some P1.68 billion, the project seeks to enable 9,000 upland farming households in Compostela Valley, Davao Oriental, Davao del Sur, Saranggani, and South Cotabato to productively, but judiciously, manage their upland resources.

We also have the Central Cordillera Agricultural Program or CECAP Phase 2, a P183.7 million project for rural communities in Ifugao, Abra, Mt. Province, and Kalinga.

The Economic Self Reliance Southern Cordillera Agricultural Development Program or CASCADE, a P161.15 million upland agriculture project that would benefit the indigenous people of Nueva Vizcaya, Nueva Ecija and Benguet.

And the Cordillera Highland Agricultural Resource Management Project or CHARM, a P321.44 million sustainable development project that would benefit small farmhold families in Abra, Benguet and Mountain Province.

b. Mindanao

Mindanao, which holds high promise as the country's new food basket, serves as the pilot area in the formulation and implementation of integrated development programs.

The development programs in Mindanao include:

- Mindanao Rural Development Project through a US$550 million WB loan which initially covers Cotabato, Sultan Kudarat, Compostela Valley, Agusan del Sur, and Maguindanao.
- SOCSKARGEN, up to 2004, covering South Cotabato, Sultan Kudarat, Saranggani, and General Santos City costing P6.3 billion covering 193,000 rural households.
- Davao Integrated Development Program, up to 2004, covering Davao provinces and City and Compostela Valley, costing P4.9 billion.
- ZAMBAS, up to 2005, covering Basilan and the Zamboanga Provinces and City, costing P5.6 billion and to benefit 388,000 farm households and 305,000 fisherfolk.
- Economic Recovery for Agricultural Productivity in CARAGA up to 2004, covering the whole of CARAGA, at the cost of P4.7 billion and benefiting 50,000 rural households.
- Household Enhancement and Livelihood Program to Muslim Communities up to 2004, covering Maguindanao, the Lanao Provinces, Cotabato, costing P461.8 million and benefiting 45,000 households.

Mindanao is also the site of some of the country's biggest and most important irrigation projects. These include:

- *The P2 billion Malitubog-Maridagao Irrigation Project.* Through support provided by Japan's Overseas Economic Cooperation Fund, the project will irrigate 10,840 hectares of new areas which will benefit some 4,549 farm families.
- *The ADB-funded Kabulnan Irrigation Project.* With a total cost of P1.772 billion, the project will construct irrigation, drainage and terminal facilities as well as provide watershed conservation for a target area of 12,030 hectares and for the benefit of some 4,196 farm families.
- *The P1.8 billion Lower Agusan Development Project.* Also funded by the ADB, the project will irrigate 7,152 hectares of new areas and eight existing communal irrigation systems covering 840 hectares for a total of 7,992 hectares, from which some 14,445 farm families will benefit.

DA has also led the initiative to consolidate government rural development efforts in Mindanao. In particular, the DA is implementing a P400 million rehabilitation program in Central Mindanao that provides farmers seeds fertilizers, carabaos, hand tractors, and other requisites for reviving agricultural activities in the area.

With these programs and other initiatives of the Department, we believe that reducing poverty and attaining food security are not far-fetched goals. Our hope now lies in the fulfillment of the strategies embodied in the AFMA.

We shall attain our goal of food security for our people by enhancing farm productivity, efficiency and competitiveness through the modernization of the agriculture and fisheries sector. In the process, because we want to ensure the long-term stability of food sources, we shall pursue modernization in the context of environmental sustainability.

REFERENCES

Balisacan, Arsenio M.

1996 "Rural Growth Food Security, and Poverty Alleviation in Developing Asian Countries." *UPSE Discussion* Paper 9610, 17–21.

2000 "Growth, Inequality and Poverty Reduction in the Philippines: A Reexamination of Evidence." Forthcoming.

2000 "Approaches to Targeting the Poor," *Report prepared for the National Economics and Development Authority in support of the UNDP-assisted Project Strengthening Institutional Mechanisms for Convergence of Poverty Alleviation Efforts.*

*The author is very grateful to Gemma Estrada and Mary Anne Majadillas for technical assistance. This paper has drawn extensively from a paper prepared by the author for the Food and Agriculture Organization (FAO 1999).

Reaction

Modern Biotechnology and Its Role in Sustainable Agriculture and Food Security

EVELYN MAE TECSON MENDOZA

ABSTRACT

Sustainable agriculture in the 21st century is recognized as imperative. To be able to feed the increasing world population in the context of sustainable agriculture, modern biotechnology has to be tapped, developed and made to work, especially for and in developing countries. Presently available genetically modified (GM) crops have been shown to contribute to reduced usage of pesticides, less tillage, and thus reduced soil erosion, higher and more stable yields, and better quality crops. Major potential benefits are seen in the development of GM crops with increased yield ceilings, improved resistance to pests and diseases, improved resistance to abiotic stresses, enhanced nutritional, processing and storage qualities. Risks are recognized and need to be continuously studied and managed.

INTRODUCTION

World population is expected to increase from 6 billion to about 8 billion and Philippine population, from 77 million to 104 million from 2000 to 2020. To attain food security and be able to feed the population, average cereal production should be increased by 80 percent higher than 1990 production. For rice alone, Philippine requirement will increase from 12.3 million tons to 17.8 million tons or a 40 percent increase. These increases must come primarily from increasing biological yields, productivity and not from expansion of farm area and more irrigation. Studies by the UNDP, FAO and WB show that use of conventional methods of crop production, even if efficiencies are maximized, will not be able to meet the food requirements of the increasing world population. Moreover, such increases in food production need to be done in the context of sustainable agriculture which is defined by FAO as "management and conservation of the natural resource base, and the orientation of technological and institutional change in such a manner as to ensure the attainment and continued satisfaction of human needs for present and future generations."

Modern biotechnology provides man with a new tool to dramatically increase and stabilize biological yields while protecting the natural resources base (Javier 2000). While protecting the environment, the use of modern agricultural biotechnology can contribute to (1) higher yield by increasing the yield ceilings, (2) improved resistance to pests and diseases, (3) tolerance to drought, excessive temperature, soil acidity and salinity, and other abiotic stresses, and (4) improved nutritional quality, processing and storage and postharvest qualities.

Food security, however, is not only a technological problem. As the paper of Undersecretary Arsenio Balisacan of the Department of Agriculture states, three factors are to be considered in food security—(1) adequacy of food supplies; (2) stability of sources of food, and (3) enabling households to have access to food of sufficient quantities. While the first and second factors may be considered technological in nature although highly affected by environment, the third is influenced by socioeconomic and political factors. Thus, solutions to food security attainment require technologies that ensure environmental sustainability, and enabling and supporting sociopolitical policies and interventions.

WHAT IS BIOTECHNOLOGY?

Biotechnology is any biology-based technology which uses organisms or their parts to make or modify products or improve plants, animals and microorganisms. For many centuries, Filipinos have been using biotechnology techniques in producing wine, vinegar, cheese and bread. Advances in science and technology have made it possible for new biotechnologies to be developed and used in agriculture, medicine, industry, and environment. These are: plant tissue and cell culture (both plant and mammalian), recombinant (rec) DNA technology leading to development of rec diagnostics and rec microorganisms, and genetic engineering of animals and plants.

Genetic engineering or recombinant DNA technology refers to specific gene transfer resulting in the modification and recombination of gene fragments of the same or related or unrelated species to produce new trait(s) in an organism. Modern biotechnology encompasses various techniques utilizing recombinant DNA technology.

APPLICATIONS OF MODERN BIOTECHNOLOGY IN AGRICULTURE

The adoption of GM or transgenic crops has been unprecedented, from 1.7 million hectares in 1996 to 39.9 million hectares in 1999, a twenty-three fold increase. The traits of dominant transgenic crops are herbicide tolerance (71 percent), insect resistance or Bt (22 percent), both herbicide tolerance and insect resistance (7 percent) in economically important crops such as soybean (herbicide tolerance, 54 percent), maize (Bt, 19 percent; herbicide tolerance, 4 percent and both Bt and herbicide tolerance, 4 percent), cotton (herbicide tolerance, 4 percent; Bt and herbicide tolerance, 2 percent). Other transgenic crops which have been released commercially are virus-resistant papaya, potato and squash, and canola with high lauric acid content. These transgenic crops are grown mostly in industrialized countries (32 million hectares) and only 7 million hectares are in developing countries.

In Asia, only China is planting transgenic crops (Bt cotton, Bt tobacco, tomato) in commercial scale. Field testings have been conducted in Japan, India, Thailand, Indonesia, and in the Philippines.

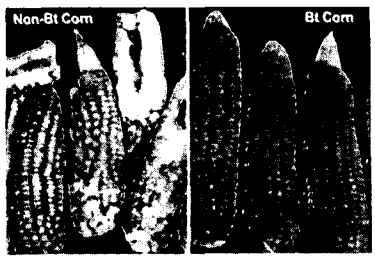
IMPACT OF MODERN BIOTECHNOLOGY ON FOOD SECURITY AND SUSTAINABLE AGRICULTURE

Higher crop yields, higher nutritional values and increased resistance to crop pests and diseases allow increased yields on the same cultivation area or same harvest on a smaller area, as well as more efficient use of land, mineral nutrients and water.

Current benefits. Insect resistant Bt corn yields 8–10 percent higher than non-Bt corn whereas Bt cotton yields 14 percent higher than its non-Bt cotton variety counterpart, which translates to US$133 per hectare. [Bt corn and Bt cotton have a gene from *Bacillus thuringiensis* (Bt) which codes for a protein that is toxic to Lepidoptera insects including the Asiatic and European corn borer and the cotton bollworm. Bt microbial pesticides have been used by farmers worldwide for the past 35 years with an outstanding record of safety to men and animals].

The use of crops with resistance to pests and diseases such as the Bt crops leads to less usage of insecticides. In 1996, 60 percent of American cotton farmers did not use insecticides, and the remaining 40 percent used insecticides only once, compared to 4 to 6 applications for conventional cotton. In 1998, 3.5 million pounds less pesticide were used for insect-protected Bt crops. In China, where 300,000 hectares of Bt cotton were grown in 1999, 13 applications of insecticide were reduced to 2 to 1 for Bt cotton. These GM crops with improved resistance to pests and diseases are therefore more environment-friendly and safe to man and animal. Papaya, potato and pepper with virus resistance have also been commercially released.

In addition, Bt corn also exhibits better quality grains and thus commands higher value. Since there is no or very little damage on the kernels, infection with pathogens producing toxins such as aflatoxin and fumonisin is prevented or minimized.



Better quality products have also been developed such as tomato with long shelf life, better flavor and higher total solids and rapeseed oil with higher lauric acid content.

A major GM crop trait, herbicide tolerance has allowed greater management flexibility for the farmer resulting in use of less dangerous chemicals and lesser amounts of herbicides. Moreover, use of herbicide tolerant crops means less need for cultivation, thus less soil tillage, reduced soil erosion and improved wildlife habitat for various species ranging from birds to soil invertebrates.

Potential Benefits. The potential benefits are numerous:

1. Efforts to specifically improve crop yield by raising the yield ceilings using modern biotechnology are underway. This process will entail the manipulation of several genes and is more difficult since crop yield is a complex trait.
2. Another strategy to enhance crop yields is to develop crops that are resistant to abiotic stresses such as soil salinity or acidity, drought, flooding, etc. This will be of major potential benefit to developing countries. This will allow our resource-poor farmers to utilize efficiently marginal or stressed areas for growing crops.
3. Improvement of nutritional quality of important crops is at various stages of progress. There are efforts to develop (a) high pro-vitamin A in rice to help the millions of youth worldwide who are suffering from vitamin A deficiency which could result in blindness or even death; (b) vegetables and fruits with high vitamin levels; (3) tomato and pepper with higher levels of beta carotene and lycopene; (d) legumes and cereals with better protein quality; (e) root crops with higher protein content, etc.
4. Development of crops with better postharvest qualities can minimize wastes and reduce energy and nutrient usage.
5. Development and use of environmentally compatible production methods in agro-industries will reduce energy and raw material consumption. GM enzymes for example, can be designed to work at lower temperatures and be more resilient than unmodified enzymes, thus making GM enzymes more efficient and effective.
6. Development of crops that produce biodegradable plastics and other polymers and crops with less wastes and toxins can reduce and prevent pollution of our environment with wastes.
7. Crops that can extract and detoxify pollutants from the environment are also being developed using modern biotechnology.

MANAGEMENT OF RISKS

Just like any other new technology, modern biotechnology has risks that must be studied and managed. There are risks inherent to the technology including biosafety issues (e.g., possible transfer of gene from GMO to another organism, creation of superweeds, faster pest adaptation, (possible effects on nontarget organisms and food safety issues), introduction of allergen or toxin, and effect of transgene on man or animal. Such risks can be science-based evaluated on a case-by-case basis and subjected to technology-based solutions. GM crops undergo rigid regulation from R and D stage to commercialization. All commercially released GM crops have undergone extensive science-based biosafety and food safety tests and evaluations. No untoward incidence or ill effects has been reported after more than 15 years of field testing and 5 years of commercialization.

There are also risks transcendent to the technology. Such risks are not really unique to biotechnology and include access to technology (cost and intellectual property rights) and widening gap between the rich and the poor, as individuals or as countries. These emanate from social and political inequalities and differences, and solutions must accordingly be social and political in nature. Thus, the need for more public funding for R and D for the country's needs, and encouragement of increased private sector investment, collaboration and technology-sharing are emphasized.

CONCLUDING REMARKS

Modern biotechnology can contribute to the attainment of food security in the 21st century in the context of environmental sustainability. The use of crops that can protect themselves against pests and diseases has lessened the application of chemical pesticides. Herbicide-tolerant crops have allowed the more effective and lesser applications of herbicides, promoting less tillage and thus reducing soil erosion, leading to greater biodiversity in the soils. Development of crops that are tolerant to abiotic stresses like saline or acid soils and drought will be helpful to many resource-poor or subsistence farmers in developing countries who farm marginal lands. Likewise, the development of high-nutrient crops will benefit people in developing countries. However, the socioeconomic and political issues that affect the effective utilization of any technology, including modern biotechnology, will have to be addressed properly and timely to enable our country to derive benefits from it, especially towards the attainment of food security.

REFERENCES

Balisacan, A.M

2000 Food security in the 21st century. Paper presented in the 2000 Public Lecture Series of the Philippine Social Science Council and the UP School of Urban and Regional Planning. 20 October, Quezon City.

Javier, E.Q.

2000 Sustainability productive agriculture and genetically modified crops. Presented during the 22nd Annual Scientific Meeting of the National Academy of Science and Technology (Philippines). July, Manila.

Tecson, Mendoza E.M.

2000 Genetically modified crops: biosafety and food safety issues and concerns. Presented during the Science and Technology Legislative Forum on Biotechnology. National Academy of Science and Technology (Philippines). 11 October, Mandaluyong City.

Reaction

Will GMOs enhance our food security?

ROBERTO VERZOLA

Genetically-modified organisms or GMOs are organisms whose carriers of heredity (i.e., their genes) have been modified through the insertion of additional genetic material taken from other species. Thus, the process of creating GMOs, called genetic engineering, transfers genetic material between species that will never interbreed (i.e., exchange genetic material) in nature. Examples of such transfers which have already been done include: between pigs and human beings, between corn and bacteria, between rats and human beings, between rice and bacteria, between human being and fish, between tobacco and fish, among others. Such transfers create organisms that may look indistinguishable from their natural counterparts, but whose genetic make-up has been permanently altered in a manner that will be passed on to subsequent generations.

THE OBJECTIONS, IN A NUTSHELL

Genetic engineers (and the firms that employ them) claim that they are in fact creating *new* life forms, in the same way that other engineers invent new machines from older designs. Therefore, like inventors, they insist they are entitled to some kind of exclusive use or monopoly over their invention. This is usually a patent, which grants the inventor the *exclusive* right to use, manufacture, or commercialize his patented work. Patents might be justifiable for machine designs, but to grant genetic engineering firms patents over life forms means we are allowing them to claim *private ownership* over genes and life forms which in the past have been seen as a common heritage of communities and of humanity. Today, there is a race among genetic engineers and corporations, particularly in the North, to patent as many of the billions of genes that exist naturally. This problem is called *genetic privatization.* Plant variety protection, which is a less exclusive form than a patent but may be used even with conventionally-bred plants, is another form of genetic privatization.

By opening our agriculture and food supply to control by corporate giants, genetic privatization is a threat to our food security.

Because genetic engineering alters species permanently, it is an extremely powerful technology. Such technologies (nuclear power is another example), when they go wrong or fall into the wrong hands, can be powerfully destructive. If a species which has been permanently changed through genetic engineering shows a harmful engineered characteristic and escapes into the environment or contaminates our food supply, it will become our permanent problem. This is called *genetic contamination.* We are extremely concerned with genetic contamination because this problem can even be worse, due to GMOs' reproductive capability, than nuclear or chemical contamination, which dissipate over time.

In short, GMOs are a threat to our food security because of two major problems: 1) genetic privatization and 2) genetic contamination.

Let me emphasize: we are not against biotechnology. But we have to be selective about this technology, adopt what is useful, and reject what is risky. A huge difference exists between insulin and vinegar on one hand, and commercial GMO crops and

livestock on the other hand, or between organic biotechnology on one hand, and genetic engineering biotechnology on the other hand. We are all for traditional biotechnology, but not for genetically-engineered human clones. We are all for organic biotechnology and organic foods, but not for genetically-engineered foods.

In fact, we have been criticizing the government for ignoring the best option for Philippine agriculture today, which is organic farming and production. Organic biotechnology must receive our highest priority because organic farming is the safest option for farmers and their families. It is also more economically viable because they do not have to buy expensive chemical inputs or borrow heavily for these inputs. Moreover, the organic market is growing faster (20–30 percent/year in other countries) than the supply can meet the demand; organic products are safer and healthier to consumers; and organic farming is friendlier to the environment. Organic yields can equal if not exceed the best of chemical or GMO yields. Over the long-term, organic yields continue to increase, while chemical yields plateau and eventually decrease as the chemicals destroy soil structure and soil life.

In rice, for instance, a form of chemical-free farming which relies mainly on compost and simple seedling, weed and water management practices easily doubles farmers' typical yields. Called "system of rice intensification" (SRI), it was first tried in Madagascar by French priest Henri de Laulanie in the 1960s and popularized in the 1990s by Prof. Norman Uphoff of Cornell University.

After Madagascar farmers became better at SRI, some even managed to double or triple their yields, getting more than 10 tons per hectare. The IRRI has known about SRI at least since 1998 and perhaps as early as 1993. Philrice also knows about SRI, presumably somewhat later than IRRI learned about it. Yet, they have kept this information from ordinary farmers and the general public, while their press releases are full of empty promises about GMO rice varieties which have not been tested for human safety and whose yields are inferior to SRI yields.

Truly, organic production is the way to go.

Even if we do not believe in genetically-engineered foods, we do not oppose genetic engineering research in confined laboratories where very careful precautions are taken against possible escape and contamination. Controversy arises when GMOs are released in the field or the environment, either through field-testing or full commercialization.

GMO advocates in the government who are in a hurry to commercialize GMOs should answer the following questions:

(1) If GMOs spread, by accident or otherwise, can you recall them?

Most scientists admit that GMO contamination can occur through various means and in various forms:

1. A GMO ingredient may contaminate GMO-free processed foods. Some 60 percent of processed foods, for instance, use soya, a commonly engineered crop, as ingredient.
2. Harvested GMO crops may contaminate GMO-free harvests in post-harvest processing, such as transport, drying, milling or in elevators or bins that process both GMO and non-GMO harvest.
3. GMO seeds may contaminate GMO-free seeds, particularly commercial seeds which through modern transport may then end up thousands of miles away from their source.
4. GMO pollen, borne by wind, insects or birds, may cross-pollinate and thus contaminate their GMO-free counterparts.
5. GMO fish or animals may escape and breed with their non-GMO counterparts.
6. Foreign genes in plants, animals or microorganisms may transfer to other microorganisms (this is called horizontal gene transfer, which is very common among microorganisms).

We cannot fully control the spread of living organisms, natural or GMO, because they reproduce, multiply and spread. We know this from our experience with the Golden Kuhol. Scientists know this and have repeatedly warned against it. The British Medical Association, for example, warned in its May 1999 statement: "Adverse effects are irreversible. Once GMOs are released, they cannot be subject to control." Even the pro-GMO US National Academy of Sciences, in its April 2000 report on GMOs, acknowledges that "total containment of crop genes is not considered to be feasible when seeds are distributed and grown on a commercial scale (p. 92)." The problem is much worse

with GMO viruses and bacteria, open-pollinated crops like corn, and small animals like GMO fish or rats.

This is also borne by the experience of the US, where "GMO-free" corn or soya shipments actually contain 1–5 percent GMO contamination and where Starlink Bt corn, which is not allowed for human consumption, has contaminated 4 percent of the 1999 US corn harvest. This is further borne by the experience of many European countries, which have allowed only field-testing and not commercialization of GMOs, but which nevertheless repeatedly detect GMO contamination of their corn, soya or canola crops. Clearly, GMO contamination is a threat to food security.

(2) Is the market for commercial GMO food expanding or shrinking? Are GMOs a competitive advantage or a competitive disadvantage?

Any honest researcher will have to admit that GMO food ingredients are considered by the market as contaminants. GMO-contaminated crops sell for a lower price, if they can be sold at all. Consumers avoid them. So, market-driven food companies also avoid them. Therefore, the market for GMO soya and corn, the major GMO food crops, has been shrinking.

The market that GMO advocates cite exists only because these GMOs are mixed with a final product or fed to animals that will be sold to consumers *unlabelled*. This precarious market will disappear as soon as mandatory GMO labelling is adopted.

Because much of its soya and corn exports are GMO-contaminated, the U.S. has lost a considerable segment of its export market for these crops. Countries like Europe, Japan, Korea, etc. are importing an increasing portion of their corn and soya requirements from countries which are in a better position to guarantee GMO-free crops, like China and Brazil. American farmers are extremely slow to respond to these market signals because they are subsidized by the U.S. government for their market losses.

It is also clear that being GMO-free is a huge competitive advantage in the market. This would be especially true where we do not have to worry about possible contamination because we have kept our countryside strictly GMO-free. In areas where widespread field-testing or commercialization of GMOs have occurred, producers can only certify their products to be GMO-free after going through a very expensive process of segregation between GMO-contaminated and GMO-free products and repeated testing. Even then, due to contamination problems, most can only guarantee lower than 1–5 percent or perhaps 0.1 percent but not zero contamination.

It is often argued that the loss of corn and soya export markets by the U.S. is the result of a trade war between the US and Europe, implying that European firms avoid GMOs as an anti-US trade measure. This is simply not true. If it were, why is there no trade war in cars, or electronic products, or a thousand other goods that the US and Europe exchange everyday? Why only GMOs? Furthermore, why would a company like Novartis, which sells its own variety of Bt corn, also refuse to use any GMO ingredient in its own food products? Why would the UK employees of Monsanto insist that their cafeteria serve GMO-free food? Are they waging a trade war against themselves? The truth is that European governments and the European biotech industry want to sell GMOs as badly as the US. It is the European public that refuses to buy GMO-contaminated products because of their bad experience in food contamination. As a result of the Starlink Bt corn contamination of their food supply, the US public is now belatedly awakening to the food contamination issue and an increasing number of Americans are also refusing to buy GMO-contaminated products.

In short, the shrinking GMO market is not the result of a trade war at all, but of a consumer uprising against GMO products. If our farmers' fields get contaminated with GMOs, they can become unfortunate victims of this consumer uprising.

(3) Is the actual experience with GMOs of early adopters like the US good or bad?

This is very important because most GMO discussions involve the future tense: the potential benefits versus the potential harm. Like any debate about the future, they involve a lot of uncertainties.

But the U.S. experience involves the past tense—not what might happen but what has already happened. The first GMOs were commercially introduced in the U.S. in 1994. GMO corn and soya were commercially

introduced in 1996. Since then, GMOs have been rapidly commercialized in the U.S. Today, nearly one-fifth of the U.S. corn crop and two-thirds of the U.S. soya crop are GMOs; look at the U.S. today and you will look into a GMO future.

And who would be the best people to ask than the U.S. farmers themselves? The American Corn Growers Association, for instance, warns other corn farmers in their website, www.acga.org:

- "More and more consumers refuse to accept products made from GMOs" (Sec. 2).
- "The American farmer faces the risk of growing a product that does not have a market" (Sec. 5).
- "Other countries are picking off our customer base. Brazil and China are producing non-GMO products and will continue to garner market share." (Sec. 5)
- "There would be a 16 percent reduction in GMO planted acres in 2000" (Sec. 6).
- "A recent survey by the USDA shows a 25 percent reduction in GMO planted area for this coming planting season" (Sec. 6).
- "Wayne Beck, Pioneer Hi-Bred vice president, stated that *everyone needs to realize that no one can guarantee 100 percent GM-free grain*" (Sec. 5).
- "The options facing farmers who plant GMOs are limited" (Sec. 7).
- "The door seems to be opening for greater opportunities for those who plant non-GMOs."

These are the American corn farmers themselves speaking. What are they telling us? They are telling us of markets lost to non-GMO producers, of the decision of many US corn farmers to back away from GMO crops, of widespread contamination, of limited options for GMO farmers and greater opportunities for non-GMO farmers.

Looking deeper into the US corn farmer's plight, we see more problems.

We see widespread GMO contamination. We see the US food supply contaminated with ingredients like Starlink Bt corn, which is not allowed for human consumption. In 1998, Starlink started contaminating US seed corn. In 1999, 430 million bushels or nearly 4 percent of the US crop was contaminated with this non-food Bt corn. In 2000, more than 300 US brands were recalled due to Starlink contamination. We see US corn and soya fields contaminated with GMO corn and soya, to the extent that exporters are unable to guarantee zero contamination anymore. We see organic products, which should be GMO-free by definition, contaminated with GMOs. "GMO-free" to the US biotech industry means 1–5 percent contamination, a false GMO-free claim that is unacceptable to consumers.

We see early adopters suffering from shrinking and lost markets as well as lower prices due to GMO contamination. We see US soya and corn farmers losing their traditional markets to countries like Brazil or China, which can still export GMO-free corn and soya.

Thus, in 2000, for the first time since GMO corn was commercialized in the US in 1996, its farmers started to avoid GMO corn. Compared to 1999, Bt corn hectarage decreased by 16–25 percent in the US in 2000, according to the US Department of Agriculture and the American Corn Growers Association. Another early GMO adopter, Canada, also saw GMO hectarage shrink for the first time, from 40 million hectares in 1999 to 30 million in 2000.

These early adopters of the technology are caught in a trap, suffering from shrinking and lost markets as well as lower prices due to GMO contamination, which they are unable to reverse. The US has been reduced to selling its GMO-contaminated crops at a discount to Third World countries, which have neither mandatory labelling requirements nor facilities for detecting GMO contamination, and preying on consumer victims who are unaware that the food they eat are laden with GMOs.

(4) Has a scientific consensus been established on the safety or non-safety of GMOs, or is the scientific debate still going on?

Any cursory research of scientific literature will clearly show a lack of consensus today.

The lack of consensus was highlighted, for instance, by the recent (April 2001) *Scientific American* article entitled "Genetically modified foods: are they safe?"

To quote some of the article's observations:

- On the current work of researchers: "Some of their recent findings are reassuring; others suggest a need for vigilance" (p. 40).
- On claimed environmental benefits: "But confirming environmental benefits is tricky. Virtually no peer-reviewed papers have addressed such advantages, which would be expected to vary from plant to plant and place to place" (p. 40).
- On possible environmental risks: "Defining the environmental risks seems even harder than calculating their benefits" (p. 41).
- Whether Bt crops harm living things other than target pests: "the jury is still out" (p. 42).
- Whether GMO crops can lead to superweeds: "So far no scientific studies have found evidence of GM crops causing superweeds.... But worrisome anecdotes have appeared" (p. 43).
- On fervent believers of GM technology: They have to "wait and see whether science confirms that belief" (p. 45).
- On potential health risks: "Perhaps proteins made from the foreign genes will be directly toxic to humans. Maybe the genes will alter the functioning of a plant in ways that make its food component less nutritious or more prone to carrying elevated levels of the natural poisons that many plants contain in small amounts. Or perhaps the modified plant will synthesize proteins able to elicit allergic reactions" (p. 46).
- On toxicity and allergenicity testing: "Arguably, the testing system has worked so far.... The safety tests are not necessarily foolproof, though." "... most safety tests are performed by the very corporations that produce GM foods" (p. 47).

A more detailed study is a refereed review of scientific literature done by Plant Research International (PRI).[1] The review was commissioned by Greenpeace Netherlands, but was done under the strict rules of scientific inquiry by PRI scientists A.J.C. de Visser, E.H.Nijhuis, J.D.van Elsas, and T.A.Dueck. Their review is detailed in a 90-page August 2000 report entitled "Crops of Uncertain Nature? (Controversies and Knowledge Gaps Concerning Genetically Modified Crops: An Inventory)"

The review identified a number of knowledge gaps and controversies over genetic modification. A gap is an area with no or very few articles published in refereed scientific journals. A controversy involves more than a few such articles, but with conflicting results or interpretations.

The PRI study identified the following controversial issues, "generally involving knowledge gaps:"

- whether genetic modification is precise and predictable
- differences between genetic modification and conventional breeding
- interactions between neighboring GM and GM-free fields
- effect of GM crops on the environment
- genetic 'pollution' of ecosystems
- the use of 'substantial equivalence' in food safety evaluations
- long-term effects of GM crops on human and animal health
- consequences of horizontal gene transfer [i.e., contamination] in the field
- food safety tests

It is clear from the two pieces above that no scientific consensus exists today whether genetically modified foods are safe or unsafe. Some scientists say they are safe, but other scientists say they are not.

But pro-GMO advocates refuse to acknowledge this fact. In public fora, they keep creating the misimpression that a clear scientific consensus already exists that GMOs are safe.

One reason scientific consensus does not exist yet is the lack of research, also pointed out by the PRI study. For instance, no scientific feeding study involving human volunteers has ever been done on GMOs.

Some pro-GMO advocates say it is unethical to test potentially harmful substances on human beings, therefore we just have to rely on animal tests. Bt corn and other GMO products have not killed rats and other experimental animals in feeding experiments, they claim, so these GMOs are safe for mammals and

therefore they are also safe for human beings. The flaw in this argument is obvious. Not everything that is safe for rats to eat is also safe for us. Furthermore, most animal feeding studies have been studies on toxicity rather than on long-term impact.

Dr. Saturnina Halos of the Department of Agriculture says millions of Americans and other consumers worldwide are already eating GMOs and nobody has died from doing so. In fact, thousands of Americans get sick and even die each year from food-related causes. But because there is no GMO labelling and there are no scientific controls, we cannot say for sure whether these problems are traceable to eating GMOs or not. Furthermore, the feeding of GMO food to millions of Americans is an unethical and uncontrolled feeding study involving subjects who were not informed or who did not give their consent to be part of a feeding experiment.

The truth is that no scientific feeding study involving GMOs has yet been done on human volunteers. This is one reason why there are so many unresolved issues on the safety or non-safety of GMOs at this time, and why the scientific community has not arrived at a consensus on this issue.

(5) Should we assume that GMOs are safe unless proven otherwise, or should we assume that they are not safe unless proven otherwise?

Because science cannot establish with certainty yet whether GMOs are safe or not safe, policy-makers who must make a decision today face a dilemma. They can follow one of two approaches:

- Assume that GMOs are safe (or as safe as their natural counterpart), unless proven otherwise. This is the principle of substantial equivalence, which most pro-GMO advocates subscribe to. Because of this approach, which claims that GMOs are substantially equivalent to their natural counterparts, GMOs were quickly commercialized in the US, without any labelling requirement. This approach is used to justify exempting GMOs from the thorough safety testing that food additives, pesticides and medicines go through ("We don't test natural corn; why test Bt corn?"). It is also cited to justify opposition to mandatory labelling ("We don't label natural corn, why label Bt corn?"). Substantial equivalence is sometimes expressed differently: that genetic engineering is no riskier than conventional breeding.
- Assume that they are not safe, unless proven otherwise. This is the precautionary principle. Under very strong pressure from the public, most European countries were forced to adopt this approach. Thus, very few GMO foods have been commercialized in Europe and mandatory labelling was adopted early.

Many scientists do not believe in substantial equivalence. The UN's Codex Alimentarius, which sets global food standards, has not accepted it. Even biotech firms themselves, when registering for GMO patents, junk "substantial equivalence" and claim the opposite view that GMOs are novel, unique and substantially different from their natural counterparts, justifying the granting of a patent. Apparently, insurance firms, too, do not believe in substantial equivalence, because they refuse to insure GMOs due to "incalculable" long-term risks.

Most pro-GMO advocates base their safety judgment on substantial equivalence, or on US rulings that GMOs are safe—rulings which are based on substantial equivalence.

(6) Are you in favor of the immediate adoption of mandatory labelling?

Imported GMO ingredients are already contaminating our food supply. In September 1999, US *Consumer Reports* and Genetic ID conducted their own tests of foods sold in US supermarkets and found the following contaminated, some of which are imported into the Philippines:

- Infant Soy Formulas: Enfamil Prosobee; Similac Isomil; Nestle Carnation Alsoy
- Frito-Lay Fritos Corn Chips; Bravos Tortilla Chips; Kellog's Corn Flakes; General Mills Total Corn Flakes Cereal; Post Blueberry Morning Cereal; Heinz 2 Baby Cereal; Old El Paso Taco Shells; Jiffy Corn Muffin Mix; Quaker Yellow Corn Meal
- McDonald's McVeggie Burgers; Ovaline Malt Powdered Beverage Mix; Gardenburger; Boca

Burger Chef Max's Favorite; Alpo Dry Pet Food; Morning Star Better'n Burgers; Green Giant Harvest Burgers (i.e., Morningstar Farms); Betty Crocker Bac-Os Bacon Flavor Bits; Ball Park Franks

- Quaker Chewy Granola Bars; Nabisco Snackwell's Granola Bars; Duncan Pines Cake Mix; Quick Loaf Bread Mix; Ultra Slim Fast; Light Life Gimme Lean; Aunt Jemima Pancake Mix.

The consumers' last line of defense against GMO-contaminated foods is mandatory GMO labelling. The government must require all imported food products as well as food and feed ingredients that contain any trace of GMO to be labelled as to the percentage of GMO content and the source of the foreign DNA. This must be done immediately as a matter of consumer right.

The biotech industry has adopted dual tactics with respect to this demand. On one hand, the industry itself strongly opposes mandatory labelling. The US government is also exerting all kinds of political, diplomatic, and economic pressure, including threats of trade retaliation, on the Philippines and other countries who are considering the adoption of mandatory GMO labelling. Our weak-willed government officials, including those who had earlier appeared to support our demands, can easily succumb to this pressure unless counter-pressure is exerted by citizens on this urgent issue.

On the other hand, the industry also fields surrogates who deceptively claim they are in favor of labelling but throw all kinds of objections and conditions to delay a mandatory labelling regime as long as possible. There are several alternative labelling proposals raised by biotech industry surrogates:

Voluntary labelling. This means that GMO foods may or may not be labelled. The decision is left to each firm. Under such a system, consumers will end up eating GMO foods without their knowledge or consent, because very few firms will admit in their labels that their products contain GMOs.

Reverse labelling. Producers of traditional foods which contain no GMOs will be asked to label their products as GMO-free. GMO products need not be labelled. The big transnational firms that control the GMO supply will love reverse labelling, because it shifts the burden of proof and the costs of testing, segregation and labelling to those who sell traditional foods, which are usually the local farmers. It will make labelled traditional foods more expensive and therefore less competitive to GMO-contaminated foods. It will create a built-in market bias in favor of transnational firms and their GMO products, against local farmers and their non-GMO products.

Incomplete labelling. As a last resort, biotech industry surrogates will fight to hide detailed information from the consumer and pretend to meet mandatory labelling requirements with an unsatisfactory label like: "This product may contain GMOs," without giving any amount or the source of foreign genes.

The mandatory GMO labelling that consumers want provides adequate information which indicate the percentage contamination and the source of the various foreign genes present in the food.

Labelling is not only for consumers. Even local food producers need mandatory labelling very badly, to enable them to use certified GMO-free food ingredients and therefore compete much better in the international market, where a GMO-contaminated label is a kiss of death.

Until mandatory GMO labelling is adopted, many consumers will not feel secure about the food they buy.

(7) Considering the lack of consensus among scientists, why did the government accept a sham scientific and technical review of the first GMO field-test in the Philippines?

The Scientific and Technical Review Panel was supposed to undertake a thorough review of the scientific and technical issues involving Bt corn and submit a report and recommendations to the National Committee on Biosafety of the Philippines (NCBP). Below is the full text of the STRP's so-called "scientific and technical review" of the Bt corn field-testing proposals:

Thank you for appointing us to the pool of Scientific and Technical Review Panel. We are very pleased to be of assistance to the NCBP with respect to the two proposals for the field release of Bt corn.

We have integrated our observation and recommendations for the two proposals to wit:

- Can the proponents provide additional information as to the genotypic background of all the transgenic materials to be tested with particular reference to their adaptation under tropical conditions where they will be commercialized in the future? No mention of this was given in the texts.
- With reference to testing against the Asiatic corn borer, what is their basis for choosing the 40–50–50 neonatal larvae per plant scheme in infesting the test plants? [That is, the proponents will artificially infest the corn plants with corn borer larvae instead of relying on actual natural infestation.] Will this scheme be used again under field conditions, aside from the naturally existing population in the areas?
- Since all the transgenics will be detaselled as a precautionary measure, the Committee would want to know what common pollinator will be used in the experiment?
- The transgenics do not carry the npt II gene. [Npt II is the marker gene that codes for resistance to antibiotics.] What were the tests conducted to identify the transformed cells that do not carry the marker? This question is pertinent to both proposals especially the Cargill proposal which did not include a copy of the paper.
- The proponents indicated that the amount of Bt protein [STRP refers to the Bt corn poison as "protein"] in the grain is minimal. (See page 30 #6–7). Are there any conclusive studies done to indicate the safety of this level of protein?
- In the Pioneer proposal, describe the three versions of the transgenic plants to be tested in the field. What do you mean by the word 'version'?

These questions are not contingent on the decision to disapprove the proposals. However, the Committee would want to be clarified regarding the points raised. The information will also be useful in future commercialization of the transgenic corn.

The Committee therefore recommends the approval of the two proposals for field testing of their Bt corn.

That was all of the so-called "scientific and technical review," signed by Dr. Ricardo Lantican of the University of the Philippines-Los Baños (UPLB), Dr. Rhodora Aldemita of Philrice, and another scientist who had passed away. It goes against all common sense, not to mention scientific logic, to admit lack of knowledge by asking six questions, five of them substantial, and then to forthwith recommend approval without waiting for the questions to be answered. Yet, this is how the STRP recommended approval of the first GMO field-testing in the Philippines, a recommendation which was heeded by the NCBP.

I have exposed in several forums this sham review of the STRP and I have never heard a satisfactory reply from any pro-GMO advocate. Dr. Aldemita responded by citing her long list of academic titles and bewailing the low pay of government researchers. Atty. Joey Ochave of the NCBP defends this sham review and says that the STRP received voluminous documents about the field-testing, so their review cannot be called a sham. Perhaps, the STRP received voluminous documents, but did they study them thoroughly? Did they evaluate the claims? Did they review all the scientific literature? Where is the document which shows they did so? There is none. The STRP submitted only one "review," the two-page document reproduced above and nothing else. If they did a review, why did they recommend approval even before the proponents answered their questions?

The audience must keep challenging any pro-GMO advocate what they think of this STRP review of the first GMO field-testing in the Philippines. We must insist that scientists keep to very high professional, scientific and ethical standards, something that the STRP and the NCBP failed to do.

Had the STRP and the NCBP done the job expected of them and thoroughly reviewed the scientific, technical, and safety issues concerning GMOs, they would have found what any honest researcher would find: that there are scientists on both sides of the debate and no scientific consensus has been established on the safety or non-safety of GMOs.

(8) Did the NCBP thoroughly study the safety, environmental, and economic issues raised against Bt corn?

Some NCBP members have been going around that they did. This is a lie.

NCBP members also cite the positive recommendation given by the STRP in its scientific and technical review. That was a sham study.

The key document that contains official NCBP discussion which led to the approval in August 1999 of the first GMO field-testing is the minutes of the NCBP August 4, 1999 meeting. In a letter, I had insisted as community representative that the NCBP must discuss the following issues thoroughly before making a decision on field-testing:

- how will they control the spread of Bt corn in case of escape?
- animal feeding studies (rats, chicken, swine, cattle, primates)
- feeding studies on human volunteers
- allergenic effects
- safety of the Cauliflower Mosaic Virus promoter
- consumer attitudes to GMOs and possible loss of market
- who owned the patents on the GMOs
- criminal and unethical behavior by the proponents
- potential carcinogenic, mutagenic or teratogenic effects
- official WHO/FAO position on the safety of Bt corn
- opinion of toxicologists

The NCBP ruled that these issues were "not relevant." Of course, these issues are relevant. Field-testing raises the risk of GMO escape and contamination, accidental or otherwise. The possibility of escape makes all these issues relevant. Unfortunately, in its rush to approve field-testing, the NCBP refused to consider these issues.

In fact, the NCBP did not even require the Bt corn field-testing to undergo an EIA process, as required by law.

Our environmental laws require environmentally-critical projects to undergo an EIA, for the proponents to submit an EIS and an ECC from the government before proceeding with their project.

The NCBP claimed an EIA was done but they could not show any documents. The DENR representative in the NCBP said a formal EIA was not necessary because the project is exempted, but they could not show a DENR decision exempting GMO field-testing from the EIA and ECC requirements.

Furthermore, it is extremely difficult to justify exempting GMO field-testing from these environmental requirements, because a field-test gone wrong can result in potentially widespread and irreversible contamination of the environment by an escaped GMO, with many health, environmental, and economic implications.

(9) Are there better alternatives to GMOs?

In fact, in the case of Bt corn, farmers have many alternatives, all of them less risky than putting a pesticide into a food crop or spraying a chemical poison. These alternatives include:

- *Proper timing.* Farmers know exactly the months when corn borers attack in their area. By timing their corn sowing to avoid these months, farmers can easily avoid serious corn borer infestations.
- *Using resistant varieties.* Breeders have developed corn varieties which are resistant to the corn borer. Farmers in areas of corn borer infestation can use these varieties to minimize damage from the pest.
- *Deploying natural enemies of the corn borer.* One example is the parasitic wasp Trichogramma, which the Department of Agriculture itself is distributing as part of its Integrated Pest Management program.

- *Detasselling.* Farmers themselves have discovered that removing the tassels of corn plants, leaving only enough to ensure that pollination will occur, controls the spread of corn borers.
- *Bacterial sprays.* The Bt bacterium is in fact commercially available in spray form. Because the Bt bacterium releases its poison in its inactive form and the poison is only activated once it is inside the corn borer gut, it is safer than the poison in Bt corn, which is already in active form. Sprayed residues can also be washed away, while the poison in Bt corn cannot.

Given all these alternatives, no wonder farmers insist that they can easily handle corn borer infestations without resorting to Bt corn.

Furthermore, some of these alternatives need to be deployed only when a corn borer infestation occurs, only in the part of the field where it occurs, and only while it remains a problem. As soon as the infestation is controlled, the farmer can stop the control measure. This is ecologically much more rational than the Bt corn approach, which in effect saturates every plant with a pesticide, twenty-four hours a day throughout the planting season, whether an infestation actually occurs or not, which is a sure-fire formula for the development of resistance to the Bt toxin.

Bt corn advocates often argue: Bt corn is just an additional option open to the farmer, who is free to use the option or not. This is not quite true. Once deployed, Bt corn can contaminate other fields, including those of farmers who want to avoid Bt corn at all costs. Even a farmer who willingly tries Bt corn may find out that he has lost the option to harvest purely non-Bt crops in the future, because he has contaminated not only his field but his neighbors' as well. As U.S. corn farmers discovered to their chagrin, they permanently lost the GMO-free option due to Bt corn contamination.

Similar alternatives can be used in the case of Bt rice. As for the much touted and still experimental Vitamin A rice, there are so many rich sources of Vitamin A among our vegetables and fruits that genetically-engineering rice for Vitamin A is clearly unnecessary. It is estimated that Vitamin A rice will typically provide less than 100 micrograms of Vitamin A (and as low as 30 mcg) per 100 gram serving of rice. Below is a list of common foods that provide 100 or more mcg Vitamin A per 100 gram serving:

[3]*5,000 mcg/100 g serving:* Carrots, olasiman, saluyot

[3]*2,000 mcg/100 g serving:* Red chile (siling labuyo), bittergourd shoots (talbos ng ampalaya), sweet potato shoots (talbos ng kamote), ferns (pako), kangkong, tamarind shoots (talbos ng sampalok)

[3]*1,000 mcg/100 g serving:* Lettuce (letsugas), mustard (mustasa), melon, ripe manggo

[3]*500 mcg/100 g serving:* Squash, fruit or shoot (kalabasa, talbos o bunga), paayap, yellow sweet potato (kamoteng dilaw)

[3]*200 mcg/100 g serving:* tomatoes, papaya, lakatan bananas, bataw, winged beans (sigarilyas), string beans (sitaw)

[3]*100 mcg/100 g serving:* avocados, kamias, jackfruit (langka), watermelon (pakwan), okra

Regular intake of any of the above can easily meet the recommended daily allowance (RDA) for the vitamin. To suffer from Vitamin A deficiency in the midst of such Vitamin A plenty implies lack of awareness in basic nutrition. The GMO approach ignores rather than solves this lack of awareness. Thus, Vitamin A rice may even worsen malnutrition because it will reinforce the nutrition ignorance of people and mislead them into thinking that they are getting enough vitamins and do not need to eat a variety of vegetables and fruits. In fact, the rice doesn't have enough to meet the RDA for Vitamin A, not to mention the other vitamins and minerals. How much simpler to tell people the common sources of Vitamin A or even for them to just eat a wide variety of vegetables and fruits, which will give them a rich supply not just of Vitamin A but of various other nutrients necessary for well-balanced nutrition and health.

(10) Do you prefer a GMO future or a GMO-free future?

In choosing between a GMO future or a GMO-free future, we must remember that the two futures are mutually exclusive. This is because once GMOs are commercialized, contamination is inevitable.

If we choose a GMO future, the US experience shows that we will lose markets because GMO-contaminated food products are rejected by the market. Since scientists are still debating the safety or non-safety of GMOs today, it is possible that more problems can arise in the future.

Not only is a GMO future problematic, it is also irreversible. It will be impossible to reverse the ensuing contamination.

On the other hand, a GMO-free status is clearly a market competitive advantage. Furthermore, if this decision should turn out to be wrong, we can still change it in the future.

In this case, the cautious approach—the GMO-free approach—is also the most rational approach. We have asked the government to take the following five steps to ensure that agriculture and our food supply remain GMO-free and genetic contamination and privatization do not become problems in our country:

1. Mandatory labelling of products containing GMOs;
2. Moratorium on the field-testing of live GMOs;
3. Banning of GMO products known to be risky, such as Starlink Bt corn and rBGH hormone;
4. No patenting of life forms; and
5. Shift in government priority from genetic engineering of food to organic farming.

In fact, the most desirable future is an organic future, which by definition is both GMO-free and chemical-free. Countries like Austria, New Zealand and Thailand are already moving in this direction, for the sake of both their consumers and their farmers.

Taking the organic road is the best thing the Philippine government can do to enhance our food security.

NOTE

[1]email: post@plant.wag-ur.nl.

Lecture 4

Urban Life in the 21st Century: Prospects and Challenges

GERONIMO V. MANAHAN

INTRODUCTION

Our concerns for security in the next century will be mainly on environment, food and health. Society, especially the developing economies will strongly rely on technology to close the gap. But is this attitude the right prospect?

In 1992, an anthropologist friend who writes for Asian Business asked me what my views are of life in Metropolitan Manila for the next 10 years, I answered: "pessimistic or optimistic?" He said, "both." My answer is summarized this way.

PESSIMISTIC	OPTIMISTIC
1. Flooding will still continue	1. The energy crises will be solved.
2. Problems of the urban poor, particularly in housing and livelihood will still prevail.	2. Better consciousness of hazards and disasters.
3. Urban poverty and urban decay will reach exasperating levels.	3. Local governance will spawn chartered cities in Metropolitan Manila and make them richer in income.
4. Garbage collection and dumping will still remain a problem.	4. Better global communications.
5. Continuing during problems and their attendant criminality.	5. Better awareness of the environmental issues.

In hindsight, the pessimistic predictions seem to be recurring, while the optimistic ones appear to be more of getting to be aware of the context and prospects of the subject. These only mean we need sustained follow through since discipline is affected by "the learning curve." But, is our society a society that learns from the past, or is it a forgetful society?

There are also emergent trends that I was not able to discern then, like the impact of electronics and technology, which I took for granted. I did not realize then that the Philippines will be able to dismantle the telecommunications monopoly if we really had the will to do it. New text messaging and the use of the Internet are pushing our young generation and our urban population into the 21st century. Just like the transistor radio 35 years ago, these new and very portable devices are changing our urban lifestyle and day-to-day actions.

Let me make a tentative conclusion. Urban life in the Philippines will trot along in its own sweet lethargic, "devil may care" attitude. *Bahala Na!*

Even if we do have very good laws in place, it is their implementation and their sustained enforcement where our discipline is weak. Our demographic policy is not well articulated in relation to food security, environmental protection, and human settlements programs.

FUTURE PROSPECTS

For the next millennium the path to economic development will not be through the wanton exploitation of natural resources, or the use of human muscles. As we are now beginning to experience, the human mind will be our resource for wealth creation. Human pursuits will take full account of the new power of knowledge and of the acceleration of information in the development of the global economy.

Our nation will thrive on free expression. There will be better feedback between governors and the governed. Decision-making will tend to be less bureaucratic, more democratic, and more responsive to the greater good. With the fundamentals of local governance in place since 1991, this will create greater humanization of governing. This will result in cities developing faster. With the ability of local governments to handle knowledge, watch out for local transformations particularly in the urban areas.

21ST CENTURY LIVING

As we enter the 21st century, we shall live in a very complex and complicated society. As we fast approach national urbanization, we shall still fear for our individual safety. We shall still fear the fact that a large majority of our population will live below the poverty level. As our population grows at a very alarming rate, we have to be mindful that our natural resources are not expanding. Pluralism of cultures will prevail globally. No one culture or ethics will dominate.

In the pre-industrial past, traditional culture was the path to knowledge. During the industrial age, modernization became the rationale. In the information age, the speed of communications brings in competing cultures, none speaking for the majority.

METROPOLITAN MANILA

Urban growth in Metropolitan Manila is now more significant in the peripheral towns of NCR. Thus, in physical terms, transport demand will also increase tremendously. The gradual shift from public transport to private transport due to the increase in income and car ownership as well as the increase in average trip lengths resulting from the expansion of the metropolis will further amplify the traffic congestion on roads. This exacerbating situation may be solved by limiting the size of cities to make environmental protection and access to food secure. The other manner of solving the face-to-face transaction is the introduction of guided mass transport systems. And the best prospect for Metropolitan Manila and the other cities of the third world is the Personal Rapid Transport (PRT) System. Time is limited to dwell on this emerging technology, but suffice it to say that my company, PROS and a transport group in Sweden, Swedetrack have just completed a business plan to put in 4 years this transport system in Metro Manila.

In general, urbanization will take a global pattern. The most prevailing will be cities having several layers: a historic layer either virtual or physical or both; a physical city and a virtual city. The historic layer will provide the city's connectedness to the past. The second, its link to contiguous localities and the hinterland, and the last, a network of connectivity to the world at an instance.

HAZARDS AND DISASTERS

Urbanization in many ways modifies the natural environment. Under fragile conditions, the modifications can trigger or amplify the destructive potentials of certain natural phenomena. In assessing the interaction between natural phenomena and urban development, direct losses on investments are not the only disaster-related feature to contend with. Chain reactions due to secondary effects can occur. These can lead to greater long run damages. Of increasing concern is the rapid urbanization and population increase in cities. In the Philippines, as in most developing

economies, high concentrations of population are sprawling into areas of severe hazard exposures. The rapid urbanizing phenomena contribute greatly to the mounting costs of disasters not so much in terms of lives, but to a larger extent, damages to property and investments.

Just as technological change has made disasters more bearable, they have also been more feared. Technology has also made building construction less environmentally disruptive, but also more worrisome. Our exceptional record for increasing life expectancy and managing acute episodes has focused our concern not only on the rise of chronic ailments but on the physical and chemical world around us. Now, as will be in the 21st century, everyday threats will be sufficiently reduced. However extraordinary ones will take a more important perspective. Telecommunications and simulation monitoring will help personalize hazards and disasters that have once been little more than just abstract happenings.

COSMIC HAZARDS

There is an erroneous belief that our planet Earth will not be hit by a devastating asteroid within the lifetime of human civilization. This condition is mostly due to lack of information. In the 3rd millennium, the detection of Earth-crossing asteroids and comets shall be in full swing. We shall get reports on these phenomena through the CNN. Today, strategies for their interception are getting to be more sophisticated; mostly by the explosion of a nuclear charge to "nudge" the body away from Earth's path without fragmenting it, perhaps even mining it.

Climate change is another global phenomena that we are getting to know more about. We may also experience typhoons that are stronger, the devastating effects of the El Niño-La Niña cycle, and even more frequent rains that cause flooding. All these are brought about by global warming. In our own little way, our communities will have to create and contribute to mitigating global warming.

PANDEMICS

Despite huge leaps in medicine, epidemics, even pandemic intent, appear to be recurrent, unless the disease is eliminated on a global scale like small pox, and maybe later, polio and leprosy. Diseases can make governments fall. This is not new, but can continue into the early years of the 21st century. The black plague, 650 years ago, destroyed civilizations; China fell to the west because of opium. One hundred years ago, diseases of epidemic proportions were cholera and small pox. Influenza occurred in global proportions. Now it is AIDS and drugs. However, with genetic coding and the mapping of the human genome, in the future, these ghastly diseases will be prevented.

EMERGENT FORECASTS

Let me attempt to systematically make guarded forecasts on trends in 6 areas futurists usually use that can affect lifestyles and early 21st century urban living in the Philippines. The first area is TECHNOLOGY. This contains a long list of breakthroughs that impact on the five other areas of DEMOGRAPHY, ENVIRONMENT, GOVERNMENT, ECONOMICS and SOCIETY.

TECHNOLOGY

Technology Timelining

A technological timeline is used to predict features that can reasonably be expected to happen, or their effects anticipated. This methodology is useful precisely because we do not know what life will be like the farther away we probe into the future. But, if we know the development rates of different technologies, we can anticipate many things that will be possible and when they are likely to happen. Even if the Philippines is far away from the main steam of technological developments, their impact on our daily lives are great. Take for instance the Filipino's penchant for text messaging.

I have culled two timelines on technology that can be very significant to 21st century living in cities of the Philippines; nay even countryside livelihood. The first timeline is from an article by Ian D. Pearson (*The Futurist*, Jan-Feb 2000), a British telecommunications analyst of Bt Labs. The second is an emerging technology timeline of the George Washington Forecasting (GFW) Team.[1] Let me dwell on this group's

methodology which is very important in making our forecasting in the country more formal.

The GWF Team keeps abreast of new advances to identify emerging trends. A Delphi survey solicits estimates of trends. The estimates are aggregated to calculate the most likely year in which each breakthrough will occur.

The GWF Team finds the methodology to be very powerful. It can be used to forecast any issue in any field. The results are replicable within plus or minus 3 years on the average. The process itself enhances a better understanding of events.

To provide a sharper focus, the top 10 breakthroughs in technology with their resulting economic potential and impact on society are listed below:

1. Portable information devices: the post-PC world
2. Fuel cell powered automobiles (this technology may be more relevant to countries with well-developed highway systems; for the developing countries the PRT may prove to be more meaningful; the GWF forecast of 1998 carried the PRT but was dropped in the 2000 forecast.)
3. Precision farming
4. Mass customization
5. Teleliving with large wall monitors using organic light emitting diodes
6. Virtual assistants
7. Genetically altered organisms
8. Computerized health care
9. Alternative energy sources
10. Smart mobile robots

MORE TECHNOLOGIES

1. Educational technology will hasten confidence build-up in distance education.
2. Virtual space travel can become a normal fare of TV-travelogue viewing; programs can be travel into the inner space of the human body or outer space travel.
3. Some Filipino overseas workers will venture to participate in space industries like the mining of asteroids and in beneficial technologies developed in outer space.
4. Nanotechnology—the building of mechanical devices on the scale of atoms and molecules—could improve health, and lead towards better environmental quality and miniaturized manufacturing.
5. Genetic mapping and screening will prevent hereditary diseases. By gene splicing, the unborn children can have features on demand. Until the technological process becomes cheap and common, this will spawn a gap of genetic haves and have-nots.
6. Breakthroughs in biotechnology, like in cloning tissue, altering genes to make donor animals a better match for organ recipients and growing organs independent of a host organism will occur.

DEMOGRAPHY

1. There will be more medical care for the aging.
2. Use of robotics (bionics) in health care will be widespread. Disabilities and handicap will be alleviated because of compensating technology.
3. Family connections will spread into four generations.
4. There will be free migration for specialist labor by teleworking or telemigration.
5. Racial mix will diversify. This will bring about cultural segregation or a multicultural society.
6. Treatments for addicts will be developed (e.g., solegiline against cocaine addiction).
7. Generation will be more health conscious. In addition, preventive care and elective treatments become options; Internet becomes a source for health-care information, including exploration of treatments and payment options. Quacks may become more prevalent.
8. Physicians will increasingly use computers and communications technology in conducting their practice—telemedicine may become a common practice during the first quarter of the century.
9. Using the patient's genetic identity will give physicians the opportunity for individual preventive care, along with a focused diet and lifestyle regimen.

10. There will emerge an industry for the elderly services market like ergonomic equipment and furniture as well as robotics and robot assistants.

ENVIRONMENT

1. The major issues of the 1990's will continue into the 21st century, among these are: climate change, freshwater scarcity, freshwater pollution, deforestation, loss of biodiversity, population growth, urban sprawl, community identity and segregation.
2. Issues and concerns will be voiced out regarding genetically modified foods.
3. Knowledge on designing with nature, green technology, phytoremediation (the use of botanicals to rid of pollution) will improve.
4. Utilization of nonconventional energy sources becomes cost-effective (the Department of Science and Technology-Philippine Council for Industry and Energy Research and Development or DOST-PCIERD has now a wind regime map of the country that can be used for setting up of windmill arrays).
5. The culture of recycling—*may pera sa basura* (there is money in trash) becomes prevalent; the use of others' waste produce as raw materials for their own processing becomes a network of industries.
6. Mariculture becomes a main source of seafood; the challenge is how to mitigate pollution in aquaculture and mariculture fields that are brought about by fish wastes and nutrient wastes.
7. Revitalization of cities will make urban living very pleasant; environmental quality balance, better mass transit, practice of resource recovery, historic preservation and conservation of buildings will become common features.
8. Smart-house technology will control personal living environments.
9. Better predictions, monitoring, and building construction retrofits will alleviate disasters in urban areas.
10. Control of plant genetics and other new technologies can boost food production, precision farming as well as the growing of building materials.

GOVERNMENT

1. Delivery of justice mediation shall prevail at the barangay level.
2. Local governance and people's council will boost commercial activities and revitalize downtown.
3. "Urban management" that promotes a range of small-scale interconnected projects that are recommended by the barangays will act as catalysts to development. This will require barangay design development statements which the city architect can initiate.
4. Privatization of city functions will be an option to city management: transport terminals, public markets, water supply, telecommunications, online mediation to settle legal disputes.
5. Virtual public hearings in getting community consensus becomes an option (voice box opinions and electronic voting are examples).
6. Improved sensory devices will thwart criminality before it happens.
7. E-government will be institutionalized.
8. A corruption-insurance system will emerge; the concept is to establish a global system that will compensate companies that lose money as a result of corruption, legal overhauls, or political instability.
9. There will be revolutionary changes in policing techniques and security.

ECONOMICS

1. Global living standards will improve in cities.
2. Electronic-commerce will lead to "shopping till you drop" without leaving the home.
3. There will be increased specialties in the tourism and hospitality industry.

Economic changes may move very slowly. It will be misleading to focus on short-term trends in projecting the true improvements to the quality of people's lives. By widening the economic horizon to examine growth and living standards over a broader perspective makes sense.

Current conditions, whether boom or bust, can present a distorted picture. Because economic experience of frequent ups and downs with their

corresponding changes in business cycle, limiting analysis to only a few years may make economic swings look like irreversible trends.

In many ways a country's living standard depends on economic attributes that require long run growth, which are not as sensitive to business cycles as is income.

SOCIETY

1. "Silver towns" for the aging community will emerge.
2. There will be a unification of the world's currency, perhaps the US dollar, the Euro and gold.
3. Philippine cities, like any other Asian city, will function 24-hours a day not only because this is the oriental culture, but also due to business transactions around the globe.
4. Friendship among peoples with like interest will expand through the Internet; virtual communities having no physical boundaries nor political borders will prevail.
5. The official language of global transactions shall be English; there will be concerns on how to preserve the diversity of languages and their cultural nuances.
6. Spirituality and inner peace will have several channels including faiths outside of traditional institutions; the challenge is how to mitigate conflicts with faiths in a democratic environment.
7. Because of rapidly changing careers, there will be shifting of relationships with employers; a liberal arts education will get to be more practical for career-shifters.
8. Entrepreneurs with small businesses will become more popular than mega-companies.
9. Large corporations will split themselves into autonomous profit centers.
10. Micro-lending specially for the urban poor becomes a common financial mode (e.g., Grameen bank).
11. New methods of wealth creation will emerge such as no-load mutual funds, electronic brokerage, asset-backed securitization, real estate investments trust, and direct market programs with individual companies.
12. Democratization of the stock market along a global perspective and electronic trading will arrive in the country.

AVOIDING BAD PREDICTIONS

I am confident with the number of predictions I have made. These are well-studied events that are likely to occur. Are these optimistic or pessimistic in the context of Philippine scenarios? We are a *gaya-gaya* (copycat) society, you must remember. However, please note I did not predict any achievement or lifestyle that will not or cannot happen. This is one principle futurists always remember in avoiding bad predictions. "Never predict that someone will never amount to anything." In the same token, avoid saying that any technological or societal achievement cannot or will not happen. **Only time will tell!**

NOTE

[1]http://GWForcast.gwu.edu.

Reaction

ASTEYA M. SANTIAGO

I. PRELIMINARY STATEMENTS

Dr. Manahan's paper opens the door wide for us to take a peep into the fantastic and stranger than fiction scenario of urban life in the 21st century. He has laid before us the limitless prospects and the formidable challenges that the new millennium is expected to bring. My reaction to this paper is divided into two parts: One, my broad comments on his key ideas, complementing them with my own views of the future. In the second part, I seek some clarification to increase my understanding of this future scenario.

II. OBSERVATIONS

In the beginning of his paper, Dr. Manahan informs us right away that this was not the first time that he had trained his telescope into the future. Some eight years ago, in 1992, he also made what he described as pessimistic and optimistic projections of the future urban life scenario. Reviewing these projections in the light of what has since then happened, I have to conclude that his pessimistic prognostications turned out to be not pessimistic enough while his optimistic views now appear to have been too optimistic. Taken together, this is tantamount to saying that what has unfolded eight years after these projections were made is a picture of an urban life that is physically, socioeconomically, environmentally, and administratively disappointing.

Together, let us review his pessimistic predictions and explain why I say, on hindsight they do not appear to be pessimistic enough. Flooding for instance, has not only continued, but has covered many more areas of the country. The problems of the urban poor in housing and livelihood have not only prevailed but have grown in awesome proportions while urban poverty and urban decay have not only reached exasperating, but intolerable levels. Garbage collection and dumping have not only remained a problem, but have even resulted in tragic consequences as exemplified by the Payatas and the Cherry Hills episodes. Finally, drug problems and their attendant criminality have not just continued, but have become a major threat to achieving security to life and property in urban society.

Among his optimistic observations, on the other hand, those which have materialized are those at the level affecting consciousness and awareness, while those affecting such aspects as a resolved energy crisis, improved global communications and richer local governments have become aspirations waiting to be realized. These only confirm Dr. Manahan's implicit premise that the future is imponderable and is subject to both controllable and uncontrollable factors. After all, predictions involve pre-empting and prejudging the elusive future. For instance, when Dr. Manahan made his forecasts in 1992, who would have foreseen the Asian Meltdown of 1997 which have caught even the economic geniuses flatfooted?

Let me now move on to his key ideas which, however, have become anticlimactic because of Dr. Manahan's tentative conclusion that urban life in the Philippines will trot along in its own sweet lethargic devil may care attitude, displaying the *bahala na* attitude. He supports his conclusion with the following features of urban life at present: unimplemented good laws and weakly sustained enforcement of even the good laws that we have passed; not well articulated demographic policy in relation to food security, environmental protection and human settlements programs. In this regard, he posed the question on whether our society is a forgetful one, instead of learning from the past. In short, he repeats the common refrain which can take the form of two alternative questions, namely "Are we a people who have not learned their lessons from the past?" and "What value have we placed on the past and the present that could benefit our future?"

III. DISCUSSION

Given the time constraint, I have selected a few of his key ideas, some of which I agree with, and some of which I express some doubts on, not because they are not valid or credible or that I do not wish they would happen (especially the positive ones), but because I have difficulties envisioning them as happening in the Philippines in the 21st century, which I have limited to the first decade, or at most two decades. I am aware that Dr. Manahan's illustration of his timeline for changes in technology encompasses a longer period than this. I think this will explain his basic optimism, guarded as it may be, and my own qualified pessimism.

First, let me discuss Dr. Manahan's "readings" with which I not only agree but which I hope most fervently would come to pass. My presentation observes the sequence in which they appear in his paper.

First is his most welcome projection that the path to economic development will not be through the exploitation of natural resources or the use of human muscles but the human mind. In fact, he emphatically refers to the human mind as the resource for wealth creation and the development of the global economy. This, I believe gives the Filipinos an anchor for hope after all, this is one area where, given the needed logistical support, we stand a chance to compete. Nevertheless, even in the absence of the hardware and software prerequisites to the maximization of this resource, this is one area where we can be more competitive. Furthermore, this is one resource whose inherent characteristics are that it is practically inexhaustible, is capable of unlimited growth and intensive and extensive expansion. It is also a resource which cannot be stolen or lost except through illness or lack of use.

Dr. Manahan also predicts that our country will thrive on free expression, facilitating communication between the governor and the governed. He is optimistic that there will be greater humanization of governing. It is true that people empowerment in the Philippines has made headway, especially in our urban areas, anchored on strong Constitutional and legal provisions and reinforced by precedents. In fact, we are now witnesses to the various modes that free expression has taken, some of which, it is alleged, have exceeded the bounds of what the Bill of Rights sanction. There are also views that in some cases, they border the punishable acts under our Criminal Code. Possibly, the future will call for more responsive and responsible use of many of our freedom including freedom of expression.

I am pleased with, although I am not prepared to readily share Dr. Manahan's strong expression of confidence in the ability of local governments to handle knowledge, which he projects will lead to local transformation, particularly in urban areas. I do not dispute that the potential is there, but at present it appears latent. What I am not fully convinced of is the political willingness and determination of our local officials to effect this transformation, more particularly if this conflicts with some political or personal agenda. While our people have achieved some level of political maturity, and while the profile of our local government decision-makers, both appointive and elective, has improved tremendously with the training conducted by the College of Public Administration (now the National Center for Public Administration and Governance or NCPAG) on technical and administrative competence, this do not appear to have been matched by professionalism and the local statesmanship which are prerequisites to effecting this metamorphosis.

If, however, the above is an expression of aspiration or hope on the part of Dr. Manahan, I wholeheartedly share this. For indeed a bright outlook for urban life in the 21st century is highly dependent on this ability of national and local governments to extricate themselves from the long winding red tape that has long been threatening to choke the bureaucracy, and adroitly handle this powerful resource, knowledge.

No doubt, we all share Dr. Manahan's apprehension that in the complex and complicated society of the 21st century, as he describes it, we will have to not only live with but overcome many of our fears arising from rapid urbanization and population increase in cities. In concrete terms, this concludes a long list of our common anxieties (a) that of our individual safety; (b) the fear that a large majority of our population will continue to live below the poverty line; (c) that the exacerbated traffic problems will need bolder measures including limiting the size of cities to

ensure environmental and food security; and (d) that uncontained urbanization and population growth will trigger and exacerbate the destructive potentials of certain natural phenomena. To all these, Dr. Manahan turns to technology to help solve many of the problems. In fact, the first two sentences of his paper immediately reveal this viewpoint. He says, and I quote "Our concerns for security in the next century will be mainly on environment, food and health. Society, specially the developing economies will strongly rely on technology to close the gap."

From this broad scenario, Dr. Manahan proceeds to make what he calls guarded forecasts in six areas, namely technology which, in turn, impacts on the five others, namely demography, environment, government, economics and society, all of which contribute to shaping our urban communities. Let me summarize these since they form the basis of my clarificatory questions at the end of my paper.

On technology, he underscored timelining, a methodology that predicts developments that can reasonably be expected to happen or make possible the anticipation of their effects. Its usefulness lies in that given the uncertainty of the future, if we know the development rates of particular technologies, we can anticipate not only what are possible, but when they are likely to happen. He then proceed to list the top ten breakthrough in technology which can be very significant to 21st century living in cities and countryside in the Philippines.

In addition, he listed down other technological developments. This list is a cause of wonderment and unfailingly elicits awe at man's ingenuity and unlimited gifts. While we have had glimpses in the Philippines of the initial development in some of these such as personal wearable health monitor, computer-based identification of crime and terrorism, videotaped surgical operations as part of medical record, and intelligent buildings, or components of them such as smart faucets which are regular features of rest rooms in hotels and other institutions, the others defy imagination and are not easy to imagine as forming part of the Philippine scenario in the coming decades.

Among those which would certainly revolutionize urban life in the 21st century in distant places are intelligent robots running unmanned factories by 2012; automated cars that drive on smart highways by 2016; deep underground cities in Japan by 2025; and the robot population surpassing humans in developed countries by 2025. The most welcome improvements will be where majority of goods will be manufactured with recycled materials by 2010 and fuel cell cars entering the marketplace and trains connecting major cities by 2010.

On demography, Dr. Manahan observes that more attention will be given to the aging population who, because of improved health consciousness and preventive care and the use of computers in medical practice, including telemedicine, will become a large sector of the population, becoming members of what he calls the silver community. He presents both good news and bad news about the future of the environment. The good news affecting the environment are utilization of nonconventional energy; smart house technology which will control personal living environments; alleviation of disasters in urban areas because of better predictions and designing with nature and green technology. However, the bad news are that climate change, freshwater scarcity and pollution, deforestation, loss of biodiversity, population growth, urban sprawl, community identity and segregation will continue to be major issues in the 21st century.

On government and community development, there is a predominance of good news such as the forthcoming prevalence of justice mediation and online mediation to settle legal disputes; virtual public hearings to arrive at community consensus; and revolutionary changes in policing techniques. It is projected that urban management will act as catalyst to development; the downtown areas will be revitalized and city functions will be privatized as an option to city management such as transport terminals, public markets, water supply, telecommunications. E-commerce will be institutionalized, and corruption insurance system will be introduced. Many of these have already been introduced in the country and will need only to be sustained and reinforced through support activities.

On economics, Dr. Manahan predicts improvement of global living standards, electronic commerce allowing shopping without leaving the home, and increased specialties in tourism and hospitality industry. Again, we already have the early

beginnings of these. However, he cautions that trending in economic aspects would require more than just a few years and should not deceive one about their irreversibility.

On the future society, his list of projections include the emergence of silver towns for the aging community, Philippine cities functioning 24 hours a day required by worldwide transactions; friendships through the internet; adoption of an official language which will challenge diversity of languages and their cultural nuances; the emergence of different channels of spirituality which will also require mitigation of conflicts in faith; changing employer-employee relationship; greater popularity of small businesses compared to mega companies; splitting of large corporations; micro lending for the urban bank as a common financial mode; new methods of wealth creation; democratization of stock market along a global perspective; and arrival in the country of electronic trading.

The predictions and readings of what lies ahead are obviously not just the product of a highly imaginative mind and irresponsible crystal ball gazing but are based on scientific studies such as those of a British telecommunications analysts, and of the George Washington Forecasting Team (the results of whose forecasts are replicable within plus or minus 3 years on the average), a careful study of trends, and on past and ongoing activities and accomplishments in these various aspects of urban life. This being the case, what we need to do is look at the extent to which they will affect or impact on the urban communities in the Philippines and in turn, on the rural areas which, by this time, would have been transformed to urbanizable or urbanizing areas and where some cities have become highly urbanized ones.

The following questions readily come to mind, which call for a companion or a follow up paper since answers to them will require another major, if not more difficult research effort:

1. When will these technological miracles make their appearance in the Philippines and to what extent will they affect the demography, environment, government, and the economy of Filipinos? The timeline prognostications obviously apply to the more advanced countries and not to the Philippines, which has difficulty sustaining its initial gains. In short, they may remain in the next decade or two as stories to marvel about and aspire for.
2. Assuming that the decade and the date could be determined when these technological developments will happen worldwide, when will the Philippines actually benefit from these and which sectors of society and what portion of the population would be affected and gain from them? Will these developments impact on the bigger percentage of both urban and rural population labeled euphemistically as the homeless and under-privileged, the informal sector or the disadvantaged?
3. Assuming that they will be made available to the country, can we afford them and do we want them? Assuming the answer is in the positive, what sociocultural preparation and values formation do we need to effectively access them?
4. What coping mechanisms will this bigger sector of the population need in order to adopt and adjust to these technological changes?
5. What kind of lifestyle will emerge from these and what sociocultural, legal, and institutional changes and adaptation would these call for? Certainly, they will require drastic modification of individual and societal behavior and in legal institutional structures which tend to painfully lag behind these technological miracles.

Let me end by reiterating that Dr. Manahan's paper has succeeded in confirming that the prospects for a desirable urban borderless global community would allow, and that the challenges that they generate have become more formidable. The biggest challenge is that of identifying which of the elements and features of the urban community we could afford and would benefit the biggest sector of the country. But we should not stop there. We should then proceed to pursue their introduction with or without modification, with the strongest of political will. Then, we will have to put in place not just the physical but the sociocultural and economic framework needed for us to adjust to and maximize the benefits derivable from them.

Reaction

JOSE DANILO A. SILVESTRE

A few months ago, I had one of the few saddest experiences in my ten years of teaching at the College of Architecture of the University of the Philippines. I was initially taken aback when queried by some of my graduating students as to my opinion on the future of the profession of architecture in our country. I paused to think and organize my thoughts, before framing the following response: that, in all honesty and with a profound sense of responsibility as their teacher, their future in architecture was bleak. The discussion that proceeded was a mix of both humor and foreboding, and though many of the issues discussed related to the profession and practice of architecture, we could not help but discern that many of these struck to the core of the problems that face our society today. In a similar vein, I had perhaps too often reminded my students that they should not look at education as learning the right answers; rather, they should look at it as learning the right questions. Education, thus, must go beyond the simple accumulation of knowledge and embark on the more profound and continuing acquisition of the wisdom to apply that knowledge properly. The context in which the aforegoing statements should be framed is one that is further defined by the fact that I was not speaking to the mediocre students in my class—I was speaking to the best.

I would therefore wish to likewise frame my basic reactions to Dr. Manahan's paper around the two statements above. The first, unfortunately, is structured around a rather pessimistic view and thus characterizes my basic reaction toward Dr. Manahan's forecasts. The second, is one that asks not so much whether or not such forecasts "can or will" come about, but whether or not they "should." In essence, my reaction is not one that questions whether the technological advances elaborated in Dr. Manahan's paper will come about; neither does it question the rate at which these advances will come about; nor does it question the potential for technological advancements to improve the quality of life that our society aspires to. The question that does come to mind is whether such rapid technological advancement will be accompanied by an equivalent advancement in the moral and ethical systems necessary to realize the potential benefits to our society. In general, it can be argued that the development and advancement of the moral and ethical systems that society needs to cope should occur apace with technological advancement. This does not usually hold true. In this regard, Bertrand Russell in his essay The Expanding Mental Universe[1] wrote, "We have considered knowledge, but I wish now to consider wisdom, which is the harmony of knowledge, will and feeling, and by no means necessarily grows with the growth of knowledge."

The current cycle of crisis that we have been undergoing as well as the general occurrences and developments that are occurring not only in our country but in the worldwide community as well, are changes that are going to be "revolutionary" in character. I use the term "revolutionary" not only in the literal, perhaps hackneyed sense of "being able to take the issues out to the streets" but also in its encompassing of the term "evolutionary." The term "evolutionary" carries connotations of an interminable, prolonged process which occurs, at least in nature, due to a series of successful mutations. These connotations are perhaps less proper in light of the pervasive and increasingly rapid "mutations" that characterize our post-industrial civilization.

Though there have been many authoritative works that have dealt with the subject of accelerating change,

it is from the *Future Shock-Third Wave-Powershift* trilogy authored by Alvin Toffler and published at approximately ten-year intervals from 1970 to 1990, that a definitive discussion is obtained. To paraphrase from *Future Shock: Though man in his modern form, Homo Sapiens Sapiens is generally believed to have existed for close to 100,000 years, this period was in all likelihood characterized by little to no technological or social evolution. In comparison, the past 5,000 or so years of what we consider to be recorded history has had a significant increase in the rate at which technology has advanced. Yet the past 100 years from the advent of the Industrial Era has brought with it an exponential if not explosive growth in the technological and social change characterizing our civilization. The amount of change in the past 100 years has far eclipsed the cumulative change that has occurred in the over 100,000 years of man's existence as Homo Sapiens.*

The advent of agriculture some 20,000 to 30,000 years ago brought with it the first permanent settlements and consequently the first cities of what we consider to be the ancient civilizations—Mesopotamia, Egypt, China, etc. This interminable period, ten to fifteen times the length of the scant 2,000 years from which we count our "modern" civilization went pretty much without major changes in the way of life. Cities that trace back to 5,000 ago did not increase in size to more than a few hundred thousand people up to the Industrial Era of the middle part of the 19th century. The Medieval Period which lasted a scant 1,000 years gave way to the Age of the Renaissance which is considered to be the start of the Modern Era. The technological advancements that gave rise to the Renaissance allowed it to then persist through an even shorter period of barely 500 years before a new set of technological discoveries (e.g. the steam engine, industrialization, mass production, etc.) heralded the advent of the Industrial Era. It can be stated that the Industrial Era was largely characterized by a worldview centered around the classical Newtonian physics of the 18th Century. The Industrial Era has literally lasted less than 100 years before it was itself eclipsed by what we now consider to be the Post-industrial Era or the Information Age. The scientific advances that brought this about (i.e., Relativity, Quantum Theory) had all come about in the early part of the 20th Century. Of course, the advent of the transistor, the microchip and the computer has arguably brought about some of the most profound changes in our civilization within the last 20–30 years.

These periods were all brought about by technological changes that had major impacts on life, on culture, on society, on the political and economic systems that prevailed.

We have had the personal computer for less than 20 years. Back in 1965 before the first personal computer was built in a garage by the two Steves (Jobs and Wozniak) who founded Apple Computers, and three years before he cofounded Intel, a fellow named Gordon Moore made an "uncannily prophetic" projection that the "number of circuits on a silicon chip would keep doubling every year."[2] Moore later revised his estimate to 18 to 24 months. Moore's forecast which has led to the remarkable growth, not only of Intel but the microchip industry as a whole, has been accurate enough for it to become known as Moore's Law. Essentially, however, as microchips get smaller and smaller, they will eventually run into the limits imposed by the molecular and atomic thresholds of scale. Moore himself estimates this will occur within about 20 years. Alternative technologies are already being investigated as alternatives to silicon-based microcircuits. The foremost alternatives include optical computers which will use photons rather than electrons to carry data; DNA computers utilizing genetic material to code, process, and manipulate data; molecular transistors; and ultimately quantum transistors.[3]

To reiterate, I do not question any of the technological advances that are contained in Dean Manahan's paper, I think all of them will probably come true. The recent completion of the mapping of the human genome, a project that was completed this year, is bound to result in tremendous developments in the eradication of many diseases and in the potential to improve the genetic make-up of the human being. This has already spawned furious debates on the ethics of cloning a human being and all the ramifications this can result in. Again, a few days ago, I was watching the movie "Gattaca" on television and this is probably less of science fiction than it is made out to be. Most of the genetic technology behind the premise of the movie is already within reach. All that will prevent the scenario is the moral and ethical will to prevent it from occurring.

There is no argument as to the cerebral, scientific and technological capability of humankind to achieve what has been outlined in Dr. Manahan's paper. Ultimately, the question that has to be answered is "Are we going to have the wisdom that will be necessary to utilize this knowledge?" The current state of our society, even in the Philippines alone, already shows how technology has fast outstripped the ability of our social, cultural, and moral systems to deal with it. It far outstripped our social and moral capability to deal with the changes that technologies are bringing on, and that has always been the problem, even at the very start of the 20th century.

Allow me to use two mundane but nevertheless relevant illustrations:

Firstly, the invention and proliferation of the automobile brought with it remarkable benefits to the quality of life in the industrialized nations of the First World. These benefits were of course tempered by the increased pollution, the automobile-related accidents and fatalities that accompanied the use of the technology. The nations of the First World that have "had" the automobile for close to a century have learned, though many will argue "not fully," that the technical capability to use the automobile and derive the benefits thereof must be accompanied by the legal, ethical, and moral framework (i.e. the wisdom) to use the technology wisely. These nations went through a series of radical changes and developed the rules of safety, conduct and behavior that were deemed necessary for them to properly use the automobile. On the other hand, the Philippines, like many developing countries, has only really seen the proliferation of the automobile perhaps in the latter half of the century. If my memory serves me right, as recently as 25 or so years ago, there was still some semblance of road courtesy and observance of the rules of the road even in Metro Manila. The recent explosion in the proliferation of vehicles in the country, perhaps in the last fifteen years has generally outstripped not only the physical infrastructure necessary to accommodate it; worse, it has far outstripped the institutional and social "infrastructure" necessary to ensure that we use the automobile properly. We would not be far-fetched to say that the only remaining rule of the road is that there are no rules. We have reaped the technology without the wisdom to put it to proper use.

When we lose something like that—and as we see, we can lose it in a scant 10 or 15 years—it is going to take 30 maybe 40 years before we are able to regain it, if we ever had it at all. Secondly, take the technology of the Internet and consider the boon alongside the bane that it has brought. We hear of online chat rooms, where the inherent anonymity and resulting blurring of identity and thus, responsibility has brought with it the dangers of "cyber-stalking," "cyber-porn" and the growing number of "online relationships" that have not only taken the place of real relationships, but have in many documented cases been the actual cause behind the disruption of real life relationships.

Take, for example, the cellular telephone, which perhaps we have had for just a bit less than 10 years, and the phenomena of "text-messaging." In spite of its benefits, it has also led to the creation of "virtual personas," that have introduced new types of social (or perhaps anti-social) relationships that develop without any face-to-face contact at all. The rules of conduct, the social and ethical standards that our generation and our parents' generation were brought up with, fall drastically inadequate in light of the changing context within which human relationships develop.

With regard to urban life, I think we have to dichotomize between urban life in Metro Manila and urban life with the rest of the cities of the Philippines. The primate city syndrome that is typical to most developing or Third World countries and so afflicts the Philippines is one that has to be re-evaluated. Plans for a mass transit system in Manila are generally in place. Whether we can achieve these plans within the next 10 years to achieve at least a modicum of the quality of life that we are looking for, is right now severely called into question. Even if we are able to somehow source the funds or the fiscal capability to be able to develop these infrastructures—the North and South Rail or the linking of the skyway from North to South—I guess the other question will be "should we do it?" The level of support given by the National Treasury and thus the rest of the country to Metro Manila infrastructure is such that the lifestyle of one Metro Manila resident is directly and indirectly subsidized by seven nonresidents. Now, if the whole Philippines is going to subsidize the kind of infrastructure that will support the quality of life that we are looking for in Metro Manila, then I think that

we should not have one in seven Filipinos living in Metro Manila. For all intents and purposes, it would serve us better to convert Metro Manila into a megalopolis to support all 78 to 100 million Filipinos and then just leave the rest of the country to return to rainforest. That is basically what is happening in Metro Manila now—unconstrained growth. The floods are not going to get better because we have totally eradicated the natural floodplains, the natural watersheds, and the natural systems that would have made these problems surmountable. Unless we take measures to reclaim the natural systems that are necessary to retain the environmental soundness within what we now know as Metro Manila, then the situation can only worsen. But I do not think that is possible because it will mean going out to areas like Pasig, near the Manggahan floodway, and telling the people living in the newly-developed subdivisions in back-filled swamps in the area that they live in the natural floodplain of the Pasig and Marikina river, and that they should not be living there at all.

Dr. Asteya Santiago mentioned in her reaction that it is becoming hard to comprehend the technological advances that are starting to come through. She further stated that perhaps we have to ask ourselves "can we afford it?" That goes much further than just a simple question of whether we can afford, for instance, an automated building, or whether we can afford to put in computerized solar shading and monitoring devices as mentioned in Dean Manahan's paper. I think one of the revolutionary approaches that we will have to take is the ability to try and accept incomprehensibility without being destroyed by that. I think this is one of the key premises that Quantum Theory called into point. Quantum theorists and cosmologists called into question the ability of the human mind to comprehend certain phenomenon. Good cosmologists and quantum theorists are those that are able to transcend this incomprehensibility and to say that we will never know and never understand on the human level some of the phenomenon that we are dealing with.

Technology will far outstrip the capability of the human mind to comprehend, even if the human mind was the source of that technology. I think, at that point, if indeed as Dr. Manahan suggests, we will have robots performing all the jobs, if indeed we get to the level where technology will help relieve us of much of the drudgery of manual labor (and this will come about, I do not argue), then I think that our minds should be focused more towards asking ourselves whether our science and the repercussions of that science will make us more, or less human. We will have to ask ourselves, and ask ourselves soon whether what we are evolving into is the kind of society that will lead to our ultimate demise, or our ultimate victory.

NOTES

[1]In *Adventures of the Mind.* Edited by Richard Thruelsen and John Kobler. 1960.

[2]"What will replace Silicon," Michio Kaku, *Time Magazine*, June 19, 2000.

[3]Ibid.

Lecture 5

Managing Metro Manila as a Megacity in the 21st Century: Challenges and Innovations

JEJOMAR C. BINAY

First of all, I thank the organizers of this forum for this invitation. With my job as Chairman of the Metro Manila Development Authority (MMDA) goes the responsibility and the privilege to serve as the MMDA's number one salesman. Speaking to willing audiences about our many tasks enables us to improve our products and services, and explain, if necessary, why things do not work as well, as fast, or as complete as they should. We are grateful for these speaking opportunities, and also for the feedback we have received from various media.

The role that Metro Manila plays in the life of the nation has long been declared. As early as the late 1960s, the primacy of problems of Metro Manila has been recognized alongside the modernization problems which confront the large cities and metropolises of the world. Uncontrolled population, poverty and homelessness, flooding, slow traffic, urban blight and insufficient public services, and the degraded ecology—these are long-known buzzwords that characterize Metro Manila. That these problems and their solutions cross political boundaries was the essence of the creation of the past metropolitan agencies—Metro Manila Commission (MMC) and Metro Manila Authority (MMA). It is sad that the same conditions with their necessary responses have served to justify the continued need for the MMDA today.

It has been reported that there was a slowdown in population growth in parts of Metro Manila. Nevertheless, its own population is boosted by the thousands of daily out-of-towners who come to work or transact business in such places as Divisoria and Quiapo, the Cubao and Greenhills Commercial Centers, the Makati and Ortigas Central Business Districts (CBDs), the various industrial zones of Pasig, Manila, Valenzuela, and Quezon City, among others.

Metro Manila's lands cover only 0.2 percent of the country's territory, but the last preliminary census speaks of a Metro Manila population of 10.5 million. Next only to Southern Tagalog, four out of every ten Filipinos are in Metro Manila.

Metro Manila's streets make up just 2.0 percent of the country's total roads, and yet, they carry more than a million motor vehicle, or about 30 percent of the country's 3.3 million motor vehicles.

Congestion, scarce public funds, need for continued policy improvements and innovative sectoral strategies—all contribute to the need for Metropolitan approaches and, at times, interregional linkages.

With this level of congestion comes many challenges in managing Metro Manila and much needed delivery of basic service. With this level of congestion comes environmental distress compounded by a very strong tendency for the inefficient use of vital resources.

On these premises, the government has deemed it best to come up with a special administrative body to handle concerns that are Metro-wide in nature to transcend local boundaries or require huge investments beyond the capabilities of its component local government units.

The services that fall under the MMDA's mandate are:

- transport and traffic management;
- solid waste disposal and management;
- flood control and sewerage management;
- urban renewal, zoning and land use planning and shelter services;

- development planning;
- health and sanitation, urban protection and pollution control; and
- public safety.

It is important to note that the delivery of these services must jive with the constitutional mandate towards localization or the devolution of basic services down to the local-level. Thus, the MMDA's primary mandate revolves around the tasks of "planning, monitoring, and coordinative functions." What it does is to "exercise regulatory and supervisory authority over the delivery of Metro-wide services." And in no way should the exercise of this authority result into "diminution of the autonomy of the local government units concerning purely local matters."

This is important because not many people, even those in government, understand the MMDA's mandate. Instead, they tend to associate the MMDA with the super-agency that the defunct MMC once was. For example, the impression of many is that the MMDA is in charge of garbage collection. This is no longer the case since garbage collection has been devolved under the Local Government Code of 1991 to the local governments. What we are responsible for is providing for the disposal facility so that the garbage collected can be safely dealt with.

The path towards the efficient and effective delivery of all these basic services is in their integration. We must always remember that these services are intrinsically related to each other. The impact on one affects all the others. It is clear, for example, that if you have ineffective traffic management and monstrous traffic jams, your garbage disposal services will be affected. Garbage trucks will take longer to reach the disposal site, there will be fewer collection trips and more uncollected garbage.

On the other hand, traffic congestion leads to higher concentration of air pollutants, which, in turn, compounds the problems of the travel-weary commuters.

The problem of flooding is aggravated by uncollected garbage since much of what is not collected finds its way into our waterways. And floods, in turn, make it harder to collect garbage not to mention its negative impact on the garbage. Currently, daily waste generation in Metro Manila is estimated at 5,854 tons with a collection rate of 65 percent; 25 percent illegally dumped/uncollected; and 10 percent recycled and self-disposed.

Not so clear but no less important are the functions of development administration as well as urban renewal, zoning and land-use planning and shelter services.

The truth is that many of the problems confronting Metro Manila can be attributed partly by an outdated zoning ordinance that dates back to 1981.

Rational land use and zoning are the key to the effective delivery of basic services because they allow you to plan the type and intensity of what is to be delivered. This is particularly true in traffic and transport management as well as flood control and sewerage management. And, in the case of solid waste disposal and management, the problem of providing the proper disposal site is hindered by the absence of a rational land-use plan in a country that is literally one big watershed.

Even public safety and disaster control and management are intertwined with these other basic services. If you look at land-use and zoning, it is clear that there should be restrictions on the type and use of structures that may be constructed in a particular area based on its characteristics.

The first and most basic innovation that can be undertaken is for us to take a holistic view of the situation, which is so basic that it is often overlooked. Government has frequently abdicated this duty.

In the case of the San Mateo Sanitary Landfill, when the landfill site was first surveyed in the late 1980s, there were hardly any residents in the 14-kilometer stretch to the site from what is now the Masinag Public Market in Antipolo City. But the building of the site necessitated the construction of an access road, which in turn brought about development of the surrounding areas that meant more people going towards that area.

The second innovation is to always consider the environmental-side of everything. As we said, our success has led us to overconsume resources beyond the limits set by nature and our technological knowledge.

We can and shall continue to produce the things we require for our existence, but only at the cost of grossly inefficient use of our resources such as energy, water, and other raw materials. The use and access of these resources become inequitably distributed. Those who have more tend to get more and those who have less end up with even less. This situation perpetuates poverty and prevents sustainable development.

How then have we put into practice these two possible innovations that we mentioned? Admittedly, we have not yet done that much, but only because we are still at the inception stages. But, as the saying goes, the journey of a thousand miles begins with the first step and a strong house begins with a strong foundation.

In the field of transport and traffic management, what we have done is to initiate the creation of an "adaptive traffic management system." Quite simply, it is an interactive traffic management system. The problem of traffic congestion if reduced to its essentials is basically a problem of vehicle queuing. This happens because there is inadequate road space compared to the number of vehicles — a fact that is stressed by the vehicular density of Metro Manila, which is 435 per kilometer of roadway.

The recently completed Metro Manila urban transport integration study was done with the objectives of (1) establishing an updated transportation database system; (2) formulate a master plan for the target year 2015, and (3) formulate a medium-term transportation development plan for the period 1999 to 2004.

One of the findings in the study indicates that the traffic problem has been worsened by the inability to regulate development to conform to the design of the road network. What should have happened was that high-density development should have occurred along the radial roads so that movement over longer distances can be facilitated through the circumferential thoroughfares. But due to uncontrolled development, the reverse occurred. Thus, the thoroughfares that were supposed to facilitate traffic movement became the access routes to the major traffic generators.

The road network really presumed that he major traffic generator would be the old downtown Manila area but that is no longer the case today. The major traffic generators are the Makati CBD and Ortigas CBD. There is also an emerging CBD along Roxas Boulevard.

We cannot anymore undo these developments. What we can partly do is to help the people of Metro Manila deal with the problem of traffic congestion through an "adaptive traffic management system."

An "adaptive traffic management system" is one that:

- detects in real-time any incidence of traffic congestion and build-up as well as identify its causes;
- immediately executes a pre-determined alternative traffic management plan;
- relays the appropriate corrective action to its traffic enforcement assets; and
- gives out this information to commuters and directs them to use the alternate routes

We are now completing our traffic command center where TV monitors will be installed to give a real picture of what is happening at the major intersections.

But there are some constraints as we perform our tasks in relation to traffic management.

For one, our present complement is not enough to man the 800 or so critical intersections, not to mention the critical portions of thoroughfares, for two regular shifts per day and maintain a skeletal force during a graveyard shift.

Presently, we are undertaking initiatives that will strengthen our operational control over our traffic management assets. In the meantime, we get support from the Philippine National Police, our component LGUs and NGOs.

The ideal situation in traffic management is to reduce the incidence of human intervention. Eventually, what we should consider are measures that will actually reduce the need for our presence in the field by producing better-quality drivers and adopting improved enforcement procedures.

The simultaneous construction of major transport infrastructure in Metro Manila in the past years had reduced road capacity to a large extent. We therefore had to adopt certain transport initiatives and measures to improve traffic flow such as the rationalization of public utility bus/public utility jeeps (PUB/PUJ) stops; efficient road administration program along Ayala

Avenue, Makati City where loading and unloading areas specifically for these public utility vehicles were designated; modified bus segregation scheme (MBSS); and lead bus rule.

The MBSS, as the title denotes, is a modified version of the bus stop segregation scheme which was introduced in 1991. The scheme features the segregation of buses by destination which, in effect, result to segregation of commuters at waiting stations. Its objective is to decongest the bus stop areas both in terms of the number of buses stopping and number of commuters waiting for their rides. The scheme also features the closed door policy requiring buses to keep its door closed once they move out of designated bus stop zones.

The differences between the MBSS and the original bus stop segregation scheme are: (1) unlike the original which provides bus stop zones for two categories only, the MBSS provides bus stop zones for three categories but also take into consideration the segregation by destination concept; (2) the fines and penalties differ in scale—the original imposed a P300-fine while the MBSS imposes a P1,000-fine.

The lead bus rule is intended to put order within the bus stop zones. The concept requires buses authorized to stop at a given bus stop zone to queue in an orderly manner which will necessitate buses to position parallel to the curb with the distance of both front and rear wheels not more than 18 inches away from the same curb. The lead bus is required to take the position at the frontmost portion of the bus stop zone. The loading/unloading time is limited to a maximum 10 seconds after which the lead bus must leave the bus stop zone at once. The second lead bus will then take the position of the lead bus. No entry into the bus stop zone will be allowed in between buses on the queue line.

The project is now on the concluding stages of its experimental phase. The final design will be completed thereafter.

One Way, One Side Parking Schemes have been certified winners especially in Makati City, both in terms of traffic impact and public acceptability, motorists and residents alike. As its nomenclature denotes, the scheme allows parking on one side of the traffic lanes allowing unimpeded movement of vehicles on the other side of the traveled roadway. The one-way system comes in pair on a counter-clockwise traffic flow. The first road will be one-way going north, while the next road will be one-way going south. In the case of other directional flow, the first road will be west while the next road will be one-way east. The one-side parking area may be relocated alternately every 154 days or every week.

We also have our serious challenges in the field of solid waste disposal and management. The fundamental policy change that we have brought about is to treat garbage not as a garbage but as a strategic resource.

Unfortunately, we have encountered enormous public resistance prompting us to use stopgap measures in the interim. Actually, there is a long-term solid waste management plan good up to the year 2015 based on the study supported by the Japan International Cooperation Agency or JICA. Under the plan, the San Mateo Sanitary Landfill should have been improved, especially in the aspect of leachate treatment, to provide disposal capacity good up to the year 2004, if necessary. By then, one of the alternative sites would have been properly constructed and the most likely site would have been the area designated as new parcel "B" located in Rodriguez, Rizal about four and a half kilometers from the present landfill site through the same access route. In fact, this proposed facility was already loan-ready.

But the plan gave way to political realities and considerations, so we ended up with an alternate scheme premised on the privatization of the facility.

As it turned out, the bidding process for the alternative sanitary landfill was delayed due to legal restraints imposed by a bidder in a waste-to-energy project as well as a losing proponent in the current bidding. And we now have to set-up an interim facility in time to meet the December 31, 2000 closure date for the San Mateo sanitary landfill set by President Estrada.

Of course, what we are still setting up is an integrated waste management facility. Even though the project is only for a two-year basis, this is without prejudice to the establishment of more control measures to allow the garbage to decompose safely and of materials recovery facilities. And these improvements, we intend to pursue.

We are particularly concerned here because the impact will not only be on land and water pollution. If garbage disposal services become unavailable, collection by LGUs will also be affected. If that should happen, open burning of garbage may become rampant compounding our air pollution problems.

In flood control and sewerage management, we have started to address the weakest links in the problem in the hope of reducing the incidence of flooding.

Under the law creating the MMDA, the flood control capabilities of the DPWH should have been devolved. Thus, there is an impression that we are the ones responsible for flood control, as should really be the case, only it never happened. Nevertheless, the challenge of flood control is not simply an engineering problem, but one that contains many social dimensions. What we have found out in the course of consultations conducted is that the primary weakness is organizational in nature.

What should have been done right from the start was to organize our flood control efforts along the water basins and waterways. Ideally, due consideration should have been given to the carrying capacity of these waterways, and the vegetative cover that provides the land's absorptive capacity for run-off water should have been enhanced and protected, but again, these also did not happen.

Over time, we have lost many natural waterways or their portions and we have not finished inventorying these. We presume that at least 40 percent have been lost. On the other hand, land use has altered the topography and the landscape, and vegetative cover has been replaced by a concrete and asphalt jungle.

More importantly, our waterways transcend geopolitical boundaries while the work being done by the implementing agencies is limited by the same boundaries. Thus, work oftentimes stops at the geopolitical boundary when it should be pursued further.

On top of these, flood control work is one of the most "politicized" government functions. In the case of Metro Manila, it is frequently our congressmen who are responsible for directing the kind of flood control projects to be implemented within their respective districts and sometimes, political considerations interfere.

An example is the dredging of the Taguig River. In the previous administration, all DPWH dredging efforts were undertaken in the Taguig River, but without similar efforts downstream or the portion that is located in Pateros. What happened was the top part became unclogged, but the water still has no place to go and the problem is not solved. So what we are trying to do is to provide the linkages between the DPWH, the lead agency, and our component LGUs, and amongst the LGUs themselves. As the lead agency, the DPWH puts into place the main flood control structures while the LGUs are in-charge of the lateral structures.

In our review, we discovered that in many cases the laterals were not interconnected. In some, the laterals were inappropriate for the main drainage system.

Hopefully, we will be able to come up with an integrated drainage plan that will guide all efforts in the future and make it easier to identify funding sources and solicit assistance from the legislature.

In the field of urban renewal, zoning and land use planning and shelter services, the LGUs are now completing their respective comprehensive land use plans. The task is ticklish since zoning pre-determines land classification and ultimately, the real property taxes that can be generated by the LGU. Considering that real property taxes normally comprise half of an LGU's income, there has to be some measure of compromise taken.

Conversely, it may also not be too easy to change land classifications to allow LGUs to raise real property tax levels, if this would be so required. Many thoroughfares, for example, are traffic congested because they are pockmarked by small establishments that should not be there in the first place or cannot provide adequate parking space for their clientele. In short, the streets become their parking lots resulting in congestion.

The appropriate solution here would be to raise property tax levels to a point where the property owners would be encouraged to consolidate their holdings paving the way for the establishment of bigger facilities that could provide more parking space within their premises. At best, this is a long and tedious process, but this is the only way it can be done.

On urban pollution control, the government's plan, through the Metro Manila air quality improvement sector development program, aims to eliminate mobile sources of air pollution by the year 2004. A big step considering that vehicular emissions are responsible for 70 percent of all pollutants in the Metro Manila air shed.

The MMDA is responsible for two program components. First is the anti-smoke belching program. We are particularly proud to say that under our administration, we have made some major strides. Since May this year our enforcers have apprehended more than 10,000 violators and we will continue to sustain and intensify our efforts, more so with the passage of the Clean Air Act.

The second component is transport planning, traffic engineering, and enforcement program, aimed at improving traffic flow in the major thoroughfares of Metro Manila, thus reducing vehicle emissions and the prolonged exposure of people on the road.

The MMDA is very much into the rehabilitation of the Pasig River as cochairman of the Pasig River Rehabilitation Commission. The Commission was created by President Estrada in January last year not only for the purpose of restoring the river to its historically pristine condition but also with the objective of transforming it into an alternative mode of transport and a tourist corridor. We expect to come up with the Pasig River Master Plan before the year ends. The plan seeks to guide the future developments along the river.

The objectives of the Commission are being achieved through a unique institutional arrangement. The Commission as an interagency body has 15 members—12 national government agencies and three representatives from the private sector. And in the absence of an office that had to run its affairs during its first year, the Commission relied mainly on the resources of its member-agencies. The agencies were grouped into technical working committees to tackle a functional area of concern like environmental management headed by the DENR, housing and information settlers relocation headed by Housing and Urban Development Coordinating Council and National Housing Authority, riverbanks development, transport and tourism spearheaded by the MMDA, flood control by the DPWH, and information and advocacy likewise headed by the MMDA. Even with the establishment of a project management office to provide staff support to the Commission, this distinctive organizational set-up composed of technical working committees continues, and it has been proven that a set-up such as this can work as illustrated by the achievements so far made by the Commission. These include, among others, the resettlement of almost 6,000 informal settler-families representing more than 50 percent of the planning figure of 100,000 families, removal of more than 100 overstaying barges and sunken derelicts, conclusion of loan negotiations with the Asian Development Bank for the 15-year Pasig River Environmental Management Sector Development Program, and fast-tracking the dredging projects of the DPWH.

In addition to these concerns as mandated, the MMDA every now and then is given other tasks to perform. This year for instance, it was named by the President to chair the Presidential Task Force on Transport Strikes and Mass Actions to ensure hierarchical responses/options with regard to transport strikes and mass actions within Metro Manila.

We recognize the need to interface with other organizations and Metropolitan areas in order to keep abreast with trends in Metropolitan Management and Governance, and avail ourselves of the transfer of technology.

From traffic improvements to river rehabilitation, private business and NGOs are sharing in many aspects of these demanding tasks. In addition, to our community-based programs, NGOs provide the vital lifelink between the Metro government and its constituencies.

Our link with various international organizations like Metropolis, an organization of Major Metropolises worldwide, extends to being part of the policy-making body of the organization.

Our partnerships with international non-government organizations and international funding institutions has had good results. MMDA now has more foreign-based assisted projects than ever and in the most critical sectors yet.

In all our undertakings, the private sector—business corporations, professional organizations and NGOs,

transport industry associations, and international organizations—has been our partner; at times, our bright and sharp critic. The various private sector groups have provided us with technical assistance, resources scarce to government, and feedforward and feedback on our traffic schemes and solid waste-related programs. International organizations are providing our personnel training and equipment to build our capacities for governance and for our sectoral mandates.

As the country's national capital region, the MMDA has to cope with the demands of being part of a global village to which we are slowly but surely linking with via information technology.

The country is now a larger part of the global economy, hence, it is demanded that the region, as the key transaction center for the country, provide world-class goods and services and the necessary transport infrastructure and communication facilities.

Metropolitanization is still a continuing process and the MMDA itself is still in the process of evolution.

In time, we hope that we can come up with an organization that will satisfactorily meet the needs of everyone.

Thank you.

Reaction

Perspectives on Managing Metro Manila

BENJAMIN V. CARIÑO

TWO PERSPECTIVES ON METROPOLITAN GROWTH

The paper of Chairman Binay is a good documentation of the problems and challenges associated with the rapid growth of Metro Manila, as well as of the strategies that have been adopted in coping with these challenges.

In commenting on Chairman Binay's paper, two perspectives on large metropolitan areas must be emphasized. The first and, perhaps, more traditional view of megacity growth that was especially popular before the 1980s is that it is evil. Indeed, the physical manifestations of this view in Metro Manila are readily discernible: uncollected garbage, the slums and squatters, shortages of urban services, traffic congestion, air and water pollution and, in general, the deterioration of the physical environment. To many scholars, urban growth is also the instrument by which indigenous culture was eroded. Various programs in rural development and the fostering of grassroots democracy are, to them, the desirable policies that would keep people in the farm and keep them from flocking to the teeming slums and squatter communities in urban areas.

The second view is that mega-cities are the engines of economic growth in almost all societies. Indeed, development theory has conclusively shown that large urban areas are the anvils of change and that the economic restructuring that has shifted societies from basically agricultural to commercial and industrial economies has occurred mainly in cities. Because of scale and agglomeration economies, locational advantages and other urban-related factors, productivity in cities is much higher.

Although seemingly contradictory, these two perspectives are relevant in determining the major components of a management strategy for mega-cities. The first perspective suggests that it is important to adopt innovative strategies in coping with problems associated with urban growth. This is the focus of Chairman Binay's lecture. The second perspective, however, stresses the fact that the management of large metropolitan areas must obviously go beyond the identification of coping mechanisms. More importantly, a sound strategy must also harness the potential of a megacity in enhancing economic productivity.

Harnessing such potentials could include, among others, adoption of policies that should govern land use and the delivery of basic urban services, improving the economic linkages of the metropolitan area to the rest of the country, establishment of appropriate governmental structures and allocation of functions at various levels of government, and redefinition of the boundaries of the metropolitan area. Due to time constraints, I shall limit my comments to two issues which were not sufficiently addressed by Chairman Binay: a) the question of the appropriate governance structure for metropolitan areas, and b) the issue of redefining metropolitan jurisdictions.

Governance Structure

The main issue in respect to metropolitan governance is the need for a metro-wide government structure, on one hand, and the move towards decentralization and greater local autonomy, on the

other. Although the need for local autonomy has gained official recognition with the passage of the Local Government Code, it is noteworthy that there are certain urban growth problems that cannot be effectively addressed by LGUs acting separately and independently. Such problems ignore existing political boundaries and are aggravated by the increasing magnitude of the "spillover" population.

Along with the benefits that could be derived from scale economies, the rationale for metropolitan arrangements and other forms of cooperation among LGUs stems from the need to cope with problems that transcend political boundaries and therefore, cannot be dealt with by a "fractionated" government structure. It should be noted that current metropolitan arrangements in the Philippines (such as the current Metropolitan Manila Development Authority) are generally weak and have not served as effective mechanisms for metropolitan governance. An alternative, second-tier metropolitan government structure with more powers and authority than the present set-up of the MMDA must be put in place. In particular, certain functions which are area-wide in character must be vested in this second-tier government structure, including transportation planning, environmental pollution control, solid wastes management, as well as the management of a system of parks and watershed areas.

Re-delineation of Metropolitan Boundaries

Since 1975, the definition of the physical boundaries of Metropolitan Manila has remained basically the same despite the obvious fact that actual urban influence extends way beyond the formal boundaries. There are definite advantages to the expansion of metropolitan jurisdictions. First, it makes good planning sense to incorporate not just urbanized but also soon-to-be urbanized areas within an urban area's expanded metropolitan region. Infrastructure services could be provided to direct outward expansion as a means of decongesting the urban core. Second, an expanded jurisdiction makes it possible to integrate area-wide services. For example, a metropolitan waterworks system would have enough territory to assure scale economies and a large enough watershed system. Finally, an expanded metropolitan jurisdiction would enhance the financial capabilities of metropolitan units. Individually, small LGUs may not have sufficient credit-worthiness and resources to finance such urban services as rapid transit, power, telephone, and so on together. However, these LGUs would have sufficient financial muscle to obtain loans needed for massive infrastructure investments.

Abbreviations

A and D	alienable and disposable
ADB	Asian Development Bank
AIDAB	Australian International Development Assistance Bureau
AFMA	Agriculture and Fisheries Modernization Act
Bt	Bacillus thuringiensis
BOD	Biochemical Oxygen Demand
CBD	Central Business District
CFC	chlorofluorocarbon
DA	Department of Agriculture
DANIDA	Danish Development Assistance
DAR	Department of Agrarian Reform
DENR	Department of Environment and Natural Resources
DOST	Department of Science and Technology
DPWH	Department of Public Works and Highways
EEZ	Exclusive Economic Zone
ECC	Environmental Compliance Certificate
EIA	Environmental Impact Assessment
EMB	Environmental Management Bureau
ENR	environment and natural resources
ENRAP	Environment and Natural Resources Accounting Project
FAO	Food and Agriculture Organization
GEF	Global Environment Facility
GM	genetically-modified
GMO	genetically-modified organism
HUDCC	Housing and Urban Development Coordinating Council
IPRA	Indigenous Peoples' Rights Act
IRA	Internal Revenue Allotment
IRRI	International Rice Research Institute
LGU	local government unit
LLDA	Local Water Utilities Administration
LWUA	Local Water Utilities Administration
MBSS	modified bus segregation scheme
MMDA	Metro Manila Development Authority
MSI	Marine Science Institute

MWSS	Metropolitan Waterworks and Sewerage System
NCBP	National Committee on Biosafety
NCR	National Capital Region
NFRI	National Forest Resource Inventory
NGO	nongovernment organization
NHA	National Housing Authority
NIA	National Irrigation Administration
NIMBY	not-in-my-backyard syndrome
NIPAS	National Integrated Protected Areas System
NWRB	National Water Resources Board
OECD	Organization for Economic Cooperation and Development
OECF	Overseas Economic Cooperation Fund of Japan
PCB	polychlorinated biphenyl
POP	persistent organic pollutant
PRI	Plant Research Institute
PRT	Personal Rapid Transport
R and D	research and development
SAFDZs	Strategic Agriculture and Fisheries Development Zones
SRI	system of rice intensification
SFM	Sustainable Forest Management
STRP	Scientific and Technical Review Panel
UNCLOS	United Nations Convention on the Law of the Sea
UNEP	United Nations Environmental Program
UPS	Unified Projection System
UNDP	United Nations Development Program
USAID	United States Agency for International Development
WB	World Bank
WMO	World Meteorological Organization

Contributors

J. R. Nereus O. Acosta
He is serving his second term as the representative of the first district of Bukidnon. He has a Ph.D. in Political Science from the University of Hawaii. He is the principal author of the Clean Air Act and also authored several other bills on environment in the Philippine Congress.

Rhodora V. Azanza
She is presently a Professor of the Marine Science Institute and Dean of the College of Science of the University of the Philippines Diliman. She has a Ph.D. in Botany from the same university and several of her articles have been published in international journals and proceedings of international conferences.

Arsenio M. Balisacan
He is an economics professor in UP Diliman and formerly the Undersecretary for Policy and Planning of the Department of Agriculture. His articles and papers on food security, rural growth, and poverty alleviation have been published in local and international publications.

Jejomar C. Binay
He is currently the Mayor of Makati City, and former Chair of the Metropolitan Manila Development Authority or MMDA. Mayor Binay has a Diploma in Land Use Planning from UP School of Urban and Regional Planning (UP SURP), a Master in National Security Administration from the National Defense College of the Philippines, and attended the Senior Executive Fellows Program at Harvard University's John F. Kennedy School of Government.

Candido A. Cabrido
He is an associate professor at the UP SURP. He also serves as consultant to various international and local institutions. He earned his Ph.D. in Environmental Science from UP Diliman, and attended postgraduate training course in Public Enterprise Policy and Management at Harvard Institute for International Development, Harvard University.

Benjamin V. Cariño
He is former Dean and currently a Professor of the UP SURP. He has written and edited several publications, especially on migrations. He is presently the General Manager of the Public Estates Authority.

Mary Mai Araneta Flor
She is the Director for Business Development of the Lyonnaise des Eaux Philippines, Inc. Prior to this, she was the Executive Director of the Presidential Task Force on Water Resources Development and Management of the Department of Environment and Natural Resources (DENR). She has a Bachelor of Laws degree from UP Diliman.

Ben S. Malayang III
He is a professor and Dean of the School of Environmental Science and Management of the UP Los Baños. He has written and published several articles on environment, natural resources, and sustainable development. He has a Ph.D. in Wildland Resource Science from the University of California at Berkeley.

Geronimo V. Manahan
He is the President of the Planning Resource and Operations Systems (PROS), a private organization involved in architectural and urban planning and research. Architect Manahan is also a lecturer at the UP SURP.

Evelyn Mae T. Mendoza
She is a professor of the Bio-Chemistry Department at UP Los Baños. She is a Ph.D. holder and the program leader of the Institute of Plant Breeding's Plant Biotechnology Program. She is a member of the National Academy of Science and Technology.

CAYETANO W. PADERANGA JR.
He was the Chairman of the Philippine Social Science Council from 1999–2001. He is a professor at the UP School of Economics in Diliman and Chairman of the Institute for Development and Econometric Analysis, Inc.

RAMON J. P. PAJE
He is the Undersecretary for Environment and Natural Resources Operations of the DENR. He obtained his Ph.D. in Public Administration from UP Diliman.

ASTEYA M. SANTIAGO
She is a professor and former dean of the UP SURP. She was vice-chair and member of the board of directors of the Bases Conversion Development Authority and also member of the board of the Fort Bonifacio Development Authority. She obtained her Ph.D. in Architecture major in Urban and Regional Planning from Sydney University.

JOSE DANILO A. SILVESTRE
He is a professor at the College of Architecture of UP Diliman where he also holds the position of Director for Research of the College. An architect by profession, he has his own architectural company called D.A. Silvestre and Associates.

ROBERTO VERZOLA
He is currently the secretary-general of the Philippine Greens and vice-chair of the Citizen's Alliance for Consumer Protection. He was a member of the National Committee on Biosafety of the Philippines from 1998–2000.

Back Issues of
PSSC SOCIAL SCIENCE INFORMATION

Available from the PSSC Central Subscription Service

Year	Volume	Year	Volume	Year	Volume	Year	Volume
1973	1 (1)	1979	7 (1)		12 (5)		20 (2)
	1 (2)		7 (2)	1985	13 (2)		20 (3)
1974	2 (1)		7 (3)		13 (3)	1992-	20 (4)-
	2 (2)		7 (4)		13 (4)	1993	21 (1)
	2 (4)	1980	8 (2)	1986	14 (1)	1993-	21 (2-3)
1975	3 (2)		8 (3)		14 (2)	1994	21 (4)-
	3 (3)		8 (4)		14 (3)		22 (1)
	3 (4)	1981	9 (1)		14 (4)	1994	22 (2-4)
1976	4 (1)		9 (2)	1987	15 (3-4)	1995	23 (1-2)
	4 (2)		9 (3)	1988	16 (1-2)		23 (3-4)
	4 (3)		9 (4)		16 (3-4)	1996	24 (1-2)
	4 (4)	1982	10 (1)	1989	17 (1)		24 (3-4)
1977	5 (1)		10 (2)		17 (2)	1997	25 (1)
	5 (2)		10 (3)		17 (3-4)		25 (2)
	5 (3)		10 (4)	1990	18 (1)	1998	26 (1)
	5 (4)	1983	11 (2)		18 (2)		26 (2)
1978	6 (1)		11 (3)		18 (3)	1999	27 (1)
	6 (2)		11 (4)		18 (4)		27 (2)
	6 (4)	1984	12 (1)	1991	19 (1-2)	2000	28 (1)
			12 (2-3)		19 (3)		28 (2)
			12 (4)		19 (4)	2001	29 (1)
				1992	20 (1)		29 (2)

Price per issue: 1973-1978 = P 5; 1979-1984 = P8; 1985-1986 = P 10; 1987-1990 =P15; 1991-1995 = P20-40; 1996-1997 = P 90; 1998-1999 = P100

Subscription Form
PSSC Social Science Information

Please enter my subscription to ***PSSC Social Science Information*** for one year.

☐Enclosed is my payment in the amount of _____(P/US$_____).

Name: _____

Address: _____

Annual Rates (Two issues): **Local**: P300.00 * **Foreign**: US$20.00. Provincial subscriptions must be paid by postal money order.

Send subscription form to:

PSSC Central Subscription Service
Philippine Social Science Council
PSSCenter, Commonwealth Avenue
Diliman, Quezon City
Tel. No.: 922–9627 FAX: (632) 929–2602
Email: css@pssc.org.ph

SOCIAL SCIENCE INFORMATION

Philippine Social Science Council
P.O. Box 205 UP Post Office, Diliman, Quezon City, 1101

May be opened for postal inspection