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# The Environmental Impact of Economic Cycles*

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## INTRODUCTION

Many ASEAN countries experienced rapid economic expansion until 1996 (Table 1). Singapore, Malaysia, Thailand and Indonesia registered impressive rates of growth that earned them spots in the list of high performing Asian economies. While relatively late in the game, the Philippines posted significant growth as well and was gradually on its way to becoming a newly industrializing economy.

**Table 1. Growth Rates of Real GDP in Some ASEAN Countries, 1988-1997 (In percent)**

| Country | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|---|---|---|---|---|---|---|---|---|---|---|
| Indonesia | 5.8 | 7.5 | 9.0 | 8.9 | 7.2 | 7.3 | 7.5 | 8.2 | 8.0 | 4.6 |
| Malaysia | 8.9 | 9.2 | 9.7 | 8.7 | 7.8 | 8.3 | 9.2 | 9.5 | 8.6 | 7.5 |
| Philippines | 6.8 | 6.2 | 3.0 | -0.6 | 0.3 | 2.1 | 4.4 | 4.8 | 5.7 | 5.1 |
| Singapore | 11.3 | 9.2 | 8.8 | 7.3 | 6.2 | 10.4 | 10.5 | 8.7 | 6.9 | 7.8 |
| Thailand | 13.3 | 12.2 | 11.2 | 8.5 | 8.1 | 8.7 | 8.6 | 8.8 | 5.5 | -0.4 |

Source: *Asian Development Outlook*, ADB (1998)

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The economic crisis which commenced in 1997 has dampened hopes of continued expansion in the ASEAN region. In that year, growth rates of most countries fell and, in the case of Thailand, turned negative. Likewise, projections indicate that rates for Singapore, Malaysia and the Philippines will decrease by more than half in 1998 and will start to recover only in 1999 (Table 2). For Thailand and Indonesia, a worse fate awaits as rates are

**Table 2. Projected GDP Growth Rates of Some ASEAN Countries, 1998-1999 (In percent)**

| Country | 1998 | 1999 |
|---|---|---|
| Indonesia | -3.0 | 1.0 |
| Malaysia | 3.5 | 4.5 |
| Philippines | 2.4 | 4.0 |
| Singapore | 3.0 | 4.5 |
| Thailand | -3.0 | 1.0 |

Source: *Asian Development Outlook,* ADB (1998)

expected to turn positive only in 1999. Bad as they are, the figures are already considered optimistic by some as fears linger that the downturn could last beyond two years and hit countries deeper. In the Philippines, there are doubts that the economy will register positive growth in 1998, not only because of the worsening impacts of the economic crisis, but also due to the twin phenomena of El Niño and La Niña.

Appropriately, the causes, effects and potential solutions of the economic crisis are now the subject of a fast burgeoning literature. Other important angles of this unfolding story, however, remain relatively unexplored. In particular, the implications of the crisis on the natural environment in the affected economies have received scant attention. The importance of work along this line cannot be overemphasized given the objective of sustainable development among the countries involved.

This paper looks into the environmental impact of economic cycles in general and the current economic crisis in particular by conducting a brief theoretical and empirical review on the subject using the Philippines as

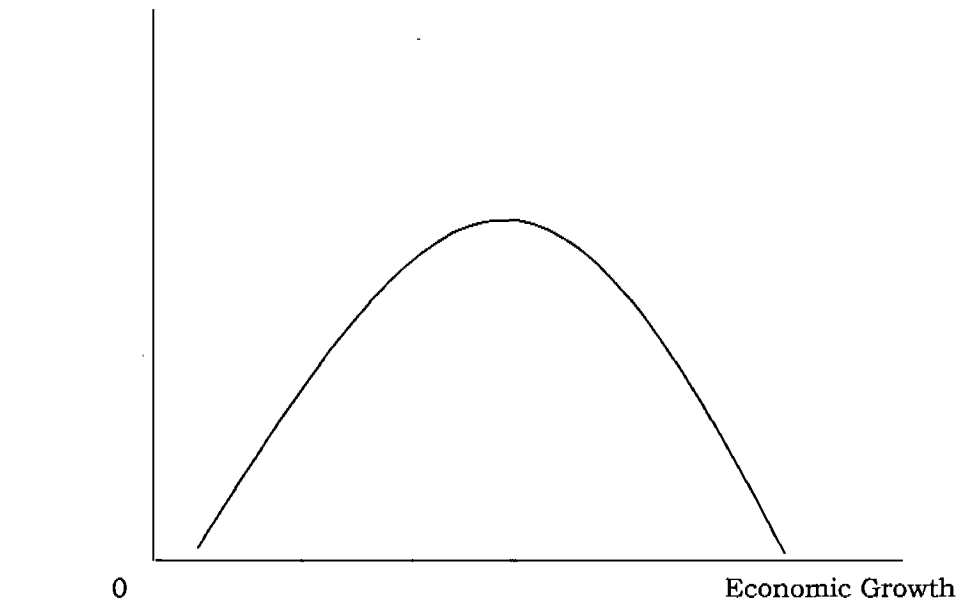
case study. The paper is a summary effort given the scantiness in environmental data useful for the purpose. It is hoped that the information generated will be helpful in the discussion of the environmental management options in light of the crisis.

The next section of the paper discusses a theoretical model explaining the relationship between economic growth and the environment. An empirical discussion that looks into the environmental experience of the Philippines in recent years follows. The succeeding section discusses the implications of the economic crisis to environmental protection and management. The conclusions of the paper are provided in the last section.

## THEORY

The relationship between economic growth and the environment in the course of development is assumed to follow an inverted *U* pattern (Figure 1). In the early stage when a country is mainly agricultural and per capita

**Figure 1. The Relationship Between Economic Growth and Environmental Degradation**



incomes are low, the consumption of natural resources as raw material inputs in economic processes and the production of pollutants and other wastes by economic units are also low. Then, as the country starts to industrialize and per capita incomes increase, the use of resources and production of pollutants and wastes likewise accelerate. The initial relationship between economic growth and environmental degradation, therefore, is a direct one. Aside from mere scale, other factors enhance this relationship, including the levels of environmental awareness and concern among the ecomonic units and the effectiveness of environmental regulations and enforcement by the government.

As the economy grows beyond the initial stage, the increasing industrialization and per capita incomes result to less and less environmental degradation at the margin. In this middle stage, the government starts to seriously tackle the problem of environmental degradation. This, and the increasing willingness to pay brought about by higher incomes, raise resources for environmental improvement in the form of invesments in less polluting and resource-conserving technologies by the economic units and stricter environmental regulations and enforcement by the government, among others. The resulting cumulative effects of all these positive developments is a diminishing marginal degradation over time and ultimately a zero growth in total degradation at some point.

When the economy matures into the late stage, marginal environmental degradation is expected to eventually turn negative. This occurs because at this juncture, the structure of the economy starts to shift from industry to the less polluting services sector. In addition, the continuously increasing incomes significantly raise even further the willingness to pay by both the economic units and the government for a cleaner environment. The end result is a declining environmental degradation and a more sustainable type of development.

Similarly, the inverted *U* pattern of relationship between economic growth and environmental degradation may be used to explain the environmental impact of economic cycles, including an economic crisis. Other things constant, in time of economic expansion when incomes and willingness to pay rise, investment for a cleaner environment also increases and net degradation falls at some point. On the other hand, in time of

economic contraction or crisis when incomes and willingness to pay fall, investment is likewise lower while degradation correspondingly rises. A caveat, though, is in order in this proposition. The observance of this straightforward relationship will depend to a large extent on the stage of economic growth a country is in. As the inverted *U* pattern implies, a developing country can have increasing degradation even in boom time for reasons already explained. In contrast, the impact of an economy in crisis on the environment may be more difficult to predict. This is because although reduction in scale contribute to an environmental improvement, the decrease in the willingness to pay among economic units and the government will have the opposite effect.

## EMPIRICAL DISCUSSION

In this section, we will look into the available data for the Philippines to empirically analyze the relationship between expansion and contraction on one hand and the environment on the other. The figures presented below cover different periods due to the unavailability of consistent time-series information, especially for environmental variables. Despite this constraint, the following discourse is instructive since the periods encompass times of expansion and contraction in the economy, including the current economic crisis.

### Expansion/Contraction and the Environment, 1988-1993

Table 1 shows that the Philippine economy grew healthily in 1988 and 1989, started to decline in 1990, contracted in 1991 and began to recover in 1992 and 1993. A comparison between these information and environmental data for the period appears to support the assertion that for a developing country, environmental degradation could worsen in an expansion (Tables 3 and 4). This is evidenced by many environmental indicators showing a generally deteriorating trend in the growth years of 1988 and 1989, including national forest cover, particulate matter in the air around Metro Manila, and suspended solids in the waters of Laguna Lake. In the recovery years of 1992 and 1993, forest cover continued to decline and sulfur dioxide in the air rose although particulate matter decreased.

**Table 3. Environmental Indicators in the Philippines, 1988-1993**

| Year | Forest Cover (thousand has.) | Particulate Matter* (mg/NcM) | Sulfur Dioxide* (ppm) | Dissolved Oxygen** (mg/L) | Suspended Solids** (mg/L) |
|---|---|---|---|---|---|
| 1988 | 6,460.60 | 151.57 | 0.013 | 7.42 | 47.03 |
| 1989 | 6,307.40 | 188.56 | 0.011 | 8.00 | 71.35 |
| 1990 | 6,158.80 | 172.50 | 0.011 | 7.80 | 47.78 |
| 1991 | 6,015.40 | 173.38 | 0.013 | 7.85 | 38.63 |
| 1992 | 5,900.20 | 176.63 | 0.008 | 7.73 | 56.30 |
| 1993 | 5,787.46 | 142.17 | 0.012 | 7.50 | no data |

Notes:

* Annual averages are only for Metro Manila, base year is 1985

** Annual averages are only for Laguna Lake

Ambient Standards (Source: Philippine Environmental Quality Report 1990-1995)

Particulate Matter - 90 mg/Ncm
Sulfur Dioxide - 0.03 ppm
Dissolved Oxygen - 5 mg/L
Suspended Solids - not available

Source: Rufo and delos Angeles (1996) as lifted from Intal and Medalla (1998).

**Table 4. Growth Rates of Environmental Indicators in the Philippines, 1988-1993 (In percent)**

| Year/ Indicators | Forest Cover | Particulate Matter | Sulfur Dioxide | Dissolved Oxygen | Suspended Solids |
|---|---|---|---|---|---|
| 1989 | -2.37 | 24.40 | -15.38 | 7.82 | 51.71 |
| 1990 | -2.36 | -8.52 | 0.00 | -2.50 | -33.03 |
| 1991 | -2.33 | 0.51 | 18.18 | 0.64 | -19.15 |
| 1992 | -1.92 | 1.87 | -38.46 | -1.53 | 45.74 |
| 1993 | -1.91 | -19.51 | 50.00 | -2.98 | no data |

It is not clear from the data if the contraction in the early nineties caused a net change in the quality of the environment. Between 1990 and 1991, forest cover and particulate matter continued to worsen but at a decreasing rate as compared to 1988 and 1981. Water pollution between 1990 and 1991 in terms of dissolved oxygen and suspended solids somewhat improved also. What is crystal clear, however, is that over the whole 1988-1993 period, deforestation increased and national standards for particulate matter in the air was already exceeded by almost twice, implying the sad plight of the environment in the country, regardless of the state of the economy.

Additional and more specific data reinforce the observation of worsening degradation in the period considered. For natural resources, there have been increasing rates of depreciation overall, and specifically for fisheries and soil resources, between 1988 and 1992 (Table 5). The high depreciation rates for fisheries and soil resources has a popular explanation. Regardless of economic cycles in those years, a significant portion of the population who was disadvantaged by the development process was compelled to migrate to the coastal and upland areas for survival (e.g., Cruz and Repetto 1992). The influx of people into these areas exacerbated the overall rate of exploitation, particularly the practice of destructive fishing and farming methods, such as the use of illegal fishing gears and slash and burn agriculture.

**Table 5. Depreciation of Natural Resources, 1988 and 1992 (In million pesos)**

| Natural Resources | 1998 | 1999 |
|---|---|---|
| Fisheries (small pelagics) | 838 | 6,560 |
| Forests (dipterocarps) | 936 | 504 |
| Minerals (copper and gold) | 354 | 26 |
| Soils (areas with at least 8% slope) | 380 | 590 |
| **Total** | **2,508** | **7,680** |

Sources: Francisco (1994), delos Angeles (1996), Logarta et al. (1996), Padilla and Cortez (1996) as lifted from ENRAP Main Report Phase III (1996).

The worsening degradation over the period considered is manifested further by data for air pollution. At the national level, emission of air pollutants was already high in 1988 and this grew much worse for some pollutants by 1992 (Table 6). Of the pollutants, much originated from households (DENR 1996). Apparently, this implies that the expansion in the late 1980s did not necessarily translate into higher willingness to pay for air pollution mitigation among the population. Moreover, the contraction in the early 1990s must have forced households and other economic units to spend even more disproportionately against the environment.

The above results for air pollution also hold true for water pollution. Discharges of water pollutants were already high back in 1988 and increased further for some types by 1992 (Table 7). Again, households have been the main producers of water pollutants, accounting to about as high as 44 percent in the case of total biochemical oxygen demand (Ibid). As in the case of air pollution, the expansion in the late 1980s may not have resulted to an increased willingness to pay for an improvement in water quality among the people while the contraction in the early 1990s could have made the situation worse.

**Expansion/Contraction and Public Expenditures on the Environment, 1990-1998**

Some data on the annual appropriations of the Department of Environment and Natural Resources (DENR), the main government agency tasked to oversee the environment in the Philippines, are available for the period 1990-1998 (Tables 8 and 9). The budget of the agency decreased yearly from 1991 up to 1993. This was consistent with the economic performance of the period and may indicate the lower willingness of the government to pay for environmental improvement during a contraction. The data also reflected decreased appropriations in 1995, an expansion year, which was inconsistent with the pattern of increasing budgets during the other expansion years, from 1994 to 1997. This could mean that

## Table 6. Sources of Air Emissions: Philippines, 1988 and 1992

| Pollutant | Area | | Mobile | | Stationary | | Total | |
|---|---|---|---|---|---|---|---|---|
| | 1988 | 1992 | 1988 | 1992 | 1988 | 1992 | 1988 | 1992 |
| In '000 ml: | | | | | | | | |
| Particulate Matter (PM) | 1,218 | 1,212 | 160 | 244 | 302 | 358 | 1,680 | 1,814 |
| Particulate Matter less than 10 microns ($PM_{10}$) | 1,204 | 1,164 | 102 | 156 | 213 | 240 | 1,519 | 1,560 |
| Sulfur Oxide (SOx) | 5 | 5 | 61 | 75 | 299 | 326 | 365 | 406 |
| Nitrogen Oxide (NOx) | 31 | 29 | 137 | 198 | 60 | 61 | 228 | 288 |
| Volatile Organic Compound (VOC) | 1,880 | 1,721 | 195 | 286 | 18 | 19 | 2,093 | 2,026 |
| Carbon Monoxide | 8,900 | 8,134 | 919 | 1,288 | 47 | 56 | 9,866 | 9,478 |
| In ml: | | | | | | | | |
| Lead (Pb) | n.e. | n.e. | 1,059 | 807 | n.e. | n.e. | 1,059 | 807 |
| Phenois | n.e. | n.e. | n.e. | n.e. | 17,171 | 17,864 | 17,171 | 17,864 |
| Flouride | n.e. | n.e. | n.e. | n.e. | 8,197 | 9,013 | 8,197 | 9,013 |

Note: n.e. - not estimated
Source: Orbeta and Indab (1996) as lifted from ENRAP Main Report Phase III (1996).

## Table 7. Sources of Water Pollution: Philippines, 1998 and 1992 (In '000 mt)

| Pollutant | Primary | | Manufacturing | | Services | | Domestic (HH) | | Surface Runoff | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1988 | 1992 | 1988 | 1992 | 1988 | 1992 | 1988 | 1992 | 1988 | 1992 | 1988 | 1992 |
| Biochemical Oxygen Demand - 5 days (BOD5) | 736 | 738 | 168 | 175 | 1,152 | 1,551 | 3,358 | 3,810 | 2,334 | 2,334 | 7,748 | 8,608 |
| Suspended Solids (SS) | 54,315 | 43,634 | 171 | 185 | 250 | 270 | 1,537 | 1,706 | 464,333 | 463,991 | 520,606 | 509,786 |
| Total Dissolved Solids (TDS) | | | 1,144 | 1,857 | 1 | 1 | | | | | 1,145 | 1,858 |
| Oil and Grease (O&G) | | | 14 | 19 | <1 | <1 | | | 56 | 39 | 70 | 58 |
| Nitrogen (N) | 235 | 235 | 3 | 2 | 28 | 32 | 271 | 302 | 1,807 | 1,798 | 2,344 | 2,369 |
| Phosphorus (P) | | | | | 8 | 8 | 108 | 120 | 31 | 30 | 147 | 158 |
| Phosphates ($P_2O_5$) | | | 33 | 30 | | | | | | | 33 | 30 |
| Fluorides (F) | | | 15 | 13 | | | | | | | 15 | 13 |
| Sulfates ($SO_4$) | | | 118 | 108 | | | | | | | 118 | 108 |

Notes:

1. Blank cells were not estimated due to the absence of effluent factors (per WHO report).
2. Toxic and hazardous wastes from other activities and industries were not computed (e.g., mercury from batteries used by households which are dumped in the landfills, and cyanide, chromium and cadmium from electroplating). According to an Industrial Efficiency and Pollution Control (IEPC) report, there is potential for significant pollution from the metal finishing industry, particularly cyanide. IEPC noted 125 mt of heavy metals generated by metal finishing activities for 1992 in the National Capital Region (NCR).

Source: Orbeta and Indab (1996) as lifted from ENRAP Main report Phase III (1996).

## Table 8. Department of Environment and Natural Resources (DENR) Appropriations, by Object, 1991-1998 (In percent)

| Particulars | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 Approved[a/] | 1998 Adjusted[b/] |
|---|---|---|---|---|---|---|---|---|---|---|
| A. Current Operating Expenses | 1,874,548 | 1,423,262 | 1,330,428 | 1,281,141 | 1,443,250 | 1,252,010 | 1,410,734 | 1,462,821 | 1,656,252 | 1,525,439 |
| 1. Personal Services | 1,029,934 | 858,720 | 873,239 | 761,802 | 741,011 | 765,861 | 855,721 | 914,062 | 1,132,998 | 1,132,998 |
| 2. Maintenance and Other Operating Expenses | 844,613 | 564,542 | 457,189 | 519,339 | 702,238 | 486,148 | 555,013 | 548,758 | 523,254 | 392,441 |
| B. Capital Outlays | 1,373,919 | 828,829 | 524,611 | 559,650 | 572,985 | 189,935 | 341,376 | 466,872 | 342,420 | 239,446 |
| **Total** | **3,248,467** | **2,252,091** | **1,855,039** | **1,840,791** | **2,016,235** | **1,441,945** | **1,752,110** | **1,929,693** | **1,998,672** | **1,764,885** |

Notes: a/ approved budget (R.A. No. 8250)

b/ approved budget less 25 percent of authorized regular appropriation for nonpersonal service items (Administrative Order No. 372)

Source: General Appropriations Act, 1990-1998, DBM as lifted from Intal and Medalla (1998).

## Table 9. Growth Rates of DENR Appropriations, 1991-1998

| Particulars | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 Approved | 1998 Adjusted |
|---|---|---|---|---|---|---|---|---|---|
| A. Current Operating Expenses | -24.07 | -6.52 | -3.70 | 12.65 | -13.25 | 12.68 | 3.69 | 13.22 | 4.28 |
| 1. Personal Services | -16.62 | 1.69 | -12.76 | -2.73 | 3.35 | 11.73 | 6.82 | 23.95 | 23.95 |
| 2. Maintenance and Other Operating Expenses | -33.16 | -19.02 | 13.59 | 35.22 | -30.77 | 14.17 | -1.13 | -4.65 | -28.49 |
| B. Capital Outlays | -39.67 | -36.70 | 6.68 | 2.38 | -66.85 | 79.73 | 36.76 | -26.66 | -48.71 |
| **Total** | **-30.67** | **-17.63** | **-0.77** | **9.53** | **-28.48** | **21.51** | **10.14** | **3.57** | **-8.54** |

Source: General Appropriations Act, 1990-1998, DBM as lifted from Intal and Medalla (1998).

willingness to pay for environmental improvement in that year may have been affected by other factors that negate any positive impact of improving economic performance.

Matching the growth rates of agency appropriations and those of the economy shows that the former greatly lag behind the latter (Tables 1 and 9). In the contraction year of 1991, the fall in appropriations was three times the decrease in GDP, percentage wise. Moreover, appropriations continued decreasing even during the recovery years thereafter. This suggests that there is no one to one correspondence between economic growth and government willingness to pay for environmental improvement. In a downturn, the environment will be afforded less priority as government resources are diverted to other more basic needs and this neglect may extend into recovery.

**Environmental Impacts of the Current Economic Crisis**

Data and information on the environmental impacts of the current economic crisis are hard to find, for the Philippines or elsewhere, because it is only a little more than a year old. The few works which deal on the subject are also exploratory (e.g., Intal and Medalla 1998 and Clay 1998). Recent quarterly data show that the Philippine economy started to decline in the third quarter of 1997 and then registered a negative growth rate in the second quarter of 1998 due mainly to the poor performance of the resource based agriculture, fishery and forestry sector (Table 10). It is forecast that growth will again be negative in the third quarter, bringing the economy to a recession.

An important impact of the current economic crisis that has bearing on the environment is rising unemployment, specifically among the lower brackets of the population. As earlier suggested, many of the unemployed could end up migrating into the upland and coastal areas and contribute to the already worsening exploitation of soil, forestry and fishery resources. In the Philippines, this abuse is made even more possible because despite some existing laws intended to curtail it, most upland and coastal resources actually remain open-access at the ground level due to poor enforcement.

**Table 10. Quarterly Growth Rates in the Philippines at Constant Prices, 1997-1998**

| GNP / GDP / Sectors | 1997 | | | | 1998 | |
|---|---|---|---|---|---|---|
| | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 |
| Gross National Product | 5.4 | 5.3 | 5.2 | 5.3 | 2.0 | -0.7 |
| Gross Domestic Product | 5.5 | 5.6 | 4.9 | 4.8 | 1.6 | -1.2 |
| Agriculture, fishery and forestry | 4.9 | 1.8 | 0.4 | 4.1 | -3.8 | -11.5 |
| Agriculture and fishery | 5.5 | 2.0 | 1.3 | 4.3 | -3.8 | -11.5 |
| Forestry | -44.7 | -21.5 | -62.7 | -27.2 | -15.2 | -12.1 |
| Industry sector | 5.1 | 7.6 | 6.4 | 5.6 | 1.6 | -1.5 |
| Mining and quarrying | -13.1 | -1.0 | 1.8 | 23.9 | 17.5 | 6.2 |
| Manufacturing | 2.3 | 5.3 | 4.3 | 4.7 | 2.0 | -2.6 |
| Construction | 21.3 | 18.5 | 18.1 | 7.6 | -5.0 | -2.5 |
| Electricity, gas and water | 3.8 | 8.0 | 4.1 | 3.4 | 7.2 | 6.1 |
| Service sector | 6.1 | 5.7 | 5.6 | 4.6 | 4.5 | 3.6 |
| Transportation, communication and storage | 8.9 | 8.2 | 7.4 | 8.4 | 8.1 | 6.6 |
| Trade | 4.9 | 4.3 | 4.3 | 2.5 | 4.1 | 2.1 |
| Finance | 15.6 | 12.7 | 13.0 | 10.8 | 6.6 | 5.7 |
| Ownership of dwellings and real estate | 4.5 | 3.8 | 3.7 | 3.2 | 2.3 | 2.1 |
| private services | 4.7 | 4.9 | 5.4 | 4.4 | 4.2 | 4.4 |
| Government services | 2.0 | 3.9 | 2.9 | 2.8 | 2.4 | 3.0 |

Source: PIDS-Data and Information System (IDS)

Available data show that the unemployment rate in the Philippines has indeed worsened, especially in the second quarter of 1998 (Table11). Reports of plant closures and employee layoffs involving casual and permanent workers in the lower economic rungs are now daily news. There is no available data on migration patterns but Intal and Medalla (1998) reported an urban bound migration of the population during the crisis, instead of rural. Thus, at least for the time being, the unemployment impact of the crisis on resource use may be more tempered than what would otherwise be expected. This may not be so in the long run if the economic crisis lingers and a reverse in the migration trend occurs.

An even larger outcome of the economic crisis that has implication on the environment is the worsening poverty that it brings to the general population. In the years before the crisis, the poverty incidence in the

**Table 11. Quarterly Unemployment Growth Rates, 1997-1998 (In percent)**

| Year | Quarter | Rate |
|---|---|---|
| 1997 | 1st | 7.7 |
| | 2nd | 10.4 |
| | 3rd | 8.7 |
| | 4th | 7.9 |
| 1998 | 1st | 8.4 |
| | 2nd | 13.3 |
| | 3rd | 8.9 |

Source: PIDS-Data and Information System (IDS)

Philippines has improved on record although the absolute magnitude of the poor remains high due to population growth (Table 12). Abject poverty will worsen degradation as it brings down the willingness to pay for environmental improvement among the population to minimal or even zero level. Since the crisis will likely result in an increase in the number of poor people, then additional degradation can be expected.

**Table 12. Poverty Incidence and Magnitude of Poor in the Philippines, 1991, 1994 and 1997**

| Year | Poverty Incidence (percent) | Magnitude of Poor (No. of Families) |
|---|---|---|
| 1991 | 39.9 | 4,780,865 |
| 1994 | 35.5 | 4,531,170 |
| 1997 | 32.1 | 4,553,387 |

Source: PIDS-Data and Information System (IDS)

If the economic crisis turns out to be a short one, which is now unlikely, then the impacts of increasing unemployment and poverty on natural resource exploitation may not be that severe on the net. In the upland and coastal areas, the intensification of resource use may only take the form of additional but temporary farming and fishing activities in already used up areas. If the crisis takes longer, which is a likelier occurrence, then environmental degradation will be much worse. Additional farming and fishing activities will become more permanent and could result to the clearing of virgin forests and the further destruction of already depleted mangroves, coral reefs and other coastal resources. Cruz and Repetto (1992) reported that in past economic crises in the Philippines, migration to rural areas indeed abruptly rose which caused these adverse environmental impacts.

As earlier mentioned, an impact of an economic contraction like the current crisis which has positive implications to the environment is the reduction in the scale of operations of economic sectors. If the crisis leads to the closure or downsizing of a substantial number of firms belonging to the pollutive and/or resource-dependent sectors, then environmental degradation may slow down. The quarterly data presented earlier show that the resource-dependent and highly polluting mining and quarrying sector has been growing, instead of contracting, during the crisis (Table 10). Thus, the hoped for reduction in activity that will help the environment recover did not happen in this industry. Unlike mining, the manufacturing

sector, which also has a large pollutive component, has slowed down and registered negative growth in the second quarter of 1998. This development may augur well for the environment in terms of scale effect although it is bad for the whole economy.

Aside from pollutive and resource-dependent industries, other private sector activities are affected by the economic crisis in ways that have implications on the environment. For one, the increasing prices brought about by the crisis could discourage private investment in natural resource generation, such as tree planting (Intal and Medalla 1998). Similarly, it can prevent investment in better technologies that makes production more resource efficient, such as wood processing and fish processing. These potential negative impacts of the crisis could be significant and should be empirically analyzed in a future study.

The impacts of the economic crisis on government spending for the environment in the Philippines were traced by Intal and Medalla (Ibid). Overall, the crisis reduced public income generation and raised expenditure requirements in 1998. On the income side, taxes and similar revenues fell because of the contraction in the economy while tariff earnings declined as importation decreased in reaction to the depreciating peso. On the expenditure side, the higher interest rates and peso depreciation propped up costs of operations and raised requirements, estimated at a combined 8.9 percent. This double-edged sword of falling incomes and increasing expenditures eventually threatened government deficit to significantly bloat.

To address the problem of very large public deficit, the national government drastically cut down public expenses. Among the cost cutting measures considered were a 25 percent mandatory reserve on all expenditures of government agencies other than personnel and debt service. The impact of this was to drastically decrease the budget of the DENR for 1998. Except for 1995 and 1996, total adjusted budget in 1998 was lower in real terms than the allotments for most years in the 1990s (Table 8). Furthermore, the growth rate of the budget was negative in 1988, after adjustment, which contrasts to the continous positive growth rates in the previous three years (Table 9).

Not just the total but also particular items in the DENR budget were affected by the economic crisis. Looking at disaggregated figures, the budget for general administrative and support services rose in 1998 as this was excluded from the mandatory cutback (Table 13). The appropriations for operations as a whole fell and particularly those for forest management, protected areas and wildlife management and environmental management. These decreases will likely impact negatively on the ability of the agency to exert its functions in those areas critical to natural resources and environmental protection and management.

There are no available data and information useful for analyzing the urban-rural sharing of public resources during the current economic crisis. These would have been instructive in examinimg additional impacts of rural neglect caused by the crisis on the environment. If past experience is a good guide, the environment should suffer even more because rural programs are likely to be among the first to be cut in times of budget problems.

To wrap up this discussion on public spending, a contraction in the economy should drive public priority to favor basic services. In addition, peace and order and crime prevention are getting a relatively bigger share of the budget in the Philippines because of the possibility of social tension and unrest during the crisis, not to mention the rash of kidnappings and common crimes which have become almost permanent features in the life of Filipinos. Among the early priority projects of the new administration is to raise the salaries and provide for the housing of the police forces and other members of the security personnel. These projects could be taken as environmentally adverse because they may drive funds away from environmental management and yet are politically expedient given present conditions.

## IMPLICATIONS FOR ENVIRONMENTAL MANAGEMENT

From the previous discussions, we can now summarize some important points regarding the relationship between economic cycles and the environment. First, for a developing country like the Philippines, an

economic expansion may result to more, instead of less, environmental degradation due to scale and other reinforcing factors. Second, the situation is not as clear during a contraction as reductions in scale and willingness to pay may have contradictory impacts on the environment. It is likely, however, that if the current economic crisis lasts longer, unwanted environmental impacts on the net may be forthcoming. A prolonged crisis may bring about a significant level of migration into the rural areas that will exacerbate exploitation of natural resources. In addition, it may significantly reduce the willingness among economic units to pay for environmental improvement. These impacts will likely more than offset environmental gains from reduction in the scale of economic activity due to the crisis.

Since intense environmental degradation can occur in both expansion and contraction, there is always the need to look for more innovative ways to conduct environmental protection and management without directly relying on the willingness of economic units to pay for it. An option that is proposed by environmental economists is the correct pricing of environmental goods and services and the internalization of environmental costs into production processes. Currently, the rights to the exploitation of forestry, fisheries and mining resources in the Philippines are highly under-priced. Also, economic units that are polluting the air and water environment are generally under-penalized, if not held unaccountable at all. The correct pricing of the environment among users is important not only because it will help generate needed funds for environmental protection and management, which is now made more necessary by the economic crisis, but also because it will force users to utilize environmental resources in a more economically efficient and sustainable manner.

There are now ongoing activities leading to the attainment of correct environmental pricing in the Philippines. Environmental valuation studies have been conducted to measure the true economic and social values of environmental assets and environmental accounting efforts have been done to reflect degradation as an additional cost in the measurement of national output (DENR 1996 and NSCB 1998). These activities will help provide the

**Table 13. Department of Environment and Natural Resources (DENR) New Appropriations by Program/Project, 1996-1998 (In pesos)**

| Program/Project | 1996 | 1997 | 1998 |
|---|---|---|---|
| 1. Office of the Secretary | | | |
| A. Programs | | | |
| 1. General Administrative and Support Services | | | |
| a. General administrative and support services | 645,636,000 | 656,765,000 | 832,746,000 |
| b. Productivity incentive benefits | | 38,478,000 | 38,146,000 |
| Subtotal, General Administrative Support Services | 645,636,000 | 695,243,000 | 870,892,000 |
| 2. Support to Operations | | | |
| a. Coordination, formulation and integration of ENR sectoral plans and policies | 86,236,000 | 100,657,000 | 118,368,000 |
| b. Coordination, monitoring and evaluation of ENR programs and projects including those developed to Local Government Units | 57,078,000 | 63,541,000 | 70,852,000 |
| c. Information system development and maintenance | 37,943,000 | 58,071,000 | 19,715,000 |
| d. Statistical services | 11,633,000 | 13,572,000 | 14,674,000 |
| e. Production and dissemination of technical and popular materials in the conservation and development of natural resources including environmental education | 92,909,000 | 41,633,000 | 44,900,000 |
| f. Legal services | 45,486,000 | 51,197,000 | 63,469,000 |
| g. Conduct of special studies, designs and development in support of forestry, mining and environmental management operations | 27,000,000 | 28,000,000 | 55,520,000 |
| h. Adjudication of pollution cases | 3,957,000 | 4,077,000 | 3,507,000 |
| i. Provisions for operations against illegal forest resources extraction/utilization activities, including payment of rewards to informers in the discovery and seizure of illegally collected/ transported forest products and apprehension of violators of Section 68 (b) of P.D. No. 705, as amended by EO No. 277, the hauling fees of confiscated logs, space rentals, guards, representation expenses and other expenses in the disposal/selling of confiscated illegally cut logs, subject to Special Budget and approval by the President | 8,100,000 | 10,500,000 | 8,460,000 |
| j. Laboratory services | 25,159,000 | 40,702,000 | 33,445,000 |
| Subtotal, Support to Operations | 395,501,000 | 411,950,000 | 432,910,000 |

**Table 13. continued...**

| Program/Project | 1996 | 1997 | 1998 |
|---|---|---|---|
| 3. Operations | | | |
| a. Forest Management | 1,655,358,000 | 2,025,587,000 | 1,569,430,000 |
| b. Land Management | 555,784,000 | 628,663,000 | 689,061,000 |
| c. Protected areas and Wildlife Management | 149,700,000 | 300,136,000 | 268,760,000 |
| d. Mines and Geo-Sciences Development | 115,408,000 | | |
| e. Environmental Management | 295,461,000 | 305,403,000 | 144,287,000 |
| f. Ecosystems Research and Development | 111,765,000 | 146,068,000 | 255,043,000 |
| Subtotal, Operations | 2,883,476,000 | 3,405,857,000 | 2,926,581,000 |
| Total, Programs | 3,924,613,000 | 4,513,050,000 | 4,230,383,000 |
| B. Projects | | | |
| 1. Locally-funded Project(s) | | | |
| a. Construction of Regional Office V Building | 10,000,000 | | |
| b. Lon-oy Watershed Development Project in Region I | | 11,838,000 | |
| c. Maasin Watershed Project in Region VI | | 6,266,000 | |
| d. Rehabilitation of Riverbanks and Lakeshore Project - National Capital Region | | 1,090,000 | |
| e. Environmental and Natural Resources Accounting | | | 69,750,000<br>100,000,000 |
| f. Water Resources Development and Management | | | |
| Subtotal, Locally-funded Project(s) | 10,000,000 | 19,194,000 | 169,750,000 |
| 2. Foreign-assisted Project(s) | | | |
| a. Industrial Pollution Control Project | 3,620,000 | | |
| b. Natural Resources Management Program | 9,807,000 | 16,553,000 | 36,124,000 |
| c. Environment and Natural Resources Sector-Adjustment Loan Project | 357,639,000 | 187,516,000 | 162,754,000 |
| d. Pasig River Rehabilitation Project | | | |
| e. Conservation of Priority Protected Areas Project | 15,915,000 | 18,300,000 | 16,273,000 |
| f. Integrated Environmental Management for Sustainable Development | | | |
| g. National Integrated Protected Areas System Program (EU Grant) | | | 11,470,000 |
| Subtotal, Foreign-Assisted Project(s) | 392,031,000 | 228,840,000 | 235,121,000 |
| Total, Projects | 402,031,000 | 248,034,000 | 404,871,000 |
| **TOTAL, NEW APPROPRIATION** | **4,326,644,000** | **4,761,084,000** | **4,635,254,000** |

Source: General Appropriations Act, 1998-1998, DBM as lifted from Intal and Medalla (1998).

necessary data useful for the estimation of true prices of environmental resources. Beyond just estimation, more clearly needs to be done as the actual imposition of correct environmental pricing among users is politically difficult. For instance, current efforts to raise the public pond lease fees in the aquaculture sector have been receiving strong opposition from the private sector. The same problem can be expected if attempts to raise resource rents in mining are made. Enough said that political will on the part of the government is necessary for correct pricing to become standard practice. Moreover, the implementation of correct pricing requires that appropriate market-based and command and control instruments must be developed for the purpose.

Another potentially powerful tool that can be used to help attain the goals of environmental protection and management is the clear delineation of property rights to natural resources. In the Philippines, resources have been abused partly because they are open-access in character. For example, in Mt. Diwata in Mindanao, otherwise known as Diwalwal, small-scale and medium-scale miners have been digging gold in upland areas and polluting the downstream waterways with mercury at will, not to mention the deforestation, siltation and other problems they cause, because up to this point, the gold deposits in the area are "free for all." Similarly, in most coastal areas of the country, abuse occurs as artisanal fishermen exploit open-access marine resources to the hilt, unmindful that by doing so they destroy the very basis of their livelihood.

There are some positive developments in the area of property rights delineation in the case of fisheries in the Philippines. The Philippine Fisheries Code grants coastal fishermen and other local stakeholders the preferential right to exploit close-by coastal resources. A similar thing should occur in mining although at present, the rights to exploit many mining sites remain unsettled. In Mt. Diwata, where the largest number of small-scale miners in the country operate, the rights to mine are hotly contested between the small-scale and medium-scale miners on one side and a large-scale mining

operation on the other. Meanwhile, the mercury pollution and environmental degradation in the site and in the affected downstream areas continue.

In the area of environmental monitoring and enforcement, much should also be done to help alleviate the constraint imposed by limited funds from the national government. The cash-strapped central administration may shed some of the burdens of management by sharing it with the local governments and nongovernmental organizations (NGOs) active in the environment. Since many of the environmental problems are actually site specific, allowing local public units and the private sector to actively participate will not only save money for the national government but also result to a more effective and hands-on approach to addressing environmental problems. The local involvement in monitoring and enforcement, as well as in overall management, is already substantial in the Philippines. This was made possible by the passing of the Local Government Code of 1991 which empowered public and private entities at the provincial and municipal levels to manage local resources. The recent passing of the Indigenous Peoples Rights Act of 1997 should also help accelerate this process of empowerment in the management of forestry, mining and other resources among the cultural minorities.

A way by which the government can promote private sector participation is to make it easier for them, the industrial sector in particular, to purchase and employ environmental goods and services. The government should consider the liberalization of the importation of environmental goods so that local users can avail at cheaper prices technologies which can be had only from abroad. In addition, it could provide incentives that will motivate the development of indigenous technologies by local manufacturers. Within the APEC framework, the Philippines has contemplated the early voluntary sectoral liberalization (EVSL) for the environmental goods sector. The popular suggestion is to allow at the start, only early liberalization for potential environmental products which are not produced locally but highly necessary for environmental protection. This will allow local manufacturers

some breathing space to adjust to competition in the short run and at the same time allow the importation of needed environmental goods.

Legislation wise, it has been said that the Philippines already has enough laws for environmental protection and management and that what is largely lacking is the strict implementation of the laws. Yet, a review will show that, in fact, some things remain to be done by way of improving the quality and quantity of environmental legislation. The Philippine Fisheries Code, for instance, appears to be promoting more intense exploitation of coastal resources by allowing some form of commercial operations in previously exclusive municipal waters. Also, other laws, like the proposed Clean Air Act, have been in the pipeline for some time and their enactment remains uncertain. It is imperative that amendments should now be made for laws which have environmentally unfriendly provisions and that environmentally related laws still already in the pipeline should be passed.

Beyond the sector level, there remain the larger economic problems of unemployment and poverty that the Philippines must face. As our discussion here suggests, forcefully addressing them will certainly go a long way toward achieving better environmental protection and management. The newly elected President of the country has made poverty alleviation a centerpiece program of his administration and has exerted some tangible actions to effect this. In just the first quarter of his tenure, several projects have been started to help improve the plight of the poor, including better housing for urban squatters. While sporadic, these are a commendable start although their environmental impacts will likely be minimal as long as the poorest of the population living in the uplands and coastal areas do not benefit from such programs.

It should also be mentioned that the path of liberalization that the Philippines is continuing, despite some doubts motivated by the economic crisis, would be a major contentious issue in the months to come. Liberalization has a lot of potential positive impacts on environmental protection and management including the freer movement of environmental goods and services and increased willingness to pay brought about by the

hoped for faster economic growth resulting from it. While there may be substantial benefits, liberalization may pose potential problems to the environment because of the scale factor as well. Suffice it to say here that the actual impacts of remaining firm and consistent with liberalization during the economic crisis to environmental protection and management will be another interesting subject of study in the future.

## SUMMARY AND CONCLUSIONS

The environmental impacts of economic cycles in developing countries and the current economic crisis sweeping Asia were discussed using the Philippines as example. The paper pointed out that degradation might occur irrespective of economic cycles. A prolonged economic downturn, however, could worsen the situation because the deepening unemployment and poverty it will cause could lead to faster rates of resource over-exploitation and decreases in willingness to pay among economic groups and government.

The dampening effect of the current economic crisis on the willingness to pay for environmental improvement necessitates the speedy implementation of other innovative approaches in the conduct of environmental protection and management. At the sector level, continuing efforts to measure the true values of environmental resources and the development of instruments for the imposition of true environmental costs on users must be supported. Furthermore, efforts leading to the delineation of secure property rights and a more effective monitoring and enforcement must be exerted.

At the national level, strong measures to address the interrelated problems of unemployment and poverty will be needed to control the over-exploitation of upland and coastal resources by the poor. As the net environmental impacts of liberalization are unknown, a study will be needed to look into them, especially in light of the divergent stands that ASEAN countries now take partly in reaction to the economic crisis.

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