



ECONOMY AND ENVIRONMENT PROGRAM  
FOR SOUTHEAST ASIA

**Science and Public Policy:  
How the Twain Might Meet**

**Ben Malayang III**

**plenary paper**

ARCHIV  
614.71(914)  
M3

**EEPSEA** is supported by a consortium of donors and administered by IDRC.

Mailing address: Tanglin PO Box 101, Singapore 912404 ● Visiting address: 7th Storey RELC Building,  
30 Orange Grove Road. ● Tel: 65 235 1344 Fax: 65 235 1849 E-mail: [dglover@idrc.org.sg](mailto:dglover@idrc.org.sg)

Deputy Director: [hermi@laguna.net](mailto:hermi@laguna.net) ● Website: <http://www.idrc.org.sg/eepsea>

# SCIENCE AND PUBLIC POLICY

## *How the Twain Might Meet*

Ben S. Malayang III

*School of Environmental Science and Management  
University of the Philippines Los Baños*

### INTRODUCTION

Glover (1993) and Bromley (1999) raised the issue of how science feeds public policy. They discussed views on how research contributes to policy making and how public policy is enriched by research.

Glover reviewed the literature on the topic. He summarized their principal points and discussed how economics research improves public policy. He noted four constraints on the ability of research to contribute to policy making: (1) it is unable to meet the needs of the policy makers in terms of providing answers to the questions they need to resolve at the time they need to do it (c.f. Hirschman & Lindblom 1962, Lamb 1987, Wilson 1978, Lynn 1978, Sundquist 1978, Weiss 1977, Rose 1977, Verdier 1984, Sharpe 1977, Davis & Salasin 1978); (2) its logic differs from the logic that policy makers follow (c.f. Leman & Nelson 1981, Nehn 1981, Verdier 1984, Rhoads 1978); (3) it has technical demands on itself that policy makers cannot accommodate (c.f. Weiss 1977, Aaron 1978, Streeten 1988, Szanton 1981); and (4) in many countries (particularly developing ones) there is not enough political space nor resources for doing it to support policy making (c.f. Fine 1990 and Thomas & Grindle 1990).

Glover noted a prevailing view among the authors he reviewed that public policy might become more receptive to research if the latter is: (1) credible (it is reliable and uses a sound methodology; c.f. Weiss & Bucavalas 1977); (2) relevant (it addresses questions that policy makers are raising and gives them the particular information they need; c.f. Faulhaber & Baumol 1988); (3) affirming (it supports the *efforts* of the policy makers to produce good policies, although not necessarily their sway toward one or another policy option; c.f. Szanton 1981); (4) understandable (to the policy makers especially; it speaks their language; c.f. Verdier 1984); and (5) practical (it offers to policy makers clear and do-able options at the time they need them; c.f. Leman & Nelson 1981). Research, in this view, is to be “client-oriented” to make it relevant and useful to policy makers (c.f. Behn 1981, Davis & Salasin 1978, Weiss 1978, and Sundquist 1978).

But Glover disagrees. He questions the client-oriented approach because: (1) researchers and policy makers fundamentally differ in how they obtain, analyze and use information; (2) “clients” are often a nebulous (hence an unidentifiable) lot or they are impermanent to the positions they hold; (3) a “client’s” interests and understanding of policy objectives may differ from those of other “clients”; and (4) too often, a client’s “policy problem” is about what had happened rather than what will yet happen; his/her “policy crisis” can be about the past rather than about the future.

Glover proposes to instead give heed to what other authors suggest is an alternative use of research in policy making, and that is to transform the policy makers' concepts and methods of understanding a policy dilemma (c.f. Weiss 1978 & 1977, Seekins & Fawcett 1986, Pelz 1978, Rich 1977, Snell 1983, Rein & White 1977, de Soto 1987, and Verdier 1984). Research is to be used to "restructure the terms *of the debate*" (c.f. Verdier 1984; italics mine) rather than merely explicating the terms *in the debate*.

Glover wrapped up by ticking off some implications to funding agencies if what he is seeing in the literature were correct: (1) the chances that research outputs are actually utilized in public policy are "quite small" really, even if (2) research impacts on concept change can be more lasting; (3) a "portfolio approach" (which aims to gain both output and concept-change impacts) would probably be more cost-effective in the long-run as is long-term research that support policy making in an extended time-frame.

Bromley focused on EEPSEA.<sup>1</sup> He disagreed with Glover in that to him EEPSEA might have a deeper impact on policy making in Southeast Asia if it were to "stress policy problems and [their] possible solutions" – a tack toward the "client-oriented" research that Glover had questioned. Bromley points to *explication* as the fundamental utility of research in policy making. Research is to show to policy makers why certain unwanted ecological situations have arisen, and why they persist. And even as it must give policy makers an array of feasible solutions to control the occurrence of unwanted situations, the solutions that research proffers must be clearly anchored on solid explanations as to their roots and derivations, which the policy makers, themselves, must be able to understand.

In addition, said Bromley, it is crucial that research is able to show policy makers the extent of the *incidence* of unwanted situations in order that the distributional (and hence political) import of its occurrence and persistence is clear to the latter (c.f. Thiruchelvam, Selliah & Pathmarajah 1999, Corpuz 1999, and Chandrasiri 1999). This should improve the likelihood that policy makers will act on a problem and will adopt the findings and recommendations of research as the basis of their action.

This paper examines the views raised and discussed by Glover and Bromley against a case in the Philippines in which research had, in fact, affected policy.<sup>2</sup> The Environment and Natural Resource Accounting Project (ENRAP) was a research endeavor under the aegis of the Department of Environment and Natural Resources (DENR). It was funded by the United States Agency for International Development (USAID). It aimed to support environmental policy making in the country and covered a number of policy issues that included forestry, fisheries and water and air pollution. This paper discusses ENRAP's role and impact on the policy to eliminate gasoline Pb in the Philippines.

---

<sup>1</sup> The Environmental Economics Programme for Southeast Asia. It is based in Singapore.

<sup>2</sup> In this paper, "policy maker" refers to any person – technical staff or decision maker – who contributes to "policy making", i.e., the shaping and formulation of a policy; they include all persons involved in determining the content and language of a policy.

## ENRAP AND THE POLICY ON GASOLINE LEAD IN THE PHILIPPINES

ENRAP began in 1991 and extended into four phases ending in 1999. Its research team was composed of private consultants (who led the project) and representatives from the DENR and other government agencies, mainly, the Department of Agriculture (DA), Department of Energy (DOE), National Economic and Development Authority (NEDA), and National Statistical Coordination Board (NSCB). In its team were highly regarded experts from within and outside the country including Dr. Marian delos Angeles, Project Leader, and Dr. Henry Peskin, Project Advisor. It did three studies on gasoline Pb. In its Phase III (April 1994 to March 1996), it looked at the economic implications of reducing Pb in the gasoline sold in the country.<sup>3</sup> In Phase IV (April 1996 to December 1999) it did two studies, one on the economic implications of phasing out Pb entirely<sup>4</sup> and the other on estimating its impact as an air pollutant in Metro Manila.<sup>5</sup>

All three studies became key inputs to Pb control policies in the Philippines. The first was used to determine the taxes to be imposed on low and high Pb gasoline which resulted in the pump prices of the two products settling to a PHP 0.40 difference and made low Pb gasoline cheaper to consumers at the pump even if it was costlier to produce than high Pb gasoline. The second became an input to Executive Order 446 issued by President Ramos on September 1997 which mandated the phase out of gasoline Pb in the country. A later version of the same study served as basis of the Congressional and public debates on the Clean Air Act of 1999 (CAA 99). The third study was used in an Asian Development Bank project to control air pollution in Metro Manila (delos Angeles 2000).

ENRAP found that Pb emissions in the Philippines will vary highly under three policy scenarios (Table 1). Ambient Pb levels in Metro Manila will fall rapidly if Pb was phased out by 1996 (Table 2). Health damages from Pb will mount if it was not phased out by year 2000 (Table 3). Tax revenues will decline if Pb is phased out (Table 4) but society will gain over-all if only Pb-free gasoline is used in the country (Table 5).

Table 1. ENRAP estimates of Pb emissions under different policy scenarios.

<i>Scenarios</i>	<i>Emissions (tons)</i>
Pre-regulation (Pre-February 1996)	117
Fuel tax restructuring*	23-95
Ban of leaded gasoline	0

\* Based on a range of responsiveness to new prices and ease of substitution between fuel types.  
Source: delos Angeles 1997.

<sup>3</sup> "Costs, Benefits and Efficiency: An Economic Analysis of Gasoline-Lead Reduction in the Philippines" by Jose D. Logarta, Jr. (in Volume 1A Section 2, ENRAP Phase III Report, 1996).

<sup>4</sup> "An Analysis of Options of Reducing Lead Emissions from Motor Vehicles" by Manasan et. al. 1998.

<sup>5</sup> ENRAP/REECS 1997.

**Table 2.** ENRAP estimates of ambient Pb levels in Metro Manila if Pb is phased out in 1996.

<i>Year</i>	<i>Ambient Level (<math>\mu\text{g}/\text{m}^3</math>)</i>
1992	1,3696
1993	n.a.
1994	n.a.
1995	0.2821
1996**	0.3197
2000**	nil

\* Estimated based on linear relationships between calculated load and ambient level  
Source: delos Angeles 1997 c.f. EMB 1996 & DENR 1990.

**Table 3.** ENRAP projections of health damages from gasoline Pb (in million pesos).<sup>6</sup>

<i>Damages*</i>	<i>2000</i>	<i>2006</i>
Mortality	106	249
Morbidity		
Cost of workdays lost	23	63
Cost of medication	595	3,551
IQ Points Decrement	3,841	9,249

\* If the Clean Air Act were not enacted in 1999.  
Source: delos Angeles 1999.

**Table 4.** ENRAP estimates of tax revenues from leaded gasoline (in billion pesos).

<i>Policy Options</i>	<i>2000</i>	<i>2006</i>
Status Quo (no Clean Air Act)	9.07	15.90
Higher Tax Differential Between Leaded and Unleaded Gasoline	8.91	14.69
Ban on Pb in Gasoline	7.70	13.48

Source: delos Angeles 1999.

<sup>6</sup> Pb is a neurotoxin that can cause anemia, neurological dysfunction, renal damage, mental & physical retardation in children, cardiovascular diseases and, at high doses, death (Manasan et al. 1998 c.f. Lovei 1996).

**Table 5. ENRAP estimates of NPV to society under two policy options on Pb (million pesos)**

<i>Options</i>	<i>NPV (at 12%)</i>
Higher Tax Differential Between Leaded and Unleaded Gasoline	3,421
Ban on Pb in Gasoline	109,341

Source: delos Angeles 1999.

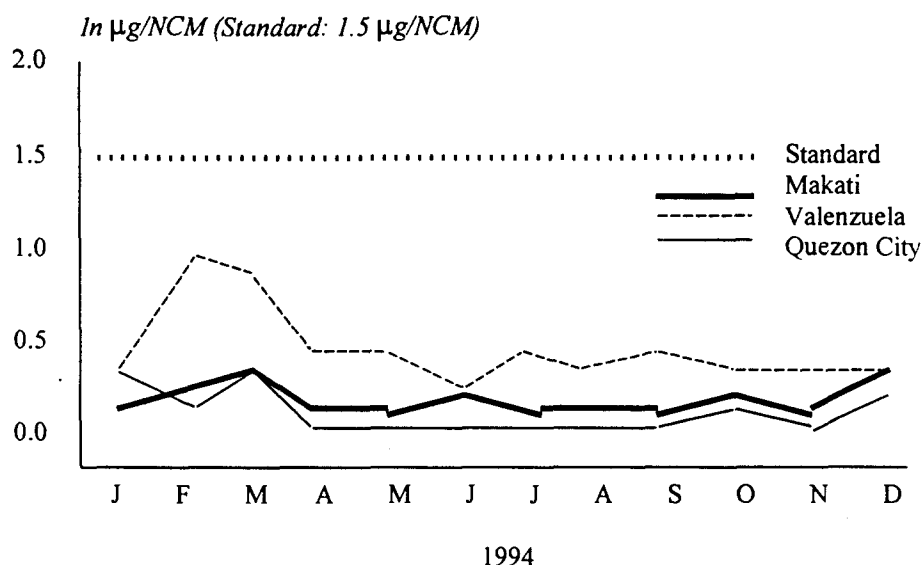
ENRAP concluded that a phase out of Pb would be to the best interest of the Philippines. It offers the highest net social benefits to the Filipino people. These findings became the basis of the provisions of the CAA 99 which spell out what would be the most stringent policies on gasoline Pb in the country to date.<sup>7</sup> Barely a year after the deadline set in the Act, unleaded gasoline is widely available in the country.

There is little doubt that ENRAP exerted much influence on the policy on gasoline Pb in the Philippines. But it did not initiate the policy. Nor did the policy emerge and took its present form in only the last two years. The policy evolved beginning in late 1992 when ENRAP had yet to begin its air pollution studies. That was when Secretary Angel Alcala of the DENR then pushed for the policy and got oil companies to sign a pact with the government that they will introduce low Pb gasoline in the Philippines.<sup>8</sup> Ambient Pb levels in Metro Manila did decline in a year after the pact was signed (Figure 1).

---

<sup>7</sup> The Act provides that in 18 months after its effectivity (it took effect on July 17, 1999) all unleaded gasoline sold in the country shall not have an anti-knock index exceeding 87.5 and a Reid vapor pressure of over 9 psi. By year 2003, unleaded gasoline in the country shall not have more than 40% aromatics by volume and over 2% benzene by volume (Section 37 par. a). The limits are to be enforced by the DENR and other agencies based on an Integrated Air Quality Improvement Framework that shall be formulated multisectorally. The Framework shall set the emission reduction goals for specific pollutants including Pb (Section 7). The Act also sets limits on Pb emissions from stationary sources. They are not to exceed an average of 10 µg/NCM over a sample period of a minimum of 4 hrs and a maximum of 8 hrs using atomic absorption spectrophotometry (Section 19). (it also provides limits on other air pollutants including SO<sub>x</sub>, NO<sub>x</sub>, HF, HCl, Cd, Tl, Hg, Sb, As, Cr, Co, Cu, Mn, N, V, and Sn and their compounds.). Violations of the Act will entail penalties that are adjusted annually or by number of violations (Sections 45 & 46).

<sup>8</sup> Secretary Alcala, a biologist with a background in chemistry, was keenly aware of the seriousness of the health risks from Pb. He saw an opportunity to do something about it in late 1992 at the time when the Philippines had its worst electric power crisis when huge areas in the country were having outtages lasting almost 10 hours daily. Air pollution was choking cities because of the proliferation of home and office generators that added to the already high emmissions from other sources. But Pb is in gasoline not diesel which was the principal fuel used in generators and public transport. Controlling it would eliminate a serious air pollutant without opposing the efforts of the government to solve the crisis. The oil companies balked, citing costs. Secretary Alcala countered by explaining what he understood was the simple chemistry involved to reduce Pb in gasoline. But with no hard data on the possible costs to the economy if leaded gasoline were replaced entirely by unleaded gasoline, the government settled for only the gradual and phased reductio of Pb over three years.



Source: DENR 1995.

Figure 1. Mean monthly 24-hour lead level in three stations in Metro Manila, 1994.

There were two problems that constantly beset ENRAP throughout its project life. One was limited data and the other was methodology. The first pertained to the lack of reliable data on natural resources and environment in the Philippines. This was especially so for data that lend directly to policy studies. For example, there were data on air pollution in different parts of the country but they were not collected in the same way or frequency. The data for estimating the costs of air pollution to society were not uniformly available in the places where air pollution data were collected. ENRAP had to use proxy data and data from a limited scope of cases. The second was about the project's choice of methods of resource valuation and accounting. Its approach differed from those used elsewhere (e.g., Norway, Canada, the Netherlands and France) or used by others (e.g., the World Resources Institute or the United Nations). ENRAP had to constantly justify its approach because other researchers and agencies in the country (e.g., the NCSB) were insistent on their preference for other methods.<sup>9</sup>

## LESSONS FROM ENRAP

A number of lessons can be gained from ENRAP on how research feeds policy. Some are related to the factors discussed by Glover and Bromley:

1. Ability to meet the needs of policy makers. ENRAP had its studies on gasoline Pb at the time when the Philippine government was considering to legislate it. It had the numbers that the legislators needed to decide how much gasoline Pb to allow in the country. It had answers to the questions of costs and benefits to the nation if Pb were banned when these were exactly being asked in Congress. In contrast, ENRAP was

<sup>9</sup> Based on the author's understanding of the situation with the NCSB whose researchers, accordingly, favor the Repetto method used by WRI.

not there with the same numbers when the policy was first pursued in 1992 to 1995. Unable to know its potential effects on the economy, the government had to settle with merely reducing it slowly. It was not able to push for its immediate ban as had been done today.

2. Sharing a common logic with policy makers. ENRAP's logic was indeed questioned, but by other practitioners<sup>10</sup> not by policy makers.<sup>11</sup> Its logic was not the issue to the legislators that used its findings, only that it had the numbers that they needed. Even its procedures to overcome its technical limitations (e.g., its projections on ambient Pb levels which was based only on extrapolations from a linear regression using a limited data set) never came into question in Congress (delos Angeles 2000). It appears that, in this case, the logic of a research becomes less an issue to policy makers if the credibility of the research team, to them, is high.
3. Technical demands on research. ENRAP had been particularly pressed to maintain a sufficient level of technical rigor because it had critics from among its immediate community of practitioners. But it was able to bifurcate its technical undertaking between satisfying its critics and generating the results for its policy clients. It was always explaining and justifying its methodology every time it gave out findings,<sup>12</sup> thus ensuring that it had the information to address what its critics needed to know, and the findings that policy makers needed to have. It was able to stress one or the other whenever it dealt with critics or policy makers. It distinguished its two sets of audience – other researchers and policy makers – and thus addressed their needs together without muddling them with each other.<sup>13</sup>
4. Political space and resources. In the Philippines, political plurality is high but funding for research is low.<sup>14</sup> ENRAP had the space to proffer its findings to policy makers but it had to rely entirely on foreign assistance funds to do its work. Foreign funding is especially crucial because it allowed it to keep its high caliber team intact for as long as it did (almost a decade). It achieved a continuity of work over the period that it took for the Pb policy to mature into a legislation. Its team had the time to develop a good sense of the policy environment in which Pb reduction was evolving into law.

---

<sup>10</sup> Those who preferred other methods.

<sup>11</sup> See letter to Dr. Marian delos Angeles from Representative Vicente A. Sandoval, Chair, House Committee on Ecology, and Representative Luwalhati R. Antonino, Co-chair, Philippine Legislators' Committee on Population and Development, Inc., dated March 15, 1999, recognizing the ENRAP team as the country's leading policy analyst on air pollution.

<sup>12</sup> ENRAP had always a section on its methodology in each of the reports it published.

<sup>13</sup> Doing this, ENRAP overcame Glover's reservations about client-oriented research. By distinguishing its audience it achieved a situation in which it did not need to rattle policy makers with the theoretical underpinnings of its procedures and its understanding of the technical aspects of a policy issue. It was able to offer its projections about future scenarios of a policy option without needing to confuse them with the theories it used to make the projections. It allowed its research team to distinguish their clients: those who needed their results and those who were concerned with its methods.

<sup>14</sup> Public funds for R&D in the Philippines is from .17-.19% of GNP, lower than in Singapore (.35%), Thailand (.25%) and Indonesia (.20%) (Florece 2000).



ENRAP's success seems to have been because it overcame the constraints identified by Glover and it served the purpose of explicating policy options that Bromley had pointed out. It achieved credibility, relevance and value to policy makers which many of the authors discussed by Glover have noted to be key to make the latter more receptive to research. But there was more. They pertain to the politics of policy making:

1. There was a political momentum for the policy that was driven by public demand for the government to do something about the worsening air pollution in cities. It began in the power crisis of 1992-1993 and had not eased until after the passage of CAA 99. ENRAP's role was to give the justification for the proponents of the policy to push for more control on Pb. The push became a political pressure which translated to an advantage for politicians to support the policy. ENRAP's numbers also served to assure the legislators who were to vote on the law on Pb phase out that their action will not be a dis-benefit to the country.
2. The Pb policy evolved over time. It was not a moment's decision by some individuals or group in government but a changing moment in a continuing process of consensus making within and outside the government.<sup>15</sup> Big and small strides were made, over time, until the policy became a law and in most of that time ENRAP was there. And because it seemed always there, it became a ready source of information for policy makers. Its continuity gave it credibility and credibility improved its ability to contribute to policy.
3. The Philippine public have gained a higher level of education on the nature and hazards of air pollution, and on Pb as a pollutant. It became less viable for legislators to *not* address the issue or to get it overwhelmed by other interests such as of those of the oil industry. The public, more educated than before, has been harder to bamboozle with excuses to *not act* on policies to control Pb pollution. ENRAP had probably little to do, if at all, with the public's rising sentiments against air pollution, but it equipped it with the sophisticated information that it was increasingly able to use, and wield in order to push policy toward the direction and content it wanted.

Interestingly, these same circumstances likewise created the opportunity for ENRAP to transform how policy makers were viewing the policy issue on Pb. This was what Glover had said should be the principal function of research. In this case, the public push for controls on Pb created a demand among policy makers for options of do it. ENRAP offered the options that were based on science, not politics. Hence, economics became the looking glass through which the policy makers sought to understand the issue on Pb. Science became the basis of the policy rather than political accomodation which is what often dictates policy choices in government.

---

<sup>15</sup> The author had discussed this concept of the policy process in an earlier work, Malayang 1999.

## CONCLUSION

Glover and Bromley seem to have been correct on the factors that they identified to be crucial to making research relevant to policy. But other factors may play a role as well. Science can feed into policy if a research enterprise is able to:

1. Sharpen its topic, its choice of hypotheses to test, and its procedures, to be consistent with the questions and timeframe of policy makers;
2. Focus on explicating the issues required to be resolved by the policy makers as they get more involved in policy making;
3. Keep a rigorous control on and a careful presentation of its methods and results, but stress only results to policy makers and keep the matters of logic to the attention of other practitioners. (Critics from among peers seem always necessary to maintain the rigor of the research enterprise.)
4. Maintain a highly credible team – credible to policy makers and to other practitioners; credibility compensates for technical trade-offs if these have to be done in order for the research to jointly meet the requirements of scientific rigor and the delivery of correct and timely information to policy makers;
5. The space for research can be created, if not by research then by public opinion and education; these can be mobilized to put pressure on policy makers. The same is true about resources for research; if it is not there, then it can be procured from elsewhere. Either way, both the space and the resources must be sufficient to match the time it takes for a policy to evolve, and the level of expertise needed to be had throughout the time that the policy is evolving.

Cultivating credibility and ensuring accuracy and usefulness of results might gain for a research enterprise the position to influence the direction and content of a policy. And if it is careful to pick research topics and focus on questions that have high political value, it is likely to be in a better position to reorient the manner that policy makers approach a policy dilemma.

It appears that all else equal, the research that has the credibility and which produces the results that would help resolve a policy dilemma that most harry, harrass or disturb a policy maker, would have a higher likelihood of influencing policy, the policy makers, policy thinking, and policy making, together.

## LITERATURE CITED

- Bromley, D. 2000. "An Evaluation of the Economy and Environment Program for Southeast Asia." Unpublished.
- Cortez, A., J. Logarta and M. Bennagen. 1996. "Valuation of Health Damages from Air Pollution (A Reestimation), in Phase III Report, Volume IV, Environment and Natural Resources Accounting Project, Department of Environment and Natural Resources and United States Agency for International Development, Philippines.
- delos Angeles, M. 2000. Personal communications.
- \_\_\_\_\_. 1999. "Presentation to the Philippine Legislators' Committee on Population and Development, Inc., March 24.
- \_\_\_\_\_. 1997. Letter to Ms. Amelia Supetran, Assistant Director, Environmental Management Bureau, Department of Environment and Natural Resources, Philippines.
- Department of Environment and Natural Resources. 1990. "Metro Manila Air Pollution Inventory".
- \_\_\_\_\_. 2000. Administrative Order No. 2000-03 "Interim Implementing Rules and Regulations of Republic Act No. 8749, 'The Philippine Clean Air Act of 1999'"
- Environment and Natural Resources Accounting Project. 1999. *Policy Brief*. Issue No. 3.
- \_\_\_\_\_. 1996. Main Report: Phase III. Department of Environment and Natural Resources and United States Agency for International Development, Philippines.
- Environmental Management Bureau, 1996. *Philippine Environmental Quality Report 1990-1995*. Department of Environment and Natural Resources, Philippines.
- Glover, D. 1993. "Policy Researchers and Policy Makers: Never the Twain Shall Meet?", a paper prepared for the Economy and Environment Program for Southeast Asia.
- Logarta, J. 1996. "Costs, Benefits and Efficiency: An Economic Analysis of Gasoline Lead Reduction in the Philippines", in Phase III Report, Volume IA Section 2, Environment and Natural Resources Accounting Project, Department of Environment and Natural Resources and United States Agency for International Development, Philippines.
- Lovei, M. 1996. "Phasing-Out Lead from Gasoline: World-wide Experience and Policy Implications. Environmental Department Papers No. 40. World Bank.
- Malayang, B. III. 1999. "Environmental Co-Management in the Philippines: A Policy Challenge from the Perspective of Political Ecology" In: *Co-Managing the Environment: The Natural Resources of the Sierra Madre Mountain Range*. Ellen Bernardo and Denyse Snelder (eds.). Cagayan Valley Programme on Environment & Development and PLAN International, 1999.
- Manasan, R. L. Rufo, M. delos Angeles, A. Inocencio, D. Ramirez, L. Castro and C. Rufo, Jr. 1998. "Alternative Policies to Control Lead Emissions from Motor Vehicles in Metro Manila," a paper for the Environment and Natural Resources Accounting Project, Department of Environment and Natural Resources and United States Agency for International Development, Philippines.
- Orbeta, E. and A. Indab. 1996. "Valuation of Direct Environmental Waste Disposal Services (Refinement of 1988 Estimates and 1992 Update)" in Phase III Report, Volume IV, Environment and Natural Resources Accounting Project, Department of Environment and Natural Resources and United States Agency for International Development, Philippines.
- Philippines, Republic of. 1999. Republic Act No. 8749: An Act Providing for a Comprehensive Air Pollution Control Policy and for Other Purposes. (Clean Air Act of 1999).
- \_\_\_\_\_. 1997. Executive Order No. 446 "Mandating the Phase-Out of Leaded Gasoline as One Means of Solving Air Pollution."
- Resources, Environment and Economics Center for Studies, Inc., 1997. "Philippine Metro Manila Air Quality Improvement: Final Report", with the Environment and Natural Resources Accounting Project. Asian Development Bank Contract No. ADM/97-301.
- Sandoval, V. and L. Antonino. 1999. Letter to Dr. Marian delos Angeles on behalf of the House Committee on Ecology and the Philippine Legislators' Committee on Population and Development, Inc., Congress of the Philippines.
- Subida, R. and E. Torres. 1994. "Impact of Vehicular Emissions on Vulnerable Populations in Metro Manila", Department of Occupational Health, College of Public Health, University of the Philippines Manila, Manila: World Health Organization.

## Appendix

excerpt from Daniel Bromley's evaluation  
of EEPSEA

### **4. Program Impact**

The purpose of EEPSEA is to build environmental economics capacity in the region. The long-run strength of the program will be enhanced to the extent that EEPSEA research activities and products can continue to stress policy problems and possible solutions. It is important that EEPSEA research projects seek to explain particular economic phenomena—to understand why particular environmental outcomes are prevalent, and to explore the feasible policy prescriptions that may solve the problem. An important dimension of this type of economic research is to describe and clarify the circumstances that constitute the economic problem. Research concerned with explication goes beyond the traditional task of showing the advantages and disadvantages—often treated as the “benefits and costs”—of particular situations. Economic explication is concerned to show why certain situations persist.

Research concerned with economic explication is concerned with the nature of incentives operating at the individual level. Why do farmers adopt or fail to adopt soil-conserving technologies? Why are certain farming systems and enterprise choices—each with different polluting implications—used while others are not? What changes in prevailing incentive structures would be necessary and sufficient to induce behavioral changes in farming practices and enterprise choice that might reduce soil erosion? How can altered incentives at the firm level alter the polluting behavior of industrial enterprises? What new institutional arrangements and their accompanying incentive structures might be sufficient to alter the use of automobiles in congested urban areas?

Notice that in studies concerned with economic explication the researcher brings economic insight to the problem of understanding why particular anti-social outcomes (pollution, habitat destruction) obtain. We must recall that it is not always necessary to compute the economic benefits and costs of the *status quo*—and of some possible alternative—before policy makers will become motivated to confront environmental problems. Policy makers often know that certain environmental problems require rectification, even in the absence of an economist showing that the present value of the benefits of the *status quo* are less than the present value of the costs. If agricultural soil erosion is clogging waterways and harming downstream farmers or transport services, policy makers are unlikely to require a benefit-cost study to comprehend that this situation calls out for correction. If chemical pollutants are destroying coastal fisheries, policy makers are unlikely to require a benefit-cost study to determine that corrective action is called for. The protests of coastal fishers are often quite enough of a hint that doing nothing is no longer a feasible survival strategy. In each case, applied economic research can be essential in helping policy makers to understand the root causes of the problem, to focus on a few feasible solutions to the problem, and then—perhaps—to identify the most cost-effective solution to the problem. We must also not forget that applied economic research can be a powerful instrument in understanding feasible political solutions.

This latter point is absolutely essential. It is traditional in economics to draw a distinction between so-called “economic” (scientific) solutions to environmental problems and “political” (metaphysical) solutions. However, we must keep in mind that our economic advice must be such that it is conducive to understanding and action by politicians. One of the fundamental components in good applied economic research is clear evidence of the incidence of the impacts of the *status quo ante* compared to possible solutions. In this sense, evidence of the aggregate benefits and costs of particular solutions is much less compelling than is evidence of the incidence of economic impacts under several scenarios. By incidence we mean which individuals (or groups of individuals) will gain and lose under feasible policy alternatives. This evidence comprises economic information of profound importance to the policy process. In that sense,

EEPSEA should work hard to encourage research that emphasizes the distributional implications—the incidence—of existing environmental problems and their feasible solutions.

Turning to a related issue, particular environmental problems persist because particular economic incentives allow, indeed often promote, these undesirable behaviors among particular members of the polity—timber concessionaires, farmers, industrialists, etc. Applied economic research concerned with explication can offer insights as to why these situations persist. Perhaps property rights are unclear and therefore pollutants are readily discharged into the environment. Perhaps certain chemical compounds, for example agricultural pesticides, are subsidized leading to their excessive use. Policy relevant research is concerned with explicating these circumstances, and suggesting ways in which environmental problems might be solved.

EEPSEA must continue to encourage research proposals and subsequent research products that will help policy makers understand why particular environmental problems exist in the first instance. It is worth emphasizing here that most policy makers tend to be linear thinkers who constantly seek linkages between particular problems and feasible solutions. Certainly they often misidentify problems (confusing symptoms with problems), they may not be very adept at identifying causality, and they may get the solutions wrong as well. These problems notwithstanding, most individuals in a position of policy maker fancy themselves as problem solvers—as fixers of problems and as leaders. This reminds us that their world is generally ordered in terms of problems and solutions—ends and means.

Economics, in its applied form, is most useful when it can relate to policy makers in ways that they structure and define the reality they perceive around them. As above, this suggests that policy-relevant research is best when it connects with policy makers in ways that they think about problems and solutions. It is a safe bet indeed that few policy makers take most benefit-cost studies seriously. If they did they would be less inclined to favor projects with a negative NPV as we calculate that idea, and they would show more interest in projects with a positive NPV. They are suspicious of benefit-cost studies because they know that the outcome—a NPV or a benefit-cost ratio—is overwhelmingly sensitive to the assumptions made, and they do not trust analysts to be forthright about the implications of many of those assumptions. But there is a more compelling problem with benefit-cost studies in their eyes. That problem derives from the fact that policy makers rarely think about problems and solutions in this way.

The promotion of policy-relevant work on the environment in Southeast Asia will be enhanced to the extent that research questions are framed in a way



that relates to how environmental problems and solutions are perceived by the general public, and by policy makers. The recent study of salinity problems in the Mahaweli River system is an excellent example of just such applied economic research.<sup>4</sup> And while a form of benefit-cost analysis was indeed undertaken in that work, it was in reality an analysis of the economic impacts of various salinity regimes in the irrigation system. That is, there was no effort to determine the social benefits and costs of reducing salinity—is it “worth it” to Sri Lanka’s society to reduce salinity? Rather, salinity is perceived as a serious problem on the Mahaweli irrigation system and the focus of the study concerned the financial gains and costs of reducing salinity. We see a similar approach in the study by Catherine Frances Corpuz concerning pollution in Metro Manila.<sup>5</sup> A recent research report on automotive pollution in Colombo, Sri Lanka is also an exemplar in this regard.<sup>6</sup> These studies are perfect examples of policy-relevant research (and there are many more in the EEPSEA portfolio).

This discussion reminds us of the goal of EEPSEA—“to support training and research in environmental and resource economics...[and to be a]...catalyst for research and action.” This goal emphasizes a long-run commitment to the development of human capital in the region—a goal that is both compelling and necessary if environmental problems are to be remedied. It is possible, at this relatively early stage in the evolution of EEPSEA, to focus too much on whether EEPSEA research is having an “impact” on policy. We must be mindful that a coherent research program ought to first produce materials that help others to develop an understanding of the nature and causes of environmental problems. Only then can one presume to affect policies concerning the environment. We in the academy often imagine that all we must do to change the world for the better is to produce a nice coherent research report or a policy brief. Unfortunately the world is much more complicated than that, and the world of policy change—which equates with forcing people to alter their traditional (meaning long-standing) behaviors—is even more resistant to facile and uncontested adjustment.