Conclusions

Chapter 6

In the initial chapters, economic evaluation of environmental impacts was said to be essential to improved project analysis on several counts. First, economic evaluation of environmental impacts would allow a more complete accounting of the many project impacts that had traditionally been considered less important or regarded as mere "externalities." Second, it was suggested that environmental improvement is a part of the overall enhancement of human well-being and therefore both positive and negative environmental impacts must be recognized and not treated as mere "side issues." Effort must be expended to assign monetary values, and incorporate these values into economic analysis. Third, progress in environmental economics means that economists are now able to draw on methods so that those impacts previously regarded as incidental might be fully incorporated into cost-benefit analysis. As an induced benefit of the development of environmental economics, it is now possible for projects to be reformulated and redesigned in response to new knowledge of the environmental implications of projects. Finally, advancements in environmental economics provide ways and means to design and analyze environmental policies, which maximize a project's utility.

Throughout the selection and discussion of case studies, we were aware of the application and importance of environmental policies, particularly market-based instruments (MBIs) in project formulation, implementation and evaluation. We find in these cases a number of instances in which various durable (long-lasting) policy reforms—informed by the application of MBIs—promise improved environmental quality without the need to obligate funds or to undertake loans that must be repaid. While these policy reforms are not without some costs to those whose behavior must now change, they can be regarded as relatively favorable Pareto[14]

[14] *A change is characterized as Pareto improvement if the event improves the welfare of one without decreasing the welfare of others.*

improvements compared with traditional loans for projects that may imply future debt service.

These guiding principles have informed the selection of cases in this book, and they have clearly influenced the nature of those projects as they moved from the identification stage to the evaluation stage. If we summarize the notable aspects of the 10 case studies included here, we see how environmental considerations have been incorporated into the various projects. We also see how the consideration of environmental impacts has influenced the formulation and design of projects, and how the economic evaluation of environmental impacts have affected the way the various projects were analyzed. Consider the following summary:

Durable policy reform	*INO: Central Sulawesi Integrated Area Development and Conservation* *PAK: Korangi Wastewater Management* *PRC: X'ian-Xianyang-Tongchuan Environmental Improvement* *PRC: Yunnan Dachaoshan Power Transmission* *SRI: Upper Watershed Management* *THA: Wastewater Management*
Air quality improvement	*BAN: Jamuna Bridge Railway Link* *BAN: Forestry Sector* *PRC: X'ian-Xianyang-Tongchuan Environmental Improvement* *PRC: Yunnan Dachaoshan Power Transmission*
Alternative transport	*BAN: Jamuna Bridge Railway Link*
Energy efficiency	*BAN: Jamuna Bridge Railway Link* *PRC: Anhui Environmental Improvement for Municipal Wastewater Treatment and for Industrial Pollution Abatement* *PRC: X'ian-Xianyang-Tongchuan Environmental Improvement* *PRC: Yunnan Dachaoshan Power Transmission*

Fisheries development	*BAN: Jamuna Bridge Railway Link* *MAL: Klang River Basin Environmental Improvement and Flood Mitigation* *PAK: Korangi Wastewater Management* *THA: Wastewater Management*
Flood reduction	*MAL: Klang River Basin Environmental Improvement and Flood Mitigation* *SRI: Upper Watershed Management*
Human health and safety	*BAN: Jamuna Bridge Railway Link* *MAL: Klang River Basin Environmental Improvement and Flood Mitigation* *PAK: Korangi Wastewater Management* *PRC: X'ian-Xianyang-Tongchuan Environmental Improvement* *PRC: Anhui Environmental Improvement for Municipal Wastewater Treatment and for Industrial Pollution Abatement* *PRC: Yunnan Dachaoshan Power Transmission*
Improved infrastructure	*BAN: Jamuna Bridge Railway Link* *PAK: Korangi Wastewater Management*
Innovative cost-benefit measurement techniques	*BAN: Jamuna Bridge Railway Link* *BAN: Forestry Sector* *PAK: Korangi Wastewater Management* *PRC: X'ian-Xianyang-Tongchuan Environmental Improvement* *PRC: Anhui Environmental Improvement for Municipal Wastewater Treatment and for Industrial Pollution Abatement* *PRC: Yunnan Dachaoshan Power Transmission* *THA: Wastewater Management*
Biological resources protection and conservation management	*BAN: Forestry Sector* *INO: Central Sulawesi Integrated Area Development and Conservation* *MAL: Klang River Basin Environmental Improvement and Flood Mitigation* *PAK: Korangi Wastewater Management* *SRI: Upper Watershed Management*

Local management to protect environment	*BAN: Forestry Sector* *INO: Central Sulawesi Integrated Area Development and Conservation* *SRI: Upper Watershed Management*
Local recreation	*BAN: Forestry Sector* *MAL: Klang River Basin Environmental Improvement and Flood Mitigation* *THA: Wastewater Management*
Outputs relevant to local needs	*BAN: Forestry Sector* *INO: Central Sulawesi Integrated Area Development and Conservation*
Public education	*MAL: Klang River Basin Environmental Improvement and Flood Mitigation* *SRI: Upper Watershed Management*
Reducing urban externalities	*PAK: Korangi Wastewater Management* *PRC: Anhui Environmental Improvement for Municipal Wastewater Treatment and for Industrial Pollution Abatement* *PRC: Yunnan Dachaoshan Power Transmission* *THA: Wastewater Management*
Public participation analysis and local input	*BAN: Forestry Sector* *INO: Central Sulawesi Integrated Area Development and Conservation* *SRI: Upper Watershed Management*
Sustainable forestry	*BAN: Forestry Sector* *SRI: Upper Watershed Management*
Tourism	*BAN: Forestry Sector* *MAL: Klang River Basin Environmental Improvement and Flood Mitigation*
Urban water supply	*PAK: Korangi Wastewater Management* *THA: Wastewater Management*

Watershed protection	*BAN: Forestry Sector* *INO: Central Sulawesi Integrated Area Development and Conservation* *MAL: Klang River Basin Environmental Improvement and Flood Mitigation* *SRI: Upper Watershed Management*
Global impacts	*BAN: Forestry Sector* *INO: Central Sulawesi Integrated Area Development and Conservation* *PRC: Yunnan Dachaoshan Power Transmission* *SRI: Upper Watershed Management*

It seems reasonable to suggest that most of these project components, and most of the innovative means to measure environmental impacts, would not have been possible under the traditional evaluation protocols. That is, the incorporation of economic evaluation of environmental impacts into project design and analysis has altered both the nature of those projects, and the perception of their benefits and costs.

There were a number of instances in which poor data precluded a more complete economic evaluation of environmental impacts in these projects. In some of those cases the BTM was used to derive estimates of project costs and benefits. In other instances, the data were so limited that benefit or cost estimates were not undertaken. However, in those cases it was possible to describe the consequences of environmental impacts although no monetized valuations was possible.

This reminds us that the process of economic evaluation of environmental impacts must be seen in evolutionary terms—data availability is endogenous to such evaluations. In other words, when certain environmental aspects are not considered relevant for economic evaluation, it should not surprise us that data are not available for environmental impacts of the project. Once analysis begins to consider new categories of environmental impacts of projects, then there is a derived demand for new data to meet that new informational need. As environmental impacts become a permanent part of future economic evaluation practices, it follows that data will become available and the assessment of environmental impacts will improve.

The obvious need for data is most apparent in those cases where BTM was used. Even though precautions were taken, the idea of transferring values from another economic setting will always be troublesome to some. In effect, it is unfortunate that this process has acquired the name "benefit-transfer," as it captures both benefits and costs. Project analysts must be very careful to ensure that appropriate corrections are made to estimates imported from other project areas. It would likewise be useful to develop country- or region-specific database using scientific primary data, in order for an analyst to improve assessments through the use of such information.[15]

A second lesson to be learned from these case studies is that project benefits can occur over a very wide geographic area. In most development projects the bulk of the beneficial effects are confined to a rather circumscribed "project region," while some other benefits may accrue to the adjacent regions. We call all of these benefits "national" benefits, even though they tend to be concentrated in the vicinity of the project. That is, the accepted accounting stance is the nation-state and so the benefits are said to accrue to the nation as a whole.

A number of these case studies promise to give rise to beneficial effects that transcend the boundary of the nation in which they are undertaken. In one illustration of this, we see that the current awareness of climate change problems permits the consideration of global benefits from the planting of trees. In essence, a project can indeed enhance the waste-processing capacity of the earth and this requires that benefits be reckoned over an area far in excess of the project area or of the nation-state.

Second, and a related point, a project that replaces a coal-fired power plant with a hydroelectric facility has the same attributes. Now, rather than enhancing the capacity for carbon sequestration capacity as in reforestation efforts, these projects help to reduce the global production of CO_2. Again, the accounting stance for project benefits must transcend the nation-state in which a particular project is located. This fact need not be regarded as troublesome. As a multilateral development financing agency, the ADB is concerned with the development of an entire region and so it

[15] *A partial database was completed at ADB through RETA 5669: Capacity Buildling in Environmental Economics.*

follows that global impacts are as legitimate as those that accrue at the level of a nation-state.

Another aspect of a number of these projects is that they are accompanied by important policy reforms that will outlast the physical entity we consider the "project" in traditional terms. These projects include several watershed projects that also entail market-based instruments for reducing externalities. Once these new pricing and regulatory structures are in place, they will become the norm and all future polluting behavior will be judged against those institutional arrangements. Indeed the establishment of these new environmental policies constitutes the essence of "development." It highlights the need for having a good policy environment to maximize the expected benefits of a project. Good project design is the sufficient condition while an appropriate policy environment is the necessary condition for sustainable development.

A number of innovative methods were used in the evaluation of these projects and it is impossible to repeat here the many novel approaches found in these 10 case studies. However, several aspects of this work warrant discussion. First, we see here a number of efforts to estimate the value of improved human health. Methods include the costs of illness (COI), and the amount individuals would be willing to pay to be free of contaminants and pollutants. When one estimates the cost of illness from lost wages it is important to understand that this measure is biased against those who are not paid for their employment. To the extent that women are not in the formal labor market, then illnesses that affect women disproportionately will carry an artificially low "cost" and would not give a true picture of the benefits of projects that will reduce illness.

When we seek to learn what individuals would be willing to pay to avoid certain pollutants, we must also recognize that this is a biased and possibly misleading indicator. To see this problem we need only speculate the alleged "benefits" of clean air in a poor rural country, say country A, and a wealthy country, say country B. To say that the "benefits" of clean air depend on what individuals would be willing to pay is automatically to learn that clean air in country B is "worth" more than clean air in country A. But there is no agreement that the "benefits" of clean air in both places are legitimately differentiated in this way. We see that the estimate of

"benefits" is itself a construct of how we seek to estimate those benefits. Some argue that an individual's willingness to accept compensation to be exposed to polluted air is the proper measure of the benefits of clean air. But here again difficulties arise in that the starting point for declaring necessary compensation by an individual in country A will be radically different from the starting point for necessary compensation in country B. These difficulties suggest that much work—both conceptual and empirical—remains to be done.

Several projects illustrate how to estimate benefits of watershed protection from reductions in the costs of accelerated flooding and required dredging of water sources such as canals and reservoirs. To the extent that these cost reductions are passed on to consumers in the form of price reductions for products and services, then they represent rather conventional benefits and not environmental benefits. However, if these cost savings are retained by the firms because market or policy circumstances preclude them from being passed on, then they represent wealth transfers to some firms in the form of publicly subsidized cost reductions. This reminds us that all project activities must be attentive to the larger economic environment within which firms and households operate.

Several projects enhance the protection of biodiversity and here estimates of value are notably difficult to generate. Perhaps it is here that BTM has its most pertinent application. If the cost and benefit estimates being "transferred" derive from studies in the developed world, and if the majority of demand for preserving biodiversity in the tropics derives from the developed world, then it would seem to follow that "benefits" from the developed world are appropriate in Asia. That is, the benefits of preserving biodiversity in Asia need not be adjusted very much from their origin in the developed world to arrive at benefits of biodiversity preservation. Furthermore, the amount which accrues to any nation-state must also be determined.

Chapter 5 provided a series of examples where ADB involvement in funding as well as conceptualization lead to projects in different sectors that can be made environment-friendly. These sectors include agriculture, energy, industry, urban, and infrastructure. It was shown that almost all projects can be designed in such a way that they would lead to either (i) an increase in environmental enhancement components, or (ii) the minimi-

zation of adverse environmental impacts. The chapter demonstrates that in today's context, there is no reason why ecologically destructive projects should be financed. The wide array of examples can be classified as: (i) environmental projects, (ii) projects converted into environment-friendly projects through the introduction of environmental enhancement components, and (iii) projects that introduce components which offset adverse environmental impacts. Examples provide cases for project funding without requiring an environmental apology. It also highlights the need for (i) sound macroeconomic and sectoral policies, (ii) appropriate environmental policies, (iii) well-designed projects, and (iv) prudent economic evaluation of environmental impacts of projects, for sustainable development to be achieved in the region.

In closing, this book provides a wide range of illustrations and circumstances that will help project planners and economists to evaluate the environmental impacts of projects. More importantly, perhaps, these many illustrations provide a rich laboratory for the continued reassessment of the full range of project activities that can contribute to economic development and environmental improvement. For too long it has been believed that economic development was destructive of the environment. Much of it was, but none of it needed to be. If economic development is undertaken correctly—and if it is evaluated properly—these case studies illustrate just how complementary the two can be. That should be the essential lesson of this book.