Development and the Upland Resource Base: Economic and Policy Context, and Lessons from a Philippine Watershed

IAN COXHEAD *

ABSTRACT

Economic growth and environmental damage are associated, but the relationship is neither linear nor even monotonic. The nature of the growth-environment link depends on the changing composition of production and consumption and on growth-related changes in techniques and environmental policies. The definition and enforcement of property rights over natural resources and environmental quality is another important element. Moreover, environmental and economic policies interact: in effect, every economic policy that affects resource allocation is a de facto environmental measure. In increasingly commercialized and decentralized economies, the responsibility for environmental management and the design and implementation of environmental policy are shifting from central government to communities and local administrations. This is especially true of Asia's uplands, where market-driven pressures for agricultural expansion and intensification collide with an increasingly urgent need to manage the natural resource base and minimize local and external environmental damages associated with growth.

In this paper, we provide a brief survey of these issues as a way of introducing the papers in this special issue of the *Philippine Journal of Development* on the local management of agricultural and natural resources and the environment. We conclude with some remarks on the experience of the SANREM CRSP/ Southeast Asia, a research and outreach project aimed at enabling better resource and environmental management decisions by upland communities in the Philippines, and the sponsor of these papers.

*Associate Professor, University of Wisconsin, U.S.A, and Regional Project Manager, SANREM CRSP Southeast Asia.
INTRODUCTION

For most Asian developing countries, the most important environmental challenges faced today are those relating to the use of renewable natural resources, especially forests, soils, and fresh water. The expansion of population and economic activity in upland areas—by which we mean mountainous or sloping lands, including the upper parts of most watersheds, whose natural vegetative cover is dense forest—is a primary factor in the depletion of forests and the degradation of upland soils and watershed functions. In this paper, we examine some economic, institutional and policy aspects of the interdependence between economic development and the use of such natural resource assets in tropical Asia.

The paper is structured as follows. In the next section, we review some basic data on economic growth and environmental damage in Asia. In the third section, we survey present selected theory and evidence linking economy and environment, focusing on phenomena of particular relevance to the case of natural resources in growing economies. In the fourth section, we focus more narrowly on agricultural development. We then review in the fifth section the interactions between environmental and economic policies, especially those relating to trade and resource allocation, environmental policy, and decentralization.

The other papers in this special issue address local natural resource management issues in the Philippine context, based on work conducted by Philippine and foreign researchers in the USAID-funded SANREM (Sustainable Agriculture and Natural Resources Management) collaborative research program. We provide a brief overview of this research program in the sixth section. Finally, in the seventh section, we give a short description of the papers and their economic and policy context.
NATURAL RESOURCE AND ENVIRONMENTAL TRENDS IN RURAL ASIA\(^1\)

As a consequence of urbanization and the spatial concentration of industry, problems of air, water and solid waste pollution are acute in many Asian cities (Brandon and Ramankutty 1992; ESCAP/ADB 2000; World Bank 2000). In spite of their evident pervasiveness and severity, however, air and water pollution and problems of solid waste disposal are not the leading forms of environmental damage in developing Asia. Most people still live in rural areas and their livelihoods depend heavily, though not necessarily directly, on agricultural and natural resource industries. Accordingly, much larger numbers of people are affected by natural resource depletion in the forms of deforestation, agricultural land degradation and diminution of watershed functions. The imputed values of these damages typically far exceed estimates of the aggregate costs of urban and industrial pollution.\(^2\)

The conversion of Asia’s forests, once the predominant land cover, to agriculture over the past century is a familiar story (Feeny 1982; Smiet 1990; Kummer 1992). In densely populated countries such as Thailand and the Philippines, forest resources have been depleted to the point where these countries which once exported timber products are now net importers; the contribution of forest industries to gross domestic product (GDP), once prominent, is now trivial. Forest depletion rates remain high even in relatively timber-rich countries such as Malaysia and Indonesia. The Food and Agriculture Organization (FAO) has estimated annual deforestation rates of greater than 1 percent per year for Indonesia (1.2%), Malaysia (1.2%) Myanmar (1.4%) and the Philippines (1.4%), all far above the Asian and world average figures (FAO 2000a).

Agriculture is the primary user of deforested land in Asia. However, the upland soils of the region are particularly suscep-

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\(^1\) This and the following section draw heavily on more detailed reviews of evidence and theory in Coxhead and Jayasuriya (2002a, 2002b).

\(^2\) See Jha and Whalley (1999) for a synthesis of evidence on this point.
tible to fertility loss and erosion (FAO 2000b). While accurate data on soil quality and propensity for erosion or land degradation are of course difficult to obtain except at a very fine scale, indicative data suggest that overall agricultural land degradation in Asian countries is a serious and pervasive problem (Doolette and MacGrath 1990), particularly when sloping lands are intensively cultivated for short-season or annual crops, and when tilled land is exposed to monsoon rainfall. Nor is the land degradation problem restricted to sloping or upland areas. Lowland and irrigated land, on which the bulk of agricultural production takes place, is susceptible to on-site fertility decline attributable to overcropping, as well as the deleterious effects of upstream erosion. In spite of managerial and varietal improvements, rice yields in the most intensively farmed irrigated lands in Asia are no longer rising, and may even be falling, for reasons apparently attributable to declining soil productivity and reduced efficacy of irrigation systems (Cassman and Pingali 1995; Pingali 1997). 3

Trends in watershed function capture the combined effects of deforestation and upland land degradation. The removal of biomass in the form of forest cover reduces water storage capacity in upper watershed areas and exposes soils to rain and wind. Watershed-level data show that land clearing and conversion of cleared land to agriculture are processes strongly associated with increased amplitude of seasonal stream flow fluctuations, diminished overall flows, and increased loadings of sediments as well as pollutants introduced by cropping and pastoral activity (e.g., Deutsch et al. 2001a). Soil and other pollutants displaced in the course of tillage contribute higher loadings of total suspended sediments and chemical pollution; moreover, soil removal from fields is a component of declining agricultural

3 According to the International Rice Research Institute: “The irrigated area devoted to rice is declining and yields are stagnating. Evidence is mounting that flooded rice soils are not resilient to intensification pressures, and that the productivity made possible by current technology may not be sustainable.” Rice Facts, http://www.irri.org/Facts.htm, accessed March 15, 2002. Other damages associated with intensification in lowland agriculture include nutrient decline, salinization, acidification, groundwater depletion, and the water pollution consequences of agricultural runoff (Rosegrant and Meinzen-Dick 1997).
productivity in uplands, unless compensating expenditures are made in the establishment of perennial crops, increased use of fertilizer, and/or construction of physical structures such as bunds and hedgerows. Upland farm households, among the poorest in Asia, are typically risk-averse and credit-constrained, and so display reluctance or inability to remove land from annual crop production for conservation purposes (Lapar and Pandey 1999; Shively 1999). The effects of deforestation and upland land degradation are not confined to upper-watershed areas; water pollution and soil transport contribute to sedimentation in dams and canals, accelerated wear on turbines and other hydro-power generation infrastructure, eutrophication of lakes, increased health costs for downstream human and animal populations, and turbidity and related damage in coastal and estuarine ecosystems normally providing habitat for corals, seagrasses and other flora and fauna as well as incomes for households engaged in fisheries and tourism (Doolette and MacGrath 1990).

Although the valuation of environmental phenomena is extremely difficult, estimates of net additions to or reductions in national income due to resource depletion and environmental damage in developing countries typically indicate that ‘adjusted’ net domestic product (ANDP) falls substantially below measured NDP. Even estimates taking account of the depreciation only of a limited range of natural resources such as forests and soils suggest that the value of their depreciation is large in relation to net income. The first empirical study of this type, which was conducted in Indonesia, calculated that allowing for natural resource depletion, NDP growth in the 1970s-1980s was closer to 4 percent per annum than the 7 percent indicated by conventional national accounts methods, with soil and forest depletion accounting for about one-fourth of the difference (WRI 1989). This result suggests that “a substantial portion of Indonesia’s rapid growth during the 1970s and 1980s was simply the unsustainable ‘cashing in’ of the country’s natural wealth” (Vincent 2000:13). Other empirical work in Asia corroborates the WRI findings where natural resources are concerned (World Bank 1990; ENRAP 1994; Vincent et al. 1997).
ECONOMIC GROWTH AND THE NATURAL RESOURCE BASE

Economy-Environment Linkages

All production generates environmental side-effects in the form of pollution, and/or contributes to the depletion of natural resources. It follows that in growing economies, pressures on the environmental and natural resource asset base should increase in step with the expansion of the economy, other things equal. It is well known, however, that the environment-economy relationship is nonlinear—and indeed, nonmonotonic. While environment-economy interactions are complex and multifaceted, a useful conceptual tool for understanding broad trends and their underlying economic determinants is provided by the so-called Environmental Kuznets Curve, or EKC (Grossman and Kreuger 1993). As its name suggests, the EKC is hypothesized to take an inverse-U shape; as per capita income increases, the intensity of environmental damages first increases, then stabilizes and ultimately declines.

The shape of the EKC reflects a multiplicity of influences on the production of ENR damage in the course of economic growth. It is now conventional to group these into three types known as scale, composition, and technique effects (e.g., Antweiler et al. 2001). The scale effect refers to the association between the size of an economy and the provision of environmental services, where ‘size’ is defined as the value of GDP at base-period world prices (Antweiler et al. 2001). Other things equal, economic growth produces increased demand for ENR assets, and when this effect dominates, the EKC rises with per capita income.

The composition effect refers to the environmental impact of changes in the structure of production and consumption. This has several components, of which the main ones are the influences of changes in relative prices and factor endowments on the structure of production. A change either in relative prices or relative rates of factor endowment growth induces the reallocation of productive resources among sectors. If sectors differ in their propensity to pol-
lute or to use depletable resources, it follows that emissions and/or depletion rates will also change. Clearly, the environmental impacts of the composition effect can either be harmful or benign.

Finally, the demand for environmental services associated with any given level of output also depends on production methods. Changes in these—the technique effect—may be stimulated by relative price changes that cause shifts in the input mix, or by the introduction of new technologies that alter the ratio of emissions (or resource demands) to output. The technique effect reflects these supply-side changes and their underlying causes, among which it is conventional to include changes in government policies limiting permissible emissions or intensities, on the grounds that demand for such policies reflects income-elastic demand for a cleaner environment. Accordingly, the technique effect is normally expected to reduce rates of environmental damage.

The inverse-U shape of the EKC reflects the initial dominance of scale effects, but increasing influence of technique effects. However, the prediction that the intensity of environmental damage associated with growth will diminish at higher levels of per capita income has not so far received robust empirical support where natural resource depletion is concerned. Econometric studies for Asia tend to show that while some forms of urban air and water pollution may either follow the EKC path or even decline continuously as per capita incomes grow, the relationship between income growth and deforestation is continuously positive (Cropper and Griffiths 1994; Shafik 1994; Cole et al. 1997; Koop and Tole 1999). EKC tests thus provide no reason to believe that continued economic growth will resolve problems of natural resource depletion without external interventions. These concerns place a question mark over the long-term sustainability of current economic development strategies.

The EKC is aggregative and abstract, and as such has greater value as a conceptual tool than as a guide for policy analysis. Tests of the EKC, even where statistically conclusive, do not indicate possible reasons for continuing or accelerating resource repletion rates.
Persistent market failures caused by ill-defined property rights may invalidate the theoretical prediction, for example, and so too might policies that augment or counteract the secular trends upon which EKC processes are predicated. To understand and begin to resolve environmental problems associated with growth requires analytical models with sound microeconomic foundations.

**Growth and Structural Change**

Growing economies undergo structural changes that imply significant composition effects, in addition to growth-related scale effects. Until the 1970s, Asian economies were dominated by agriculture and other primary industries. Most countries in the region have since grown very rapidly, and along with growth have experienced a tremendous expansion of industrial activity in general, and manufacturing in particular. This has been driven by a combination of changing factor endowments—capital accumulation relative to growth of the labor force and natural resources—and policies favoring manufacturing over other forms of activity. Manufacturing growth has been rapid both in absolute terms and relative to total GDP, and has been matched by a corresponding decline in the relative importance of agriculture. Within manufacturing, the composition and factor-intensity of production has also changed, with important implications for labor markets and wages, and thus for growth rates of agriculture and natural resource industries.

In addition to changing factor endowments, policies governing trade, investment, exchange rates and other areas of economic activity have exerted significant influence over industrial structure. Among these, import-substituting industrialization (ISI) policies were arguably the most important in Asia. ISI in general provided support for heavy industry and other ‘basic’ manufacturing, and thus conferred benefits mainly on capital-intensive industries producing for the home market. Traditional tradables industries (mainly in labor-intensive agricultural and natural resource sectors) were penalized by ISI and experienced relative declines in
investment and productivity. Employment growth in protected sectors was limited both by their relative capital-intensity and the size of the domestic market. In more open economies, rising industrial labor demand associated with manufacturing growth has shifted the balance of employment creation away from primary sectors. In Malaysia, for example, manufacturing growth contributed nearly two-thirds of total job creation in the decade 1987-1996 (Athukorala 2001:20). Industrialization has also fuelled urbanization, further reducing direct dependence on agriculture and natural resources. During the 1980s and 1990s, rural population growth rates in Asia's rapidly industrializing economies fell below replacement rates, with the consequence that rural population density stabilized in the 1970s and declined thereafter. In contrast, countries experiencing slower overall industrial growth (including Myanmar, Cambodia and Vietnam prior to the mid-1990s) have also seen rural population density increase in every decade since 1960.4

In view of the intersectoral effects of capital-intensive growth it is not surprising that in the countries with the most severe and persistent import substitution policies, migration to the agricultural frontier peaked during the high tide of protectionism, contributing to a doubling and redoubling of the numbers dependent on upland agriculture, and increasing pressures for deforestation (Roche 1988; Southgate 1988; Barbier 1990; Cruz 2000). Labor force growth was concentrated in the informal urban services sectors and at the frontier of agricultural cultivation, where land could be colonized for subsistence production. Moreover, flawed industrialization policies have promoted not only the expansion of upland agriculture at the expense of forests, but also its intensification, largely at the expense of soils and the environmental services provided by watersheds.

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4 In the Philippines, however, rural population density has fallen only minutely from its peak of 480/sq. km., reached in 1983. Source of basic data: World Bank, World Development Indicators 2001.
Agricultural Development

Whereas most of Asia was historically a region of food surplus and labor scarcity, twentieth century population growth soon began to apply pressure on the agricultural land base. In the three decades after World War II, a period during which the region’s population grew very rapidly, pressures on the agricultural resource base began to climb, domestic food production per capita began to decline, and the share of food in the value of imports to rise. Investments in irrigation, and the introduction of yield-improving technology packages in the 1960s and 1970s, which centered on modern cereal varieties (the ‘green revolution’), partially alleviated land scarcity by enabling production increases on existing land. In addition, states sponsored the colonization of new lands for food production through internal migration, supported by subsidized or publicly provided services such as land clearing and market and physical infrastructure.

Within agriculture, cereal production continues to dominate land use (Table 1) and sectoral employment. It follows that economic change in food policy has significant effects on agricultural development. Governments of food-importing Asian economies have enshrined food security—or more strongly, self-sufficiency in cereals at the national or even subnational scale—as a basic plank of development policy (Barker and Herdt 1985; David and Huang 1996). The key instruments of the self-sufficiency strategy have been quantitative restrictions on food trade (recently converted to tariffs to comply with WTO rules), usually with monopoly control over imports assigned to a state agency. These policies, along with the overall economic development strategy as just discussed, do much to determine resource allocation and investment both to agriculture as a whole, and to industries within the sector.

These trends in food demand, agricultural technology, and food policy have all had significant environmental consequences. Most obviously, agricultural area expansion has taken place primarily at the expense of forest. The mechanisms for this change vary from country to country and over time, with contributions from
state-sponsored land clearing for settlement programs, commercial forestry and subsequent land conversion by corporate agribusiness enterprises, and deforestation and land clearing (as well as the intensification of bush fallow rotation systems) by ‘subsistence’ farmers (Angelsen 1995). All, however, have been driven by a combination of opportunity and necessity, and encouraged by the absence of well-defined and effectively enforced property rights over forest-covered land. The property rights problem itself is partly an artefact of government policies that identify forest-covered land (or land so designated, including cleared land above a certain slope or altitude) as a public resource, neither alienable nor disposable, without providing adequately for its protection from encroachment.

While the direct impacts of infrastructural investments and of green revolution technologies outside of irrigated areas were generally small (David and Otsuka 1994), yield gains in lowland irrigated areas almost certainly diminished pressures for expan-

<table>
<thead>
<tr>
<th>Country</th>
<th>Cereal area planted ('000 ha)</th>
<th>Percent of arable land</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>91,525</td>
<td>78</td>
</tr>
<tr>
<td>SE Asia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indonesia</td>
<td>13,422</td>
<td>72</td>
</tr>
<tr>
<td>Lao PDR</td>
<td>653</td>
<td>84</td>
</tr>
<tr>
<td>Malaysia</td>
<td>695</td>
<td>48</td>
</tr>
<tr>
<td>Philippines</td>
<td>6,676</td>
<td>123</td>
</tr>
<tr>
<td>Thailand</td>
<td>10,984</td>
<td>64</td>
</tr>
<tr>
<td>Vietnam</td>
<td>6,635</td>
<td>118</td>
</tr>
<tr>
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<tr>
<td>Bangladesh</td>
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</tr>
<tr>
<td>India</td>
<td>102,044</td>
<td>63</td>
</tr>
<tr>
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<td>11,649</td>
<td>57</td>
</tr>
<tr>
<td>Sri Lanka</td>
<td>835</td>
<td>96</td>
</tr>
</tbody>
</table>

Note: Due to double cropping, area may exceed 100 percent of arable (cultivated) land. Source: World Bank, World Development Indicators 2001.
sion of food production in uplands by driving down relative grain prices. Rising labor productivity and labor demand in lowland agriculture also reduced incentives for labor migration to uplands (Coxhead and Jayasuriya 1994; Hayami and Kikuchi 2001). These indirect impacts of the green revolution thus conferred environmental benefits in uplands, raising the opportunity cost of deforestation and land conversion. Such gains must be offset against the long-term costs of intensified production in lowland areas—especially soil quality degradation and the water pollution effects of increased use of inorganic inputs.

Agricultural price policies have in general had the twin effects of promoting the expansion of food cultivation and of de-linking domestic and international cereal prices in the short to medium term. Whatever their benefits in terms of food security, these policy-induced distortions have potentially important implications for the environment. Since the land cultivated to cereals is a very large fraction of total agricultural area, it follows that virtually any intervention in cereal markets that affects incentives or production technology is bound to have environmental impacts through the demands for land, soil nutrients, and water, and through the discharge of agricultural effluents into freshwater and coastal ecosystems. Food policies aimed at self-sufficiency must be held at least partly responsible for the expansion of area planted to cereal crops in the relatively fragile and easily degraded uplands (Coxhead and Shively 1998; Coxhead 2000).

Patterns of Agricultural Development in the Uplands

The economies of uplands—usually defined officially by slope, but in practice referring also to ‘remote’ agricultural areas—differ both in structure and level of development by comparison with coastal and river delta zones. They are less densely populated and more dependent on agriculture and other resource-based industries; their populations are poorer, less healthy, and less well educated. Market access is constrained by higher transport and transactions costs. Formal legal and administrative institutions are rela-
tively weaker, although traditional or customary institutions may be stronger than in lowlands. Though an accurate count is impossible, a 1990 study put the population of upper watershed areas in Asia at 128 million, or about 10 percent of the rural population (Doolette and MacGrath 1990).

Whereas upland agricultural systems were traditionally based on long-cycle rotations between crops and bush fallow, modern practices are increasingly sedentary. Typically the sector utilizes labor and very limited capital to colonize new lands, or to intensify the use of existing land by means of new crops or technologies. This form of development is constrained by access to markets for farm inputs and products. As markets expand they create new economic opportunities, and in so doing, alter the value of immovable resources such as forests and land. In a subsistence economy, such resources (and even labor) have values derived only from the requirements of local households, but in a market economy, resource valuations come to reflect returns obtainable in new uses. The environmental implications of this change are very important when the frontier of cultivation for the market is located within environmentally sensitive forest and upper-watershed areas.

Economic development policies exert tremendous influence over the allocation of natural resources (Repetto and Gillis 1988; Cruz and Repetto 1992). Through markets and migration, policies directed at specific ‘lowland’ sectors can also affect upland resource valuations, patterns of land use and production, and thus environmental outcomes (Coxhead and Jayasuriya 2003b). As already noted, food policies have historically had a particularly important role to play, promoting both migration and agricultural intensification. In most of tropical Asia, the expansion of corn and coarse grains as well as temperate climate vegetable production—the spread of which is associated with very high rates of land use change and soil erosion in upland and highland areas (Hefner 1990; Lewis 1992)— has received significant support from policies that both raised and stabilized their prices, thus greatly increasing the area over which they could profitably be grown for the market. But policies di-
rected at other sectors have also mattered: much of the impetus for migration to upland areas has come from very slow growth in real incomes in lowland agriculture and urban areas, thus rendering the expected income to be derived from land colonization and upland farming relatively attractive.5

CURRENT TRENDS AND ISSUES

Institutional Evolution

Growth is accompanied, in most cases, by institutional development. Once again, the penetration of remote areas by national markets and administrative structures has much to do with this where forests and other natural resources are concerned. As hinterlands come under the sway of national governments, customary legal and social institutions governing land tenure, resource use and environmental quality yield to, or reach accommodations with, national laws and formal dispute settlement procedures. At the same, local resource use constraints may also evolve, frequently as a consequence of changing resource valuation. Goods (such as forest or fallowed land) that were once governed by traditional use rules, may become “open access”. Other environment-related rights, such as the disposal of pollutants and waste into waterways, which were once ‘free’ may acquire value, causing property rights to be asserted over them. Conflicts arise over ownership of all such goods.

The ways in which growth interacts with institutions and their evolution are important to the outcomes for the uses of natural resources and the environment. This can be seen formally, although abstractly, in models of resource exploitation under alternative institutional arrangements (e.g., Brander and Taylor 1997); it can also be identified empirically in a range of environmental and natural resource management case studies.

5 This was documented in a Philippine study by Cruz and Francisco (1993:26), who concluded that “migrants [to upland areas] are motivated more by lack of other livelihood options than by the attractiveness of destination lands.”
Empirically, examples abound of the resource depletion and environmental damage attributable to institutional failures in Southeast Asian forest and upland agricultural areas. In Indonesia, where the capacity of the central government to restrict forest exploitation for timber and agricultural conversion has recently been greatly reduced in both de jure and de facto senses, the current race to liquidate natural resource capital for short-term revenue is a very important recent instance (FEER, August 2000; Colfer and Resosudarmo 2001). However, it is important to note that growth does not uniformly lead to resource depletion. In Thailand, for example, there has been very substantial recovery of forested area in the years since the imposition of a ban on commercial logging in 1988, to the point where a recent World Bank report ranks deforestation in Thailand only as a “minor” environmental problem (World Bank 2001). Thus resource rates in upland areas cannot be predicted from economic growth rates alone. We must also take account of institutional settings and institutional changes that may themselves be induced in the course of growth.

Accumulated experience suggests that as uplands develop, there are three phases of institutional development. In the first, customary laws prevail in largely subsistence economies. These are gradually displaced, or marginalized, by expansion of the market and by associated processes, including migration. Market expansion and the intensification of activity creates new pressures on the resource base, unprecedented imbalances of power, and new conflicts over resource use that customary law is ill-equipped to handle. In the second phase, new institutions are imposed, largely from outside. Municipal governments, local offices of national agencies, and so on are established and mandated with the management of natural resources and the environment. But state authority is low at the frontier, and with an apparent abundance of resources and often extreme levels of poverty, there is little political will for environmental or resource measures that might reduce current income generation opportunities. Rapid deforestation, compression of fal-
low cycles, and overexploitation of soil and water resources all result.

A third stage emerges (often following a 'natural' disaster related to deforestation and upland agricultural intensification, such as the flooding and mud flows that occurred in Ormoc, Leyte, in 1990 and in southern Thailand in 1988) in which there is widespread recognition of the need for "sustainable" development. Laws and regulations are formulated and implemented that reflect a growing community demand for environmental quality and resource conservation, both on the grounds of sustainable production, and for less concrete reasons related to the amenity value of the natural environment. In the best situations, these local demands for more ecologically friendly development are complemented (or at least, not contradicted) by national laws and policies. In the best outcomes, some of which can now be observed emerging in the Philippines and elsewhere, national agencies, community groups and local governments collaborate in the design and implementation of resource management and development policies.

Challenges for Policy Design

Modern environmental policy in Southeast Asia faces a very different set of circumstances when compared with those of a half-century ago; moreover, attitudes that provide the impetus for policy formation are also changing, albeit slowly. The traditional approaches to environmental and natural resource management through direct interventions and command-and-control regulation, though arguably appropriate in an earlier era, are steadily becoming less effective, and more costly, with the growth of the private sector and of markets. Sustained growth in per capita incomes, where it has occurred, has created opportunities for governments to consider policies (such as the declaration of parks and protected areas) that explicitly posit a tradeoff between growth and the environment, and to begin to consider environmental goals more or less on a par with other developmental objectives.
At the national level, environmental initiatives are beginning, albeit slowly, to enter the mainstream of policy debate. Following the 1992 Rio Summit on the environment, the Philippines was one among several Asian countries to produce their own adaptation of Agenda 21 documents (PCSD 1997). Environmental measures, including initiatives to protect watersheds through measures consistent with, rather than in contradiction with, the needs and aspirations of local communities have followed. Such initiatives will undoubtedly help slow the growth rates of pollution and natural resource depletion. Given present rates of increase in the demands for environmental services, however, current measures are unlikely to be adequate to maintain approximate equality between marginal social damages and the welfare benefits of polluting or resource-depleting production.

Communities and representative local governments, as the front-line consumers of pollution or losers from natural resource degradation, are not merely more highly motivated than any other group to influence the use of local ENR assets, but armed with appropriate capacity and tools, can also be more effective in making and implementing policies for this purpose. This has been demonstrated by the catalytic local policy actions of community-based water quality monitors in the Philippines (Deutsch et al. 2001b). Everywhere in the developing world, the involvement of communities is emerging as a critical factor in the success of environmental initiatives, a trend that has assigned concrete meaning and policy import to the much-abused term ‘participation’. The preconditions for community-level collective action are intuitively clear: knowledge of potential gains from the action; some potential for actual gain; and ‘social capital’, as measured for example by membership in reciprocating organizations (White and Runge 1995; Rola and Paunlagui 2001). So too, in the era of increasingly decentralized policy-making and administration, is an understanding of the function of representative local governments in resource management initiatives. After years of failed attempts at centralized control, the conventional wisdom has now turned decisively in favor of devolved ap-
proaches to environmental and natural resource management, in which central government agencies act in partnership with, or even under the leadership of, communities and local governments (e.g., World Bank 2000). The trend toward devolved NRM has been welcomed in principle by many development specialists, especially as it coincides with and is reinforced by a general trend toward democratization, especially at the subnational level. The latter, however, is a critical constraint on the effectiveness of local control: where local administrations are not accountable to their constituents, devolving authority merely results in accelerated degradation, a process now being witnessed in Indonesia. Moreover, the question of optimal policy ‘control areas’ for local administrations whose resource management activities generate transboundary externalities (both downstream, nationally, and in the cases of biodiversity and atmospheric carbon releases, globally) has yet to be seriously confronted (Coxhead 2002).

IMPLICATIONS FOR THE DESIGN OF PROJECTS AND POLICIES

Most anecdotal evidence, including that just presented, indicates that in the early stages of development of once remote upland and forest margin areas, both scale effects (more people and a larger market) and composition effects coincide to create rapid resource depletion and environmental degradation. As is widely agreed, these trends affect not merely those responsible for the resource use decisions, but also impose external costs on those living downstream. There is therefore a social gain to be won by intervening to alter present resource use patterns: governments have a mandate to adopt policies and/or support projects that address “sustainable development” in the uplands, both for their own sake and to reduce downstream damages. The goal of such interventions should be to compensate for market failures (for example, credit) in uplands, and externalities, in the hope of reversing undesirable composition effects and promoting technique effects with
the greatest rapidity. What does this mean, in practical terms, and what are the challenges to achieving it?

In the past, problems of upland resource management have been addressed by means of policies or projects targeted directly at some aspect or aspects of the upland economy and environment. These include extension, research and development aimed at generating new or more efficient upland farming techniques, support for local infrastructural development, forest protection measures, and sloping-land conservation “packages” (such as SALT), among many others. After many years of trial and error and a great deal of reflection, many are well-conceived, and some have even proved to be effective in achieving local economic or environmental goals. However, the challenge with such direct approaches has always been, and remains, to ensure that they are adopted and that their adoption persists after the withdrawal of monetary and technical support. Moreover, there is a persistent problem of the compatibility of specific local measures with other development goals and with the broader economic and institutional context. “Livelihood” goals, for example, are often found to be inconsistent with the long-term conservation of natural resources, and vice versa.

Philippine policies on corn, a crop whose cultivation has a very strong spatial association with poverty, provide ample illustration of the trade-off between economic and environmental goals. Protection of domestic corn producers, producer price stabilization, and investments in raising the productivity of corn land, have conferred benefits on all producers, not merely those in the most productive lowland areas for whom the measures are primarily intended. The result has been the expansion of upland corn area even while total area planted to the crop has declined nationwide. Without suitable measures to replace soil nutrients and reduce erosion, corn is one of the most damaging uses of sloping upland soils in the Philippines and elsewhere in Southeast Asia. In the long term, the livelihood gains promised by higher corn prices may be offset by degradation of the natural resource base on which poor upland farmers depend.
The point made clear by this example is that the solutions to problems of upland agricultural development and environmental management can seldom, if ever, be defined solely in terms of the local economy. Rather, the broader economic and institutional context must always be taken into account. This is true even when upland farmers appear to be producing only for subsistence, with apparently very weak links to a broader economy. As argued in the previous section, the boundary of cultivation for the market is capable of being moved by a wide range of factors, including both local and “national” initiatives; a small change in relative prices may be all that is needed to convert a farmer from subsistence to commercial production.

It has been observed that institutional development lags behind aggregate growth and the spread of the extent of the market in developing economies. When the extent of the market expands, and in doing so challenges or displaces traditional institutions governing the use of natural resources, we often observe very high transitional rates of resource depletion and environmental degradation. These can (and do) lead to permanent—nontransitory—changes such as the loss of old-growth forest, biodiversity loss, and soil exhaustion, depending on the length of the transition and the severity of pressure on resources during the transition. This is the upland analog of the rising section of the environmental Kuznets curve: a period during which scale effects and environmentally harmful composition effects (agricultural intensification) dominate. In this phase of upland agricultural development, there may be few or no operational institutions to constrain resource managers, since the conditions for which traditional laws were effective have disappeared with the arrival of the market and with migration, but no new mechanisms have emerged to replace them. In this period, when upland ecosystems are most clearly at risk, there is a role for both policy and project interventions to minimize harmful activities and to promote the kinds of new techniques, new production structures, and above all new institutional arrangements that will promote more sustainable development. Well-designed projects and policies can help bridge
the gap between economic and institutional growth rates—that is, between growth of the demand for natural resource and environmental assets and the development of the capacity to understand and regulate their depletion. In a decentralized economy, these must operate consistently at all levels, from community to national government.

LESSONS FROM THE SANREM EXPERIENCE

The mission of the SANREM CRSP/ Southeast Asia project is to conduct research on the linkages between environment and development in the context of upland agriculture, and where appropriate, to formulate proposals for locally as well as nationally based initiatives for change. Based since 1994 in Lantapan, a municipality of Bukidnon province, the project was established at a critical time in the development of Mindanao upland agriculture. Driven by the creation of new market opportunities, agricultural intensification and expansion at the forest margin were both well established. Evidence of resource depletion—in forests, soils and water—was abundant (Deutsch et al. 2001a; Garrity et al. 2001; Midmore et al. 2001) and for the most part relatively recent in origin. Traditional institutions of governance and of resource use had for the most part been displaced or made marginal, both by the expansion of the market and migration, and by competition from institutions of land tenure, governance and resource management designed and implemented from outside. There was little evidence that such institutions were effective for the analysis or prevention of resource depletion and environmental degradation.

The project is centered on research and outreach related to the agricultural economy, agronomic practices and land management, and use of forest and forest-margin resources. Unlike many such activities, however, it neither begins nor ends with such research, but rather embeds it in a process designed to involve the community and to generate lasting impacts through institutional development and policy reform. The project is motivated by the belief that process is a critical aspect in the design and implementation
of natural resource management research oriented toward sustainable development. To this end, the project embraced a set of principles that stressed breadth, inclusion and completeness in the choice of activities and evaluation of outcomes. Adherence to these principles, when it worked well, provided a realistic perspective on the complex and intersecting factors affecting resource management decisions by individuals and communities in the project site.

Implementation of the project was on the basis of four guiding principles, or “cornerstones”: participation; collaboration across disciplines and sectors; and a landscape approach. Of these, participation and interinstitutional collaboration played key roles in defining process. The challenge of promoting sustainable natural resource management in a developing economy cannot be met merely by adopting participatory data collection methods and setting up on-farm experiments. It requires outreach activities, with the meaningful engagement of institutional partners, which build local capacity and empower communities to analyze and resolve their own problems. In Lantapan, the project worked with nongovernment organizations, community groups, and local government. All groups of these types have comparative advantage over researchers in activities such as community organizing, outreach and even capacity-building. This did not mean, however, that a division of labor in which all outreach was assigned to nonresearch partners while control over research was retained by academic and research-based institutions would be the best means to proceed. The commitment to participation and interinstitutional collaboration—linking researchers and “action-oriented” local institutions—helped ensure that research was relevant, sensitive to local conditions, and oriented toward the solution of specific local problems. At the same time, the involvement of researchers in outreach-oriented partnerships created new opportunities by bringing science to bear on complex issues. A formal impact analysis of the project (Buenavista et al. 2001) reveals influences at work in both directions.
Among many lessons to emerge from the project, two stand out above all others. The first is that while that ‘participation’ is a term with multiple shades of meaning, the probability of a project achieving lasting success depends heavily on the extent to which its objectives and methods are aligned with community interests and institutions. This lesson has been learned in a number of ways, both positive and negative, in the course of the project. Research activities that made considered and deliberate commitments to participatory research resulted in the establishment of formal locally based organizations as well as strengthening existing ones (Deutsch et al. 2001b; Koffa and Garrity 2001). Their presence gives credibility to the claim that a project’s influence may persist after its funding has ceased. Similarly, the remarkable convergence of interests between the project and the Lantapan municipal government, resulting in the latter’s creation of a municipal Natural Resource Management and Development Plan, indicates the kinds of opportunities that are created when project design is responsive to local political and institutional processes. To be sure, not all of the project’s attempts at participatory engagement have been as successful as these, but there can be no doubt that long-term institutionalization of SANREM-sponsored ideas and approaches to development has profited both from early success and by learning from setbacks.

The second outstanding lesson is that it is not safe to assume that solutions to environmental degradation or unsustainable use of natural resources can depend entirely, or even predominantly, on efforts to alter behavior of the residents of the affected area. So long as farmers and others are connected to a broader economy through markets for labor, credit and agricultural products, there is scope for market signals or economic policies to drive local resource allocation decisions. Admittedly, the farmers of Lantapan municipality are for the most part engaged in commercial production, but even those who do not produce for the market are clearly strongly influenced by market prices. Two illustrations of particular relevance are those of Philippine corn and vegetable pricing policy,
and the local labor market and wage effects of growth in the national and regional economies. National policies that raised corn and vegetable prices have been major forces behind land expansion in Lantapan. Similarly, growth of non-agricultural labor demand could in the long run cause cultivated area to diminish—and perhaps influence adoption of soil and forest-conserving technologies as well. Thus market-related events beyond the control of the affected community can have major effects on incomes and on resource use decisions. We conclude from this that efforts to alter resource use patterns that do not acknowledge markets and the influence they exert are unlikely to achieve lasting success, no matter how carefully they attend to the process of becoming embedded in local development institutions.

It might be observed that the two lessons just cited appear to embody a contradiction. On the one hand, we have made the case for local involvement as a precondition for the success of a project of this kind. On the other, we argue that project design must pay careful attention to policy constraints and market signals from outside the project site as (possibly dominant) influences over major resource use and environmental decisions. How are these consistent? The answer is that both are important, but in different ways. Even if external stimuli dominate in farmers' land use decisions, there is substantial and increasing local community and administrative influence over land use, zoning, environmental ordinances, and taxes relating to resource use and the environment. Philippine decentralization since the early 1990s has shifted considerable and increasing power over resource use to municipal governments; this move has coincided with economic reforms that have greatly strengthened the power and reach of markets. Moreover, the acknowledgement of overlapping claims to ownership and control over land and forests in Philippine uplands has greatly increased the importance of village and cultural institutions as arbiters of actions affecting natural resources and the environment. This has occurred even as (in many respects) the economic importance of
such resources has diminished with urbanization and the growth of nonagricultural, nonrural income and employment.

One thing that is clear is that inconsistency between local approaches and the resource use incentives "received" from a broader economic and policy setting will most likely result in failure to move toward sustainable development. A project aiming to promote sustainable use of local environmental and natural resources must therefore be cognizant that the primary managers of resources are farmers and others whose actions are constrained by specific local cultural, economic and political institutions, but project designers must not lose sight of the influence of external economic opportunities and policies on individual actions. Researchers can document, analyze and disseminate findings in which local processes, broader influences and technological and institutional opportunities are identified and their interactions made clear. Ultimately, though, responsibility for sustainable development of Southeast Asia's upland areas is shared between farmers, communities and community groups, and political jurisdictions from local all the way to national level.

OVERVIEW OF PAPERS

The papers in this special issue represent a cross-section of work undertaken or sponsored by the SANREM project, and deal with a range of issues impinging on the management of natural resources in the uplands of tropical Asia. Manasan's paper surveys the principles of decentralization and identifies the features of the Philippine Local Government Code and its implementation that affect natural resource and environmental management. This paper provides a context for more detailed consideration of local resource management issues, in particular by highlighting the incomplete articulation of responsibilities between central and local administrations.

The remaining papers are drawn directly from data or experience in the Lantapan site, and address issues in the local management of natural resources at the farm, community or local gov-
ernment scale. Rola and Coxhead investigate the implications of growth in nonfarm labor demand, finding that this reduces pressures to expand and intensify agricultural production in the uplands, and also that rising labor costs reduce the profitability of labor-intensive farm-level investments in soil-conserving structures or practices.

If such investments generate externalities, then the appropriate scale for considering their costs and benefits is that which the external effects are fully internalized. Shively and Zelek's model construes the watershed as an administrative as well as environmental unit, and considers the effects of tax and technology policies having differential effects on farms at different locations, and using different land use practices, within the watershed. Nissen and Midmore investigate the specific case of agroforestry at the farm level. Upon the foundation of a careful analysis of tree-growth data, they ask whether there is a case for government intervention in support of agroforestry in the uplands. Finally, Buenavista, Sumbalan and Coxhead consider the less tractable issue of linkages between projects, communities and local governments in the identification, analysis and treatment of environmental and natural resource management problems.

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