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Knowing Where To Hit It: A Conceptual Framework for the Sustainable Development of the Himalayas

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**KNOWING WHERE TO HIT IT:
A CONCEPTUAL FRAMEWORK FOR THE
SUSTAINABLE DEVELOPMENT OF THE HIMALAYAS**

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...how hard it is to gain, in this country,
accurate information as to facts which
seem most obvious to the senses.

*Narrative of a Journey Through the Upper
Provinces of India, 1824-25, Reginald Heber, D.D.,
Lord Bishop of Calcutta.*

PREFACE

This paper originated in a short exploratory piece of work for the United Nations Environment Programme (UNEP), in the nature of a "strategic reconnaissance" of a complex knot of environmental-social problems. However, early forays indicated strong underlying parallels with issues being explored in other case studies in the Institutional Settings and Environmental Policies (INS) project at IIASA. For this reason, and despite its limited external resources, the Himalaya work written up here took its place as one part of a troika INS project, that also involved research on hazardous waste management and on energy policy modeling.

Though the main effort has been on hazardous waste management, the intellectual connections between these apparently diverse research fields have proved most instructive. These connections have to do with the ways in which uncertainties (both technical and social) are defined by institutions, especially regulatory and policy analytic bodies. The thrust of research on all these fronts has been to better characterise different kinds of uncertainty and to explore the origins and policy implications of conflicting problem definitions. The practical aim in this effort has been to encourage better policy design. An understanding of the institutional roots of uncertainty and of multiple problem definitions opens the way for an anticipatory style of policy formulation that is capable of evaluating the implementability, and thus viability, of different policy options and institutional arrangements. This strategic concern is a direct evolution from the previous work of the Risk Group—the predecessor to INS.

In presenting this work, and as INS Research Leader, I cannot let pass the opportunity of expressing my deep personal appreciation for the enthusiasm, commitment and all-round support shown by Mike Warburton as a research colleague in the group. He is much missed.

Brian Wynne

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Michael Thompson and Michael Warburton

CHAPTER 1. INTRODUCTION

Rapidly increasing populations of small-scale agriculturalists—people who depend directly on the land for their living—may be threatening the entire ecology of the Himalayan region. But the deforestation and the associated massive erosion and flooding are not merely technical problems. Beneath them lie millions of people and a multiplicity of social, political and economic processes, perspectives, expectations and ambitions. There can be no doubt that, if there is a problem, it is first and foremost a human problem.

Nor is the Himalayan system a closed system. At all levels it connects into the wider global system. The jet stream's complex interaction with the Greater Himalayan Range is believed to be crucial to the annual onset and termination of the monsoon throughout the Indian sub-continent; the silt-laden run-off from thousands of mountain torrents alternately devastates and nourishes the Indo-Gangetic Plain and the great deltas that, over the millennia, it has itself created. What happens in the Himalayas is, quite literally, vital to the 350 million people who live in the plains beneath them; and, farther afield still, millions more, keenly aware that we have only one Himalayas to lose, mobilize at every level from the United Nations to the individual to do what

they can to avert that tragic loss.

The largely frustrating history of attempts to do the "right" thing has left some valuable lessons in its wake, but a great deal remains to be learned. Many meticulously planned projects have turned out to be totally inappropriate, and even counterproductive, when measured against their stated goals. The United Nations Environment Programme (UNEP) has therefore asked IIASA, first, to try to analyse this complex Himalayan system and, second, to try to draw some strategic recommendations from that analysis.*

The prospect of death, Dr. Johnson said, concentrates the mind wonderfully, and a ten-week deadline has much the same effect. We decided, first, to choose an approach that might allow us to say something useful in the very short time-span available to us and, second, to try not to say anything that had already been well said. This Working Paper is a revised version of the draft paper, *Interrelationships Between Resources, Environment, People and Development: The Case of the Himalayan Foothills*, that we submitted to UNEP on Christmas Eve 1982. The first section, *Appropriate Institutional Development*, is essentially the Discussion Paper that we provided for the Inter-Agency Meeting, sponsored by UNEP, that took place in Geneva on 15 and 16 August 1983. The second section, *Uncertainty on a Himalayan Scale*, as well as providing the technical and reasoned support for the argument we advanced in our Discussion Paper, has been developed as part of IIASA's continuing concern with uncertainty and institutions.

A final qualification is to know our limitations. We at IIASA were not prepared, nor did we attempt, to design a specific plan of action for UNEP after only a brief survey study (a study which, moreover, left us no time to learn about UNEP as an institution and about the context in which it has to operate). Rather, we have directed what expertise we have towards outlining a potentially useful perspective on a problem that has challenged technical experts from many disciplines for many years. With the help of an advisory/working group composed of several key experts on the region**, we have produced a conceptual framework for handling both the technical and the human problems. Though our study suffers from some of the defects associated with time-pressured work (and has not yet had the benefit of being tested in up-to-date conversations with practitioners in the field), this framework reveals a set of strategic insights which may help international agencies (and others) to shape more effective policies for the encouragement of environmentally sound development in the region. The perspective and revealed insights are intended to provoke productive discussion among people better acquainted than ourselves with the difficulties encountered in implementing international programmes.

The starting point for our analysis has been the recognition that man does not interact directly with his environment. It is not just perception but cognition—seeing *and* knowing—that brings man and his environment together and, since there is more than one way of knowing, there is more than one way for him to come to grips with his environment. Since man is a social animal

*See Appendix A.

**See Appendix B.

and since knowledge is a social product, the relation between him and his environment is inevitably threaded through a more or less well integrated buffer of social and cultural institutions—institutions that run the whole gamut from the Charter of the United Nations to the Sherpa habit of not mentioning the names of the dead. The analysis, therefore, suggests that, if it is possible to unlock the downward spiral of environmental degradation and unsustainable patterns of development, the key will be found within these myriad institutions.

Most attempts to intervene in this downward spiral are founded on the assumption that the forest is a renewable resource that must be conserved. But to apply this assumption where all the institutional supports are lent to the contrary assumption—that the forest is a convertible resource—is to invite a truly uphill struggle. All the institutions will have to be turned around before such a project can have any lasting effect. Perceptual mismatches such as this abound in the Himalayas and they present formidable obstacles to the implementation of policies that take no account of them. In this study, we try to develop criteria to judge what actions might or might not be appropriate in certain contexts. And, in the process, we reject the "grand design" approach to development.

To think in terms of "Development with a capital D" when confronted by such a veritable patchwork of institutional heterogeneity, to speak of an "integrated approach to environmental management and development planning" when confronted by such a diversity of resource perceptions, and to call for policies to be considered in "the global framework of the interrelated phenomena of a planned process of development", when the only frameworks that could tell you *anything* about the likely efficacy of a policy are those at the most local level, is, we argue, to invite disaster. These ideas which are appealing at the macro level—the international agencies and the national governments of the region—must first be related to the institutional reality on the local level, and action taken only when this is understood.

For example, the Appropriate Technology solutions of fuel-efficient stoves and solar cookers to combat deforestation are environmentally appropriate only if the forest is being viewed as a renewable resource—a perception to which, as it so happens, the providers of that technology are deeply attached. But what if those to whom they wish to deliver this technology see the forest not as a source of fuel but as a source of fresh agricultural land (and our analysis suggests that this is often, but not always, the case in the Himalayas)? Give them the technology and the last obstacle to the full clearance of the forest is removed. As we go from one institutionally induced perception to another, so the Appropriate Technology becomes supremely inappropriate.

In contrast to this "grand design" approach, the alternative that emerges from our analysis seeks to retain and respect all these different perceptions by untangling some strands of the web of interrelationships that supports them. The result is a set of strategic recommendations that are designed to do two things. First, to help UNEP to remove itself from criticism for taking inappropriate actions and, second, to provide UNEP with an evaluative framework that will help it to channel its effort in potentially effective directions. To be more specific, our analysis suggests that much can be learned from interacting with institutions as they now exist and from monitoring the momentum of the particular processes that have led to the present institutional configurations. The interrelated concepts of political development, economic development, and institutional development begin to suggest

context-specific criteria for distinguishing appropriate actions and technologies from inappropriate ones.

For example, it is often suggested that Switzerland faced the same problem in 1880 that Nepal faces today: serious deforestation and associated massive erosion and flooding. The Swiss solution was a strict forestry law that tightly regulated the cutting of timber. The serious suggestions made by those who draw this parallel is that such a law (with, of course, appropriate cultural adaptations) could form the basis for a solution in the Himalayas. Beyond the fact that the technical problem is essentially quite different in a monsoon-dominated climate, the institutional situation of Nepal today, with regard to economic and political development, is quite different from that of Switzerland in 1880. A strict law enacted by central authority could not possibly have the same effect, or even the same meaning, in Nepal now that it had in Switzerland then.

There is indeed a great deal that must be learned before suggested revisions in (let alone transplants of) institutional structures can be meaningful. A sensitivity to local contexts and their histories is the first essential. The appropriate institutional development approach suggests that large-scale projects which attempt to solve problems defined on a regional scale often cross too many contextual boundaries to even be considered appropriate, and can sometimes be positively counter-productive if pushed through without revision. Our analysis begins to offer some criteria for evaluating these contexts and their tremendous local variation. But we also try to show that, whilst the notion of institutional appropriateness closes certain options (such as the Swiss solution), it does at the same time open up many others that remain hidden to the single problem/single solution approach. These hidden options are revealed by taking the contrary approach—the multiple problem/multiple solution approach.

In surveying the extensive data available on "the problem" in the Himalayas, we were immediately struck by the remarkable range of expert opinion on a number of key variables. For example, the high and low estimates of annual per capita fuelwood consumption in Nepal differ by a factor (not a percentage!) of 67. Whether the subject of enquiry is fuelwood use, agricultural production, or even whether there is a connection between deforestation and flooding, the collection of valid and non-contradictory data is extraordinarily difficult.

The available data, in other words, do not suggest a single credible and generally consistent picture of what is happening in the Himalayas. Such a picture can be obtained only by arbitrarily declaring some of that data to be anomalous. Our approach, in essence, is defined, first, by our unwillingness to do this and, second, by the mild and unremarkable observation that the scientist in the Himalayan region is continually finding that it is institutional forces that muddle his attempts to analyse and solve what, at first glance, appear to be technical problems. In many ways, it seems to us, the institutions *are* the facts.

We therefore have chosen to try to understand the man-land interactions in the Himalayas through the institutions and the perceptions that go along with those interactions. The tremendous variation encountered in all contexts—physical and institutional—is itself a key attribute of the system. Recognition of this pervasive heterogeneity immediately makes approaches based on a homogeneous understanding of "the problem" inappropriate for the Himalayan region.

In the single-problem/single-solution approach the institutional reality at the local level—the seething mass of contradictory problem definitions, contending perceptions, divergent personal strategies and polarised policy prescriptions—is inevitably part of the problem. If the problem and its solution have already been defined then successful implementation calls for the imposition of the correct perception and the eradication of all the misperceptions. Inevitably it calls for the hegemony of a single personal strategy (the one that will respond to policy in the expected way), and for the delegitimation of those who, for the best of institutional reasons, advocate prescriptions that run counter to the official diagnosis.

But, in the multiple-problem/multiple-solution approach, this plurality becomes part of the solution. The contradictions and the contentions—the heterogeneity at every level—constitute a rich resource, perhaps the ultimate resource. Implementation no longer requires us to insist that one set of policy actors is right and that all the others are wrong. Instead, our attention is directed towards the notion of *appropriateness*; which kinds of social transactions are best handled by which institutional mode? How can we act at the macro level in such a way as to encourage multiply defined solutions to emerge at the local level and there meet up constructively with plurally perceived problems?

These are the sorts of questions we pose, and attempt to answer, in this paper.

CHAPTER 2. APPROPRIATE INSTITUTIONAL DEVELOPMENT: AN ARROGANT ARGUMENT FOR A HUMBLE APPROACH

I. INTRODUCTION

For centuries the Khumbu Sherpas managed their common forest resources with the help of their social institution of forest guardian (*naua*) - a rotating office within each village the annual holder of which, after due (but fairly casual) consultation, laid down the permissible extraction rates for fuel-wood and constructional timber and exacted traditional fines on those villagers who did not comply [Fürer-Haimendorf 1964 and 1975]. But, following the overthrow of the Rana regime in Kathmandu in the 1950's, all the forests in Nepal were nationalised and control vested in regionally-based officials. Since the Sherpa who wanted to cut a tree for a new roof-post now had to go on a four-day walk to Paphlu (the local administrative centre) to obtain permission, instead of just popping round the corner to a fellow villager's house, and since the official in Paphlu could not see what was happening in Khumbu (and in a hundred similar forests), the old institution was destroyed and the new one simply did not work.

This little example, by showing the way in which institutions at different organisational levels can impinge on one another, helps to clarify the idea of context. Before the nationalisation of forests, the administrative institutions in Kathmandu were not part of the institutional context of forest management in Khumbu; after the nationalisation they were. Since the micro-institution—the system of village-based forest guardians—worked quite well, whilst the macro-institution—the nationalised forest system—simply destroyed the micro-institution and then did not work itself, we can use the twin notions of institution and context to distinguish between those institutional arrangements that are appropriate and those that are not. That, in essence, is what we try to do in this chapter.

INSTITUTIONS AND THE ENVIRONMENT

But this approach, by way of institutions and contexts, is only a beginning. Though it provides us with our conceptual framework, we still have to bring that framework down to earth. And it is the earth—the precarious resource base for all these institutions and contexts—that is our prime concern. What is happening to it and what, if anything, can those who are caught up in all these institutions (and that includes us) do about it? Since the parts of the Himalayan resource base that are causing the most alarm are those parts that are communally exploited, the whole inquiry has ended up being concentrated on the *tragedy of the commons*.

There is a tendency, especially among those who care most vociferously about the world's natural resources, to interpret environmental degradation in general, and Himalayan deforestation in particular, in uncompromisingly tragic terms—something quite awful is befalling us, and it is we who have unleashed the inexorable forces that lie behind it. The trees disappear, they argue, because no one individual can afford to do what he would do if only everyone else would do the same. Unable to take this first step from selfishness to altruism, we end up destroying the one world that should be our most sacred trust in a frenzy of myopic greed.

We bring our approach down to earth by questioning this interpretation. It is not the tragedy itself—the environmental degradation—that we query. That, we concede, happens often enough. It is the *inexorableness* of the forces that shape the tragedy, and our *powerlessness* in the face of them, that we take issue with. As the example of the Sherpa forest guardians shows, even the flimsiest and most casual of institutional arrangements *can* avert the tragedy. Tragedies happen, not because they are inherent in the commons, but because the institutional supports for the commons are insufficient or inappropriate.

Of course, if every appropriate institutional support was already in place, if every one of them was already giving its maximum possible support, and if every instance of contention between these institutions had already adjusted itself to the Pareto optimum,* then there would be nothing that we could do, except keep our fingers crossed and watch to see whether the great tragedy hit us or passed us by. But this is not how things are in the Himalayas. The institutions, as they now stand, are not giving of their best; there is room for improvement. The problem is to know what can be changed (and what cannot be prevented from changing) and to know whether such changes would be improvements.

Institutions are all that we have to work with and, like it or not, we must work with the institutions that we have. These institutions, fortunately, are not immutable; they can be changed and they do change. But, as the example of the Khumbu forests makes clear, not every institutional change is a step in the direction of environmental sustainability. The challenge is threefold and formidable: to identify the feasible (or inevitable) institutional changes, to gain some feel for whether they are likely to promote or demote environmental sustainability, and to understand the extent to which it may be possible to intervene so as to encourage the desirable changes and to discourage the undesirable changes.

ECONOMIC DEVELOPMENT AND POLITICAL DEVELOPMENT

The lessons of the Khumbu forest have not gone unheeded. All the signs are that control of such forests is now beginning to be devolved back to the local level. Social forestry projects in Nepal and grassroots pressures, such as the Chipko Movement in India, are helping to bring this about. So it might appear that after thirty years we have come full circle, with the original institutional supports back where they were but with many of the forests having disappeared in the process. But this back-to-where-we-were interpretation ignores the very considerable political development that has taken place during this time. In 1950 the administrative institutions in Kathmandu scarcely

*The point beyond which any change makes one, other or both parties worse off than they were before.

touched the daily lives of the Sherpas in Khumbu; now they touch them in many ways. The Royal Nepalese Airlines Corporation flies regularly into Lukla and Sangboche, the Edmund Hillary schools (started in the 1960's) have been incorporated into the national education system, a police station at Namche stamps the trekking permits of the thousands of tourists who pass through the area every year, and many Sherpas now divide their time between their farms in Khumbu and their burgeoning business interests in Kathmandu.

So it is not simply a matter of the government increasing the centralization of its power in 1950 and preparing to decentralize it now. Over the last thirty years there has been an enormous increase in the total *amount* of power in the system and, even when it has devolved the control of the forests back to the local level, the government's power will still be immeasurably more centralized than it was when it saw fit to nationalize the forests.

The relationship between economic development and political development is not (to say the least) entirely clear, nor is it altogether free from controversy, but that there is a relationship and that it is an important relationship is somewhat less disputable. The point we wish to make is simply that the undoubted economic development that has occurred in the Khumbu region is consistent with the thesis that political development is a necessary condition for sustainable economic development, and that the decentralization of power is conducive to political development only after the total amount of power within the system has been very considerably increased [Boggs 1982]. One advantage of seeing both economic and political development in terms of institutional development is that it allows one to take some useful account of these sorts of necessary conditions and to make some sort of useful institutional assessment of just where and when decentralization (or centralization) is likely to be effective—politically, economically and environmentally.

So the approach we are advocating is an approach by way of institutions. Since the institutions (in the Himalayan region at any rate) are so richly heterogeneous, their development is not amenable to "grand design" solutions. Rather, the process of institutional development is inherently unplannable. But it does, at certain places and at certain times, offer points of leverage—localized opportunities for facilitating and integrating the development of institutions in the desired direction. Since such an approach has all the time to be sensitive to contexts, so as to be able to recognize a point of leverage when it sees one, we could perhaps speak of this approach as *appropriate institutional development*.

TRANSACTIONS AND BOUNDARIES

The actions of international agencies in the Himalayan region affect the lives of many people. These actions are primarily concerned with the transfer of various resources from the outside to the inside of the region, and the great challenge lies not in doing this—that is easy enough—but in doing it in such a way as to assure and strengthen the environmental sustainability of the development processes that those resources will meet up with once they are inside the region. The crucial question in the approach we label appropriate institutional development is: "Is there anything we on the outside can do that will make the forests (or whatever) more valuable to those on the inside whose activities, directly or indirectly, impinge upon those resources?"

Take, for instance, those Himalayan creatures currently assigned to the category "animals of no economic value"—tigers, pheasants, rhinoceroses, langur monkeys, red pandas, snow leopards, and so on. It is true that, in a narrow economic sense, these animals have no value—they are not exploitable through domestication in the way that goats and water buffalo and yaks and domestic fowl are—but, to many people far-removed from the Himalayan region, they have immense biological value*. Their argument is that we (by which they mean humankind) would be immeasurably impoverished if we were to allow these species to be driven into extinction. One of the great practical challenges for the practitioner of appropriate institutional development is to facilitate and integrate the long chain of institutional links that will transmute the biological values of individuals many thousands of miles removed from the Himalayas into the economic values of those who actually live there. It is not an impossible task and, indeed, many of the necessary institutional supports are already in place.

Each of these "animals of no economic value" has, organized around it, an articulate and potentially highly effective group of humans dedicated to its conservation and welfare. Those individuals in the West who are concerned for the pheasants of the Himalayan region are not just *interested* in pheasants—they are *fanatical* about them—and the same is true for all the other human groups that are focused on these "worthless" animals. They will, and do, travel thousands of miles in the hope of seeing their chosen creatures and they will, and do, spend thousands of dollars, pounds, marks, yen, francs, and lira in the process. As long as the animals and their habitats are there, they and their money will pour into the Himalayas and, if the animals and their habitats go, then that money will stop. Once this connection is made, it is clearly nonsense to speak of these fabulous (and inalienable) assets as "animals of no economic value".

The problem, in many ways, is quite trivial. Those who want to keep the forests and their biological riches in place are willing and able to pay the price, and those who are currently removing the forests would be only too happy to be paid not to. Only connect—that is the task of appropriate institutional development.

*Norman Myers, one of the ablest proponents of this position, describes the world's tropical forests as "over-exploited and under-utilized". He argues that protecting them from rampant deforestation should be a high priority for Third World governments and international organizations, because of the biological treasures the forests hold. "Their tremendous diversity has not been examined. Tropical forests cover less than seven percent of the earth's surface, but contain fifty percent of its species". (As reported by Robert Sangeorge, Washington, 3 May 1983, UPI.)

II. A CONCEPTUAL FRAMEWORK

The literature, we have found, tends to segregate itself into three quite distinct levels—the bio-physical, the micro-social, and the macro-social. The phenomena at each of these levels can readily be represented in a systemic way and each of these levels tends to be appropriated by a particular set of disciplines. We should stress that these are *epistemological* levels—partial discontinuities in the arrangement of knowledge. We do not claim that the world itself is so arranged. But, since it is systems of knowledge that allow us to understand and (to some extent) to manage the world, we draw upon these three levels and their systemic connections for our conceptual framework.

The Bio-Physical Level

The physical and biological scientists [Reiger 1981, for instance, and Pereira 1981] focus on the physical and natural processes that sustain (and, under certain conditions, undermine) the forests until eventually they bump up against the agents that are busy removing the trees—the individual hill farmers. These agents, clearly, are a crucial part of the system but the natural scientist is, by now, getting away from his expertise and he tends to represent the behaviour of the farmer by some rather simple set of assumptions based on the "tragedy of the commons" hypothesis.

The Micro-Social Level

The anthropologists, the social foresters, and the cultural geographers focus on the individual hill farmer and his social context—the framework of land tenure within the village and the patterns of social relationships within the village. The rather inadequate figure sketched by the natural scientists is here worked up into a very full and accurate portrait. We get right into the worlds of the Gurung [MacFarlane 1976, Messerschmidt 1976], the Sherpa [Fürer-Haimendorf 1964, Ortner 1978], the Rai [Allen 1972], and so on and we begin to see their physical and social environments in their terms. In particular, the ethno-ecological studies of Kirsten Johnson and her colleagues [1982] reveal to us the hill farmer's own land-use categories and, through them, the shrewd, sensitive and rational strategies by which he strives to manage the natural and man-made hazards that he faces.

Fürer-Haimendorf [1975] goes one stage further and broadens this picture by moving back and forth between the Hindu and Buddhist populations—between the Middle Ranges and the Highlands—and thereby revealing the very different, yet mutually reinforcing, strategies of the "cautious cultivator" (for whom land is wealth) and the "adventurous trader" (for whom individualized exchange is wealth). This painstaking teasing out of the various socially induced strategies that are available at the micro-level opens up all sorts of policy capabilities that are ignored (denied, even) by the tragedy-of-the-commons assumptions.* But what is absolutely crucial before we can hope to exercise these capabilities is an understanding of the sorts of perturbations to an individual's social context that will dislodge him from one strategy and bring him to rest at another. There are, of course, perturbations at this micro-level but they pale into insignificance against the sorts of perturbations that are generated at the macro-level:

*And also, we would argue, by the assumptions built into "economic man".

e.g., rapidly rising population,
industrial development,
geo-political upheavals,
policy changes at central government level.

The Macro-Social Level

The political scientists, the policy analysts, and the students of international relations focus almost exclusively on this macro-social level, often to impressive effect. For instance, a serious trans-boundary problem in North America and Europe is acid rain. There, as in the Himalayas, something that happens in one country is seen as having unfortunate downstream consequences in another country. The physical scientists do their research, the ministerial level meetings are held, resolutions are passed, and eventually, mutually satisfactory national policies are thrashed out. When it comes to the implementation of those policies the obstacles, though considerable, are not insuperable. The agents that cause the acid rain are the power stations controlled by vast utilities or even vaster nationalized industries. Legislation, regulation and inspection are quite easily applied to such agents, once the political will has been mustered. But, in the Himalayas, the agents are the myriad individual hill farmers. So it is a *problem of many agents*, and satisfactory policy formulation and implementation simply will not be possible unless the micro and macro levels are first related to one another.

A Simplistic Model

The understanding of the systems that operate at each of these three levels—the the bio-physical, the micro-social, and the macro-social—is really most impressive (in qualitative terms, at least). The understanding of the systemic connections between these three levels is abysmal—non-existent almost*. But it is precisely these connections—between the natural environment, the myriad strategizing agents, and the large-scale social perturbations—that will have to be explored and understood before we can really tell whether anything can be done about the environmental degradation of the Himalayas and, if so, what.

What we have tried to do with this little study is to construct some sort of framework for these connections, and to construct it in such a way that the crucial insights that already exist at the different levels are preserved and, indeed, are given salience. Insights such as that the tragedy is not intrinsic to the commons but, rather, results from a lack of appropriate institutional support. Insights such as that the "cautious cultivator" and "adventurous trader" strategies are induced and stabilized by social context rather than by cultural heritage. Insights such as that the foreign policy of a buffer state is best served by it playing off one international agency against another rather than by encouraging them to negotiate an integrated effort.

*The one disciplinary exception being the forest historian.

*INSIGHTS AND SYSTEMIC CONNECTIONS 1:
THE TRAGEDY OF THE INSTITUTIONALLY UNSUPPORTED COMMONS*

The prevalent thesis that the tragedy is inherent to the commons and that, human nature being what it is, the tragedy is therefore unavoidable, leads directly to some drastic conclusions. Either we must get rid of the commons or we must change human nature. The first conclusion justifies *privatization* as the only viable policy; the second conclusion, pinning its hope on a new era of human cooperation being miraculously ushered in through the application of draconian regulation, justifies *coercive utopianism* as the only viable policy. Rieger [1981], for example, and Wallace [1983] find themselves carried towards the privatization policy; Hardin, [1968] for example, and Cronin [1979] find themselves carried towards the coercive utopianism policy. Those milder observers, who happen not to be already predisposed towards one or other of these extreme solutions, will point out that those who subscribe to this bleak view of humankind have simply failed to apprehend the full wonder of human social and cultural institutions.

The whole historical process that is subsumed within the rubric of "sustained institutional development"—whether it be the successful operation of the Sherpa system of forest guardians in Nepal or the emergence in the West of professions with codes of practice and associated sanctions capable of discouraging those actions that, though profitable to the individual practitioner, would bring the calling itself into disrepute—can be read as a cumulative sequence in which commons managing institutions are continuously being piled upon commons managing institutions. On this reading, human social life is, in large measure, an enterprise in tragedy aversion; and human history is, in large measure, the story of that enterprise's successes and setbacks. But the privatizers and the coercive utopians do not read it in this way; it does not square with their predilections. Their perceptions are not false; they are partial, partisan, provincial and polarised.

On top of this, the myth of modernization—the conviction that we in the developed North are altogether different from them in the developing South—has curiously distorted the dispute between these two schools of tragic thought. Because of this we have first to straighten out the distortion before we can draw the correct conclusions from the dispute. The privatizers and the coercive utopians share the same basic assumption—that the tragedy is intrinsic to the commons—but they start off from seriously polarized positions on development. The privatizers are *for* development, the coercive utopians are *against* it (it is this polarization that shapes the growth/no growth debate in the North). Both subscribe to the myth of modernization and see us as altogether different from them; it is just that the privatizer sees development as a desideratum and the coercive utopian sees it as a disaster. Both are suffused with missionary zeal (though, in this secular age, such zeal tends to take on an economic or ecological form). The privatizer sees the unmoderns as benighted (underdeveloped) heathens and is anxious to lighten their darkness; the coercive utopian sees them as noble (nature-respecting) savages and is anxious to bring us Gadarene swine to our senses before we all fall over the eco-cliff edge.

When the milder observers enter onto this polarized scene, and point out that in many traditional societies there exist all sorts of institutions for the collective management of resources, the myth of modernization immediately insinuates itself to insist that such archaic institutions do not, of course, exist among us moderns. As the milder observers then move on to become advocates for the adoption and adaptation of these traditional commons managing

institutions into the development process so they accuse the privatizers of seeking to impose their inappropriate Northern solutions upon the South. And so the myth of modernization, remounted, rides on; they are collectivized, we are privatized.

Appropriate institutional development, therefore, faces a twofold task. First, it has to show that the tragedy of the commons is not intrinsic to the commons themselves but is a consequence of their receiving insufficient or inappropriate institutional support; second, it has to show that we in the developed North are as knee-deep in collective commons managing institutions as are they in the developing South (and that it is only the different *stages* that each has currently reached in the development process that in any way distinguishes them). Of course, it is to the professions and to the self-regulation of institutions such as stock exchanges and Lloyds of London that we should be looking in the developed North but, even so, we can still find examples of Northern agricultural commons managing institutions.

The Solway Marshes in the north of England, for instance, are a common that is managed by a combination of privately owned "stints" (grazing rights) and the collective control of grazing level through a venerable local body that each year assesses the ecological status of the common and sets the number of cattle, sheep, etc. per stint accordingly. Compare this with the forest at Dahbaley in the Arun Valley in Nepal.

By mutual agreement everyone in the village shared the right to use the forest as they needed, but no one was allowed to clear the land. To promote a sustained yield, the headmen of the village assign rights to gather firewood in certain areas of each woodlot, and households jealously guard their territories; many territories represent traditional claims that date back several generations. Trivial uses of wood are discouraged, and when a household needs a particularly large tree for a construction project, they must pay a sizable sum to the village headmen. The fundamental concept of a renewable resource is also recognized, and the headmen will sometimes declare a moratorium on cutting if a certain plot shows signs of really excessive use that will soon lead to complete exhaustion. [Cronin 1979, pp.75-76]

So the Solway Marshes and the Dahbaley forest turn out to be managed in almost identical ways (and similar examples can be added from other parts of the world—Botswana, for instance) and the common recipe for success seems to include the following ingredients:

- (i) A definite piece of land; a definite group of people.
- (ii) Small in scale (village level institutions).
- (iii) Some privatization (stints, family "territories") and face-to-face relationships for the communal control mechanism.*

*We are indebted to Malcolm Odell for this list of ingredients for success. Also relevant here are traditional communal working arrangements such as the Sherpa *ngalok* (Fürer-Haimendorf 1975) and the Gurung *nogar* (Messerschmidt 1981).

*INSIGHTS AND SYSTEMIC CONNECTIONS 2:
THE SOCIALLY INDUCED STRATEGIES*

Very little has changed, it would appear, since Erik Eckholm wrote:

Land use patterns are an expression of deep political, economic, and cultural structure; they do not change when an ecologist or forester sounds the alarm that a country is losing its resource base. [Eckholm 1976, p. 167]

Yet, incontestable though this assertion of changelessness may appear, it does not square at all well with Heraclitus' similarly incontestable (but rather longer lived) assertion that the only thing that is permanent is change. To resolve this paradox we must look a little more closely at what is meant by a "deep political, economic and cultural structure".

Such structures, of course, are built up of institutions and they can, in general, be *rigid* or *flexible*. A rigid structure resists the inevitable change that it encounters and, in so doing, increases its own fragility. Though the change is not incorporated into the structure, it does not go away; it builds up outside the structure until it reaches the point where its strength exceeds that of the structure itself. At this point we get *structural collapse*. A flexible structure absorbs the inevitable change that it encounters and, in so doing, stimulates its own *adaptability*. Since the change is continuously incorporated into the structure, it cannot build up outside it and this means that, instead of structural collapse, we get *structural transition*. A complex structure (such as we are talking about in the Himalayas) will contain both rigidifying and flexing tendencies in some dynamic and, in general, unbalanced pattern of contention.

The classic development approach has been to sound the alarm and then, confident that the country's attention has been gained, to tell it what will have to be done if it is to avoid losing its resource base. It has not worked. It has not worked because it has ignored (as if it were some mere detail of implementation) the deep political, economic and cultural structure that is, in fact, what determines the country's attention and lack of attention. What is needed is a more sensitive approach; an approach that places the 'mere details'—the institutions that constitute this deep structure— at the very centre of the stage and relegates to the wings the alarm bellringers and their immaculate prescriptions.

There is, we hasten to add, nothing particularly new about this approach. It is, for instance, wholly consistent with the economic arguments set out by Hirschman [1977] and by Sen [1975], with the political science arguments set out by Dahl and Lindblom [1953] and by Wildavsky and Pressman [1973], and with the rural development arguments set out by Clark and Johnston [1982]. The only novelty we would claim is in our giving this approach a thoroughgoing and, we hope, useful institutional expression.

We would agree with Eckholm when he says that the "prerequisites of ecological recovery are identical to the tactics of a more general war against poverty and hunger" and we would stay with him when he goes on to say that "those concerned with global ecological deterioration and its consequences have no choice but to throw themselves into the maelstrom that is the politics of social change" [Eckholm 1976, p. 167]. But where we might, perhaps, differ is in the manner of our throwing ourselves into that maelstrom.

The stark simplicity of the poverty and desperation engendered by a rapidly growing landbased population is the basis for the deterioration in the Himalayan region, but the attempt to move forward—to do something about it—is fraught with all the complexity encountered in any anti-poverty campaign. As the pressures on the land increase so the hill farmer finds himself driven to accepting the second, third, or even fourth best alternatives suggested to him by his traditional strategies [Johnson et al. 1982]. At the limit, he faces an almost total lack of alternatives. In other words, the deep structure is becoming ever more rigid and ever more fragile. To find oneself a part of such a structure is to find oneself becoming poorer and poorer; that is what poverty *is*—a sheer lack of options.* But, though this sort of description does fit many of the people who live in the Himalayas, it does not fit them all. It does not fit those, like the Thakkalis and Sherpas, who are busy exploiting the opportunities presented by tourism and mountaineering; it does not fit Tamang villagers on the fringe of the Kathmandu Valley who are now breeding buffalo for the hamburger market, portering for expeditions, and pedalling tri-shaws in the gaps in between; it does not fit, and it never has fitted, those largely Buddhist people whose institutions, such as monasticism and economic individualism, stem the cause of all this rigidity—the rising population and the equation of land with wealth—at source.

Of course, just because these people are following flexible and adaptive strategies, it does not automatically follow that they are doing wonders for their physical environments—that is something that can only be determined by careful on-the-ground observation and monitoring. No, what is so important about these opportunistic strategies is not what they are doing to the environment (though that, of course, is important) but that they are *there*. If rigidity and fragility spells poverty, then *anything* that promotes flexibility and adaptability carries with it the possibility of escape from poverty.

Let us explain more precisely what we mean by this, since it is the crux of our argument and the key to our strategic recommendations. If land and wealth are seen as virtually synonymous, and if the population that has to live on that land is increasing rapidly, then we have a negative-sum game from which the only possible relief is by way of population stabilization or increased productivity (or both). But, if the equation of land with wealth is severed, closure is no longer inevitable and it is possible (but by no means certain) that the game will become positive sum. At present both games are being played in the Himalayas.

The distinctive feature of mountain environments is not that they are relatively closed but, rather, that they exert severe constraints upon the organisation of social life. Some settlements may indeed be constrained in such a way as to be almost totally isolated; elsewhere lines of communication may be constrained in such a way that settlements are little more than staging posts for a massive two-way traffic in trade between areas separated by the mountains. Thus, at one extreme, communities are so constrained that they have to be self-supporting (though in the Himalayas such communities are few and far between and those that do exist can have little effect on deforestation) whilst, at the other extreme, there are communities that exist solely to take advantage of the trade flow and which simply could not support themselves without this external contact. In many areas it is possible to choose some optimal mix between these two extremes. Some—the *cautious cultivators*—

*Though the two often go together, poverty is to be distinguished from destitution. Destitution is a bio-physical concept, poverty a social one.

stay at home to farm and are content to produce a small surplus of grain over and above their own requirements; others—the *adventurous traders*—make do with a minimum of agricultural production and direct most of their energies to the business of trade. [Fürer-Haimendorf 1975]

So interdependence, not independence, is the mountain rule and the significant (and policy relevant) differences that emerge are those between the different ways in which that interdependence is taken up. Those in the Middle Ranges tend to adopt the low risk/low reward option of cautious cultivation and a small production surplus* ; those in the higher valleys tend to adopt the high risk/high reward option of adventurous trading and some farming in the background. This bifurcation of risk-handling strategies is remarkably pronounced and, as well as being reflected in the Middle Ranges/high valleys settlement patterns, usually corresponds with the profound cultural division between Hindus and Buddhists. Yet, despite this separation, each strategy depends for its viability upon the other. The myriad cautious cultivators sell or barter their small surpluses to the adventurous traders who, in their turn, use this grain to supplement their own meagre production and to form one half of their lucrative trade with the Tibetan plateau. To the adventurous trader, tourism is just another kind of trade and many have already switched across to it. The development of this industry has, fortuitously, coincided with the decline of the traditional trade with Tibet (as a consequence, in the short term, of the Chinese occupation of Tibet and, in the longer term, of the substitution of cheap Indian salt for Tibetan salt throughout the Middle Ranges). So the interdependence system remains essentially the same; it is just that the surpluses of the cautious cultivators now find their way, via the adventurous traders, into tourism rather than into Tibet.

This system of interdependence would break down if the presently increasing population of the Middle Ranges were to reach the point where there was no longer a net surplus of grain.** Or at least, it would break down if new industries did not appear in the meantime. As was the case with Switzerland and Austria, the most likely new industry is tourism.***

It is the adventurous traders, with their opportunism and their entrepreneurial flair, who respond most readily to this new industry. Some (like the Sherpas) have established a virtual monopoly in certain areas, but, at the same time, some of the cautious cultivators (Tamang villagers on the fringe of the Kathmandu valley, for instance) have switched across to the adventurous trader's strategy in order to take fuller advantage of this newly available opportunity. So these strategies, though they exhibit a certain rigidity, are not immutable—they are, as it were, a function of the social context that, paradoxically seemingly, is largely their creation.****

*Sometimes they will augment this by periods of seasonal labour in the Indian plains or by more lengthy absences as mercenaries in the British or Indian armies or in the Singapore riot police. As one moves further west along the Himalayas so the interplay of arable and pastoral strategies becomes more significant. The transhumane and semi-nomadic Gaddis and Gujars move their flocks of sheep and goats and their herds of buffalo through the settled populations along traditionally established, but still changing, routes that are sustained by innumerable exchange relationships (stubble-grazing for manuring, for instance) of quite staggering sequential and spatial complexity.

**For a fuller description of these relationships see Fürer-Haimendorf (1975 final chapter).

***The latest five Year Plan for Nepal [HMG 1981] shows serious shortfalls in almost all its industrial targets with only tourism surging far beyond what was expected of it. In Bhutan, tourism is expected to become the principle industry in the Bhumtang area (Jest and Stein 1982).

****For some discussion of the complex processes by which plural socially induced strategies are stabilized and transformed, see, Marriott (1967) and Thompson (1982).

We will return presently to discuss the practical implications of these socially induced strategies but, for the moment, it is sufficient to note that the strategies exist, that they are stabilized by an individual's social context, that the process of institutional development inevitably results in changes in the social contexts of some individuals, that such changes can sometimes result in the displacement of an individual from one strategy to another, and that (where points of leverage exist within this development process) there exists the possibility of intervening in such a way as to encourage the displacement of certain "borderline" individuals from a less desirable to a more desirable strategy. Lest it appear that all this smacks too much of social engineering, we would point out that *any* policy implementation displaces people from one socially induced strategy to another, often unwittingly and often in an undesirable direction.

INSIGHTS AND SYSTEMIC CONNECTIONS 3: THE MANAGEMENT OF POWERLESSNESS

Over the centuries the great empires have always run out of steam at the Himalayas. The Moghul Empire, though it ruled all the plains, could not forcibly convert to Islam the Rajput kingdoms that took refuge in Kangra, Kulu, Garhwal and Jumla; neither the British nor the Russian Empire, for all their bitter rivalry, was able to win the Great Game (as it was called) and subjugate Afghanistan; further east, the British simply gave up trying to incorporate Nepal into their empire; and, on the other side of Nepal, the Chinese Empire had little option but to leave Tibet autonomous and independent in all but token claim. In geopolitical terms the Himalayas are not a power vacuum—for that would imply that they could readily be filled—but, rather, a sort of plateau where the power of the plains finally becomes so attenuated that it can no longer sway events one way or the other. The Himalayas, in consequence, are a vast political margin—a largely uncontrolled tract filled with a rich assortment of independent-minded opportunists and refugees.

For those who have become accustomed to understanding human affairs in terms of power relationships the Himalayas are as baffling as is weightlessness to those pragmatists long used to operating with their feet planted firmly on the ground. Himalayan politics, in countries like Nepal and Bhutan, are more concerned with the management of powerlessness than with the direct exercise of power. The difference is akin to that between judo and prize-fighting. The consummate skill of the recent kings of Nepal (and, before them, of the hereditary Prime Ministers) has resulted in a delicate display in which the balance of the slight central figure is maintained by continually playing off the various superpowers (and, more recently, the various international agencies) against one another.*

Development experts have now learnt to their cost that the impressive arrays of policy levers displayed in the ministries of many of the less-developed countries are, all too often, not connected to anything. This is usually interpreted as a symptom of underdevelopment; the conclusion is that they should be connected and that satisfactory development will become possible once they are connected. But such a conclusion would be valid only if the political system was based upon the direct exercise of power. In a system

*The curious politics of the Nepalese budgetary process, for instance, makes sense only when interpreted in this light (Wildavsky and Caiden 1974). For a detailed account of Nepalese politics see Rose and Scholz (1980) and for Bhutan see Rose (1977).

based upon the management of powerlessness the fact that the policy levers are not connected to anything may demonstrate neither underdevelopment, nor inefficiency, nor oversight; rather, it may confirm that everything is functioning correctly. It would be as well to bear this perhaps alarming possibility in mind when devising policies aimed at alleviating the environmental and developmental problems of the Himalayas.

From this geopolitical perspective Himalayan deforestation (and other concomitants of environmental decline) is just another specific instance of the problematical relationship between centre and periphery—between empire and margin. The power lies in the plains but the problem lies in the hills. What should the centre do? Over the centuries there have always been two options: impose or interpose. The establishment of a forestry service and the designation of Reserve Forests (such as occurred along the Himalayan fringe of British India) is an imposed solution. When effectively implemented, it makes both visible and actual the uneven distribution of power and, in so doing, incorporates the mountains into the empire. The judicious fostering of Buffer States (such as occurred with Nepal, Sikkim, Bhutan and Tibet) is an interposed solution. Deciding that (beyond a certain point) it is less trouble simply to leave well alone, the empire deliberately holds back and, in effect, guarantees the autonomy of the mountains in exchange for their absorption of the pressures that the empire would be exposed to if it were to move up and take control of them. In this way, an arrangement that appears quite natural often turns out to be largely contrived and, when this implicit compact between empire and margin breaks down, we often see the empire switching over to imposed solutions—Younghusband's punitive expedition to Lhasa, for instance, and India's recent annexation of Sikkim.

Though the autonomy of the Himalayan margin is always tenuous, in that it has always been at the mercy of the great powers that surround it, it has always proved to be remarkably resilient. In many instances it has crystallised out into small nations; in others it is continually being manifested in the *de facto* independence of Indian citizens far-removed from the centres of power (e.g. the Chipko Movement). As the fortunes of the mighty empires wax and wane, and as they switch back and forth between imposed and interposed solutions, so autonomy is swept away here and reasserted there. The Chinese occupied Tibet in the 1950s, thereby stimulating the deployment of Indian troops and the construction of strategic roads in Lahoul and Ladakh in the west and in Assam and the North East Frontier Agency in the east; in the early 1970s Nepal secured the removal from its soil of the Indian Military Mission; in the late 1970s India annexed neighbouring Sikkim; more recently the Tibetan guerilla forces, having been expelled from Nepal, moved across into the vast wastes of Ladakh, Spiti and Rupshu, thereby providing a very effective intelligence-gathering screen that allowed India to pull the bulk of its forces back into warmer and more congenial garisons.* And, behind all these surface events, the Great Game (with the United States replacing Britain in the shadowy struggle with Russia) still continues.

At first glance it might seem that, with these kinds of strategic priorities dictating the ever-changing geopolitics of the whole region, there really is no chance of devising and implementing any policies for arresting the environmental decline of the Himalayas. But perhaps we could relate these policies,

*But not the forces facing Pakistan. They are still in place in Ladakh and imposed solutions have long since eroded the autonomy of the buffer—Kashmir and Jammu—that used to keep them apart. See Faux (1982).

not to the erratic and inherently unpredictable political situations, but to the ever-present and unchanging principles that underlie that turbulent flux? These principles all have to do with the *implicit compact* that, so long as it is observed, guarantees the autonomy of the margin—the continued existence of the buffer states.

Because of the power imbalance between the centre and the margin, this compact is curiously asymmetrical. If the centre can get what it wants without having to push on all the way to the point where it finally runs out of steam then it will be prepared to hold back and guarantee the autonomy of the buffer that such a holding-back creates. The buffer state, for its part, knows full well that its autonomy depends upon this compact being observed but it also knows that, thanks to its powerlessness, it can only do what it can do to maintain the compact. If, despite all its efforts, the nuisance (be it Chinese soldiers or silt-laden floodwater) breaks through the buffer then it knows that the centre will be forced to switch from interposed to imposed solutions. So, on this analysis, the autonomous margin will have a keen strategic interest in alleviating the flooding of the plains. Given that it will want to do something about the flooding, the question then is: can it? And the policy question for all those international agencies that are concerned about Himalayan deforestation is: is there anything that they can do that might help to change the margin's answer from no to yes.

Of course, this assumes that there is a causal connection between the downstream flooding and the upstream deforestation. Since both the Nepalese and Indian governments (and perhaps others as well) are at present disposed to make this assumption, there is some practical sense in treating this as the political, if not the physical, reality.

In this particular instance it so happens that the sorts of solutions urged by those who are convinced that there is a connection are very similar to the sorts of solutions urged by those who are convinced that there is no connection and also by those (like us) who are convinced that, given the present state of knowledge, we cannot tell whether there is a connection or not. But there is much more to it than this, and this serious predicament—whether to go for the physical reality or the political reality—is precisely what the institutional approach is designed to handle.

We have, so far, said very little about the physical facts and we have said even less about the numbers that scientists habitually use to express such physical facts. But this does not mean that we have not looked at any numbers; we have looked at thousands of them, and we have collated and compared them. It is only a slight exaggeration to say that it is our considered conclusion that there is at present only one number that has *any* scientific validity at all, and that is the number 67—the factor by which all the expert estimates of the per capita rate of fuelwood consumption vary. This analysis of the scale and nature of the uncertainty at the bio-physical level, and of the institutional forces that are all the time generating and maintaining that uncertainty, is a lengthy and technical business (which we summarise in the next chapter) but one of the perhaps surprising conclusions that emerges from it is that whilst it is extraordinarily difficult to come up with any useful and valid physical facts it is quite easy to come up with useful and valid institutional facts.

When this contrast between what we might call the shifting sands of physical fact and the solid rock of institutional fact is set beside the practical good sense of dealing with the political reality rather than with the physical reality, the case for adopting the appropriate institutional development

approach becomes overwhelming. This does not, of course, mean that we should wash our hands of the bio-physical level and abandon all efforts at increasing the certainty of the physical data. Indeed, one of the key strategic implications of this institutional approach is that it helps to pinpoint the sorts of physical facts that it would be most valuable to know and, out of those facts, the ones that we are most likely to be able to know.

THE CONCEPTUAL FRAMEWORK AND ITS PRACTICAL IMPLICATIONS

Generalising at a high level of abstraction we have, at the macro level, a system based on the implicit compact and manifested in the dynamics of imposition and interposition and, at the micro level, we have a system based upon interdependence and manifested in the dynamics of recruitment to the cautious cultivator and adventurous trader strategies. These geopolitical and socio-cultural systems, as well as being related to each other (by the processes of power accumulation, centralization and decentralization—processes that are realized through the reciprocal dynamics of consent and authority that mediate the ever-changing relationship between these levels) are in turn, connected to the bio-physical systems of resource exploitation which currently, by most of the expert accounts, would seem to be programmed (via the increasing population of the cautious cultivators) for deforestation, denudation, degradation and, eventually, desertification. Somewhere along this downhill path there is the crucial threshold point at which the Middle Ranges cease to be a net exporter of grains. In the absence of any institutionally appropriate development, the crossing of this threshold will trigger the collapse of the interdependence system (and, one presumes, of the implicit compact system as well).*

So, on this analysis, the absolutely key variable is development's mode of entry into these linked systems. In other words, can the processes of development be steered in such a way that technical and institutional capacities (the positive-sum game) can get ahead of population and natural resource constraints (the negative-sum game)? With this momentous question in mind, we can distinguish a number of crucial responses at the micro-level.

1. It seems that the cautious cultivator's strategy at present results in increasing population (perhaps it always has done) whilst the adventurous trader's strategy seems always to have resulted in a stable population. More research would be needed to substantiate this important distinction but the empirical evidence that is at present available (institutions such as fraternal polyandry, monasteries and nunneries with celibate inmates, and primogeniture rules of inheritance on the Buddhist side and, on the Hindu side, large families as guarantees for support in old age giving way to smaller families in situations where old age pensions are guaranteed) does all point in this direction.
2. Population pressure** coupled with limited resources (agricultural land for grain production, grazing land for animal husbandry and forest land for fuelwood, fodder and forest products generally) is *the* main cause of environmental degradation and of the undesirable downstream effects generally.*** Ethno-ecological studies [Johnson et al. 1982] go on to

*Because of the extreme heterogeneity of the region this threshold will not be reached everywhere at the same time. So the collapse will be spasmodic and cumulative rather than instantaneous.

**But with the proviso that the effect of population is relative to institutional and technical capacities. The statement holds if population increases and these capacities do not.

***Whether these downstream effects exist transnationally is, at present, an open question, but the

suggest that it is population pressures that cause the hill farmer to switch from the detensification of land use to the intensification of land use in response to his (impressively accurate) perception of landslide (and other) hazards.

This means that, for every individual who is absorbed into new industries, the direct pressure on land-based resources is correspondingly reduced. The population remains the same, of course, but the pressure to intensify land use is diminished. At the same time, those individuals who enter developing industries such as tourism are likely to switch over to the adventurous trader strategy and this trend should in the longer term, result in a diminution of the rate of population increase.

So tourism, (and other industries that are not directly land-based), sensitively handled*, could result in a quite rapid relaxation of the pressure that the present population increase is placing on the land in general and on the forest in particular whilst, in the longer term, it could act so as to stabilise the population itself. This is not to suggest that tourism is the *only* way of doing something to remedy the environmental problems of the Himalayas but only that it might provide us with an exemplar—a paradigm as it were—for the designing of policies and policy instruments in situations characterized, at the macro level, by the management of powerlessness and, at the micro level, by a cause that is the aggregation of the strategically determined acts of myriad individual agents.

III. SOME STRATEGIC IMPLICATIONS

There is a growing awareness that conventional approaches to development in the Himalayan region have been a largely frustrating experience. Increasingly, those who work in the development field are having to step back from their problem to ask themselves what has gone wrong with their solution.

There has been an inadequate use of learning in development programs. The short-term, result-oriented, project approach is doomed. We have to be very modest. There is an enormous need for humility both in our capacity to understand and intervene in these processes.**

In all humility, we propose the appropriate institutional development

experts are all agreed that they do exist within the Himalayan states and regions and that they constitute a serious problem.

*There is, of course, the argument that tourism too is land-based in that it makes rapacious demands on food and fuelwood (and on labour that otherwise would have been committed to agricultural production). Tourism is often castigated as the goose that lays the golden eggs and fouls its own nest in the process, and this indeed is often the case. But, as the Austrian example shows, tourism can be handled in such a way as to maximise the golden eggs and minimise the nest-fouling and, as we explain in the next chapter, the Himalayan margin is rather well-equipped institutionally to handle tourism in this way.

**John Cool (Agricultural Development Council, Kathmandu). Statement made in introductory remarks at the International Workshop on the Problems of Mountain Renewable Resources Development held at Mohonk, New York, December 1982.

approach as a useful way of simultaneously learning about the development process and, through that learning, of identifying the points of leverage that furnish the only opportunities for us to intervene constructively in that process.

Development, on this humble view, is something altogether greater than the totality of development projects. Development encompasses the whole process; development projects can be usefully fed in only at such points of leverage as exist within that process. Mark Twain's advice—not to let your child's schooling interfere with his education—has, we suggest, a counterpart on the macro level—not to let your nation's development projects interfere with its development.

The strategic implications of this humble approach can be explored by way of three substantive manifestations of this important distinction between development and development projects. First, the matching and mismatching of technical fixes and institutional supports; second, the intervention implications of "top-down" and "bottom-up" development; third, the relative merits of "grand design" and "tinkering" solutions.

STRATEGIC EXPLORATIONS 1: TECHNICAL FIXES AND INSTITUTIONAL SUPPORTS

One convenient way of bringing the conceptual framework down to earth is to quickly search through the literature to extract from it a list of technically feasible prescriptions—technical fixes—from galvanized gabions to intra-uterine devices, from solar stoves to mini-hydro, from miracle rice to compulsory re-settlement, from eucalyptus groves to social forests ... and so on, and then to offer them up to our conceptual framework [in the building trade sense of seeing whether the new part will fit with the existing (w)hole] so as to get some feel for whether they are likely or not to enjoy institutional support. Since "technical fix" tends nowadays to be used as a euphemism for technical fixation, we should stress that we are not using it in this pejorative sense. Whilst we would reject the bone-headed approach that, when a fix bumps up against an institution, insists that it is the institution alone that will have to give way, we feel that that approach is today little in evidence and that, by and large, the quite clearly perceived cooperative challenge is to bring some sensitivity to this "offering up" exercise in which technical fixes meet up with, or are rejected by, their institutional supports.

Since for many of these technical fixes the appropriate "delivery" level is the village whilst the "provider" level is that of central government/international agency, there is always the likelihood of institutional mismatch; a "good" project will enjoy macro-institutional support (that is why it's "good") but quite possibly will not enjoy micro-level support. So there is, first of all, a problem of *institutional transfer*—a problem that is often made even worse by being misinterpreted as a problem of technology transfer. Conversely, projects that would probably enjoy institutional support at the village level are often strangled at birth because they do not have support at the macro-level, and therefore come off the project production line as "bad" projects.

With this simple idea we can offer up technical fixes to these two levels—macro and village/individual—and put pluses and minuses against them according to whether they will enjoy institutional support or not. At this stage we should also try to flesh out this scorecard with *development vignettes*—little case studies—that illustrate the various permutations. However, whilst

we do have quite a number of these vignettes, we feel that it would be invidious to parade them in this way. Instead, we prefer to leave the "development vignette" boxes blank and to invite the thoughtful reader to fill them in from his own experience, and to his own satisfaction.

Probable Result	Institutional Support		
	Macro level	Micro level	Development vignette
No Problem	+	+	
Problems of Implementation	+	-	
Strangled at birth	-	+	
Dead loss	-	-	

Figure 1. The simple scorecard

But, of course, each of these levels is not institutionally homogeneous. At the village level, for instance, landlords may support and tenants may not, or vice versa. At the macro level an international agency might support and a ministry might not, or vice versa. So we have to be prepared to break down the scorecard even at these specific levels so as to take account of institutional plurality and institutional contention. As we do this our increasingly complex matrix of pluses and minuses carries us, at the village level, right into the realities of power as manifested in the land tenure system and, at the macro level, takes us into the realities of power as manifested in the management of impotence and in the vertical integration/horizontal insulation of ministerial sectors.

Once these two institutionally mediated power struggles have been revealed in this way, we can begin to offer some prescriptive guidelines for their evaluation and modification. At the village level, anything that increases the security and local control of the peasant farmer will also increase the total *quantity* of power within the wider system. But there are some constraints. It would, for instance, be difficult to do this in ways that did not at the same time benefit the landlord. So there has to be facilitation between these two institutions—landlord and tenant. Such facilitation would focus on the land tenure system which, contrary to prevalent belief, can at certain times and in certain places become quite flexible. For instance, in recent years rather diffuse rent strikes in the Kathmandu Valley have, by and large, been accepted by the landlords who, having seen the writing on the wall, have been easing away from investments in agricultural land and towards new business opportunities in and around the capital (a move, incidentally, that severs the equation of land with wealth). A few landlords, however, did take legal action to obtain their rents but the courts found in favour of the tenants. So here we have an instance of quite rapid, and quite large, *de facto* and *de jure* change in the land tenure system.

At the macro level the concern of the facilitator should be more complex. The aim should be to promote the integration of institutions in such a way as, first, to increase the *quantity* of power in the system and, second, to increase or decrease its *concentration*—depending on the achieved level of economic and political development. We would not claim that such judgment is easy, but we would point out that the apparent paradox of simultaneously increasing village level autonomy and concentrating power at the centre can perhaps be resolved by fractionating the issue. Such simultaneous aims are sometimes the appropriate goals of inter-institutional facilitation, particularly in cases involving the improvement of local incentives for increased private investment in agricultural land. Again, the issue is the land tenure system and the solution is for some fractions (e.g. ultimate title) to go to the centre and for others (e.g. rights of usufruct) to go to the periphery. When we look, we find that the land tenure systems in the Himalayas always have been fractionated (for all sorts of pragmatic reasons) and may, therefore, prove to be quite amenable to this sort of approach. [Regmi 1976]

However, to fully resolve this paradox we do need to examine another political (constitutional, even) variable—consent. A particular configuration of institutions functions as a total system only when two opposed flows regulate their exchange relationships—authority from top to bottom and consent from bottom to top. Individuals (or groups with representative individuals) can readily negotiate these exchange relationships to reach positions where each party is better off than they were before, but diffuse institutions (which abound in the Himalayas—castes, for instance) often require some sort of *third party facilitation*.

STRATEGIC EXPLORATIONS 2: SMART MARKETS AND STUPID PROJECTS

So these rough "scorecards" (both the simple and the complex ones) should give us some useful indications of technical fixes that, if pushed through at the macro level, would probably "take" at the micro level. At the same time, they might give an early warning system for those "good" projects that will probably be disasters once they are pushed down to the village level. But these sorts of prescriptions—sensitive and helpful though they are—are not all that we can get out of this approach. In a way, they begin to provide a map of key contextual boundaries. Indeed, it may be best to regard them just as a stage—a heuristic device—for moving to a deeper and, to some extent, more familiar synthesis.

An economist, on seeing one of the complex "scorecards" with its vague patterns of pluses and minuses, would be eager to translate it into his familiar, and powerful, notions: market incentives and social sanctions. So (aside from the serious but handleable quibble that market incentives *are* a particular kind of social sanction) it should be feasible to move on from this rather *ad hoc* approach to a more coherent framework that takes its shape, not just from technical fixes and mixed institutional responses to them, but also from the social processes that underlie them. [What we have in mind here is the appropriation to the business of institutional development of the *new institutional economics**. We can here do no more than mention this possibility and

*In which markets, hierarchies and egalitarian groups (sects) are seen as competing, yet complementary, arrangements for the handling of social transactions. Each has its advantages and its disadvantages and the concern is not with which one is right—that is a meaningless question—but with the question of appropriateness: "which kinds of transactions are best handled by which kind

underline the rich promise that it holds.]

Returning to the simple "scorecard" for a moment, it is interesting to note a certain asymmetry within its matrix. If we draw a diagonal from the top left to the bottom right corner then we can see that the projects in the top right triangle often come to pass whilst those in the bottom left triangle tend to remain hypothetical. The reason, of course, is that projects have first to pass through the needle's eye of macro level acceptance before they can go on to be realized at the micro level. The message is simple but profound: *there is no "bottom up" approach.*

The profundity of this message becomes apparent once we observe that, whilst there can be no "bottom up" development projects (i.e. interventions), there is lots of "bottom up" development (i.e. process). Not to heed this message can lead to needless and wasteful difficulties. To modify what they say in Chicago, "Projects may be stupid but markets are always smart".

In the trees beside the monastery at Tangboche in Khumbu there is a curious triangular building of wood and glass that looks as if it has just been dropped there from out of the sky. We suspect that this is indeed how it got there, since it is a part of a New Zealand aid project for the Everest National Park and the Park Warden's pre-fabricated house (and even his cast iron Aga stove) were flown in by Pilatus Porter. This triangular oddity—the Tangboche Trekkers' Lodge—is a tourist facility and, since tourists need facilities, its presence there might, on reflection, seem reasonable enough. But just around the corner from it, tacked onto the outside wall of the monastery in an agreeably higgledy-piggledy way, is a thriving chang-house-cum-yak-caravanserai that has over the years effortlessly evolved to cope with the unpredictably changing volume and structure of the passing trade.

Of course, this is a fairly trivial example but it does serve to illustrate a serious disability—*project blindness*. All too often we cannot see the unplanned (and free) indigenous success for the planned (and costly) alien failure that, we have convinced ourselves, should be the solution to the problem. What problem? Just as, if there is no solution, there is no problem so too, if the solution is already in place, there is no problem. This is not to say that markets are always right and that planning is always wrong; only that we should develop a feel for the different sorts of contexts that render the one more appropriate than the other. In the case of the Tangboche Trekkers' Lodge this feel has not been developed, with the result that the "top down" development project has failed to mesh constructively with the "bottom up" development process. One great advantage of markets, when it comes to project blindness, is that they are like mushrooms—when conditions are not appropriate you don't see them, and when conditions are appropriate they spring up overnight. All you have to do is watch to see where markets do spring up and where they do not spring up and that pattern will reveal to you the underlying institutional deployment of market incentives and social sanctions. For example:

Dudh Kosi, Nepal

The Sherpa wealth that is generated in Kathmandu tourism pours back into Khumbu. The regular Sunday market in Namche has grown, and is still growing, at an astonishing rate and, as it grows, it sucks into its ever-widening orbit more and more of the downstream inhabitants. It is now worth the while of many of these Rai villagers to walk for a week

of institutional arrangement?"

or more carrying loads of grain, pork and other produce to this market and many have established regular contractual agreements whereby a Sherpa trader guarantees to buy (at an agreed lower price) the surplus that may be left over if market business has not been brisk enough.

Kali Gandaki, Nepal

The Thakkalis of this valley put even the Sherpas in the shade. Their traditional services along this caravan and pilgrim route have adapted effortlessly and ingeniously to take advantage of the tourist throng that now passes along this most popular of trekking routes. Across the Thorong La, the Manangbhotis are doing much the same but have also negotiated with the government special trade concessions with Bangkok to compensate (so they argued) for their lost trade with Tibet.

Kulu/Ladakh, India

Throughout this vast stretch of country there are many, sometimes tragic, instances in which the indigenous and essentially unplanned local enterprise is at odds with the imposed "solutions".

*Carpet and
Tanka Industries*

The Tibetan carpet industry has thrived, both in India and Nepal. There are, however, some interesting differences. In Dharmasala the Dalai Lama has imposed quite strict quality control (of both materials and design); in Kathmandu quality control has been left to the discretion of individual entrepreneurs, the result being a wider range of products with the traditional quality end remaining largely in Tibetan hands while the cheaper and more exuberant end has been developed more by Newaris. The increasing commercial production of *tanka* paintings—an activity much decried by art historians—seems to be dominated by individual Tamang artists.

The Terai, Nepal

The clearing and settlement of this formerly malarial tract during the 1960s and '70s is a smaller scale repetition of the sort of process that took place on the plains of India almost a century earlier. In the Nepalese case the process was planned but the planners were unable to control the process. As has happened so often in both urban and rural development around the world, squatters have produced a *fait accompli* that is very different from what the planners had in mind.

Bhumthang, Bhutan

The preliminary plans for the development of tourism in this area [Jest and Stein 1982] are flexibly designed so that they can readily be evaluated and adapted as they meet up with just this sort of unruly "bottom up" development in the course of their implementation. The planners concede that unplanned change is inevitable and that much of the planning process should be concerned with preparing for this—both for the unplanned change that can be anticipated and for that which cannot. These plans, it would seem, provide an interesting

example of appropriate institutional development planning which should be carefully monitored for the valuable lessons it will provide.

To summarize, the great perceptual corrective in the institutional approach is that it draws our eyes away from the technical fixes and prescribed solutions that are handed down from on high and towards the diffuse and pluralized institutional reality on low—what is actually happening in and to the development process. We can see from the markets that spring up what is being ingested and why, and we can see from the project failures what is being rejected and why. Eager to learn from development history, and equipped with some conceptual understanding of these two forces that shape the development process—acceptance through markets and rejection through social sanctions—we can now begin to approach environmental policy in a potentially useful way.

STRATEGIC EXPLORATIONS 3: GRAND DESIGN VERSUS TINKERING

Though markets are always smart (they are defined as such) they are not always eco-smart. Though sanctions exist for good social reasons they are not always there for good ecological reasons. We can ask (and reasonably expect an answer) whether current markets and sanctions (as they are variously deployed in specific Himalayan settings) are eco-smart or not, and we can then go on to ask whether there are any policy options/instruments that might help to strengthen those that are eco-smart already, and to steer in a smarter eco-direction those that are not.

What this means, in practice, is:

- (1) Close, careful and continuous observation, evaluation and monitoring of specific on-the-ground processes. For example, of the Namche Market and its effects upon the strategies of the Rai who are increasingly drawn into its orbit, of the environmental effects of these changing Rai strategies, of the environmental effects of all this at the Namche end as well, and so on. Another example would be to design this sort of monitoring and learning component into the development plan for the Bhumtang area of Bhutan from the very beginning.
- (2) Continual facilitation (again, in specific on-the-ground contexts) aimed at revealing patterns of social sanctions that are way below the Pareto optimum and, thereby, helping them to readjust into a more optimal configuration. Such revelation is not just for the edification of the facilitator and the "decision maker"; to be effective it has to be a mutual process that involves all the people who are actually applying the sanctions.

For example, a social forestry project team arrived in a Nepalese village and immediately set about clearing lines (in preparation for planting the eucalyptus saplings they had brought with them) through the sad-and-sorry remnant of a forest that they found there.* To their surprise and dismay, they were set upon by the villagers who, brandishing sticks and *kukris* (large curved knives) chased them out of the forest and refused to let them back in. The members of the team, anxious to do what they had come to do and fully authorised by the government to do it, found themselves unable to do it. They

*We are indebted to Jeff Romm for this vignette.

had two options: go away or try to talk to the villagers. They chose the latter.

What had so incensed the villagers, they learnt, were the straight lines and the eucalyptus saplings. Though straight lines and eucalyptus saplings spelt good forestry practice to the team, they spelt unwelcome government control to the villagers. (Fences, too, it turns out, can be similarly repugnant at the village level and in some recent successfully facilitated social forestry projects the villagers have actually persuaded the government not to go to the expense of putting fences around the forests and have themselves provided, and paid for, forest caretakers instead). As they talked to each other, the divergent aesthetics of the team members and the villagers became more and more apparent to them both. As the leader of the project put it, "It gradually became clear to us that our idea of what a healthy forest looked like was very different from their idea of what a healthy forest looked like". He described the facilitation process that eventually got the team back into the forest (but this time with the approval of the villagers) as a negotiation between these two aesthetics. Each side conceded that the existing forest was way short of its aesthetic ideal. It was, they both agreed, an ugly forest.

In other words, it was sub-optimal, and the issue was not *whether* it should be changed or not—both agreed that it should be—but *how* it should be changed. The team's aesthetic and the villagers' aesthetic defined different directions of change, and the big question was whether these paths could be reconciled. The two aesthetics, fortunately, turned out not to be fundamentally contradictory and, step by step, the villagers and the team negotiated a synthetic aesthetic that integrated much of the good practice of the social foresters into much of the traditional practice of the villagers, and discarded the straight lines and the eucalyptus saplings in the process.*

All this was several years ago, and the leader of the team has recently revisited the area. The forest now, he says, looks nothing like the idea he had then of what a healthy forest should look like but he is adamant that, nevertheless, it *is* a healthy forest. "The whole thing", he says, "has been a revelation to me."

All the strategic implications of the appropriate institutional approach are captured by this vignette. First, we see the vigorous rejection at the micro level of certain technical fixes—straight lines and eucalyptus saplings—that had already received institutional support at the macro level. And, in the facilitation process that follows on from the project's acceptance of this rejection, we see the sort of backtracking that is needed to modify the "top down" approach so that it meshes constructively with the "bottom up" development that it encounters as it makes the transition from the "provider" level to the "delivery" level.

Second, this backtracking exercise clearly demonstrates the veracity and strategic importance of the assertion: there is no "bottom up" approach. Only when the project has come down from the top to the bottom can it then turn around and start to move from the bottom to the top. And, as the descending development project meets up with the ascending development process, we see clearly the sort of mutual learning and adaptation that, when feasible, reveals both the existence of a point of leverage and the means by which constructive leverage can be applied to it.

*For those who would like to know what can be constructively done when the divergent aesthetics are fundamentally contradictory, the answer is nothing.

Third, we see that facilitation is possible only when the divergent aesthetics are not fundamentally contradictory and that, in consequence, points of leverage do not exist everywhere within the development process. In other words, much of the development process lies beyond the reach of deliberate intervention. We can intervene constructively only at those points where constructive intervention is possible. Yet it seems to us that the Grand Design approach to development planning refuses to accept this limitation—a limitation that, if accepted, would allow us only a tinkering role in the development process. (This distinction between Grand Design and Tinkering, we should stress, has nothing to do with the scale of development projects. The size of a tinkering project should be appropriate to its point of leverage.)

Students of urban development are at last coming to realise that the city is a social work of art which has a design but not a designer and that, in consequence, those who would aspire to remake it by grand and conscious design are being ludicrously presumptuous [Rowe and Koetter 1981]. The same lesson holds for those who would do something for the Himalayas. Just as the megalomaniac quest for the blueprint for the modern city is giving way to a humbler effort to understand the diffuse business of *bricolage* by which the city changes, so developers-in-the-large are at last shifting their focus from immaculate technological prescriptions to the institutional details that keep getting in the way of those prescriptions. As this focus changes so the need for understanding increases. Understand the diffuse institutionally generated processes by which the system you would intervene in is maintained and transformed and you will then have some clues as to where there might be some leverage—some chance of nudging it in a more desirable direction.

The mechanic in the backstreet garage cannot redesign the faulty engines of the cars that are brought to him; but he can tinker with them. And, knowing this, he develops the appropriate skills. There is the story of the motorist who, having tried everything he can to get his car to start, finally pushes it round the corner to the garage. The mechanic lifts up the bonnet, looks at the engine for a while and then, selecting a large hammer from his tool tray, gives it a hefty clout. "Try it now" he says to the owner, and it starts first time. "How much do I owe you?" asks the delighted owner. "Ten pounds" says the mechanic. "Ten pounds" says the owner, his face dropping, "ten pounds for just hitting it with a hammer?". "Oh no" says the mechanic, "fifty pence for hitting it with the hammer, nine pounds fifty for knowing where to hit it."

Knowing where to hit it—that's what sustainable development is all about.

IV. SPECIFIC RECOMMENDATIONS TO UNEP

The development community does two things—it acts and it thinks. The relationship between the two is complex but suffice it to say that each, to some extent, shapes the other. Development action, you could say, takes place within a conversation about development—a conversation that has been going on for many years and that, despite the discord, the circularity and the eternal themes it contains, does have a certain momentum. Currently that momentum is, in certain quarters, imparting more and more credibility to the theme that large-scale aid (international and governmental) is not only useless but positively harmful.

- It is true that all too often large-scale official aid ... supports inefficient or corrupt governments and that it is frequently spent on extravagant prestige projects which have little relevance to the poor. [Brian W. Walker, Director General, Oxfam, Letter to *The Times* 18 April 1983].
- Without foreign aid there is no Third World. [Bauer and Yamey. *The Times* 11 April 1983].
- I am not convinced that a UN agency is capable of coordinating a "new approach". I believe that the UN agencies and big government programs *are* a large part of the problem. [Personal communication from the head of a small voluntary agency.]
- Overseas aid is just a way of getting the poor people in the rich countries to help the rich people in the poor countries. [Anon]

Open season has been declared on the Big Agencies, and those of them desirous of avoiding extinction should devise some strategies for coping with this latest threat. Perhaps the simplest solution for a Big Agency is for it to make itself appear small and this, in fact, is precisely what the strategic insights that flow from our conceptual framework suggest.

The notion of a development process that is open to constructive intervention at only certain points of leverage, (and, even then, only if the intervention is institutionally appropriate) suggests that both institutionally inappropriate interventions at these points of leverage *and* attempts to intervene at other points where constructive intervention simply is not possible, are likely to be positively harmful to the process. The main strategic contribution of this appropriate institutional approach, therefore, is a useable basis for separating the useful interventions from the harmful ones. It provides guidance not only on what to do but also, and more importantly, on what not to do.

What this all boils down to is a strategy that takes its shape from two commitments: the first to the uncovering of patterns of heterogeneity as a basis for a practical and local understanding; the second to tinkering as the only feasible way of intervening. Knowing where to hit it is a knack that is not easily acquired, and some of the pitfalls along the way to its acquisition can be mapped out by a little cautionary tale—the Sahel.

In 1977 the UN Conference on Desertification (UNCOD) agreed a programme to reverse the overgrazing and over-cultivation in the Sahel and create green belts north and south of the Sahara to halt the spread of the desert.

A programme to reverse these vast homogenized effects, and to throw a green belt around the Sahara, is a very grand design indeed. Between the agreeing of a programme and its delivery, between the vast coordinated project and its implementation, there is often a wide abyss.*

In a 90 page report, Earthscan [1983] blames a sequence of "personal and organisational antipathies" for the failure of plans to save the Sahel, despite aid worth more than 4,000 million pounds committed to the region between 1975 and

*The classic work, subtitled "How Great Expectations in Washington are Dashed in Oakland" is Wildavsky and Pressman (1973).

1980. These frictions had "sometimes resulted in agencies working almost openly against one another." [This and preceding quote Samstag 1983].

At first glance the idea of developing an integrated interagency approach, within which one agency (UNEP perhaps?) will take a central coordinating position, is powerfully attractive. But there are three serious objections to this strategic option.

First, the fact that the Himalayan states sustain their autonomy by playing the agencies off, one against the other, suggests that it would be difficult (impossible perhaps) to achieve this desired integration and that, to the extent that it could be achieved, it would actually be imposing dysfunction upon those Himalayan states—something that, surely, must be undesirable. Second, integration and coordination inevitably reduce diversity, redundancy, duplication and overlap—the very system properties that, in a setting characterized by high levels of uncertainty, should be conserved if fragility is to be avoided and resilience husbanded.* Third, an integrated and coordinated effort, especially if one agency is to take up a central position within it, is not something that can be evolved step by gradual step. It has to be large and complete to begin with and this means that it has to be right first time. In other words, learning, flexibility and opportunistic adaptation—precisely the approach qualities needed when the chances of getting it right first time are vanishingly small—would actually be ruled out by the integrated and coordinated approach.

All this suggests that the integrated approach is probably impossible and that, even if it is not impossible, it is probably undesirable. At the same time, it suggests that the "hundred UN flowers" approach is probably unavoidable anyway and that this, far from presenting us with an intractable problem, is all to the good. Accordingly, we urge the following strategic orientation.

1. UNEP should resist the temptation to go for integration and coordination in its Action Plan and should, instead, look for a *distinctive approach* that will add to, rather than reduce, the multiplicity in approaches that already exists.
2. The appropriate UNEP approach can be distinguished by just one word: *institutions*. Existing approaches, focusing on the bio-physical level, all seek to formulate policy by working from the environment to the institutions. We believe that our conceptual framework, by focusing on the macro- and micro-social levels and by emphasizing the uncertainties at the bio-physical level, will encourage the development of that complementary and currently neglected approach to policy formulation that starts with the institutions and works, through them, towards the environment.
3. In adopting this distinctive and counter-integrative approach it does not follow that there is no need to develop a consensus among the various UN (and other agencies) involved. But that consensus will be achieved, not by getting all the agencies to agree to a single integrated approach, but by UNEP obtaining agreement (through a series of bilateral conversations, as it were) that its own distinctive approach *complements* those of all the other agencies.

*See, for instance, Landau, (1989).

4. We urge that the distinctiveness and initial modesty of the UNEP approach can best be preserved by deliberately avoiding a commitment to new projects. Rather, the aim should be to draw upon the conceptual framework so as to *learn* from the successes and failures of existing projects and, since learning is a two-way process, to sharpen and modify that conceptual framework in the light of what is discovered.
5. By starting out *small-scale and modest*, and within a relatively easily obtained consensus, UNEP will remain flexible, adaptive and opportunistic. As the approach evolves so, if it lives up to the promise we believe it to contain, resources and credibility will flow to it. If they do not, then the enterprise can be quietly abandoned, the only losses being the small amounts of resources and credibility that will, by then, have been committed to it.

THE ACTION PLAN

The task now is to work up this strategic outline, with one eye all the time on these pitfalls, so as to generate a set of specific proposals for an action plan. We do, of course, have some general thoughts on this.

- (i) We think that UNEP should avoid too close an on-the-ground involvement in projects (after all, how could it hope to match the sorts of skills that FAO, say, has acquired over decades of practical experience).
- (ii) Conversely, we think that it should develop a very close on-the-ground involvement in both *project evaluation* and *certainty creation* (this latter would draw upon the conceptual framework to identify two sets - the bio-physical facts that it would be most useful to know and the bio-physical facts that we are most likely to be able to know. Attention could then be concentrated on the intersection of these sets).
- (iii) Putting these two ideas together, we begin to see UNEP as performing a sort of "merchant banker" role in the promotion of institutional integration by facilitation throughout the Himalayan region—organisationally compact, well equipped to judge between desirable and undesirable projects, and very well informed.

But, regrettably, we know virtually nothing about UNEP as an institution, nor do we know anything about the context in which it operates. True to our approach, we deliberately hold back from making any specific recommendations at this stage. We hope that these will begin to emerge from the discussion that this paper is designed to promote.

CHAPTER 3: UNCERTAINTY ON A HIMALAYAN SCALE

I. WELCOME TO UNCERTAINTY

"The spiral of tragedy has taken its own route. There is suffering in the hills now and there will be considerably more suffering in the future. The Himalayas might well change completely to a semi desert ecology. They might not. But things will get worse before they get better." [Cronin 1979, p. 222]

A complex series of interactions between man and nature in the Himalayan region has many experts from various disciplines speculating about the probable course of events in the area. The literature on the Himalayan "eco-crisis" is replete with descriptions of rapidly expanding hill populations exploiting increasingly marginal land in an attempt to produce more food. As agriculture is extended so the forest cover is destroyed. Erosion and landslips decrease the productivity of soil, pasture and forest. There are all manner of self-reinforcing feedback loops in this system and traditional attempts by the farmer to better his lot or produce more food and fuel often lead to a worsening of the global situation in the hills and in the plains below [see, Eckholm 1976, Lall 1981]. The lowlands are subjected to the silt and water run-off from the denuded land above, as well as all the attendant effects of migration by hill people. Because of growing populations in both the hills and plains, more and more people are displaced or otherwise affected by food and fuel shortages, changes in ground and surface water flows and mass movements of land, water and people in the area. Social unrest has also been increasingly intermixed with the effects of these processes. Regional and international attention has been focused on this situation, and many governments and organisations are already involved in trying to find a solution to a perceived crisis.

But describing the nature and the extent of the problem is fraught with complexity and uncertainty. There are many levels of interdependent cause-and-effect relationships to consider in the context of extremely fluid and complicated ecological and social systems. And uncertainty has become just as important a feature of the problem as any of its other attributes.

The problem, all agree, is that the Himalayas are caught in a downward spiral. Yet, when we look at the key variables in current models that attempt to define this spiral, we find that the uncertainties are so vast that we cannot even be sure that there is a spiral. For example, the expert estimates of two of these key variables—the per capita fuelwood consumption rate and the sustainable yield from forest production—vary by such enormous factors that it is but a slight exaggeration to say that, if the most pessimistic estimates are correct, the Himalayas will become as bald as a coot overnight and that, if the most optimistic estimates are correct, they will shortly sink beneath the

greatest accumulation of biomass the world has ever seen. Despite our convictions as to the nature of the problem, the quantitative data can give us no guidance as to whether the spiral, if it indeed exists, is upward or downward.* Far from the problem containing some uncertainty—a common enough situation in applied science—it is the uncertainty that contains the problem. The credible problem definitions, thanks to all this uncertainty, span such a wide range that it no longer makes any sense to use methods that attempt to tune an already acceptable understanding of "the problem". Such a *tunable understanding* is possible only when the problem contains some uncertainty; it simply does not exist in the Himalayas.

Another way of talking about this switch from tunable to untunable problem that accompanies such a marked increase in the scale of uncertainty is to say that as we go from the one situation to the other so we go from science to *trans-science* [Weinberg 1972]. Trans-science is the science of messes, and the most important thing for the scientist who ventures into this region is that he be aware that he is entering it. This is because the tried-and-true methods that have long served him so well in situations that involve some messiness simply cannot be relied on to support him when he finds himself in a situation where there is nothing but mess. It is our contention that the Himalayas currently constitute such a region and that the scientists who have ventured into it have failed to switch across to the methods appropriate to trans-science. Furthermore, since these scientists have entered the region at the behest of policymakers, there has been a knock-on effect and the policy formulations generated by this inappropriate science have been similarly flawed. Our argument, therefore, proceeds in two stages. Firstly, a critical stage in which we show that the Himalayas are currently well inside the realm of trans-science and that both research and policy formulation, having failed to concede this, have been inappropriately conceived. Secondly, a constructive stage in which we try to develop the methods and the policy implications appropriate to the trans-scientific realm.

CIS-SCIENCE AND TRANS-SCIENCE

Policy issues can be approached in two ways. You can ask "what are the facts?" and you can ask "what would you like the facts to be?". In a situation where there is already considerable certainty about the facts (and especially where there is a good prospect of increasing that certainty even further) the sensible approach is by way of the first question. As the noose of certainty is tightened so those who are advocating policies that, to be justified, would require the facts to be other than they are will be forced to abandon either their positions or their credibility. But in a situation where there is wide uncertainty about the facts (and especially where there is little prospect of

*In circumstances such as this the traditional engineering response is to switch across to qualitative data—not just *any* qualitative data but qualitative data supported by the wealth of experience of those who provide it.

There seems to be little practical advantage in quantifying by sophisticated statistics the gap between the fuel needs and the available resources of firewood, for to anyone familiar with the region over a number of decades it is obvious that the hill forests are shrinking—in some areas more rapidly than in others—and that the needs of the population can no longer be met from the remaining forests. [von Fuerer-Haimendorf 1983, personal communication].

The engineer, you might say, switches to qualitative data and acts; the scientist sticks to quantification and recommends more research.

decreasing that uncertainty) the sensible approach is by way of the second question. If those who are advocating the various rival policies can all justify their policies without losing their credibility then they will simply stick to those positions. Here, in contrast to the first situation in which the problem contains some uncertainty, the noose is so loose that the relationship is the other way round and it is the uncertainty that contains the problem. This means that, try as you may, you cannot determine who is "right". But you can still do something—you can gain some understanding of why the various advocates take up their various positions.

When the noose of certainty is loose we are in the realm of trans-science and, as it tightens, we move across into the realm of what we are accustomed to call science but which, if we are going to be following policy issues back and forth across this divide, we should get used to calling *cis-science*. That way we can give equal status to each—they are just two *kinds* of science—and we can concentrate on the different methods and modes of enquiry that are appropriate to each. Since *cis-science* is quite familiar to us, it is the methods and modes of enquiry that go with trans-science that will appear strange; and none stranger, perhaps, than the *sociology of perception* (by which is included the history, philosophy and sociology of science and the sociology of everyday knowledge*) and that has to do with the institutional forces that confer and withdraw credibility.

A science, it is often said, has reached maturity when it can afford to ignore its history but this comforting idea of an irreversible progression—for instance, from natural history to the various biological and earth sciences—is currently being undermined by the emergence of forest historians, risk historians, climate historians ... carbon historians in response to such pressing and largely trans-scientific problems as "the greenhouse effect" and the whole question of the sustainable development of the biosphere. This distinction between (and even-handed legitimation of) *cis-science* and trans-science does not do away with the notion of scientific progress but it does reject the idea that it is always in the same direction. *Cis-science*, one could say, progresses by ignoring its history; trans-science cannot get along without it. Each has its part to play in the advancement of science. We are not opposed to *cis-science*; we are opposed to its misuse.

IS THERE A SPIRAL?

Analysis in terms of physical facts—the appropriate method of *cis-science*—has first to identify all the components of the Himalayan system and all the connections between those components. The result is a qualitative model made up of numerous labelled boxes, that represent the components of the system, connected together by a web of labelled arrows representing the dynamical processes that, *in toto*, sustain or transform the system. Before you can tell whether this system is being sustained or transformed (and, if the latter, the direction of that transformation) you need to know the relative rates of all these processes. At the very least, you will need to know the rates of those that can clearly be seen to be the key variables of the system. Uncertainty can enter into this analysis at several points. You may not have identified all the components of your complex system, you may not have identified all the dynamic processes that link those components, you may not have identified the key variables correctly and, lastly, you may not have achieved a

*This is the definition provided by Mary Douglas (1983).

sufficiently accurate measurement of the rates of these key variables. The Himalayas notch up impressively high scores on all of these possible sources of uncertainty.

For example, in trying to understand how fast the forested area is changing—one of the most important characteristics of the ecological structure of the region—you must first understand the pressures on the forest resource. One of the most significant demands is the need for fuelwood by farmers. In Nepal, farmers make up about 95% of the population, and it has been calculated (by the Energy Research and Development Group at Tribhuvan University, Kathmandu, Nepal), that about 95% of all wood taken from the forest is destined for use as fuelwood. Not only this, but the same group has estimated that about 87% of total energy consumption for the whole country is in the form of fuelwood. Most attempts to quantify the impact of this factor have depended upon measuring *the per capita rate of fuelwood consumption*. This, according to the prevalent models, is one of the most crucial variables for understanding the whole system* and many authors have used estimates of this rate to demonstrate the environmental impact of a growing population that must (they assume) depend on the land for meeting its subsistence needs.

A survey of estimates of this nationwide rate in Nepal [Donovan 1981, No. 14] over the last 26 years has revealed a range from 0.1m^3 (or 60 Kg.) to 6.67m^3 (or 4000 Kg.) per capita per annum—quantities separated by a factor of 67. Even when the two upper outliers are deleted (one of which may be a misprint)** we are still left with a range that differs by a factor of 26. Though the estimates do seem to cluster around the 1 cubic metre level, Donovan's investigation of the *range* of expert opinion is very instructive for those trying to assemble previous research data on the Himalayan region. Uncertainty of this magnitude on a crucial system variable is quite rare in the systems with which we are familiar. Even the vast uncertainties associated with estimating oil and gas reserves [Schanz 1978 and Wildavsky and Tenenbaum 1981] pale into insignificance when compared with this. And, in the case of fuelwood consumption, there is at least *something* that can be measured; in oil and gas reserves estimation there is nothing!***

*Assuming, of course, that the forests are being perceived and treated as a *renewable* resource within that system. If they are being perceived and treated as a *convertible* resource—forested land into agricultural or grazing or building land—then this variable becomes much less crucial and the conversion rate becomes the key variable. This deep uncertainty as to which of these is the key variable in the Himalayas is discussed further in the section headed *Some Credible Perspectives*.

**Donovan (op.cit. p. 4) makes the following observation:

On page 144 of Rieger et al., under the section entitled "Forest Administration in Practice", the authors report that according to the "Divisional Forest Offices ... firewood demand is 50 bundles per family per year". Possibly then the authors' subsequent estimate on page 152 of "per capita annual fuel consumption ... (of) 50-100 bundles of 40 kilograms each" is a misprint.

The fact that it simply is not possible to figure out whether or not this is a misprint is, perhaps, the most telling indication of all that the uncertainty contains the problem.

***The scientific guesswork in oil and gas reserves estimation is "... akin to going to an unfamiliar supermarket on a foggy night and trying to estimate the total amount of asphalt used in paving the parking lot with no other data than a cubic inch sample of the blacktop used." [Schanz p. 333]

CHALLENGES TO QUANTIFICATION

Such gross and persistent uncertainty, around something that is intrinsically measurable, demands some explanation. What obstacles, self-imposed and external, have got in the way of the fuelwood consumption estimators? The answers form a sad and familiar litany.

"All too often visiting consultants have neglected to explain the methods used to arrive at their expert opinions ... some estimates have been boldly quoted and requoted, often without citation, in ever more respectable documents, until a very casually contrived estimate has become the basis for policy formation and program planning." [Donovan 1981, No. 14, pp. 5 and 14]

Donovan's own investigation into fuelwood use in the commercial sector sheds some more light on the uncertainty of figures related to resource consumption in the Himalayan region. Much information is gathered by asking local people how much they use.

"... sometimes we felt the reply given was more socially or politically desirable than correct. At times there appeared to be an effort to present a facade of modernity; a few individuals preferred to guess weight, volume, or distance in international units rather than to report what they probably knew with greater confidence in traditional units ... Volume to weight ratios often vary from village to village, region to region and season to season. Time and distance are two additional variables presenting measurement problems, especially in a country where the average inhabitant does not own a time-piece and has little use for kilometers or miles". [Donovan 1980, No. 9, p. 5]

On top of these difficulties in collecting data where book-keeping is practically non-existent, and where (as anyone who has travelled in the Himalayas knows to his cost) people always try to give the answer they think you would like to hear, there are some other powerful forces at work shaping the data.

"... a universal dread of the tax collector appeared to hinder our attempts to secure accurate production and revenue data ... Although not as sensitive an issue as the more popular survey topics of family planning and farm management, the study focus on wood-fuel utilization did give rise to some degree of apprehension among those individuals questioned. Due to the rapid deterioration of Nepal's national forests during the last decade, the consumption of firewood and charcoal recently has come under scrutiny by government officials. In some districts where forest preserves have been established, local villagers now must obtain special permits to cut wood in areas which once were their common fuelshed; in Surkhet valley townspeople who have access to government fuel depots are denied such permits. Government forest regulations subject to enforcement by an inadequate, ill-equipped staff of field officers have had only limited success, however, in halting forest destruction. To our questions regarding forest utilization, I often felt informants gave a politically appropriate response rather than actual fact. Many times individuals were hesitant to name their suppliers or geographical source. In several instances we were told to return at dawn if we wanted to talk with the charcoal producers. Fearful of government surveillance these people carry their loads into the cities and towns

under the cover of early morning darkness". [Donovan 1980, No. 9, p. 8]

It is indeed difficult to gather factually accurate information under these circumstances. We say "*factually* accurate information" because, of course, the information that is gathered does quite accurately reflect the various social forces that are at work in the Himalayas. In this sense, it is *institutionally* accurate and, as we shall argue later, perhaps institutional accuracy is more valuable (and more accessible) than factual accuracy. Though "proper" research methods are supposed to control sources of bias such as these, they have clearly met their match in the Himalayas. But, even assuming that the information that has been gathered can be controlled for bias, it still has to be assembled into a conceptual framework that is consistent with the context from which it was derived, and herein lies the next obstacle.

CHALLENGES TO CONCEPTUALIZATION

When trying to fit a factor such as per capita fuelwood consumption into a quantitative causal model of impact on forest resources, the "consumption" concept is often used as a proxy for "demand" or "need" in order to provide a gross measure of pressure on resources. This is probably a better proxy than many arbitrary guesses, but it has been noted that there are sometimes extreme variations in fuelwood use in relation to region [Donovan 1981, No. 14], availability [FAO 1974], season [Kawikita 1979], foodgrain availability and farm management styles [Bajracharya 1980]. People do not just *have* needs; they *manage* them. They use more wood when it is easier to get and less when it is more difficult to get.* And, even when a number is put on a concept such as per capita fuelwood consumption, the researcher, focusing on numbers alone, "may lose sight of their context, and thus, their relevance and reasonableness". [Donovan 1981, No. 14, p. 14]. The generalization of a locally derived figure is often unwarranted, and it often does not have any significance as a behaviour indicator under slightly different circumstances. Nonetheless, many numbers, we find, are treated in just this manner.

"Firewood is used at a rate of 546.3 Kg. per capita per annum in Nepal. The estimated sustainable yield of firewood production from Nepalese forests is only 77.9 Kg. per capita per annum (1978). This represents a loss to the nation of 6.5 million tons of wood a year. With firewood scarce and expensive, the Nepalese are beginning to use dried animal manure for fuel, which results in lowered fertility on fields that previously were fertilized with manure. In addition, fewer people are boiling their drinking water, and eating hot meals because fuel is too precious. This leads to greater health problems because of poor nutrition and contaminated water." [Library of Congress 1979, p. 39]

Besides expanding on the logical consequences of fuel shortage, this sounds very authoritative and precise. But not only is there no feeling for the uncertainty of the consumption figure, and its local contexts, there is also no mention of the inherent assumptions of forest productivity or even forest area

*For instance, von Fuerer-Haimendorf (1975) has reported that when he was first in the Khumbu region (in 1957) every house kept a fire going all the time but that when he revisited the area (in 1973) they were only lit for cooking. This must represent a saving of at least a third and indicates that the Sherpa fuelwood consumption rate is highly elastic.

which led to the 77.9 Kg. per capita per year figure for "sustainable yield" of firewood.*

Indeed, the very definition of what constitutes "forest" (and other resource inventory classifications) adds still more confusion and technical uncertainty to the understanding of what is happening in the Himalayan region. Those who have taken the trouble to look in both places know that a forest on a bureaucrat's map is not always the same thing as a forest on the ground.

"In fact, even in the protected forest area, one finds considerable tracts of small shrub ... it is not uncommon to find vast areas of open ground which support only shrubs although they were formerly forested and are still counted as forests in official statistics because of unrecorded deforestation." [Parikh 1977, p. 1974]

"Published national forestry statistics are often misleading. They usually cover only those wooded areas officially designated as forest lands by governments and even the figures for those areas are sometimes grossly doctored. The United Nations researchers carrying out the 1963 World Forestry Inventory discovered that as much as half the area reported as 'forest land' in many countries was also labelled 'unstocked'—generally a euphemism for partially or wholly denuded lands on which reforestation remains a hypothetical prospect." [Eckholm 1976, p. 37]

Because of this data problem, it is often difficult to assemble a picture of regional land use patterns, or to even make intelligent estimates of potential forest production, because you need to know how much forest there is to do that.**

Fuelwood consumption and supply, of course, is only one aspect of the Himalayan people-and-resources system and we should now move on to see whether the spectacular levels of uncertainty that surround it apply elsewhere in the system.

*A cursory investigation of "sustainable yield" calculations reveals that different forests grow at different rates, and that even the same sorts of forests grow at different rates in different areas. Yield calculations often involve the multiplication of several estimated quantities such as forest area, forest density, and average growth rates. Errors made in any one of these values are compounded in the product. Taking the value of "forest growth" alone, it is not surprising that different methodologies and sample areas have produced estimates of "forest growth" varying from less than $0.2\text{m}^3/\text{hectare}/\text{yr}$ (1976 Tribhuvan University study for areas near villages) through the 1978 World Bank *Forestry Sector Review* for Nepal which reports forest growth at $0.8\text{m}^3/\text{hectare}/\text{yr}$., through $12.5\text{m}^3/\text{hectare}/\text{yr}$ (Levenson 1979) through Wormwald's 1978 reports of $15\text{-}30\text{m}^3/\text{hectare}/\text{yr}$ for areas in west central Nepal.

**Satellite remote sensing studies may now be helping to resolve this difficulty, but ground truth tests and detailed surveys are still in their early stages.

FROM MEASUREMENT PROBLEMS TO CAUSAL UNCERTAINTY

Data derived from survey questionnaires can often be deceptive. The statistics used to quantify agricultural production and associated land-use patterns have been investigated by a team from the Research Centre for Nepal and Asian Studies at Tribhuvan University in Kathmandu.

"In a study of the reliability of single visit surveys in Nepal, it was found that error on crop yields exceeded 180% for more than 20% of the farms ... (for all farms, 54% of the households reported erroneously their land holdings, with an average error of 240% ...). In a separate study, it was also found that 80% of the respondents did not fully understand the questions they were asked to answer ... These results which vary from village to village point to the fact that non-sampling errors are greater than sampling errors." [UNDP 1980, p. 27]

Further technical uncertainty is encountered in analysing the human components of erosion, flooding and shifting hydrological patterns. Since only that part of a process that is caused by human agency can be altered by altering human behaviour, the whole question of how much of the damage inflicted by these processes is due to human activity in the hills and how much is due to events which would occur whether man were present or not has become increasingly important to policy makers.

In a paper presented at a seminar on the Himalayan region, several geologists agreed:

"The tectonic stresses which heaved up these mighty ranges in the recent past have not completely died down as yet, and provide additional impetus and vigour for the dynamic processes. These processes are manifested by intense seismic activity, floods, and mass wastage observed in this region." [Department of Science and Technology, Government of India 1978, p. 9]

Obviously, flooding and erosion are part of the natural Himalayan environment. In the flooding case, the policy relevant question has become: how are these massive floods related to the land-use activities of upstream people and has the problem become more serious in recent years because of upstream deforestation? [The following description is not intended to minimize the importance of forests in highland/lowland hydrologic systems but rather to give a sense of a more complex relationship than is usually assumed.]

Upstream deforestation has been repeatedly, and categorically, labelled as a cause of catastrophic flooding.

"The major common factor is the increasing damage to the lowland agriculture of India, Pakistan and Nepal by floods loaded with debris from misused high altitude watersheds. These floods are due to increasing populations of subsistence farmers on steep mountain slopes in remote areas." [Pereira 1981, p. 3]

And, in much the same vein:

"In 1979, India suffered \$2 billion in property damage and numerous lives in the Ganges Valley in part because of deforestation in northern India and Nepal." [Cultural Survival Quarterly 1982, p. 3]

But, in a monsoon-dominated climate, even forested watersheds can lose much of their protective effect when they become saturated. A study [Ross 1982] by a weather observer (Russell Ambrosiac of NOAA) has revealed that the weather pattern associated with the 1978-79 record floods of the Ganges released most of its moisture on *forested* land. If a heavy storm strikes when the 'sponge' is already full (a common enough situation during the monsoon) most of that precipitation will become run-off, there will be little buffering effect, and catastrophic floods will ensue. So it is oversimplistic to say that protection of forests in highland watersheds will put an end to flooding in the plains.

The bulk of the Himalayan literature paints a picture of increasing run-off from deforested slopes leading to ever increasing flood damage in the lowlands. It is actually very difficult to document whether catastrophic flooding is more serious now than before simply because flood damage statistics are usually published in monetary terms, and "flood damage" is bound to increase along with increasing population and associated development in floodplain areas.*

"It is true that mountain torrents have increased as a result of deforestation, but with widespread flooding, the connection has not been very well documented. The upstream problems alone justify reforestation projects, but if you try to justify them on the basis of downstream flooding, that could be vulnerable ground." [Eckholm 1982]

The academic research community has prepared a whole battery of ongoing research projects to try and answer the question of how much human activities contribute to flooding and erosion [e.g. UNESCO 1977, p. 28] but, in the meantime, the linkage between upstream deforestation and downstream flooding is a key policy consideration in the Himalayan region because "upstream causes" are often located in one country and "downstream effects" in another. The number of people who are affected is also an important consideration in this international framework because this number provides an initial guideline for the priority of disbursement of financial assistance to nations and organisations with interests in the region. In this economic and institutional context it is interesting to note the points emphasized by the Nepalese Ambassador to the United States, (Nepal is heavily dependent on foreign loans and grants) and by the international academic community concerned with scientific research in the Himalayan region (financed largely by UN organisations).

When asked if deforestation in the hills of Nepal led to catastrophic flooding in India, the Nepalese Ambassador replied, "It is obvious there is a very clear and direct link" [Thapa 1982]. This perfectly legitimate position (given the current uncertainty) provides one more item in the list of justifications for the channelling to Nepal of increased financial assistance out of proportion to its own population. Likewise, all the academic experts who participated in the UNESCO Man and the Biosphere Activity in Southern Asian Mountain Systems in Kathmandu adopted the statement:

*And also with increasing disbursements, by government and international agencies, of flood damage compensation and relief. See Kunreuther (1969) for an account of how this has happened in the US.

"Although only about 40 million people live in the Hindu Kush Himalayan mountain lands, about 350 million live in adjacent large river basins and plains, and are seriously affected by conditions in the mountain areas." [UNESCO 1977, p. 15]

Flooding figured prominently in their list of effects and, since so many people were affected, the participants (again, quite legitimately) concluded that this was one more reason why further research should be funded to study mountain problems. So the experts are just as busy assigning salience to the data in response to their institutional pressures as are the hill farmers, the ambassadors, and anyone else with a stake in the region. In other words, they are biased.

The "hard" scientist may find such a conclusion discouraging—insulting, even—but the sociologist of science sees it all in a more encouraging and complimentary light. First, it shows that the "hard" scientist is only human and, second, it helps to reveal the patterns of institutional forces that sustain both the polarized positions of the various stakeholders and the wide uncertainty that allows them to legitimately take up those different positions. At the same time, it gives some clues as to why this uncertainty is so gross and so persistent. Uncertainty, we begin to realise, is not just the absence of certainty but, rather, a positive thing in its own right—something that can be socially generated and socially imposed in order to protect the legitimacy of established institutions and to prevent that legitimacy from being eroded by a creeping tide of certainty. Just as it would be naive to expect lawyers to tidy up the law, or the police to eradicate crime, so we should not place too much faith in the ability of "hard" science to tell us what the facts in the Himalayas really are.

CRISIS OR NO CRISIS?

A great deal has been written about the accelerated ecological deterioration in the Himalayan region. Most of it centres on the critical nature of the "crisis". One view which stands out like a sore thumb is that of a former US Peace Corps Director in India who, in 1981, went back to the Khumbu region of Nepal which he had not revisited since his initial trip there in 1950. Instead of reporting critical deforestation and deterioration of the Sherpa lifestyle as is the usual custom in that area [e.g. Lall et al. 1981, Coppock 1978) he said that, with the exception of a thicket of dwarf juniper at Pheriche, there was "as much or more forest cover than there was in 1950 and I have the pictures to prove it." As for the Sherpas, he felt they "were better off and happier today than they were thirty years ago." Though he said he could only speak authoritatively about Khumbu, he felt that the whole question of "Is there really a problem that is more serious today than 30 years ago?" is an important one to consider. [Houston 1982]

Houston, in questioning the very existence of the crisis, has thrown his cap into the ring in much the same way that some bold spirits in the US have seriously questioned the existence there of an energy crisis. All we are concerned with at this stage is to set the seal upon our argument that the uncertainty contains the problem by showing that even the existence of the crisis itself is open to doubt, but we will presently return to this particular challenge—the status of the Khumbu forests—and attempt some sort of resolution to it.

FROM FUZZY PHYSICAL FACTS TO THE POLITICS OF POLARIZED PERCEPTIONS

Whilst this quick survey of uncertainty has not touched on many important aspects of the Himalayan system (it has not, for instance, gone into what happens to the key variables when the forest is viewed as a convertible rather than a renewable resource) it has served to draw attention to a few parts of that system where viewpoints, and hence problem definitions, can vary.

There are many individuals, organisations and governments that have become intimately involved in different aspects of the development challenges faced by the people of the Himalayan region, and each of them approaches the situation with a distinctive perspective—a perspective that is shaped by institutional structures and by past experience. Yet one of the most important perspectives in the whole system—that of the individual hill farmer himself—seldom gains entry to this arena. The reason is two-fold. First, the inappropriate cis-science approach, dealing in physical facts not socially induced perceptions, cannot make room for him. Second, the hill farmer, lacking recognizable political or economic power, cannot force his way in. True, the hill farmer is often described, and a token place accorded to him, but, in a world where international balances of power are wavering, where internal political stability in a number of Himalayan countries is being eroded, and where the positions of economic and academic elites are always at stake, this viewpoint and its connection with the land that is actually threatened receive lowest priority.

The "carrying capacity" of this land, despite the cis-science insistence to the contrary, is not simply "given" by its bio-physical properties and by the state of the technology that is brought to bear on it. It must be locally perceived and interacted with. The local perception of the ecological situation is of extreme importance to any policy design, and as Edward Cronin has said "to the villager's mind, the problem is not one of too many people but merely not enough food" [Cronin 1979, p. 216]. This locally generated problem definition it must be stressed is not the result of a "misperception" on the part of the hill farmer; it is deeply embedded in a particular cultural context and strongly buttressed by all sorts of local institutional supports. That is why it's credible to him. The policy maker who, for much the same sorts of cultural and institutional reasons, finds himself committed to the opposite problem definition—too many people—is being hopelessly optimistic if he expects the hill farmer to realign his perception once the "real" situation has been revealed to him, and he is being hopelessly unrealistic if he expects to be able to push his policies through in the face of this perceptual mismatch.*

*The policy maker, of course, will try to subsume the villager's problem definition within his own by pointing out that there is not enough food *because* there are too many people. But the villager does not make this connection. The fact is that, over the years, his seemingly inadequate problem definition has served him very well; it has, you could say, provided the strategic underpinning for optimal migration. If there used to be enough food, and now there is not, then move on!

People have always sloshed about in the Himalayas, leaving places where the opportunities have declined and going to places where they are opening up. Population density is a very poor indicator of opportunity (and of its direction of change) nor is it something that is directly perceivable by the villager; hunger is an excellent, and readily perceived, indicator. (Its great drawback is that, by perpetuating the equation of land with wealth, it does not indicate those opportunities that are opened up by the severing of that equation.) Of course, it will be objected that this strategy is no longer viable because the population everywhere has increased to such an extent that there are no longer any opportunities left anywhere. This, as we will show, simply is not true. The strategy is not obsolete but it does need updating (particularly in its interaction with the other strategy—the "adventurous trader" strategy—that opens up the opportunities that it ignores).

Nor is this local perception, crucial though it always is, everywhere the same. Whilst Cronin's succinct characterization of "the villagers mind" fits well enough with the institutional supports that sustain the "cautious cultivator" strategy, it does not fit at all well with the very different institutional supports that sustain the "adventurous trader" strategy. That is, not only is local perception a key consideration in the design of effective policy, but that local perception itself varies dramatically from one locality to another. The tragedy of the classic ("what are the facts?") approach is that, by according the hill farmer just a token place in the arena, it commits itself to viewing the Himalayas as one enormous homogenised smear: "*the* hill farmer", "*the* villager's mind", "*the* sustainable yield", "*the* per capita fuelwood consumption rate" ... "*the* carrying capacity". But the Himalayas are not like that at all.

The state of empirical knowledge, patchy though it is, tells us that more trees are being cut down in some areas than in others, and that the same sort of variation holds for the soil that is indeed washing down the rivers, and for the population that is indeed increasing, but these relative rates and their significance have defied all attempts at global "objective" analysis. That there is a problem is difficult to dispute but there are tremendous local variations in its manifestations and, more importantly, in its perception. In the Himalayas the ultimate clients of any programme of sustainable development are astonishingly diverse, and the interrelationships between all the brokers of economic and political power flows are remarkably complex. This is the arena in which data are being collected, models constructed, and projects launched. There is great technical uncertainty and the quality of the data reflects this but, even more importantly, different people are approaching the situation with different perceptions and with different ambitions.

The Himalayas may be poor in natural resources but they are extraordinarily rich in institutional variety—in contradictory perceptions, in multiple problem definitions, in plural rationalities and in contending prescriptions—something which, alas, the classic approach, with its homogenising assumptions and its inappropriate cis-science methods, is ill-equipped to handle. Perhaps the greatest single justification for the trans-science approach, and for its central preoccupation with institutions and credibility, is the simple recognition: where there's heterogeneity there's hope. This does not mean that there is no place for cis-science in the Himalayas; only that, at present, much of it is misplaced and misapplied. The essential heterogeneity of the region is precisely what the cis-science data captures—it makes sense of specific localized contexts. To then go and generalise that data across the region is simply to throw away all the understanding that it contains and to generate from it not policies but platitudes.

THE KHUMBU FORESTS REVISITED

It is worth pausing here for a moment to show how Houston's perception and the perceptions of those who argue for the existence of the crisis can be reconciled. Since a major strand in our argument is that cis-science is at present being misused, we should try to say more precisely what this misuse consists of. There are, it seems to us, two urges (both of which have their institutional origin at the macro level of international bureaucracy and science) that should have been resisted. The first is the urge to generalise locally valid data across the region. The second is the urge to quantify what appear, from this lofty viewpoint, to be the key variables of *the* system.

Of course, the Khumbu forests are not at all typical—they are at a high altitude in a region that is not densely populated—and the forests that are causing most concern are those that extend (or used to extend) from the Middle Ranges down into the Terai. But, even so, we can use the example of the Khumbu forests to explain what we mean about the misuse of cis-science and to show the sort of progress that can be made by developing a sensitivity to contexts and by drawing upon the largely qualitative data of trained observers who have detailed and often long-term experience of a particular locality.

On his second visit to Khumbu (in 1973), Furer-Haimendorf found that fires were lit only for cooking whereas, on his first visit (in 1957), they had been kept going all the waking hours. This must represent a fuelwood saving of at least a third and indicates that, sometime between 1957 and 1973, something happened to fuelwood supply. What? The forest productivity could not suddenly have changed, and the population did not suddenly increase. Nor is it very likely that this was the sudden cumulative result of gradual long-term misuse. The fact that the Sherpas had been living in Khumbu for 400 years or so without destroying the forest pretty well rules that out. One explanation that is sometimes advanced is that the increase in mountaineering and tourism had placed an excessive pressure on the forest resource but this, on closer inspection, does not bear up either.

Trekkers' permits are checked at Namche police station and in 1977 there were about 5,000 recorded.* Since trekkers have been increasing rapidly year by year, the total must have been considerably less in 1973 when Haimendorf noticed the drastic reduction in fuelwood consumption. But, even if we take this high figure and assume that each trekker spends a fortnight in the area, we obtain an increase of only around 200 man-years consumption as against a saving of $1/3 \times$ the permanent population (which has long remained fairly constant at about 2,200). Since this works out at roughly 700 man-years of consumption (at the old rate) foregone—a sum that comfortably swamps the increased demand resulting from tourism—we must look elsewhere for an explanation.**

For 400 years the Sherpas were able to burn as much wood as they wanted and then suddenly, between 1957 and 1973, they had to cut back drastically. If it was not the tourists and it was not population increase, what was it? Well, in the 1950's the forests were nationalized. Management was taken out of local hands and transferred to central government—a reform which, we know, destroyed the indigenous management system that had worked successfully for centuries and then did not work itself. Once this had happened the gentle controls were off and people began to take too much wood from the nearby forest and not enough from further away. The thicket of dwarf juniper at Pheriche disappeared and so too, by Haimendorf's account, did some other areas of forest close to the villages and the trekking routes. But, on the other hand, Houston too is largely correct in that vast tracts of forest some distance from the villages and trekking routes are still intact. Indeed, large fallen trees lie rotting within them. If this is the case—if it is not a lack of forest but a lack of control of forest—then the solution is a temporary moratorium on taking wood from the nearby forest, and the best means of effectively doing this is probably a revival of the system of village forests and forest guardians

*This section is based on Thompson's fieldwork notes during a visit to Khumbu in 1977 to study the personal risk-handling strategies of Sherpas involved in mountaineering.

**Of course, there is also the spin-off—the cooks, porters and so on who accompany some of these trekkers. But the Tamang, Rai (or whatever) porters usually get replaced by Sherpas (and/or yaks) once a trek reaches Khumbu, in which case the spin-off effect is comparatively slight.

backed up, if need be, by the sanctions that the local Everest National Park staff are already empowered by central government to exercise. At the same time, both institutions can probably collaborate in replanting the bits of forest that have disappeared and in enforcing the regulations that require trekkers to be self-sufficient in fuel (e.g. gas or kerosene) once they enter the park.

So here is a plausible, and testable, explanation of what has been happening to the Khumbu forests*—an explanation that closely relates such data as exist to their context, that makes use of detailed local observation, that incorporates such historical facts and trends as are known, and that, by respecting the integrity of both Houston and those that he criticises, is able to zero in onto the sort of fine-grained and critical shifts in collective resource management that alone can tell us what is wrong and what needs to be done to put it right.

Of course this is a very tentative explanation and prescription, based on just a few field studies that, moreover, were not even directed at the question of forest use,** but, even so, it serves to highlight the meaninglessness of such generalisations as the per capita fuelwood consumption rate and the absurdity of the sort of premature quantification that tries to tell us that Nepal is losing 6.5 million tons of wood a year.

II. GETTING TO GRIPS WITH UNCERTAINTY

The wide uncertainty surrounding Himalayan deforestation provides us with a wide choice of problems. We could, if we were so minded, simply choose the problem best suited to our approach and discard the rest; but that, of course, would mean claiming that that was the real problem and that all the others were unreal. If we want to preserve what is real about all these problems—the uncertainty as to which, if any, of them is the real problem—then we have to treat the problem we choose simply as a point of entry: a way of opening up and exploring the complex physical, social and cultural system that is currently generating all this uncertainty. Since this whole idea of putting the problems inside the uncertainty runs so counter to the established

*An additional factor in the breakdown of the control system may be the partial erosion of the two great stabilizing ideals of Sherpa life: the proper utilization of acquired wealth and the cultivation of courtesy, gentleness and a spirit of compromise and peacefulness. Both Sherpa business involvement in Kathmandu and central government's involvement in the local affairs of Khumbu contribute to this erosion.

** Much more data of this type is now available. There is the experience of the National Park wardens (e.g. Jefferies 1982), and of the leaders of the two hydro-electric projects in Khumbu (e.g. Hinrichsen et al. 1983 and Coburn 1983). Recently there have been detailed studies of how fuelwood is used in Namche village (Adam Stern) and of how that wood is obtained (Barbara Brower). Führer-Haimendorf has just completed another field trip to Khumbu, aimed at documenting the changes that have occurred since his previous visits, and Sherry Ortner has recently revisited the area to study the effects of mountaineering and tourism on the Sherpas' Buddhist belief and practice. Then there is the less formal, but every bit as useful, on-the-ground experience of various programme staff and, be it said, of the Sherpas themselves many of whom are multi-lingual, well-educated and extraordinarily well-travelled. In every local context in the Himalayas there is knowledge and experience of this type waiting to be tapped. All that is missing is the recognition by international agencies, organised science and national governments that this is the level at which data becomes information. That is, it begins to tell you something.

patterns of applied science, we should make explicit the various steps that are involved in this sort of exploratory exercise.

THE TRANS-SCIENCE APPROACH TO UNCERTAINTY

The system that we wish to describe is, first and foremost, a system for generating uncertainty. This uncertainty, we would argue, is not inherent in the bio-physical properties of the system (though they, of course, are not irrelevant to it), nor is it generated just by accident, nor is it generated just for its own sake. It is generated *by* institutions *for* institutions. The survival of an institution rests ultimately upon the credibility it can muster for its idea of how the world is; for its definition of the problem; for its claim that its version of the real is self-evident. And, for such credibility to be maintained, the institution must come tolerably close to delivering on the expectations that rationally flow from the system of knowledge that it promotes.* In this way, uncertainties in knowledge about physical processes are brought face-to-face with the creation of expectations by social processes. Social institutions are the means by which these two—knowledge and experience—are brought together, and only those institutions that manage to achieve some measure of consistency in this conflation can remain credible and viable.

If we have a system of plural institutions—a system that depends for its very existence on the contention of the diverse institutions that comprise it—then we should expect it to display a number of fundamental system properties: plural perceptions, plural problem definitions, plural expectations, and plural rationalities. And for such a system to go on existing it will, somehow or other, have to generate sufficient uncertainty to swamp all the contradictions that are inherent in the pluralized positions it contains.

To describe such a system you have to observe it, and herein lies the next difficulty. The observer is inevitably a part of the system he wishes to observe; there is no way that he can step right outside it and play the "cosmic exile". Our terms of reference and, indeed, the whole context within which the institutions we are embedded in were able to come together to conceive, approve and fund this project predisposed us to grant credibility to one particular problem definition—that in terms of the trans-boundary properties of the silt and water run-offs in the Himalayan region. So we begin by treating this particular problem *as if* it is the real problem but, mindful of all the uncertainty we have already described, we try to resist the narrow parochialism that inevitably closes in around any single-problem definition by all the time asking ourselves how this particular definition might relate to some other possible definitions. By doing this we are able to list some practical reasons—some useful advantages—for choosing as our point of entry this trans-boundary problem. Then, as we try to generalize these advantages by placing this trans-boundary problem into its political and institutional setting, and by conceding that all sorts of other flows (technology "transfers", for instance) also encounter boundary problems, we are able to translate these practical advantages into tactical and even strategic advantages.

*"Tolerably close" means that the system of knowledge that an individual is supplied with in return for granting credibility to a particular institution comes closer to delivering on the expectations it creates for him than would any of the systems of knowledge that would be available to him if he were to switch his allegiance to other institutions. For a fuller treatment of this see Thompson 1982 (especially p. 56).

In other words, we gradually detach ourselves from a particular set of trans-boundary problems—those involving water and silt flows between the countries of the region—and fasten finally upon trans-boundary problems of a much more general kind. Boundaries, we come to realize, are being generated (or actively maintained) all over the place and we end up by focusing on the perceptual and transactional boundaries that serve to separate and sustain all the various contending institutions. The physical boundaries between the nations of the region, of course, fall within this frame but, as our exploration has proceeded, so we have found them becoming less and less significant. And, as this particular trans-boundary problem has receded, so others have come to the fore. If we were to single out one particular type of trans-boundary problem as being the most significant we would choose the problems of transfer between national and village-level institutions—between programme provision and programme delivery.

POINT OF ENTRY: SOME CREDIBLE PROBLEMS

1. Is the problem the environmental degradation of the Himalayas? if so, we must consider all the vegetated vertical zones—from the alpine pastures to the Terai.*
2. Is the problem the deforestation of the Himalayas? If so, we must consider the forest zones or, at least, those that are or may be subject to deforestation.
3. Is the problem the downstream effects—the worsening impacts of flooding, the silting of dams, the clogging of turbines, etc.? If so, we have only to consider the increased run-off (from removal of the forest buffering) the increased erosion (from deforestation, over-grazing, over-terracing—over-extension of land-use generally) and the increased transport of silt (from the combination of these two).

*These zones are not at all clear-cut. They are "merely broad outlines that conform to a basic progression of changing temperature and rainfall, and each contains a preponderance of particular species that gives it a characteristic identity" (Cronin 1979, pp. 24-25). Botanists dispute the specific boundaries and compositions of these zones but agree that, whatever they are, they do vary as one moves east or west along the Himalayan chain. Around the middle of this chain, according to Cronin, "there appear to be six zones of plants and animals stacked one on top of the other in rapid succession up the slopes". These zones are:

1. From 600 feet above sea level (the edge of the plains of India: the Terai) up to 3,000 feet. A *tropical zone*, originally largely sal forest.
2. From 3,000 feet to 6,000 feet. A *sub-tropical zone*, originally a mixed forest of *Castanopsis* and *Schinus* trees and the palm *Pandanus furcatus*. This is now almost entirely replaced with terraced cultivation.
3. From 6,000 feet to 8,500 feet. A *lower temperate zone*, comprised of oak and laurel forests. Since much cultivation stops at around 6,000 feet, this forest is still quite continuous. In many areas, though, people largely of Tibetan origin manage to cultivate potatoes, buckwheat and barley up to 14,000 feet.
4. From 8,500 feet to 12,000 feet. An *upper temperate zone* containing a variety of forests: maples, magnolias, rhododendrons and bamboo.
5. From 12,000 feet to the upper limit of plant life (varies between 16,000 and 20,000 feet). An *alpine zone*. Fir and birch forests giving way to low shrubs, alpine meadows and moraine-covered slopes. Some cultivation extends into this zone and livestock are often grazed up to the very limit of vegetation.
6. From the upper limit of the alpine zone to 29,000 feet (the end of the earth). A *high altitude zone*. No plant life but many invertebrate creatures feeding on wind-blown plant debris (mostly pollen).

The serious trans-boundary problem is the last one. It is, of course, nested within the first two wider problems so far as the total physical/biological system is concerned but it stands by itself as a *political* problem.

In one sense, of course, it really does not matter where we start. Whether we begin with the tail or the trunk, the systems approach, concerned all the time with the *connectedness* of the parts, should lead us to the same totality—the elephant. But there are, nevertheless, certain practical advantages in starting with this particular trans-boundary problem.

1. Being political, it is directly concerned with "the art of the possible"—with delineating what, if anything, can be done given the way people and nations are now and might be in the immediate future.
2. It sets for its solution a clearcut and, by comparison with the other two problems, a modest goal—mitigating the downstream effects until they become roughly equivalent to what they were some years ago. With the other problems, by contrast, you run the risk of inadvertently committing yourself to the immodest and politically unreasonable goal of restoring the eco-system to what it was before man arrived on the Himalayan scene.
3. It places at the centre of the whole system the agent responsible (in the physical sense of wielding the axe, that is, not in a social or political sense) for the problem—the individual hill farmer. In so doing it encourages us to understand his perceptions, his ecological theories, his strategies for coping with environmental dangers, his relations with his fellow men and the way in which all these act so as to shape the options that are open to him and to guide him in his choice between them.

With this particular focus, the art of the possible becomes concerned with two things—the possibility of influencing his situation so that the options available to him are changed (either by adding new ones or removing old ones or both) and the possibility of influencing his choice between these options (by, somehow or other, changing their attractiveness relative to one another). Such influences can be brought to bear in two ways—by enforcement and by incentives. So far as the art of the possible is concerned, these sticks and carrots are the only instruments there are for reversing the downward spiral of degradation. If no combination of these instruments can achieve this then there is no solution. If there is no solution then there is no problem. It is important not to lose sight of this possibility; if there is no solution then resources, both financial and intellectual, should be redirected towards adapting to the inevitable.

In contrast to this art of the possible, where policy options have always to be measured against the solid (but locally variable) features of the hill farmer, there is what might be called the "science of the possible" which simply ignores these obstacles. The challenge is, somehow or other, to explore both these—to experience the exhilaration and scope of what *could* be whilst, at the same time, gaining some sort of feel for the institutional barriers that may inhibit its attainment.

The crucial distinction between the "science" and the "art" is that the first sees the agent (in this case, the hill farmer) as a sort of zombie who just sits there having his life altered by the various ingenious policies that are targetted on him, whilst the second sees him as a responsive strategising being who may be expected, not to just passively receive such policies, but to react to them as well. The science of the possible, therefore, has no place for perceptions, it sees *cis-science* as the only way to go, and it deals in technical

fixes. The art of the possible, by contrast, accords a central place to perceptions—they are what makes *reactivity** possible—it leans towards trans-science, and it anticipates the institutional obstacles that may get in the way of the technical fixes. To understand just the fixes is to risk some nasty surprises once you start to implement them; to understand just the obstacles is to risk never getting to the point of implementing anything. The challenge, therefore, is not to choose one or the other but to usefully combine these two modes of understanding.

So let us start with the science of the possible and, ignoring the hill farmer and his heterogeneous perceptions, explore the range of solutions that are logically possible—solutions, that is, to the trans-boundary problem of increased run-off and silt transport from the hills causing increased flooding in the plains. But since we already know, from our exploration of the uncertainties surrounding this problem, that there may not be a causal connection between the human activities in the hills and the flooding in the plains, we should include alongside each of these "solutions" a description of how they would look for this sceptical perspective.

Adherence to one or other of these perspectives is not haphazardly distributed, nor is it simply a function of personality. The view that there is a clear causal connection is the perspective to which those in the plains, close to the sources of power and its articulation, tend to subscribe. Behind it one can almost hear the irate administrator complaining about "the debris from misused high altitude watersheds" cascading down onto the plains as a direct result of the unruly behaviour of "subsistence farmers on steep slopes in remote areas". The view that there is no clear causal connection is the perspective of those whose precarious autonomy at the mountainous margin of all this power is sustained by the "implicit compact" that guarantees the continued existence of the Himalayan buffer states. Since too much "unruly behaviour" in the hills may cause those in the plains to abandon this implicit compact and move up to take control of the buffer, the autonomous margin has to do what it can to manage its relationship with the plains so as to lessen the likelihood of this happening.

Such management—the management of powerlessness—is often achieved by strategising behaviour; for instance, that of the Nepalese ambassador who, by lending credibility to the existence of a clear causal connection, can further justify his claim to increased international aid, and hence autonomy, for the margin. The result of all this strategising behaviour is an apparent blurring of the clear separation of perspectives between those in the plains and those in the hills—between centre and margin. The scientific expert, too, may find himself drawn into all this; for instance, when he adopts the position of a sceptical observer in the hills and speaks out on behalf of remote villagers

*Of course, to assume that reaction will be of only one type—that consistent with the notion of economic rationality—is really no different (since it admits of no strategic options) from the simple zombie assumption. Like the zombie assumption, it too generates surprise-free scenarios. The notion of "policy responsiveness" assumes but a single rationality and but a single correct perception; "reactivity" assumes that rationalities and perceptions are plural.

But it would be unfair, and untrue, to tar all economists with this single rationality brush. If economic rationality is seen as being context dependent, then one could expect to see different strategies emerging in different contexts. In a sense, one could then say that there are as many rationalities as there are possible strategies. So, rather than making an indiscriminate attack on economists, we should try to mesh our approach with that of the institutional economists who, like us, do not insist that rationality is extensional. [We have tried to give some indication of how this might be done in Chapter I, in the section headed *Strategic: Explorations 2: Smart Markets and Stupid Projects.*]

who otherwise would have no voice in the policy debate. That, to a considerable extent, is what we are doing here.

Of course, to speak in terms of just two perspectives—one from the plains and one from the hills—is to grossly over-simplify the patterns of socially induced perceptions in the region, and the fact that strategising behaviour also has some of the policy actors hopping back and forth between the various perceptual vantage points like characters in a Feydou farce only complicates things still further. Though these underlying patterns and their overlays of strategising behaviour can be sorted out*, we will not attempt to do it here. Instead, we will simply try to keep the idea of plural problem definitions alive by moving back and forth between just two of these socially induced perceptions—the "irate administrator's" and the "sceptical observer's". What we are doing, in effect, is taking a crude geo-political slice through all these varied perceptions. We identify the axis between the plains and the hills, and its accompanying implicit compact, as one of the key variables in the whole system and we then collapse all the perceptions down onto that axis and explore the range of credible problems and credible solutions through the remarkably different perceptions that lie at each end of that axis. What follows, therefore, is not a complete analysis of problems and solutions but an exploratory range-finding exercise.

SOME CREDIBLE SOLUTIONS

Solution 1. Restore the run-off (by increasing the tree cover) and restore the erosion rate (by reducing the landslides, etc. that are caused by human activity *and* by increasing the tree cover) so as to reduce the violence of the flooding to what it was ten, fifteen, thirty or whatever years ago. This is an *upstream solution*.

The sceptical observer in the hills sees things rather differently. In his experience, "the major effects are felt primarily at source. We don't count them because uplanders don't record the disappearance of their farms from landslip or burial or chronic deterioration". [Romm 1983]. From this perspective, the distinction between upstream and downstream cannot be drawn just once—at the line that separates the hills from the plains. Rather, every point in the hills is upstream of somewhere and downstream of somewhere else, and the distinction is one that has to be drawn over and over and over again if we are to gain any valid understanding of what is happening there. This distinction between upstream and downstream is crucial because water flows downhill, and the critical issue becomes "how to redistribute water consumption" [Romm 1983]. The problem (in the hills, for the hills, throughout the hills) is that the present pattern of water distribution, when combined with the ethno-ecological knowledge and associated strategies of the hill farmers, tends to encourage "extensive land use in land scarce conditions" [Romm 1983].

There is no magic solution. Rather, it will be necessary to somehow or other encourage a gradual and pervasive shift in patterns of water distribution so as to steadily move away from widespread extensive land-use towards a patchwork of intensive use

*For an illustration of how this can be done in the context of the energy debate in the West see Thompson (1982a) and Wildavsky and Tenenbaum (1981).

(where landslip hazards are low and other conditions are appropriate) and detensive use (where landslip hazards are high and other conditions render intensive use inappropriate). If there is a causal connection between human activity in the hills and flooding in the plains then, the sceptical observer would hold, this redistribution of water in the hills will do more to lessen that impact than anything else.

The irate administrator's perception leads him towards the *integrated watershed management* solution—a solution which presupposes that someone is in a position to do the managing. The sceptical observer's perception leads him towards a *facilitated water redistribution* solution—a solution which presupposes that no one is in a position to do any managing. The sceptical observer is keenly interested in the ecological theories, land-use categories and associated risk-handling strategies of the hill farmers because they provide the basis from which facilitation can start. The irate administrator shows little interest in such things and is often driven to distraction by the deviant and irrational behaviour of "these people". The irate administrator, you might say, sees the hill farmer as part of the problem; the sceptical observer sees him as part of the solution.

Solution 2. Reduce the *impact* of the increased run-off and silt transport to match what it was ten, fifteen, thirty years ago (by flood control engineering, relocation of settlements, etc.). This is a *downstream solution*.

The sceptical observer would point out that, though he is doubtful about there being an increase in the run-off and silt transport, this is probably still a sensible thing to do. It is, in fact, the traditional solution in the plains, and all those large-scale public works and resettlement schemes are just what's needed to keep the irate administrator happy and to divert his attention from the punitive expedition into the hills that he has been contemplating.

A little historical vignette may help to show the way in which the articulation of the political power that resides in the plains and the implementation of downstream solutions go hand-in-hand. Political power needs public works and public works need political power:

The Ganges Canal was the brain-child of Captain Proby Cantley of the Bengal Engineers. He was convinced that it was possible to get water out of the Ganges and into the Doab, the land between the Jumna and the Ganges, an immense area which suffered from frequent and terrible famines. He made his first survey in 1836.

Then came the institutional obstacles—toes being trodden on in the efforts to coordinate departments that had not had to be coordinated before, and all the exquisite agonies of implementation:

Every kind of difficulty had to be overcome: orders and counterorders came from the authorities, civil and military, in bewildering confusion. One moment it was to be an irrigation canal, next for navigation only. Then it was not to be built at all; notwithstanding the fact that the East Jumna Canal which had originally been built by the Mughals in the eighteenth century had been extremely successful in combating famine in the country which it passed through.

Then there came the gloomy prognostications of the doomsters of the day:

It was said that earthquakes would destroy the viaducts, that miasmas would hang over the irrigated lands, that malaria would become rife and that the navigation of the Ganges would be affected. (This last objection was the only one that proved to be right.)

In overcoming all these obstacles the great empire was able to demonstrate its power and to impress upon those who were affected by the project the full extent of their incorporation into that empire.

Twelve years after its commencement the Ganges was finally admitted into the canal at Hardwar in April 1854 ... By the eighties it had been extended as far as Allahabad and the irrigation of the Doab was complete. Its completion marked the end of serious famine in the area. [This and preceding quotes, Newby 1966, p. 61].

Solution 3. Some politically and physically optimal combination of Solutions 1 and 2. This is an *upstream and downstream solution*.

The sceptical observer in the hills will probably identify as optimal a combination somewhat different from that identified by the irate administrator in the plains. But, even so, when the notion of the appropriateness of different solutions as we go from downstream to upstream—from centre to margin—is fed into this combination, a surprising amount of agreement can be reached.

The sceptical observer, for his part, can approve of the large-scale downstream solutions whilst the irate administrator, well aware that the implementation of integrated management schemes is much more easily achieved in areas where his control is effective than in areas where it is not, may well be relieved to have the hills taken off his hands. Provided he can bring himself to accept (and justify) that other, less managed solutions, are appropriate in the areas to which his writ will not run, then the irate administrator may well be prepared to let the facilitated solution take precedence over his managed solution. Disagreements, of course, will remain but at least this matching up of institutional obstacles and technical fixes allows us to fractionate the issue and to avoid demanding an answer to the question "Who is right?". With this debilitating demand safely out of the way, the administrator can now become a little less irate and the observer a little less sceptical.

But that is not the end of it. We still have to consider the *unthinkable solutions*.

Solution 4. Let it collapse. If the Himalayas are desertified their population will decrease dramatically and human impacts will similarly decrease. But, quite apart from the human misery this would entail, perhaps the run-off and silt transportation—the non-human impacts—would be even worse than before.

It is not easy for the layman to gain any clear conception of what a desertified Himalayas would be like. We could, of course, look at those parts of the Himalayas (like Ladakh, the Karakorum and Dolpo) that are deserts now, but these regions are deserts because they lie beyond the reach of the monsoon. It is the idea of *the wet desert* that is so difficult to grasp. A first reaction is that it must be a contradiction in terms—an emotional but scientifically

indefensible outcry against environmental degradation—but, no, the north of Scotland, once covered by a rich forest of Scots pine, is now a wet desert and in many parts of South East Asia denuded hills, their fragile soils leached by the heavy rains, now support little but coarse *lalang* grass. So wet deserts do exist and it is possible, perhaps inevitable, that the Himalayas will (in whole or in part) become one.

Neither the irate administrator nor the sceptical observer confronts this possibility head-on. Given their prior commitments to their respective restorative policies, their eyes are inevitably averted from a prospect in which these policies will be rendered totally useless. As they urge their various prescriptions they use the wet desert as a sort of bogeyman: "If you persist in disregarding what we are telling you, the wet desert will get you". This is not to say that that they should change what they are doing; only that, like the Hudson Institute's study of nuclear war and its accompanying megadeaths and overkills, there is also a need for someone to think the unthinkable in the Himalayas.

Of course, it could be argued that such a study would be a waste of time and money because even the most cursory study of what is likely to happen if the Himalayas are desertified is sufficient to convince us that to deliberately allow such a thing to happen could never be a sensible policy. But to take up that position is to assume that the choice is ours. It may be, but what if it isn't?

Solution 5. If the collapse is unavoidable anyway then the problem is one of adapting to the inevitable. What would and could such adaptations entail? Exploration of this question will open up some unfamiliar and surprising policy options—the development and settlement of the new island that is forming in the Bay of Bengal, for instance, and the possibilities of controlling the silt flow through the Ganges delta to create and stabilise further new land. The deployment of capital-intensive projects undergoes a similarly dramatic switch—from gulley-plugs in the Siwaliks (the Himalaya foothills) to seawalls in the Sunderbans (the alluvial islands of the delta).*

Though neither the sceptical observer in the hills nor the irate administrator in the plains would wish to concede the inevitability of collapse, both may nevertheless seek to benefit from some of the policy options that are opened up by its contemplation. Nepal, for instance, has already tried to establish its claim to this new island (on the grounds that it is Nepalese soil) and, if it is successful, it might be well-advised to seek Dutch aid in place of the Swiss and Austrian aid that it sees as appropriate now.

Again, a little historical vignette may give us some feel for the awesome processes that are at work in the region.

A Victorian engineer**, Sir Charles Lyell, estimated that 350,000,000 tons of silt were discharged each year at Ghazipur on the Middle Ganges. "Nearly the weight of sixty replicas of the Great Pyramid". A useless comparison. "It is scarcely possible", he goes on, "to present

*See, for example, the very "grand design" solution along these lines proposed by Fazal (1983).

**An eminent geologist, in fact.

any picture to the mind which will convey an adequate conception to the mind of the mighty scale of this operation, so tranquilly and almost insensibly carried out by the Ganges." Whether some small-holder in Bihar, watching his half-acre slipping noisily into the water and his family being swept downstream on top of a haystack would regard the operation as being either tranquil or insensible is open to question. No one knows for certain the depth of the alluvial silt in the Delta. [Newby 1966, p. 16]

These sixty pyramids per year have over the millennia created the Delta and, if they are to some extent the product of human activity in the Himalayas, then that land, far from being a "given"—a part of nature's endowment—is to a considerable extent "the flesh and blood and sweat of men" [quoted by Simon 1981, p. 85]. While it has been well said that God made the Dutch but the Dutch made Holland, the trans-boundary properties of this Himalayan system give an extra twist to the relationship. God may have made the Bangladeshis but the Nepalese (with some help from the forces of gravity) made Bangladesh!

Solution 6. Even if the collapse is not unavoidable we should still consider various combinations of these *adaptive policies* with the *restorative policies* of Solutions 1, 2 and 3 above.

Somewhere, between the undoubted good sense of putting a few bamboo stakes into a river bank in Bhutan to prevent a valuable rice paddy from being swept away and the undoubted stupidity of carting alluvium from Bangladesh back up into the hills to rebuild a little terraced field on a ridiculously steep and landslip-prone slope, there is a line that can and should be drawn.

The sociology of perception (which is what we have been relying on to guide us as we we have tried to feel our way through all these credible solutions) whilst it does argue that problems and solutions are shaped by institutional forms, does not argue that they can be shaped into anything at all. It does not require us to take up a position so relativistic as to deny the existence of the line. No, all of the socially induced perceptions can agree that the line *can* be drawn; their disagreements are over just *where* it should be drawn. And the definition of the problem, the credibility of the solution, and the formulation of sensible policies are all directly related to the position of that line. (If they were not—if, as sometimes happens with some policy issues, the noose of certainty was so tight that such variability and polarization was not possible—then the whole issue could be dealt with in terms of cis-science and there would be no need for the application of this trans-science approach.)

So this whole exploration of alternative Himalayan realities does fit inside some physically imposed frame. Whatever we might argue about the social malleability of physical facts we would not wish to argue that physical facts can be whatever we want them to be. Water, for instance, we concede does flow downhill. Or, to avoid any criticism for being over-positivistic, let us say that, if we assume that it does, we get quite good results; and quite good results, not perfect enlightenment, is all we are seeking.

PUTTING THESE PROBLEMS AND SOLUTIONS INTO A PHYSICAL FRAME

Since all these credible problems fit inside a physical frame, it does not matter which particular credible problem we use as our point of entry for the exploration of that frame. So we stay with our initial "as if" approach in terms of the trans-national boundary transfers of silt and water.

We have, in the first instance, to take the entire drainage basins of the Indus, the Ganges and the Brahmaputra. But, since run-off and catastrophic flooding are caused by the monsoon rains, we do not really have to consider those parts of the basins that lie beyond the limits of the monsoon (but could the monsoon change? Is it changing?). Nor do we need to bother too much about those areas that are above the cultivation limit (approximately 6,500 ft. but it varies with the latitude).^{*} Nor, so far as cause is concerned, do we need to bother about the plains. We are left with a long, narrow winding strip all the way from Kashmir in the west to the Naga hills in the east. Which countries are involved? Pakistan (only marginally?), India, Nepal, Sikkim (currently annexed by India), Bhutan (India presently responsible for foreign policy), India again ... Burma (has the same problem but does not drain into the Brahmaputra—the frontier lies along the watershed). Also, in several places (e.g. Sun Kosi and Arun valley in Nepal, north of Sikkim and north of Assam and Arunachal Pradesh in India) China is involved. In some of these areas the frontier currently is not clearly defined or is in dispute.

But what this long narrow strip does not reveal is the convolution of the landscape that it contains. Though the cause lies within this strip, it is far from evenly distributed along it. The oft-quoted statistic that the volume of silt disgorged into the Ganges by the Karnali is equivalent to the annual removal of a layer of land one and three quarter millimetres thick from the entire drainage basin of the Karnali River should not be interpreted as a valid description of what is actually happening.^{**}

The convolutions of the Himalayan landscape, and its underlying geology, render some localities particularly prone to mass wastage and others virtually immune.^{***} And some localities are actually subject to mass deposition; that's where the Kathmandu Valley came from. Far from the cause being evenly spread, ninety percent of the "damage" may result from ten percent of the land. Recognition of this profound heterogeneity within the long narrow strip helps us to introduce a strategic perspective. What is needed is a rejection of homogenising generalisations and their replacement by a sensitivity for local contexts. On the one hand, we will just be throwing scarce resources away if we approach the problem in terms of generalised data and, on the other hand, we will simply be wasting our efforts if we persist in packaging land by administrative units, map grids and fence lines. Instead, we must recognize that any set of data is meaningful only in relation to its context and we should

^{*}But the ideas of an altitude cut-off point is sometimes too simple. See previous footnote on the vertical zones, p. 48.

^{**}To draw such a comparison is to mislead and to repeatedly requote it without any qualification is to deliberately mislead. The image of a 1.75 millimetre thick layer of Karnali basin is as unreal a picture of what is actually happening as is Sir Charles Lyell's image of sixty great pyramids floating down the Ganges each year. The difference is that, in Sir Charles' case, the bizarre imagery has been drawn so as not to mislead the reader.

^{***}The "denudation rate", the unit used by soil scientists to describe the effects of erosion over a wide area, is itself a homogenizing measure which tends to average out the impact of individual events such as landslides, but the rate calculated for one drainage basin in Nepal was more than an entire order of magnitude greater than the rate generally calculated for that part of the Himalaya (Caine and Mool 1982). In other words, the particular geologic structure of this area was contributing to a far higher level of erosion than that generally assumed for the larger area.

allow the data themselves to tell us what are the appropriate (that is, meaningful) land packages.

So much for the cause; now what about the effects? Where are the serious (and, perhaps, worsening) floods? The floods occur in India (in the Ganges, Brahmaputra and Indus plains), in Bangladesh (fairly widespread throughout the delta) and, to a lesser extent, in Pakistan (in the Indus and Punjab river plains) and in Nepal (in the Terai). As with the cause, we obtain a fairly clearly-defined geographical area for the effect.

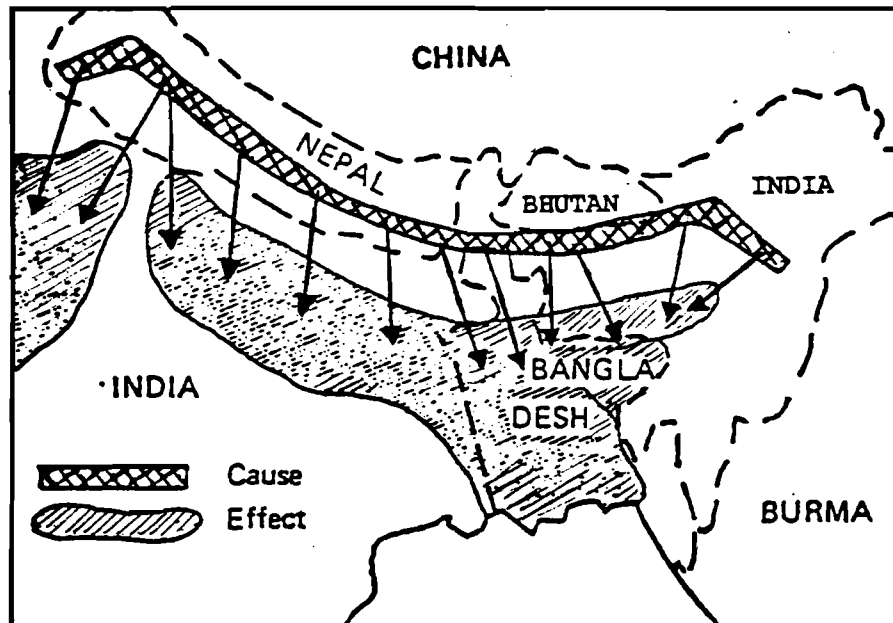


Figure 2. Schematic representation of cause and effect.

This little diagram makes salient a number of key features.

1. Cause and effect are clearly separated geographically.*
2. This separation, in several instances, coincides with national frontiers and thereby gives rise to the trans-national properties of the system. Moreover, the direction of causation defines "giver" and "receiver" nations (e.g. Nepal and Bhutan are givers, Bangladesh is a receiver, India is both a giver and a receiver but receives more than it gives).
3. The areas of both cause and effect are densely populated (the area of cause perhaps 40 million, the area of effect perhaps 350 million). So the problem is first and foremost a *people problem*; it is a social, economic and political problem set against a dramatic physical backdrop—the greatest mountain range in the world.

*For schematic clarity, they are shown as more separate than they probably are.

But to state the problem baldly like this is to feed the conventional desire to blame everything on population density—a homogenising cop-out that we should be on our guard against. Just as the mass wastage is not evenly skimmed off across the Himalayan foothills, so the effects of population density vary dramatically from one locality to another. Population pressure often enough does lead to environmental deterioration, but what this long narrow strip does not reveal to us is that the best managed lands are often found where population densities are also high. We simply cannot draw a direct relationship between population and effect across the whole strip because the effect of population is totally relative to institutional and technical capacities, and these social capacities vary from village to village and from culture to culture across the region. So long as technical and institutional capacities advance ahead of population there is no problem; eventually we can all be living in space colonies instead of on Himalayan hillsides. The trouble only comes when population seriously outstrips technical and institutional capacities and this situation, like proneness to mass wastage, is something that is not uniformly present across the region. To identify population density as the problem, without developing any feel for the localised variations in institutional arrangements that everywhere modify its effect on the land, is to compound on the social level the misdirection of effort engendered by homogenising assumptions about mass wastage at the physical level.

Now, with this physical frame and its heterogenous properties established, we can reverse the procedure of our earlier exploration (in which we simplified the perspectives so as to open up the variety of problems and solutions) and move on to explore more fully the ways in which this dramatic physical backdrop can be perceived.

SOME CREDIBLE PERSPECTIVES

One perception might be that the problem is the collective responsibility of the countries that are physically affected, in which case the patterns of cause and effect—of giver and receiver nations—could provide a first tentative framework for the necessary international negotiations between them. But such a perception is unrealistically static in that it ignores the grand process that has created, and is still transforming, the present state of affairs.

The forest historian [Tucker 1981] will point out that, at one time, most of the Indian sub-continent was covered in forest and that, over the centuries, this forest has been gradually rolled back (under the combined influence of population increase, technological development, and political development) across the plains and up into the foothills. What we are witnessing now is simply the final stage of this awesome historical process. From this dynamic perspective, halting and, to some extent, reversing this trend is an even more formidable task than that revealed by the more static perspective. In particular, preserving and restoring the forests along the Himalayas, without at the same time doing something similar in the plains, looks like a very artificial and processually naive thing to try to do.*

*Historical processes, of course, seldom do have "final stages". What looks like a final stage often turns out to be simply a turning point. In North America and in Europe the forests, after being rolled back for centuries are now actually rolling forward. The point we wish to make is that a feel for this historical momentum is crucial for anyone who is trying to hasten this turning point (if it exists) in the Himalayan region.

Another virtue of placing the problem within its historical context is that it provides us with some guidance on the critical uncertainty as to whether the forested land in the system now is being treated as a renewable resource or as a convertible resource (in much the same way as the waters of the Ganges were converted by public works into a means for the extension of political influence). Clearly, the whole rolling-back process depends upon the forests being treated as a convertible resource. Only in the case of the little pockets that remain is there any likelihood of renewable resource treatment. If what is happening in the Himalayas now is essentially the continuation of this rolling-back process, then this would suggest that much of the forested land is being treated as a convertible resource but, at the same time, the physical contortion and the political marginality of the region should result in many more (and larger) pockets of renewable resource being left behind than has been the case in the plains.

The strategic implications of this historical insight are profound. The rolling-back process imposes a complex pattern of heterogeneity—renewability here, convertibility there—on the Himalayan forests. In the pockets, all the institutions will be geared towards renewal and will only need sufficient encouragement and support for their forests to remain intact. Elsewhere, all the institutions will be geared towards conversion and will first of all have to be "turned round" for conservation to become feasible.

From a wider international perspective, the idea that the problem is the concern only of the directly affected countries is similarly naive. The Himalayas, for better or for worse, exert a powerful fascination over people and organisations many thousands of miles from the Indian sub-continent. At the level of the global community, the Himalayas enjoy (or suffer) a status that is little short of a *de facto* International Park. The English garden is largely composed of Himalayan plants originally collected by Sir Joseph Hooker; Nanga Parbat is a German mountain, K2 an American mountain, Annapurna a French mountain, Everest a British (and New Zealand) mountain*; there are Californian monks in Tibetan monasteries in Kathmandu, Spanish nuns in Lahouli nunneries in Kulu, and world travellers of every nationality, colour, and creed spaced out all the way along the trails from Pokhara to Muktinath and from Lama Sangu to Everest Base Camp. The Himalayas are to this modern Grand Tour what Italy was to its eighteenth century counterpart.

One exercise that might be worth taking seriously, as a way of exploring the wider international pressures that bear upon the region, would be to treat the Himalayas as an International Park and to enquire, first, into what sorts of park management techniques would be appropriate in different institutionalized settings within the developed world and, second, into how those techniques (and the recipient) might fare when they are transplanted from the centre out into what is really the margin of the periphery of the global economic system. It is ironic that, whilst those individuals who embark upon this Grand Tour do so in the hope of putting a little distance between themselves and the elaborate institutional arrangements (especially the bureaucratic ones) of their highly developed home countries, those who are responsible for the delivery of international and national government aid programmes are drawn almost exclusively from those irksome institutional reaches. In

*Not, we hasten to add, in any colonial sense but in the sense that these nations' relationships with, and understandings of, the region are to a considerable extent shaped through their historic involvements with these mountains.

consequence, the exploration of these various transplants may well reveal more about the institutional disjunctions within the highly developed North than about the cultural gulf that separates it from the less developed South. If it does, then that is all to the good; aid can then flow one way and self-understanding the other.

In the nineteenth century the Alps became "the playground of Europe"*, and it is this idea that has shaped them into the sporting, convalescing and recreational paradise (nightmare) that they are today. In America, the idea of "the wilderness" so dominates the National Park scene as to make the Alps look like Disneyland-with-Snow. So stern is this ideal that, not only telepheriques and sumptuous mountain huts, but even the presence of natives in the landscape is frowned upon.** In the lavishly illustrated Time-Life book *The Himalayas*, [Nicolson and the editors of Time-Life Books 1975] there is not a single Himalayan inhabitant of the species *H. sapiens* to be seen.*** In Britain the absence of wilderness and the presence of Wordsworth has led to a park ideal in which the appearance of man's interaction with nature is frozen at just the point where "all is peace, rusticity, and happy poverty, in its neatest and most becoming attire". [Gray's *Journal in the Lakes* quoted by Wordsworth 1810, p. 70.]

In the projects, the proposals, and the prescriptions currently aimed at the Himalayas all these park ideals can be discerned and, since their combined impact is likely to be considerable, an understanding of the various contending aesthetic orientations that underlie international concern for the Himalayas may well prove to be a useful evaluative aid.

A TENTATIVE SYNTHESIS

Possible problems and possible solutions do not meet up with one another in some value-free void;**** they come together only when there exists a possible perspective for them to come together in. Then, and only then, can appropriate and socially viable management styles emerge. Such possible perspectives are socially-shaped, value-impregnated, and aesthetically-articulated. Surprising though it may seem, it is aesthetics and not economics, or engineering, or applied science, or systems analysis, that has to be accorded the central role in formulating an approach to the problems of the Himalayas. It is writers, painters and poets who profoundly change the world; economists, engineers, scientists, system analysts and, be it said, international agencies, just tinker with it.***** Rather than succumbing to the temptation to see ourselves as the saviours of the Himalayas, we should heed Lord Keynes' salutary advice and aim to be "like dentists". [Keynes 1931].

*We might refer the reader to the book of that title by Lesley Stevens and also to Thomas Mann's *The Magic Mountain* and to the film *The Sound of Music* as the supports and evidence for this particular park ideal.

**Thoreau's *Walden*, John Muir's whole life (but see his *My Childhood and Youth*) and, in particular, his friendship with Theodore Roosevelt are sufficient to give some impression of the strength of this park ideal.

***This is not *quite* correct. There are some tiny specks to be seen walking up the Western Cwm of Everest in a photograph wrongly captioned "Annapurna".

****Or "garbage can", to use the organisation theory terminology.

*****For an elaboration on this perhaps disconcerting theme see Boulding (1983).

Aesthetics, of course, is to the artists what ornithology is to the birds but, even so, it can help us to tinker in a more effective way. Parks, like other social and cultural institutions, have followed a developmental path. We have had private parks, municipal parks, national parks, bi-national parks* and now, for the first time, we have in the Himalayas a *de facto* international park. Since the same aesthetic forces that have shaped the parks we already have are, even now, busy shaping the parks we are about to get, there is much to be said for trying to understand these forces—the different perspectives within which possible problems and possible solutions can come together, and the different park management styles that can emerge from these confluences.

The aesthetic of the playground shapes the Euro-park; the aesthetic of the wilderness shapes the New World park; the aesthetic of man-and-nature-in-rustic-harmony shapes the British park. All three aesthetics (and, perhaps, others as well—the Japanese park?) are currently competing to shape the Himalayan park. We should enquire whether these competing aesthetics are inherently contradictory. If they are, then it is a waste of time trying to create a single management style out of them, and the solution is to fractionate the Himalayas (along the lines of the pattern in terms of renewable and convertible resources) and to encourage the application of the appropriate aesthetic and management style to each fraction—the wilderness style in the parts that are (or could feasibly become) sparsely populated (Hongu, for instance), the playground style in the areas (like Khumbu) that have already evolved in that direction, and the man-and-nature-in-rustic-harmony style in those more densely populated areas where man's impact is greatest.

If, on the other hand, the rival aesthetics are not entirely contradictory then, to the extent that they are not, it may be possible to negotiate (or, more properly, facilitate) between them with a view to moving towards a new synthetic aesthetic appropriate to the Himalayas. Or, rather, since the Himalayas themselves are far from homogeneous, towards a number of distinct aesthetics—one (or more) appropriate to the Indian Himalaya, one appropriate to the Nepal Himalaya, ... one appropriate to the Bhutan Himalaya. Such negotiations, of course, are already being attempted—in the social forest/commercial forest distinction highlighted by the Chipko Movement in India [Agarwal 1982, Gadgil and Sharma 1982, Tucker 1981], in the experimental efforts to establish National Parks in Nepal,** and in the careful preparations for the development of tourism in Bhutan [Jest and Stein 1982].

The tentative conclusions that can be drawn from these negotiations suggest that there is little prospect for achieving any viable synthesis of these aesthetics. In its early attempts at establishing National Parks, Nepal would seem to have fallen foul of these contradictory park ideals by choosing (under external aid pressure, no doubt) one that was inappropriate. In many cases, it can be argued, the British ideal of man-and-nature-in-rustic-harmony would have been more appropriate than the American (and New Zealand) wilderness ideal that was initially chosen.

"National parks can be recommended only if the rights of the local inhabitants can be safeguarded. A totally misguided proposal to evacuate the Sherpa inhabitants from a Khumbu National Park has fortunately been abandoned. But the tragedy of the Rara National Park must be a warning to planners prepared to sacrifice human needs to

*For example, between the US and Canada.

**Nepal has already parcelled out development zones to different national aid missions so as to avoid conflicts between their different, and perhaps irreconcilable, approaches.

the establishment of wild life sanctuaries.

On the banks of Rara Lake there used to be two medium sized Thakuri and Chetri settlements, which greatly contributed to the attractiveness of the locality. Neither had encroached on the surrounding forests, and the cultivation of crops of barley and potatoes utilized only a small area. The lake was full of fish which the local people caught only by spearing. Such was the position in the early 1970s. When a Wild Life Sanctuary was established, the inhabitants of the two villages, who had lived there for many generations, were forcibly evacuated, and moved from an environment situated at 10,000 feet above sea level to the lowlands of the Terai without being provided with adequate aid for their resettlement. It is reliably reported that the communities disintegrated and many perished within a short span of time." [Fürer-Haimendorf 1983]

INTERNATIONAL AID AND INADVERTENT CULTURAL IMPERIALISM

The first thing to notice about these various park management styles is that they all involve management, not facilitation. As such they are antithetical to a political margin that has to sustain its precarious autonomy by playing off against one another (in the nicest possible way, you understand) the various external pressures that bear upon it. As long as it is successful in doing this it will keep itself largely free from hierarchical patterns of control. Of course, there is some control in the margin, and it is hierarchically organised, but it is remarkably undeveloped. A comparative study [Schloss 1983] of Russian, American, Chinese, British and Indian road construction projects in Nepal shows that, though each country adopted a distinctly different management style, they all encountered serious and unexpected difficulties in matching their styles to a situation where the machinery for administrative and financial management and control scarcely existed.

Their surprise is rather like that of the British colonial powers who, having chosen the principle of indirect rule as the best means of extending and consolidating their empire, found themselves up against some peoples in West Africa and the Sudan who simply did not have any chiefs—any permanent positions of leadership—through which that indirect rule might be channelled*. There are two ways of coping with such a surprise: keep the external style and change the indigenous organisation, or keep the indigenous organisation and change the external style. The first way leads to cultural imperialism; the second way leads to appropriate institutional development.

If we assume that imperial aggrandisement is not the aim of those who provide this aid, then what we are faced with is a facilitation problem on a global scale. At the macro level an international park looks like a good idea but, as it moves from this provider level down to the delivery level, it starts running into difficulties. The challenge is to resist the temptation to push it through regardless (a temptation that, alas, it is particularly difficult for the bureaucrat to resist) so as to allow a learning process to move up in the reverse direction and modify the initial design to suit the local conditions.

A successful buffer draws a sharp distinction between itself and what lies outside it. Though governments in the Himalayas can do very little to directly control their hill farmers, they can (and do) exercise considerable direct

*These are the celebrated acephalous societies. See, for example, Bohannan and Bohannan (1969).

control over their foreign tourists (and other visitors). They issue them with visas, they count them in and out, they grant or withhold trekking permits for various areas, they add and remove mountains from the list of available peaks, they insist on trekkers taking kerosene or gas fuel with them in the Everest region, and they demand that adequate insurance be taken out on the lives of high altitude porters engaged for mountaineering expeditions (they also exercise much the same sort of control over research and aid projects). There are, of course, certain constraints on their freedom to channel this alien influx—to irrigate their land with tourists. Just as water will only flow downhill, so tourists (with a few notable exceptions—the Chitwan Game Reserve in the Terai, for instance, and river rafting) will only flow uphill, towards the mountains that are the object of their pilgrimage. Tourists are also very localised, culturally and spatially. They all want their four-minute breakfast eggs and they all want to go to the honeypots of Leh, Kashmir, Kathmandu, Annapurna and Everest, and in consequence, the very considerable sums of money that they spend are not at all evenly spread throughout the villages.*

But, even so, by closing to tourist traffic this airstrip here and opening up that airstrip there, by stipulating that if you fly into the Everest region you must walk back (or vice versa), by granting or withholding trekking permits for different areas ... by initiating or discontinuing tourist buses along different roads, those who manage the powerlessness of the buffer are able to gain considerable scope to ease the tourist flow this way and that. In so doing they modify the social contexts, and hence the strategic behaviour, of remote villagers whose lives they are scarcely able to touch by any direct means (and it is, of course, an excess of *direct* control that is inimical to the inner workings of the buffer).

So the sharp distinction between the inside and the outside of the buffer is the key to the successful modification of the park management styles as they make the transition from the provider to the delivery level. By fractionating the issue, so that direct control is exercised over the alien tourist and only indirect control over the indigenous hill farmer, the buffer is able to have the best of both worlds. The tourists, as they are carefully channelled to the places where they are needed, can enjoy all the blessings of an International Park whilst the hill farmers, pretty well immune from any such controls, can get on with their lives in what is for them a working and lived-in landscape. Just as, to the Sherpa, mountaineering is simply another kind of trading so, to the hill farmer, the International Park can be simply another way of making some of his natural resources more valuable to him.

*And, of course, much of it never reaches the villages but stays in Kathmandu and even California.

III. HOW HAVE WE GOT TO GRIPS WITH UNCERTAINTY?

Quantification and science are often bracketed together, and it is indeed true that they are often in one another's company, but quantification is not a necessary condition for science. This is just as well because, if it was, we could not develop any scientific approach to uncertainty, apart from that which aims to convert it into certainty or into risk—an approach that, at present, is making little headway in the Himalayas. But fortunately science proceeds, first and foremost, by *reducing the arbitrariness of description* and this is what we have tried to do in getting to grips with uncertainty.

The Himalayas, we can safely say, abound in heterogeneity. There is the ecological heterogeneity that results in perhaps ninety percent of "the problem" being caused by perhaps ten percent of the land; there is the social and cultural heterogeneity that, by endowing or withholding technical and institutional capacity, dramatically modifies the environmental effect of population; there is the resource treatment heterogeneity that transforms the raw material of the forest into a patchwork of renewable and convertible resources; there is the aesthetic heterogeneity generated by the social and political forces that shape the various contradictory park ideals; there is the geo-political heterogeneity that results in such markedly different control modes as we go from the inside to the outside of the buffer. In recognising this heterogeneity, in uncovering the patterns in which it is arranged, and in identifying the processes that lie behind those patterns, we can discard all that conceptual baggage that assumes homogeneity. We are left with remarkably little; a description in terms of linked patterns at three levels (physical, social and cognitive) and of the institutional forces that sustain and transform those patterns, and a strategy for intervention based on a limited number of management styles and their appropriateness in relation to the heterogeneity that is revealed by that description. Though we may sometimes despair at the inability of our institutions to cope with the complexities of our world, there remains the simple fact that, like it or not, those institutions are all that we have. Rather than despair we should make the most of them.

A CLOSER LOOK AT "THE PROBLEM"

The wide uncertainties that currently exist at the biophysical level—uncertainty as to whether the consumption of fuelwood exceeds or is comfortably within the rate of production, uncertainty as to whether deforestation is a widespread or localized phenomenon, uncertainty as to whether it is population pressures or inappropriate institutional arrangements that lie behind instances of mismanagement of renewable resources ... uncertainty as to whether deforestation in the hills (if it indeed exists) has any serious impact on the flooding in the plains—mean that a wide range of mutually contradictory problems are credible. The Nepalese ambassador to the United States, for instance, is convinced that there is widespread deforestation in the hills and that there is also a strong connection between it and the flooding in the plains whilst Charles Houston, for his part, is convinced that the forests of Khumbu are in as good shape now as they were twenty years ago. These positions, given their policy implications, are inevitably thrown into contention. One position justifies one policy, the other position another policy, and the stage is all set for the acrimonious exchange of accusations of self-interest. If, by remedying what is happening in a nation of 14 million souls, the welfare of 350 million more can be assured then, of course, resources should be committed to the small root of the huge problem. But, if the forests are not really disappearing then who, we should ask, stands to gain by convincing us that they

are? The whole international eco-lobby, of course—the professional foresters, conservationists, agronomists, and so on who need serious (but curable) environmental problems every bit as badly as anti-poverty campaigners need poor (but deserving) clients.

The perhaps unpalatable point we wish to make (and it is the point on which the whole trans-science approach rests) is that, if we wish to retain any shred of scientific integrity, we must extend legitimacy to each and every problem definition that can be formulated in such a way that all its assumptions lie within the current bounds of uncertainty. To demand to know which of these problems is the right one is simply to encourage the arbitrary tyranny of one uncertain position over all the others, and we do not wish to be a party to that sort of thing. On the other hand, if the price of keeping an open mind on the subject is the acceptance of a world view so cynical that it can see behind these rival positions nothing other than the ill-disguised and predatory advancement of craven self-interest, that too is a pretty unattractive option. So is it a straight choice between Arbitrary Tyranny and Cynical Resignation?

No. We can, as they say in international negotiation, fractionate the issue; we can separate current certainty from current uncertainty and handle each by its appropriate mode. We can visualise the boundary between certainty and uncertainty moving this way and that in response to two opposing forces—the drive towards certainty that advances under the banner "what are the facts?" and the drive towards uncertainty that is the inevitable by-product of people variously choosing, from among available (but contradictory) facts, those that comport best with their various socially induced predilections.

Only those who subscribe to the sociological fallacy, and believe that the universe can be anything they want it to be, could seriously consider a situation in which this boundary was pushed so far out that nothing was certain; only those imbued with the positivistic optimism of Victorian science could trust in the foreseeable arrival of the day when all uncertainty will finally be squeezed out of our environment. Not wishing to position ourselves at either of these polar extremes, we began by conceding that in any policy debate uncertainty will always be contained within a noose of certainty and that two complementary modes are available for the progress of that debate: we can strive to tighten the noose and we can strive to understand the forces that resist that tightening. The first is the *adversary mode*, familiar to us in such grand institutions as the courts of law and the scientific method,* in which we ask "what are the facts?"; the second is the *exploratory mode*, less familiar to us perhaps but subtly built into most constitutions and into many political systems, in which we ask (in effect) "what would you like the facts to be?" The first, when successfully applied, allows us to get rid of what we cannot live with; the second, when successfully applied, allows us to live with what we cannot get rid of.

When we apply this sort of fractionating approach to the policy debate over Himalayan deforestation we see that the noose of certainty is, at present, rather loose and that, since there are many important variables (like local fuelwood consumption rates) that (unlike oil and gas reserves) are intrinsically measurable, there is clearly much progress to be made by the pursuit of the adversary mode (especially if data are not torn from their contexts). At the same time, the scientist who operates within this mode soon becomes aware of all sorts of institutionally mediated pressures (from the granting and

*But not in science itself which is complex mix of adversary and exploratory modes.

withholding of resources by the agencies that fund his research, through the screening processes built into the editorial policies of the journals in which he aspires to publish, to the systematically biased responses of the villagers he interviews in order to assemble his data). The institutions, you might say, have got there ahead of the scientist and have interposed themselves between him and the facts he is so anxious to uncover. Thus, there is a very real sense in which the institutions *are* the facts.

SO WHAT IS THE PROBLEM?

The first part of the problem (and perhaps the most difficult part to grasp) is that there is not *a* problem. There is a plurality of contradictory and contending problems—each one focused by the shared credibility it enjoys in the eyes of those who subscribe to it, and each held separate from the rest by the mutual incredibility that is the inevitable global corollary of locally focused credibilities. The reason, of course, is that if the institutions are pluralized so too will the facts that those institutions mediate be pluralized.

"... it is a common characteristic of interactive problem solving that many, perhaps most, of the participants each carry a distinct version of what "the problem" is in their minds ... They are not working on any one given problem, nor do they think they are." [Lindblom 1982]

The second part of the problem is to accept this state of affairs; to stop demanding *a* problem when there is not *a* problem, and to take up a conceptual position from which diversity, contention, and contradiction, far from being undesirable qualities that must be eradicated before any progress can be made, can be seen for what they really are—our ultimate resource.

THE OUTLINE OF A STRATEGY

It is not an either/or choice between cis-science and trans-science—between the adversary and exploratory modes. Both are essential. The choice lies in their appropriateness in any given situation. At present, in the policy debate surrounding Himalayan deforestation, there is clearly much scope for both modes but, at the same time, the rich institutional plurality (and, in particular, the institutional "spread" between the micro- and macro-social levels that is the inevitable accompaniment of the "many agents" problem) suggests that the biggest payoff will come from the exploratory mode.

So what does the exploratory mode look like? First and foremost, it is tolerant of contradiction, not in a spirit of anything-goes eclecticism, but with a view to uncovering patterns of contradiction and contention (such as those that are generated through local credibility and global incredibility). It uncovers those patterns, not for their own sake, but for the policy capabilities that may be embedded in the dynamical systems that sustain them (within the "cautious cultivator" and "adventurous trader" strategies, for instance, that provide the dynamic basis for the widespread Hindu-Buddhist geographical and cultural pattern). Then the exploratory mode has to turn away from the sort of legitimacy-conferring and legitimacy-withdrawing processes that are appropriate to the adversary mode. Learning, mediating, facilitating, ... interacting—these are the sorts of processes that characterize the exploratory mode.

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APPENDIX A:

**TERMS OF REFERENCE FOR THE PREPARATION OF A DISCUSSION
PAPER BY IIASA ON INTERRELATIONSHIPS BETWEEN
POPULATION, RESOURCES, ENVIRONMENT AND DEVELOPMENT:
THE CASE OF THE HIMALAYAN FOOTHILLS**

The purpose of the Discussion Paper, to be prepared by IIASA at the request of UNEP, is to provide a basis for developing a consensus among the various UN agencies actively engaged in the geographic area, on the nature of the problem and a range of policy options and action programs to address the problem. Following a review, discussion and consensus among the UN agencies involved, UNEP may use the revised document as a basis for discussions with Nepal, India and Bhutan, as well as with other national and international agencies who may be potential participants in formulating future remedial Action Plans. In this sense, the document is seen as providing the strategic orientation for specific future action.

The proposed Discussion Paper is to:

- (1) Collect easily available, and at macro level, critical information to understand and address the issue and to identify serious gaps in information.
- (2) Provide a broad overview of the current status of the problem in terms of the interrelationship between biophysical and social environments.
- (3) Describe the issue at the macro level and "bound" the problem area.
- (4) Identify, by employing a systems approach, linkages between principal actors and processes, social, economic and ecological impacts.
- (5) Present the information as a dynamic interacting system.

- (6) Propose, tentatively, the actions and realistic policies that can be undertaken.
 - locally
 - within a country
 - multinationally.

- (7) Include a list of agencies involved, sources and types of information available (e.g. UNEP's INFOTERRA, UNESCO's MAB, FAO's Forestry Projects, UN University's work on land degradation, IUCN's conservation strategy, etc.). The participants at the July 15, 1982 meeting held in Geneva offered their full collaboration and agreed to send macro level information on the issue, (e.g. review papers, state-of-the-art documents, problem analyses, etc.) to UNEP (Golubev) and IIASA, and to all other organisations represented at the meeting.

- (8) IIASA will undertake this study by hiring a suitable person to gather the background information and by setting up a small Advisory/Working Group of key experts in the area. Michael Thompson has overall responsibility for the preparation of the Discussion Paper.

- (9) considering that the objective of the report is to enable UNEP to formulate recommendations for a meeting in February/March 1983 and the resulting time constraints, IIASA will keep UNEP fully informed and will provide the salient findings of the Advisory/Working Group by 24 December 1982.

15 September 1982

APPENDIX B:

ADVISORY/WORKING GROUP

Dr. Christoph von Fürer-Haimendorf

Professor Emeritus
School of Oriental and African Studies
University of London

Background: Social Anthropology

Contribution: Social and cultural properties of the problem area and their variability.

Dr. Jeff Romm

School of Forestry
University of California, Berkeley

Background: Social forestry projects with Ford Foundation in India, forestry experience in Nepal, Southeast Asia

Contribution: Applied development experience in forest sector of the region.

Dr. Malcolm Odell

Local Institutions Specialist, Synergy International,
Consultants in Development, Amesbury, Massachusetts

Background: Sociology, facilitation experience in development projects in Nepal, Botswana, India

contribution: Advocacy of indigenous institution management techniques in the problem area.

Dr. Leo Rose

Department of Political Science
University of California, Berkeley

Background: Political Science

Contribution: Comprehensive background in the geopolitics of the problem area, Nepal in particular.

Dr. Brian Arthur

Food Research Center
Stanford University

Background: Institutional Economic Demography, Operations Research

Contribution: Population trends within the problem area, their relationship to both the physical and the social and cultural environments, and their responsiveness to conceivable policy instruments.

Dr. Aaron Wildavsky

Survey Research Center and Department of Political Science
University of California, Berkeley

Background: Political Science, Policy Analysis

Contribution: The constraints on the implementation of conceivable policies within the problem area.

Dr. Jack Ives

President International Mountain Society
Department of Geography
University of Colorado, Boulder

Background: Geomorphology, glaciology, administrative organisation of International Mountain Society, coordinator of research in the problem area of United Nations University and UNESCO sponsored projects.

Contribution: Mountain geocology, connections with research community presently working in the region.

Dr. Jagmohan Maini

Director General
Policy Directorate
Corporate Planning Group
Environment Canada

Background: Ecology

Contribution: Environmental management styles in different institutional settings.

Dr. Gennady Golubev

Assistant Executive Director of Programme
United Nations Environmental Project
Nairobi, Kenya

Background: Natural Resource Management

Contribution: International agencies and their impacts on the problem area.