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RARE ANIMALS, POOR PEOPLE, AND BIG AGENCIES: A PERSPECTIVE ON BIOLOGICAL CONSERVATION AND RURAL DEVELOPMENT IN THE HIMALAYA

TOM HATLEY[1] AND MICHAEL THOMPSON[2]

International Institute for Applied Systems Analysis
Laxenburg, Austria

ABSTRACT In earlier issues of *Mountain Research and Development* (Vol. 5, Nos. 2 and 3), Thompson and Warburton developed an institutional approach to development in the Himalayan region: an approach that, in treating the institutions and the perceptions they generate as the facts, largely dissolved away the physical constraints in a sea of uncertainty. In this article, we try to complete the exploratory circle by bringing nature—the physical constraints—back into our cultural picture.

All institutions, sooner or later, bump against these constraints; the local farmers sooner, the international agencies later. Learning—readjustments in systems of knowledge—then takes place. Nature, in effect, forces the different systems of knowledge that are promoted by different institutions into conversation with one another. The present challenge is to convert that conversation from monologue to dialogue.

RÉSUMÉ *Animaux rares, peuples pauvres, et grosses agences: Une perspective sur la conservation biologique et le développement rural de l'Himalaya.* Dans *Mountain Research and Development* (Vol. 5, Nos. 2 et 3), Thompson et Warburton ont présenté une approche institutionnelle à l'égard du développement de l'Himalaya. En traitant les institutions et les perceptions qu'elles engendrent comme étant les faits véritables, cette approche a permis de réduire la complexité du problème en éliminant pratiquement les contraintes physiques. La présente communication essaie de compléter et d'intégrer cette approche en ramenant la nature, donc les contraintes physiques, dans la perspective culturelle.

Tôt ou tard, les institutions concernées doivent faire face à ces contraintes, les fermiers d'abord, puis les agences internationales. C'est alors que l'apprentissage se produit, c'est-à-dire un réajustement des systèmes de connaissance. En effet, la nature force les différents systèmes de connaissance embrassés par diverses institutions à s'adapter les uns aux autres. Ce qu'il reste à faire est de promouvoir une communication véritable entre ces systèmes, au bénéfice de tous.

ZUSAMMENFASSUNG *Seltene Tiere, arme Bevölkerung und Monsterbehörden: Eine Perspektive über biologische Erhaltung und ländliche Entwicklung im Himalaya.* In früheren Ausgaben von *Mountain Research and Development* (Vol. 5, Nr. 2 und 3) entwickelten Thompson und Warburton einen institutionellen Lösungsweg zur Erschließung des Himalaya Gebietes: Eine Methode, die Institutionen und deren Vorstellungen als gegebene Tatsachen behandelt und damit alle geophysikalischen Zwänge in einem Wust von Ungewißheiten verbirgt. In dieser Veröffentlichung versuchen wir, den Untersuchungszyklus zu vervollständigen, wobei in unserem kulturellen Modell die Natur mit ihren physikalischen Zwängen berücksichtigt wird.

Früher oder später muß sich jede Institution mit solchen Beschränkungen auseinandersetzen, und zwar zuerst die heimischen Bauern und später dann die internationalen Agenturen. Erfahrung wird gewonnen und in die bestehenden Wissenssysteme eingebracht. Die Natur, in der Tat, erfordert zwischen den einzelnen Wissenssystemen, die von unterschiedlichen Behörden gefördert werden, einen Gedankenaustausch. Die gegenwärtige Herausforderung besteht darin, den einseitigen Erfahrungsaustausch in einen Dialog umzuwandeln.

A ONE-SIDED CONVERSATION

Our framing proposition is that there is, at present, a structural relationship between North and South; a relationship that is defined and sustained by a one-way flow of gifts. Alms pass from North to South and nothing, save mute acquiescence, passes from South to North. If the feeling is that there is something wrong with this relationship—if it is felt to be indefensible ethically, or Pareto-crummy economically, or mutually destructive environmentally—then the solution (if there is one) lies not in fiddling around with the nature of the alms but in transforming the relationship itself, from one-way alms to two-way gift exchange.

The particular gifts that concern us here are packages of scientific expertise, and our argument, at bottom, is that a Northern science that gave *and* received expertise would look very different from what we now have. Given this

[1]Tom Hatley is now at the Department of History, Duke University, Durham, North Carolina, U.S.A.

[2]Michael Thompson is at the Institute for Management Research and Development at Warwick University, U.K., and at the Technology Policy Unit at the University of Aston, U.K.

starting point, our discussion inevitably hops back and forth between what is wrong with the North's science and what is wrong with the South's environment. Though geographically and epistemologically separated, these two problems are mutually sustaining. Change one and the other will change; keep one the same and the other will not alter. Northern science tosses scraps to the Southern beggar at its gate. How would it look if it invited him to join the feast?

CULTURAL COMMENSALITY

It is a sad fact of life that, as the world's centres of power shift, so the art treasures of the old centres are sucked away into the new. Of course, in any particular instance, it does not look like that. Lord Elgin took the Parthenon marbles to save them from the depredations of the weather and the Turks; a century later Lord Duveen, travelling back and forth on the Queen Mary, facilitated the welcome exchange of British family heirlooms for American dollars in contracts that were freely entered into by both parties; but, nevertheless, the aggregate result was that the treasures migrated until they were aligned with power once more.

The interesting thing about this process is not that it happens but that it *can* happen. After all, a work of art is a living thing that grows out of the cultural soil and is nurtured by the cultural climate of a particular place, a particular time, and a particular people. How can it be rudely uprooted, transported to an alien shore, and yet not die? Well, the answer is that, in an important sense, it is dead the moment it reaches fruition. The art object is but a shrivelled husk. In recent years, conceptual artists, through their insistence on the importance of the non-importance of the art object, have discomforted us by revealing the collective commodity fetishism that leads us to fill our museums with these dead objects and to staff (or should we say stuff) our art history departments with latter-day necromancers to pore over them.

Yet this is only half the story. Though dead, the art object will not lie down. The art concept, unlike the soul, cannot cast the body's vest aside; it goes on and on working through the art object. This process is at its most spectacular when the art object itself is made of living material—in the landscape garden, for instance—but it can, and does, happen with even the most inanimate of objects. The Koh-i-noor diamond soon found its way from India to Britain but this was no mere act of pillage. It became the Jewel in the Crown—the object that made immanent the special quality of India's relationship with the Queen Emperor. It became the high-art concept that somehow condensed into one small, hard, glittering symbol all that riot of cultural borrowings—from chutney to pyjamas and from the Brighton Pavilion to the suburban bungalow—that was, for Britain, the romance of India. Indian historians now generously point to a reciprocal flow: cricket, a distinctly English legal system, marmalade, driving on the left and, most important so far as this article is concerned, the legacy of Jungle Jim—the Corbett National Park in Kumaun in the foothills of the Indian Himalaya.

The seemingly most unpreservable and untransportable of objects have been successfully sucked away to new centres of power. Mouldering canvases, and even whole worm-eaten panelled rooms, have been "frozen" by ingenious conservation techniques and spirited away; whole castles, and even London Bridge, have been dismantled stone-by-stone and transported to the New World. But what about tigers? If much of a poor country's heritage comes in the form not of art objects but of living animals, what then?

To spirit away rare animals, in all their wild and natural glory, you have to spirit away an entire habitat. Of course, it is not beyond the wit of wealthy man to create a tiger habitat in Florida, say, but what *is* beyond his wit is to make that habitat natural. So wild animals are different from these other kinds of heritage. They are inalienable. In this article we explore this unique property that enables this one kind of heritage to swim against the all-powerful tide. What, we will ask, can poor people do with their rare animals?

A first response to this question is that it is shot through with woolly-minded liberal nonsense. Poverty (by definition) is about not being able to do things and, before we ask what poor people can do with their animals, we should first ask what rich people are already doing with the poor people's animals. Just because they cannot spirit them away it does not follow that they cannot get at them!

In the old days, of course, commodity fetishism carried all before it. The rich people simply took possession of the poor people's animals by shooting them; by turning them (at some small risk to themselves) into shrivelled husks and hanging them on their baronial walls. Nowadays they do much the same, but to the people not the tigers, and they do it remotely, safely, and with kindness. Development, overseas aid . . . the patronage of South by North; these are the modern weapons of appropriation. Euphemisms like "modernization", "basic needs", and "LDCs" (Less Developed Countries) provide the camouflage for the latest and most serious bout of commodity fetishism. But the real traitors, as always, are the clerks—the scientists.

THE APPLIANCE OF THE WRONG SCIENCE

In the recent geography of hunger and poverty, the Himalayan region stands out in bold outline from the world map. The response of the world's wealthy nations to the situation in the Himalaya indicates a shared perception of a serious crisis. In the ten-year period, 1976–85, over 189 million dollars have been spent or promised for reforestation aid in Nepal alone (Wallace, 1981:148). Yet the effectiveness of this aid is being compromised by an old and persistent split in the understanding of natural systems between, on the one hand, a naturalistic environmental

science that attempts to study nature on its own terms and, on the other hand, a utilitarian conservation science that views nature as a manageable and exploitable resource. The same duality carries over into the curriculum structure of most Northern universities ensuring that the reputedly purer fields, such as biology and ecology (in common practice focused on an environment pretty well detached from the human economy, in theoretical terms at least), are taught in a separate division from applied sciences such as agriculture and forestry. The result has been that development projects sponsored by Northern nations have been designed almost exclusively in response to utilitarian criteria. Basic environmental investigation has been locked out of these programmes. Of course it will be argued that, since the overriding aim of development is to help people, this bias is not improper. Such a design philosophy, we concede, would be fine if its underlying aim—to make resources work for people—worked. Alas, it has not.

The joint United States–Nepalese Resource Conservation and Utilisation Project (RCUP), to take a topical example of the widespread difficulties encountered by environmental aid to developing countries, has naturalistic science designed right out of it. Though aimed predominantly at reforestation, it contains no funds for basic research on watershed function, nutrient regimes, or the natural plant communities that underwrite forest productivity. This project, like many others, has found itself frustrated by its inability to make lasting improvements in either the environment or the lives of villagers.

> We don't really meet the people's needs. Drinking water, cottage industries, these are outside the project's goals and boundaries. So the farmers ask us when we do reviews in the countryside: "Why do you care for my animal when you don't care for me?" (From an interview with a former US-based administrator of the RCUP, May 1983.)

Neither the cow, the village pasture, nor the village ends up getting effective attention. Perhaps the programme has missed the mark because the applied utilitarian science behind it has focused all the attention on a technically defined "resource" and has excluded what it is that makes it a resource: its relation to other features of the local environment and economy.

Recurrent experiences such as this have, over the years, led to an increasing awareness in the development community of the messy but important business of implementation: of how to bed development in social and cultural *terra firma,* both in the Himalaya and elsewhere. But, to make matters even worse, such development, to be sustainable, has also to be bedded in nature, and nature is something that is only haltingly understood even by those who set out specifically to understand it. Just as ergonomics designs machines around the human body so development projects, if they are to achieve anything, will have to be designed around the social, cultural, and natural constraints and capabilities they will encounter. Our argument, quite simply, is that the traditional separation of naturalistic environmental science and resource-based utilitarian science prevents this from happening.

Unfortunately, among developmental planners, the application of biological science is still viewed as a separate kind of enterprise: one that involves unaffordable parks, quixotic attempts to save rare birds, and seemingly irrelevant and arcane research on ecosystem function. Still this omission cannot be laid entirely outside the door of the conservation disciplines; ecologists, and other "pure" scientists, have tended to regard human economies as outside the boundaries of natural systems and, particularly in the Third World, a direct obstacle to their optimal functioning. Whilst we may sympathize with both communities, and with their self-inflicted disabilities, the simple fact is that biological processes and resources are often fundamentally linked to the lives of those Himalayan villagers who are most in need of assistance. In consequence, some of the best (indeed, quite possibly, the only) openings for village level rural development, and for the design of effective conservation strategies, hinge directly on understanding and exploiting this connection. What we are saying may become clearer if we stand back, for a moment, from the technicalities of development theory and biological science and look instead at the word "help".

The Principle of Reciprocity states that social life is made possible by a three-fold obligation—the obligation to give, the obligation to receive, and the obligation to reciprocate (Mauss, 1954). Of course, the gift exchange does not have to be symmetrical—that will depend on the relative status of each party involved—but it does have to occur. It is not easy to quantify and compare the values of things as disparate as chutney and cricket but it is more than likely that the social intercourse between Britain and India during the colonial period was, on balance, in Britain's favour. But this is beside the point. The point is, not that the reciprocation was unbalanced, but simply that there *was* reciprocation. India and Britain, by their mutual acceptance of the third obligation, became locked into a permanent relationship. No single transaction could be self-liquidating; each paved the way for the next. This is what revitalized the Koh-i-noor diamond (and launched a hundred London curry-houses in its name) and may, even yet, lead to its ultimate return to India (or, perhaps, to the most generous balance of all—shared ownership with each partner insisting that the other have it). The necessary condition for the creation of such a permanent relationship is that each party believe that the other has something worth having.

When this condition does not exist—when one party believes that the other has nothing worth having—the picture changes and we get, not gift exchange, but alms. Here one party gives, the other receives and then tries to reciprocate, but the first party refuses the reciprocation and reneges on the obligation to receive. The result is that the direction of giving is not reversed; the next, and all subsequent gifts, flow in the same direction. That is alms; and its meaning remains the same whether it be a few pennies to a poor leper or 189 million dollars to a poor country.

In scientific exchange the gifts are expertise, and the set-up at present insists that all the expertise is on one side. What we are saying is that there is a direct structural link between the North's present separation of naturalistic and utilitarian science (and the bias that each science carries with it) and its blocking of the South's efforts to reciprocate. Only connect, and reform, these two sciences, and

expertise will then flow in both directions. Charity, we would suggest, begins at home. The best thing the North could do to help the South would be to shake up its own hallowed halls of learning. Of course, there will be a price to pay. The rich man will have to invite the beggar to his scientific feast.

In this article we try to make this connection. We map the common terrain between the two kinds of science and, in particular, we keep a look-out for any unsuspected expertise that (if only the institutional channels existed) might usefully flow from South to North. We begin by exploring some of the links between the village economy and the biological resources from which it draws. We then go on to examine the need for environmental information of a somewhat different kind: information, we suggest, that is often not so much explicit as *encoded* in the relationship between local people and their local habitat—between their ethno-science and their ethno-practice. Finally, we turn to the non-existent channels and, by looking critically at the essentially patronizing bias of the organizational resources that are presently in place, we suggest how those resources might be modified to offer a new and more entrepreneurial potential for development.

Patronage, we argue, is what is clogging the channels and, as Machiavelli pointed out many centuries ago, the entrepreneur is the arch-enemy of patronage. Once expertise begins to flow in both directions, the old North–South mould will be broken and the cold charity of alms will give way to the warm reciprocity of gift exchange. A reformed naturalistic science, we shall see, is able to recognize and make good use of the home-grown Himalayan expertise; utilitarian science, though it has always had to deny its existence, can learn to apply it too.

BIOLOGY AND CULTURE: TWO SIDES OF THE DEVELOPMENT COIN

In the village landscape of the Himalaya, fields and forests are often biologically fitted to the lives of the villagers who use them. Cultural accommodation to biology is the other side of this coin. The relationship can be viewed as a kind of co-adaptation with dynamical processes and stability limits all of its own. Three little case studies will help to put this observation into a more concrete context by focusing successively on the village field, on the marginal forest of the village, and on the forest relatively remote from the village.

The Village Field

The Himalayan region is a minor "centre of diversity" for wheat. In Nepal, for example, the combination of extremes in environment and a strong patterning of seed exchanges between regions, has endowed the many local varieties of wheat with diverse traits (such as special disease resistances) that are potentially of great value wherever wheat is grown. Each village community's wheat (and in eastern Nepal the diversity reaches right down to this level) also indicates a fine-tuned grain production (Whitcombe and Row, 1976).

This diversity is not something that is just *there;* it has been created, is maintained, and is being continually modified and *developed* by the interplay of endless small decisions by millions of small farmers. Some awareness of these genetic crop plant resources that are already in hand in a village, and of the sorts of social and environmental interactions that sustain them, can greatly assist the provider of development aid (for a start, he will become aware that he is aiding development, not providing it). In assessing the chance of success in a development strategy, such as the introduction of a new crop, it helps to know what it is being introduced to (Whiteman, 1985).

For example, after an attempt to introduce *triticale* (a wheat/rye cross) into a Nepalese village, the researchers, in a rare example of this insight, concluded that the project, to be successful, would have to operate "recognising that information about the agro-economic conditions of the farmers is important but [also by] ensuring that [this] information is used to determine research priorities" (Biggs, 1982). The providers, with their utilitarian science, and the villagers, with their encoded expertise, used very different criteria for success. The providers judged the trials of triticale to be successful because it grew well, ripened in time, and so on. But, for the villagers, this was only the starting point. The success of the trials was then critically assessed by them *in comparison to their own crops.* Such comparison, of course, takes time and it is too early yet to say for sure what the verdict will be. The probable outcome is that triticale will be used on some fields but that the overall reliance on traditional wheat varieties will continue.

As it successfully negotiates its way from the explicit and utilitarian science of the providers to the implicit and naturalistic science of the villagers, so the triticale itself undergoes a parallel transition—from wonder-crop to just one more localized variety. The hill farmer, with his closely-adapted wheat species and his encoded expertise, has a great deal to contribute to the development process. His culturally and biologically based knowledge and skills are absolutely crucial to the design of development work. We should stress that we are not saying that the villager is the repository of all wisdom; only that he is the repository of *some* wisdom. He is not an empty vessel; and to work on the assumption that he is, is to risk some nasty and wasteful surprises. The message is simply that the local is the expert on his locality, and that local expertise is as important as (but very different from) global expertise.

This particular example is interesting and encouraging because the providers, when they bumped up against the local expertise, made due allowance for it and were able to do two things: to successfully negotiate their new variety into the local diversity and to learn some valuable principles for assessing future ventures. But they also put their finger on the need for something else—something that cannot be sorted out by just bumping up against the local expertise. This is the setting of research priorities. They realised that the local encoded information should travel, not just to them, but all the way back to their research sta-

tions where the new varieties are developed. In other words, they realised the need for scientific gift exchange between South and North; they saw that the receivers also had something valuable to give.

The Village Forest

The many products—food, fuel, fodder—of the village forest, as well as the virtual extinction that it now faces in some parts of the Himalaya, have made it the focus of a growing number of resource development projects. A positive shift in the overall design of these projects in the past few years is reflected in their titles; projects that once were called simply "reforestation" are now labelled "community" or "social forestry" undertakings. Though this is a move in at least one right direction, the village forest is a biological as well as a social entity.

In the abstract, the village forest represents a wild community that has been brought into semi-domestication. And, as any dog-owner knows, domestication is a two-way process: the villagers modify the forest and the forest modifies the villagers. As a result, the structure of this village forest often closely reflects the preferences and needs of the villagers (and *vice versa*) and this pattern of mutual accommodation, in turn, suggests a natural/cultural template for a more carefully designed approach to reforestation.

For instance, at least ten major cattle fodder tree species occurred in the area of the Swiss-Nepalese project (around Jiri) and the fact that individual trees of these species were often leased for pollarding should convey some idea of the extent to which this forest had become domesticated (Panday, 1976). Semi-domesticated forest community types which, as in the Jiri example, have been shaped to provide fodder trees, are not short-lived accommodations. Not only do the patterns take many years to emerge, but evidence from Latin America, of the many-hundred year persistence of cultivated patterns of forest trees around ruined Mayan cities, suggests a remarkable biological durability for this kind of forest once it has been created (Folan *et al.*, 1979; Gomez-Pompa, 1981). Unfortunately, as these diverse forests are cut for the sake of the most simple and most elemental product—firewood—the village-level environmental knowledge and expertise necessary to make the best use of the domestic forest is soon lost as well. In many areas this kind of traditional ecological and subsistence knowledge is perhaps more fragile, and more in jeopardy, than the forest itself.

As in the case of wheat varieties, village forests offer a highly developed genetic stock that can be used in development efforts aimed at increasing the productivity of the village's land-based resources. For example, some of the best candidates for tree improvement work useful in agroforestry projects are already growing along roadsides, in garden and field margins, and as shade trees. Because of this, their utility and prospective growth can be easily judged by drawing on the experience and judgement of the villagers who themselves fostered that domestication and who can continue to use its benefits (Burley, 1980).

The same perspective that brings this opportunity to light also distinguishes areas in which caution must be exercised. For example, marginal lands—field edges and embankments—are often proposed for fuelwood plantings in reforestation work. Yet, in the case of wheat, these weedy in-between spaces provide critical habitats for hybridization of crop plants (Bennett, 1971), as well as free and accessible "trial" sites for identifying superior trees. Thus, even though it makes sense to include marginal lands in fuelwood projects, designing for their development should include a sense of the multiple values of these lands that might be lost through their wholesale conversion to single purpose tree plantations.

The More Remote Forest

What is man's impact on rare species of wild animal? The conventional answer to this question is that man-caused disturbance is a prime negative factor in the loss of critical habitat. This, indeed, is often the case, but not always. The kind of partnership that we have seen in the natural/cultural systems close to the village can also carry over to seemingly wild ecosystems. The development potential of these exceptions to the conventional rule is well worth exploring. If man's impact is sometimes positive then man and animal can sometimes become caught up in a positive sum game; both can become better off as a result of an interaction that is generally assumed always to be detrimental to one, other, or both. If such an unexpected positive sum pocket exists in the midst of all these negative sum interactions, then the development trick will be to encourage those interactions that are already in the pocket and to try to steer into it those that are not. A study of the population history of the rhesus monkey in the Galis forest of Pakistan's Himalayan hill region illustrates how biological interconnections between forest, man, and monkey can result in changes that run counter to those conventionally expected.

For several years the Galis has been the centre of work on the ecology of the rhesus by a Yale University team. Since the forest is undergoing extensive modification today, the investigators felt that an understanding of the history of the forest (on which both man and rhesus have depended) was essential to capturing the full ecology of the animals. Their results indicate that over the past century the populations of humans and their cattle, sheep, and goats have increased four-fold. Over the same span of time, the Galis has been transformed from a deciduous oak and, at higher elevations, fir forest to an almost uniform dominance by blue pine stands, here and there punctuated by open grasslands or eroded areas. Yet the population of the rhesus may have even increased (at least within the Galis if not in the surrounding countryside) due to these changes which have resulted in an increase of food plants and habitats used by the rhesus. The researchers noted that "It is frankly uncertain to us that the rhesus could find an adequate diet without reliance upon the food items supplied through the unintended consequences of human activity in this forest", and concluded "the rhesus in this area cannot survive without a significant assist from farmers or foresters, the two groups which are responsible for the

direction of change in the forest" (Dewar *et al.*, 1981:12).[1] However, they also fear that a limit may be close at hand for all forest dwellers—human and non-human. The farmers continue to heavily lop trees for fodder; just before the Second World War, the decline of the preferred fodder-trees—the oaks—led to the lopping of pines. The pines are currently declining under this pressure and, though it is possible that some second option for cattle fodder may present itself as the pines follow the oaks into oblivion, the most likely prospect is an environmental breakdown in which the loss of the pines is compounded with other related changes such as increasingly serious erosion. Both the villagers and the rhesus would then become losers.

From the historical perspective we see man and monkey entering into a positive sum relationship, transforming the forest in the process and, as that transformation progresses, approaching the point where they will both pass out of this positive sum pocket. So the prospective fate of the Galis echoes some of the relationships seen in our first two examples. If indigenous wheat varieties are lost, some of the flexibility of hill agriculture will go with them. If the carefully cultivated structure of the village forest is broken down across the hill zone, it will be exceptionally difficult to revive the diversity that underlies its productivity and utility. However, the fact that a mutual accommodation still persists in each of these situations offers some signposts along a path of conservation compatible with, and even central to, development.

THE APPLIANCE OF THE RIGHT SCIENCE

Running through these three case studies are a number of common strands and a single ray of hope—the existence of positive sum pockets: conjunctions in which both man and land can benefit. To pick out the common strands—the mutual adaptation of villager and landscape, the expertise encoded in the relationship between them, and the natural/cultural template that provides the enduring pattern in that relationship—we have to turn to naturalistic science. To apply that naturalistic environmental science to the design of intervention strategies that stand any chance of promoting sustainable development we have to read these signposts that indicate the way to the "points of leverage"—the positive sum pockets. These, of course, lie in both time and space; hence there is need for both biogeography and environmental history in the approach.

The changes in the Galis forest illustrate the difficulty of drawing a sharp line between the domesticated resources used by man and the resources depended on by his wild neighbours. Yet, in the case of many rare species there is both a sharp boundary between the world of man and rare animal and a real antagonism that is expressed in competition for the exclusive use of habitat. In order to capture something of the status of these species, and the ecosystems that they often stand in proxy for, it will be necessary to take a step back from the village landscape that until now has captured our attention.

The Himalayan region encompasses a range of ecosystems, habitats, and species unparalleled in a similar area anywhere else on earth. From a biogeographic point of view it is less a coherent region than a meeting ground: the confluence of great evolutionary flows of species assemblages from India, Central Asia, and Southeast Asia. Much the same is true of the people who have flowed into the region along much the same sorts of axes. As these biological and cultural diversities have met up, so they have modified one another and entered into the complex and ever-evolving patterns of accommodation that, *in toto,* have made the Himalaya what they now are. But the problem for any sort of sustainable development is to *know* what the Himalaya now are. This knowledge does exist but it is not easily got at; it is, in large part, encoded in the relationships between these diverse peoples and their diverse landscapes. Fortunately, for much development design, it is enough to know *where* this knowledge is rather than *what* it is. As long as the aid provider "offers up" his project at the village level, the villagers will bring their encoded knowledge to bear on it through the sort of critical assessment process that we saw happen in the triticale case.

But for some development design (the setting of research priorities, for instance) locally encoded knowledge is not enough. It has to be explicit; it has to be elicited by a particular kind of scientist—an ethno-ecologist (or a cultural biologist or a social forester)—a naturalistic scientist who can recognize the local as the expert on his locality, who can decode his knowledge as far as that is possible, and who can formulate his own explicit science in a way that makes some allowance for the existence of that implicit information that he is not able to decode. The task, in other words, is to put together as much of the natural/cultural template as can be put together. Such a template is inevitably incomplete but, so far as the design of effective development strategy is concerned, any template is better than the present predicament of utilitarian science—no template at all.

Yet even this sort of understanding, vital though it is, is only one part of the undertaking. It deals, not with the whole Himalayan picture, but only with that part of it where the sharp resource-use line between man and his animal neighbour cannot be drawn. To fill in the rest of the picture we have to consider the sort of information needed to understand what is going on where this line *is* sharply drawn—for instance, in high alpine areas not used by man. And then, of course, there is the relationship between these two; lines that were sharp may become blurred and *vice versa,* and these sorts of possibilities too may open up all kinds of positive sum pockets. We can explore this very difficult area of information needs by looking at a few specific instances where the line has been (or can be) changed

[1] A similar example occurs in the Gir Forest in Gujarat where Asiatic lions co-exist with, and to some degree depend on, the cattle of Maldhari herdsmen: "If the Forest Department could remove the Maldharis and their cattle, the forest could be preserved, but the major source of food for the lions would disappear, and the Maldharis—an exceptional human resource—would have to be relocated with unknown potential consequences" (Berwick, 1976).

—by looking at what has (or may) happen as animals were (or might be) moved into or out of domestication. But first we look at the explicit information: what there is of it and how it might usefully be improved.

The geography of knowledge about the Himalaya is every bit as varied as the Himalaya themselves. Most work has focused on the central part, particularly on Nepal where research access has been relatively easy and the land and people inviting. In all regions (with the exception of Nepal) work has been directed at taxonomic studies that are a first step towards an explicit understanding of the diversity of the region. The implicit understanding—the local ethno-sciences and ethno-practices, folk taxonomies, and indigenous land-use strategies—have received much less attention. Certainly, and regrettably, their investigation has seldom been seen as integral with the pursuit of the explicit understanding.

Even so, the explicit information in hand is adequate to make some reasonably sure-footed judgements about the extent to which mammal species, for instance, are endangered. In the *Red Data Book* (published by the International Union for the Conservation of Nature), 23 mammal species are listed as facing severe survival threats in eastern Afghanistan, Bhutan, and Nepal alone. The most critical gap in this understanding is the basic functioning of the Himalayan ecosystems that support these species, as well as man. The list of key points of enquiry—nutrient cycles, water relations, pollution effects . . . all the ethno-science that helps sustain all these existing patterns—could go on at length. With so much to know, the problem is to set priorities—to decide what, and how much, to know first.

Even if it is collected purely for its own sake, information such as this can be applied in assessing the sustainability of development projects, in understanding environmental tolerances, and in marking the contributions of individual species to the delivery of "ecosystem services" to man (Ehrlich and Mooney, 1983). Since this fundamental knowledge of ecosystems is only now beginning to emerge in developed nations as well, and since the Himalaya provide such a perfect "laboratory" for their biological and cultural investigation, this is one specific instance where expertise might usefully begin to flow from South to North.

One sensible priority principle is, whenever possible, to concentrate this fundamental research in the places where it can then be usefully applied. Rather than choosing to be all-encompassing, environmental research should aim (if conservationists will excuse the phrase) to kill two birds with one stone by focusing in part on specific development contexts. For instance, the 10 developed nations that provide bilateral foreign assistance directed at reforestation clearly need to understand more of the basic function of watersheds in the region. Recognizing this, the US Agency for International Development (AID) is now investigating ways of integrating this sort of information into its development projects by earmarking a small fraction of each project's funds for basic research. Whilst this is certainly a step in the right direction, the short duration of many AID projects is something of a handicap. Some kinds of environmental monitoring that have to be carried out over many decades might be better handled by national governments that can more easily give them the sustained attention they need. Also, international efforts, such as the United Nations Environment Programme's Global Environmental Monitoring System, might well have a key role to play in this sort of work. Similar niceties in institutional matching apply to space as well as to time. Just as an institution's "attention span" may be too short, so too may its "project spread" result in some localities receiving too much basic research and others too little. Such mismatches are not unavoidable—markets are the traditional means of avoiding them—and perhaps the various agencies could usefully engage in a little horse-trading among themselves!

MOVING ANIMALS OUT OF DOMESTICATION

Yet, as we have suggested, sophisticated knowledge is not needed in pinpointing steep declines in the numbers of large species. Once a rare species has been backed into a remote corner, protection often means saving animals in a traditional way, in parks and reserves. Today, there are 91 internationally recognized protected areas in the broadly defined Himalayan region (Conservation Monitoring Centre, 1981). Most are in India. Only one major biogeographic province, the Tibetan Plateau, does not possess a protected patch (but, given the sparseness of the human population and their Buddhist faith, perhaps it does not need one). On the other hand, the Kingdom of Bhutan has placed approximately 20 percent of its total land area in reserved categories, a much larger proportion of the state than is set aside in the typical European country. Such designated areas, when successfully implemented, move habitats out of domestication (or semi-domestication). Since these habitats are also proxies for the threatened animals within them, this designation strategy is essentially one of moving the animals themselves out of domestication.[1]

In spite of many successes, the status of these protected areas can be politically and ecologically fragile. For instance, the Royal Chitwan National Park in Nepal's Terai is an important refuge for the Asiatic tiger and for assemblages of ungulates (wild grazing animals). Yet the ecology of this mixture of wetland, grassland, and forest habitat that supports the tiger is complex and unstable. Part of the reason for this instability in the landscape has to do with its history—with the particular path by which it was moved out of domestication. Prior to the Ghurka wars (in the late eighteenth and early nineteenth centuries), the Chitwan area was quite densely populated and cultivated. It was depopulated and decultivated as a deliberate act of policy in order to create a malarial tract that would deter British forces from invading Nepal (Burkhill, 1910). In this it was successful and, over the years, it has remained largely depopulated though used to some extent for domestic stock grazing by nearby hill villages. It is this history that has endowed it with its curious and unstable vegetation mosaic. The population status of the tiger is similarly tenuous. Estimates of tiger population in the Chitwan Park and its

[1]Domestication is usually said to have occurred when man takes control over an animal's breeding. Since we are talking about increasing or decreasing an animal population by moving its habitat into or out of domestication, we are talking about controlling breeding (albeit, very crudely) in a rather indirect but nevertheless often effective way.

vicinity reach up to 60 at maximum—very close to the best guess that biologists have as to a population threshold for large animals below which a substantial risk of inbreeding occurs (Smith and Mishra, 1981).

Despite the biological and political concomitants of moving a habitat out of domestication, the creation of parks such as Chitwan is an old and often successful kind of development strategy. In the view of one IUCN official, "the local people have almost automatically made a switch in attitude. If a tiger skin is worth "x" dollars, they see that keeping a tiger alive in the park is worth two times "x" dollars (personal communication, 1983). Even so, in spite of a substantial effort in the past by many nations in the Himalayan region, many species are seeing their ranges continue to close in. For some lucky members of these species, however, there may be as much (or more) hope outside the parks as in them. Domestication and the hurly-burly of the market economy may offer survival chances every bit as good (or better even) than those on offer in the regulated wilderness.

Moving Animals into Domestication

The Himalaya are a global centre of origin of pheasants. Six species survive in the wild in the central region alone. There is an old and lucrative European market for species like the blood, cheer, and peacock pheasants and many individuals have exchanged a tenuous existence in the wilds of India and Nepal for a life of cosy domestication in Britain and the Federal Republic of Germany. Indeed, more individuals of the six Himalayan birds probably are captive-bred in Europe than hatch out in their homeland. This suggests that the pheasants would still be onto a good thing if they moved into domestication without going to Europe in the process. The question for conservation and development is: would the villagers, too, be onto a good thing?

Apart from domestic fowl in some areas, there is little by way of an indigenous tradition of aviculture in the Himalaya. On the other hand, captive-breeding of pheasants is already well-advanced in at least one locality (near Pokhara in Nepal) so there are evidently no obstacles to the fostering of the necessary techniques. All it requires is that the undertaking can be made profitable. Whilst pheasant breeding is unlikely to be the salvation of every Himalayan village, economic viability could probably be achieved in a number of centres by way of small-scale financial commitments by groups such as the World Pheasant Association. Initially, market outlets could also be provided through these same sources and, in the longer run, villagers would benefit from a new protein source and from the reduced pressure on wild populations. The more chance there is of seeing a pheasant in the wild, the more chance there is of tourist income being generated by that attraction. In a zero sum game you cannot have your cake and eat it but, in this case, both villagers and tourists could have their pheasant and eat it too! So here is a positive sum pocket just waiting to be filled.

At present there is one other attempt underway, in India, to bring a commercially valuable but vanishing species—the musk deer—into domestication (Baoliang, 1983). This project builds upon two decades of work in the People's Republic of China where the problems associated with extracting the musk from the captive animals have now been overcome. Other species, such as the rhesus monkey, are extensively used in biomedical research and others, such as the endangered pygmy hog, offer a similar potential. The growing interest that now exists, in several countries in the region, in the musk deer project, suggests that more attention could profitably be given to these sorts of domestication ventures. Interest might well escalate if the potential buyers of musk, or research animals, or pheasants, were approached to provide initial funds and purchase agreements. Many Northern firms would jump at the chance of putting themselves on the side of the angels, by conserving rather than extinguishing rare animals, and the musk deer might well do for the up-market parfumiers what the panda has already done for Fiat.

Steering a Biological Course Through Efficiency and Equity

The musk deer project, and others modelled along the same lines, are similar in many respects to earlier attempts to develop cottage industries. The danger is that they too may fall into the kind of economic dependence that was often entailed in the cottage industry innovations of colonial authorities. The signs, though, are more hopeful so far as these new animal-based industries are concerned. Though it might be too fanciful to foresee a group of tiny Himalayan states (and China) forming themselves into a musk OPEC, the inalienability of their extremely valuable resource—the rare animal and its habitat—does confer a measure of immunity that was absent in the case of the basket-weavers, the match-makers, and the bidi-rollers. Moreover, the performance over the last 80 years or so of some of the village industries that were initiated in the colonial period provides a mixed but hopeful precedent for new efforts.

Resin-tapping, for example, has become an important source of income for villagers in some areas; so important, indeed, that much of the support for the Chipko Movement and for a Ghandian Ashram self-help organization in Gopeshwar has been generated by villagers' fears that they are being squeezed out of their share of resin production (Centre for Science and Environment, 1982). The significance of this action is accentuated when set against the decline of many traditional or cottage industries in the Himalaya—such as lac production and metalcraft—that are being undercut by deforestation (Acharya, 1976). By contrast, village projects centred on the musk deer and other animals offer a way out of this fuelwood trap. Since they make direct use of animals, they benefit from the animals' fast generation time rather than being dependent on the slow rate of forest growth.

Whilst deforestation may undercut the villagers' industries, the villagers in their turn may undercut the grand designs of those who do not live in the villages—the national and international planners and providers of development aid. The emergence of the Chipko Movement was not a component in any development plan; it arrived "out of the blue", as it were, and messed up a whole lot of carefully laid plans. Planners can no more ignore the

social processes of village life than the villagers can ignore the natural processes of forest life. Yet these two equally implacable sets of obstacles receive remarkably unequal attention.

Social movements, contrary to popular belief, are not confined to California. Nor is affluence a necessary condition for their emergence. Nor, though they always come as a surprise, is there anything surprising about their coming. They come whenever policy is unresponsive to serious mismatches in perception between different institutional levels. Mother India is the mother of social movements, and the critical mismatch there is usually between the village level and those higher up. At present the Chipko Movement is making audible the villagers' increasingly strident criticisms of official "social forestry" projects which, they fear, are really disguised plantings for industry. The protesters argue that, even though the funds for these projects were raised for the purpose of assisting village economies, the trees will not be accessible to them. Whether or not the criticisms are correct, this perceptual mismatch highlights the political stakes of development work. In the early 1920s things went even further and extensive new plantations were burned, on account of much the same kind of perceptual mismatch, in an act of political protest by the hill people of Uttar Pradesh (Tucker, 1982).

Yet development theorists often seem blissfully unaware of these institutional obstacles. Once upon a time efficiency was their goal; now equity is all the rage. But, though their goals may change, their overriding assumption remains the same: that development, be it efficient or equitable, is theirs to give. Social movements require us to question this assumption. The boons of efficiency and equity, they show us, do not belong to the planners; they are not theirs to give. The planners have overlooked the little matter of consent. The "mere details" of implementation—the local perceptions and the local problem definitions—sometimes turn out to be insuperable obstacles. Just as you cannot chop firewood if there are no trees to chop, so you cannot reach your planned goal if there is an unsuperable obstacle in your way. Just as the successful gardener has to work *with* nature so the successful planner has to work *with* institutions. And if what he is planning is, in effect, a garden, then he will have to work with nature too. Naturalistic environmental science, once it has been modified so that it can respect other (more local) systems of knowledge, will enable him to accomplish this double feat.

Rather than agonizing between efficiency and equity, neither of which he is in a position to bestow, the planner should allow his naturalistic science to steer him through these institutional complexities and tell him how much of each of these desirable features he might, in any particular instance, be able to encourage. We turn to North America for a text-book example of this not being done.

JOJOBA, THE SCIENTISTS OF THE NATIONAL ACADEMY, AND THE RESIN-TAPPERS OF UTTAR PRADESH

When the problems posed in designing a village level project are technical (as we have suggested the problems of animal breeding are) the practical end of putting the idea to work in the village is all too easily overlooked. In the early 1970s, an unlikely series of events, beginning with the public interest in the protection of whales, led to new attention to the economic potential of *jojoba,* a desert shrub which produces a wax that, among its other uses, provides a perfect and inexpensive substitute for sperm whale oil in its many industrial applications. In the late 1970s the ban on domestic whaling, and the consequent prohibition of the importation of whale products under the United States Endangered Species Act, gave economic impetus to the scholarly investigation of this shrub and the National Academy of Sciences stepped in with funding. The project was unusual in that it had an explicitly social goal: to make the intensive plantation cultivation of jojoba the exemplar of a new approach to the agricultural development of Native American owned arid lands. Tribes in the Southwest of the United States were seen as being at a natural economic advantage because extensive natural stands, representing critical seedstocks, were already growing on their reservation lands (National Academy of Sciences, 1977).

Yet this project, born under such favoured stars—the Native American, the endangered whale . . . the whole popular ecological consciousness of the 1960s and 1970s—has fallen far short of its auspicious beginnings. Though the research effort (carried out by the National Research Council, the National Science Foundation, and a number of distinguished universities) was impeccable, its implementation was not. All the scientific and technical information on how to make large-scale jojoba plantations workable was public information, and the poorest sector of the society—the "targeted" group—could not quickly enough seize the advantage provided by the research done on its behalf. Instead, agri-business investment in jojoba plantings in the region (and even in Australia) has surged ahead and swamped the Native American share of the market.

The wonderful thing about monumental blunders like this is that you can learn from them, and our preceding discussion of Himalayan innovations such as resin-tapping suggests that the U.S. National Academy of Sciences could usefully learn a thing or two from the hill farmers of Uttar Pradesh . . . if only it would listen. The Himalaya, their biological and topographical complexity matched by an equally bewildering institutional and cultural complexity, have long been a kind of natural laboratory for the investigation of the obstacles—technical *and* institutional—that often stand in the way of what look like good ideas. Of course, mistakes—many mistakes—are made but the practitioners *do* learn from them. The providers of triticale, for instance, stayed with it and, as they negotiated their explicit global science into the implicit local knowledge of the villagers, finally got their innovation to take root, biologically and culturally. Social foresters, similarly, have been able to appreciate the ethno-silviculture of those they have come to help; and medical practitioners now routinely design their local health-care systems around the indigenous health-care institution—the *shaman.*

Natural and institutional obstacles, if we are prepared to learn from them, become development signposts. In setting constraints on what is possible they also set bounds on the amounts of equity and efficiency that could be contributed by any particular project. In the jojoba case we

can see that, without far-reaching institutional reforms, there can be no equity contribution. Whether there is an efficiency contribution will only become apparent when the agri-business ventures start producing and selling the jojoba oil. By contrast, the Himalayan resin-tapping business is very much tilted towards equity, and the rapid emergence of the Chipko Movement indicates that the local institutional arrangements are probably capable of defending that distributional bias in the face of larger-scale commercial and state institutions. That small-scale resin-tapping is also an efficient and sustainable industry is attested by its long-run profitability.

To explain just why jojoba and resin-tapping come out so differently in terms of efficiency and equity is not easy. The reasons are probably multiple, and certainly both biological and institutional. The chir pine, being restricted to a particular attitudinal belt and to a particular set of climatic conditions, is probably endowed with an inalienability that is not shared by the jojoba shrub which will grow on arid land both on and off the reservation. In a sense, you could say that the "reservation" of the Himalayan villagers takes in all the territory where chir pines will grow. The villagers may not have a total monopoly on the resin but they are certainly capable of putting up a good fight for their share of the market. When we look at the institutional reasons we see that resin-tapping takes it shape from the natural/cultural template. The natural and institutional obstacles do not just co-exist; together they form a *pattern* of constraints. Their co-adaptation ensures that they often work in concert rather than in conflict, and the natural obstacles to the alienation of the chir pines, it turns out, are reinforced by some interesting institutional ones.

Unlike fields, which tend to be privately owned and which can quite easily pass into the hands of merchants and money-lenders, chir pines (or, to be precise, tapping rights over chir pines) tend to be communally held; certain tracts of forest traditionally "belong" to certain villages. Such communally held resources, contrary to the prevalent *tragedy of the commons* hypothesis, turn out to be an equitable blessing. They are much less easy to lose and much more easy to defend than those that are privately owned. Since their sale (or mortgaging) requires the agreement of all their owners, it is virtually impossible. Since they are communally held, their defence has to be communally organized; and communally organized defence, as manifested by the Chipko Movement, is an extraordinarily effective way for the mountainous margin to counter the inroads of an often rapacious centre.

What seems to be happening here is a number of natural and institutional obstacles acting together to define a quite definite path that leads to a good measure of efficiency and a good measure of equity. Since it is probably impossible ever to fully describe (let alone quantify) these obstacles, the trick is to develop a "feel" for them, to assess one project (for example, the musk deer domestication) against those (like the resin-tapping industry) that are already successfully in place; in other words, to do to your development projects what the villagers did to the triticale. The aim should be to make the obstacles that stand in the way of any grand design into the very forces that will carry the man/nature interactions into the positive sum pockets. Do not ignore the natural/cultural template; do not smash it to pieces; design your interventions around it.

This is not to say that no institutional reforms are possible; only that those that do not enjoy a high level of consent are likely not to achieve their desired results. Also, we must be careful not to treat "the village level" as homogenous; there are often marked differences both between villages (adventurous Buddhist traders, for instance, versus cautious Hindu cultivators) and within them (landlords versus tenants, for instance, or one ethnic or caste group versus another). We have addressed these issues in other articles that concentrate specifically on this institutional perspective (*Mountain Research and Development,* Vol. 5, Nos. 2 and 3). Here our concern is simply to point to the connections that exist between all this institutional complexity and the biological base on which it draws. Our aim is to show something of the complex mutual accommodations that are involved in these connections and to suggest that the structure, or pattern, created can actually be used as a template for the design of intervention aimed at encouraging sustainable development.

Knowledge and Incompleteness

The contrast between the triticale team and the scientists of the National Academy is most instructive. The scientists with "hands-on" experience in the Himalaya have developed a "feel" for this template by bumping up against the local systems of knowledge-and-practice and then modifying their own globally-conceived solutions until finally they have meshed constructively with those systems. Such individuals, unfortunately, are all too often seen by their "arms-length" colleagues as being on the fringe of their disciplines. This is doubly unfortunate because the sorts of modifications to those disciplines that are needed if gifts of expertise are to flow freely in both directions call for nothing less than the reversal of fringe and centre. When the tinkerers on the fringe get it right in the Himalaya and the centrist grand designers make such a mess of it in their own backyard, the locus of expertise is in for one of its historic shifts. Those who openly acknowledge the incompleteness of their knowledge begin to look more credible than those who continue to insist that they have a complete grip on it all.

A vitamin pill may certainly contain all the vitamins we know about but, equally certainly, it may contain none of the vitamins we do not know about. If our knowledge turns out to be almost complete then our reliance on the vitamin pill will have been well-placed; if our knowledge turns out to be very incomplete then we might have done better had we listened to what mother used to say. Often enough, we would do best by taking the vitamin pill *and* listening to mother. In the Himalaya, the equivalent to listening to mother is to make room for the villager—his encoded knowledge, his divergent perceptions, and his contrary problem definitions. If there are many different systems of knowledge, and if each of them is incomplete, then the more of them we can make use of the better. The only trouble is that, to do this, you have to concede that your

truth is not the only truth: something that does not come easily to those who see development as a kind of mission.

So what we are advocating is a "tinkering" approach rather than a grand design. Grand design is feasible only when there is complete (or near-complete) knowledge. Bench sciences[1], closed systems, green field sites, and *tabula rasas* characterise the grand design approach; and it has some spectacular successes to its credit—the moon landing, for instance. But the trouble with grand design is that it only works with simple problems—the sorts of problems, for instance, that physics restricts itself to. Once you have to consider a dynamical system more complicated than the earth and the moon, complete knowledge starts to slip from your grasp; you cannot get your whole system up onto your bench. As you count the pieces on your bench how do you tell whether they are the pieces that count? Tinkering becomes the only appropriate design mode once you concede the incompleteness of your knowledge. Engineering arts, open systems, places, and palimpsests are what you then have to deal in. The engineer does not work on the bench; he works in the world. He uses a lot of bench science, of course, but his skill, his judgement, and his art lie in his handling of the tension between the closed-system assumptions of the science he is using and the open-system reality of the world in which he is working. Sites have lines drawn around them; they are the planner's attempt to match the physicist's bench—the fruits of his physics envy. Places, by contrast, shade away into other places. The "genius of the place" resides not in the place itself but in the way it is connected up to everywhere else. Sites pretend to be objective; places are unashamedly subjective—qualities that are conferred upon topography by social processes. Sites deny the template; places are part of it. *Tabula rasas* are slates wiped clean; they provide you with no information as to their provenance, as to how they came to be there. They have no history, and if you insist on treating something as a *tabula rasa* then you are insisting that its history is of no consequence. But palimpsests *are* their history. As new land-use is continuously piled upon old land-use so the landscape and its future capabilities are increasingly determined by its history. To disregard that history—to insist that what we can see now is all the information that we need or to claim that we live in an age altogether different from any that has gone before—is to adopt a hopelessly inappropriate design approach.

The efficiency/equity debate in development provides a nice example of this inappropriate approach in action. At the heart of it there is the simple notion of an either/or switch over which the planner has control. Nepal's recent history reveals just how mistaken this notion is:

> . . . the development debate on efficiency *vs* equity had reverse import to Nepal both in timing and sequence. The first three plan periods corresponded with the phase when economic planners had full faith in growth *per se*. But Nepal had little infrastructure to generate economic productivity. Even when equity or social justice emerged as a new development philosophy in the early 1970s, the Nepalese economy still lacked the vigour to do justice to the distributive aspect. It might have been an academic expediency later to discard economic growth models and adopt a minimum needs approach but such shifts in policy orientation were not conducive to the maturing of the development process.
>
> (Gurung, 1984)

The grand designer might conclude from this that equity is a frivolous and far-fetched concern in a region where the desperate need for income seems to far outweigh the luxury of monitoring its distribution. Paradoxically, he has to argue that efficiency is Nepal's basic need whilst his current development philosophy points to the basic needs of the Nepalese as the justification for choosing equity.

The biological perspective resolves this paradox by pinpointing the fallacy that underlies it: the grand designer's either/or view of equity and efficiency as priorities, and the belief that he can choose which of them to encourage. From the perspective of biological conservation, social equity is very closely related to biological efficiency; it is precisely the poorest villages that are most likely to be locked into an ecologically destructive struggle to win a livelihood off a Himalayan hillside. That, after all, is why they are poor! The natural/cultural template that the grand designer has ignored has already locked the switch in the equity position. The only pathway to increased efficiency is by way of the poorest villages. If their relationship with their environment cannot be encouraged into an upward spiral then nothing can be done for the totality of which they form the least fortunate part. It is naturalistic science, and not the bogus utilitarianism that speaks in terms of efficiency or equity, that points the way to sustainable development. If there *is* a way, that is.

UNCLOGGING THE CHANNELS

Up to this point the Himalayan land has been at the centre of our attention. But to bring into effective action the kind of development approaches suggested here will demand a great deal from all concerned, particularly the outside agencies. Above all, the problems facing the Himalaya will require those agencies to cultivate an adaptability fully equal to the high level of failure they will encounter. Effective action will demand a keen and open eye towards working within the framework of Himalayan society and towards making the most of the vitality, both spiritual and economic, that flourishes within that society. Particularly with respect to biological conservation and development, one promising source of organizational ideas for United Nations and other agencies seeking to meet this special kind of challenge is the conservation groups themselves. Operating outside the world of block grants and major projects, groups such as the World Wildlife Fund/International

[1]For example, physics and chemistry. Sciences based on the strategy of getting all your variables up onto the bench in front of you and then experimenting with them secure in the knowledge that no extraneous variable will wing its way in and spoil it all.

Union for the Conservation of Nature (WWF/IUCN) have a history of experimentation and opportunism in their work. The entrepreneurial style of WWF/IUCN is summed up in a staff member's remark: "As far as biological conservation is concerned, we don't care how we get there; it's the bottom line that counts. We have to go after openings where we find them" (personal communication, 1983).

Of course, it is precisely because they operate outside the confines of the global bureaucracy that such groups are able to ignore the path by which their bottom line is reached. Bureaucracies, on the other hand, have to operate according to a *procedural rationality* that particularly concerns itself with the path. The result is that all sorts of things that are good decisions in terms of the *substantive rationality* of an opportunistic organization are bad decisions within a bureaucratic organization. As is well recognized, both by those who study such organizations and by those who work within them, bureaucracies suffer from rigidity; they tend not to be very flexible and adaptable. On the positive side, they have all sorts of advantages that are denied to the opportunistic organization. Their stability and their rich internal differentiation allow them to give attention to the long term, to monitor events over long periods of time, and to appreciate complex temporal and spatial patterns in the environment in which they operate. You might say that, in the ecology of organizational types, bureaucracies are the large, long-lived, and rather lumbering beasts whilst the entrepreneurs are the small, fast-breeding, and opportunistic rodents. Little purpose is served by arguing about which one is right; still less by urging one to make itself like the other. Each is the way it is by its very nature; it is the differences between them that we should be making the most of. The challenge lies in matching the different organizational species to the development tasks to which they are best suited.

Our argument is that, at present, this matching is nowhere near as good as it could be. In particular, it is the blocking of opportunities for expertise to flow from the bottom up that is the prime cause of rigidity. Adaptability depends upon feedback; upon keeping your eyes skinned for any response by the system in which you are intervening. If you care only for the bottom line then you will take feedback from anywhere. So an increase in the on-the-ground involvement of entrepreneurial organizations is the best way of unclogging the channels that connect bottom to top—South to North—and of transforming scientific alms into scientific gift-exchange.

Groups like IUCN are proudly aggressive. They are assisted in their work by a network of other organizations, often with prestigious and politically powerful contacts in the developing world. For instance, IUCN contacts in Bhutan were instrumental in the forward-looking demarcation of reserves in that kingdom. The 1,500-member World Pheasant Association has provided funds for a Himalayan government to operate a critically needed sanctuary; a major accomplishment for a few thousand dollars a year. And the activities of these groups are not limited to field projects. For instance, the IUCN Conservation for Development Centre is now completing a national conservation strategy for Nepal that will call for some major institutional innovations in that country (and, with appropriate modifications, they do the same sort of thing for developed countries). However, though their energy and enterprise are formidable, the financial resources of these groups are small. The Himalayan region today has only two or three small active IUCN projects; total expenditures in the region over the next few years are expected to be slight—in the range of US $100,000 perhaps.

For an agency such as the United Nations Environment Programme (UNEP), meeting part of its environmental agenda in the region could be expedited, to some extent, by mimicking the entrepreneurial approach of IUCN. However, since there is a limit to how far a big agency can go in this direction, there is also a need to look for alternative accommodations. If UNEP and similar agencies were to step back a little from direct on-the-ground involvement then an increase in co-operative projects with IUCN or Asian organizations with similar aims could make good use of the substantial organizational resources already in place but chronically underfunded. These, of course, are just a few suggestions, not a strategic prescription. Whatever the particular organizational mix that is chosen, the guiding principle for success in the joint venture of rural development and biological conservation is a willingness to encourage an institutional diversity on the outside equal to that sure to be encountered inside the region.

CONCLUSION

The crisis in the Himalaya has pulled into the same net rare species, food crops, domestic animals, remnant patches of natural forest, human residents of the region, and international organizations seeking to help. Understanding more of the biological groundwork may open up some new and perhaps unexpected directions for development (and, at the same time, close others that may look inviting but cannot, in fact, carry the totality in an upward direction). In the village landscape, for example, wheat varieties retain the building blocks of farmland productivity, and these and similar assets can be used, perhaps, to push yields even further. By the same token, the loss of a village wheat variety, or a promising local race of fodder tree, or the watershed-regulating function of a forest imposes substantial future costs on both the ecosystem and the people that it serves.

It is conventional practice to cite the formal links between biological resources and developing economics. Perhaps this article has, in a general way, suggested that a productive approach to development can actually be built upon conservation insights.

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