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Distinguished Lecture

Dams, Cows, and Vulnerable People: Anthropological Contributions to Sustainable Development

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It is with considerable trepidation that I agreed to address so distinguished a gathering of development economists, theoreticians, and practitioners. I was enormously honoured when Professor Naqvi invited me to make this presentation, and at the same time impressed with my own temerity at having accepted. I am not an economist; at best, I contribute to the emerging discipline of economic anthropology, that subfield of anthropology that some have baptised as the "dismal science of the 20th century." I locate my research within a subfield of that subfield, in a specifically *development* anthropology, making the claim that is still received in some quarters with only partial tolerance, that anthropologists–those curious people identified in the popular mind with the recovery and study of isolated people, bones, and potsherds–have also something useful to add to both the theory and praxis of development.

As a self-conscious field of inquiry, development anthropology dates only from the last 20-25 years, though its roots can be found in the late 19th century, when scientists working for the United States Bureau of American Ethnology tried to understand the Ghost Dance, a great messianic movement that spread rapidly among subjugated Native Americans who were forced on to reservations by the government and in very large part deprived of the means of social and economic reproduction [Mooney (1965)]. Especially in Britain, a policy-relevant anthropology emerged in conjunction with its colonial service [Asad (1973)], and during the 1940s, some of the most prominent American anthropologists–including Margaret Mead, Geoffrey Gorer, Ruth Benedict, Robert Lowie, Alexander Leighton, and Conrad Arensberg–tried to apply an anthropology that had traditionally focused on tribal and peasant populations to the understanding of our Russian allies and our German and Japanese adversaries during the Second World War.

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Author's Note: Some of the ideas explored in this paper were shaped during my tenure as a World Bank Visiting Research Fellow in 1994. The opinions expressed here are mine alone and not necessarily those of the World Bank or any other organisation.

In the early post-war period, in the 1950s and 1960s, some anthropologists worked with the United States International Cooperation Agency, the predecessor of the Agency for International Development, especially in Latin America [Doughty (1968); Dobyns *et al.* (1971)]. According to Allan Hoben (1982), at that time there were more anthropologists employed in the foreign aid programme than at any American university. But the particular contributions of anthropologists appeared to have little saliency when the programme was reorganised in 1961 under President Kennedy to deliver and unreservedly econocratic and technocratic approach to development [Cernea (1993)], informed by the "modernisation hypothesis" that marginalised the people-centred or participatory development with which anthropologists were more comfortable [Rostow (1960)].

At the same time, the war in Southeast Asia, which the United States assumed from the French, seemed to many anthropologists a repudiation of the anti-colonialism with which they identified. The involvement of a handful of anthropologists in counter-insurgency work in Latin America (code-named Project Camelot) and in Thailand was so repulsive to the vast majority of our colleagues that there was a general reluctance in the later 1960s and early 1970s to have any association with the government. Academia and university-affiliated museums were the employers of all but a very small number of social anthropologists.

A concatenation around 1973 of several independent events identifies that year as the initiation of a new involvement of anthropologists with the American foreign economic assistance programme. First, there was a rising sense among economists, as well as among other social scientists, that there was something terribly flawed about the modernisation hypothesis that assumes that "underdevelopment" is an evolutionary stage towards "development," and that the time it took to achieve a developed economy could be shortened and the process facilitated simply by the transfer of technology, technical expertise, and money. Several decades had passed, and while there were a number of countries that appeared in some senses to have "graduated" from underdevelopment–such as Taiwan and South Korea (two countries that enjoyed enormous capital investments from the United States)–and while advances in plant genetics had produced high-yielding varieties of wheat and rice that some foresaw as presaging a resolution of the Malthusian problem, many of the former colonial countries of the world–in Africa, Asia, and Latin America–had actually lost ground in such indices as per capita GNP, rural quality of life, infant mortality and average life expectancy, and per capita food production; and in many of these countries there was a widening gap between the urban and rural masses and their often minuscule élites. The writings of Frank (1969) and others proposed that rather than being linked in an evolutionary sequence in which development replaces underdevelopment, the two were simultaneous products of the power asymmetries inherent in the global political economy. Informed by such thinking, although perhaps not fully appreciative of its

potentially radical implications, those two bastions of world capitalism, the United States Congress and the World Bank, altered their development rhetorics to insist that, henceforth, development efforts must focus in the first instance on the immediate causes of poverty. In much of the world, this stress on improving the conditions of the "poorest of the poor," with its concern for equity as well as for growth, turned attention to rural populations. But other than some agronomists and veterinarians, who knew useful things about the rural poor? The development gurus in economics, law, and public administration were far more accustomed to working with the aggregated data of national accounts than with the nitty gritty, non-quantitative, imprecise, fuzzy, and often subjective data of individual farms, households, and small rural communities.

Secondly, by 1973 the Western world had become aware of the great drought in the African sahel triggered by six continuous years of severely deficit rainfall. The immediacy of television, with its graphic images of dead and dying crops, livestock, and people, the great migrations of people from rural areas into refugee camps at the fringes of African cities, formerly productive farmers and herders transformed into mendicants, generated a popular insistence that SOMETHING BE DONE ABOUT IT. The Congressional Black Caucus, comprised in those days of a handful of African-Americans in the House of Representatives, demanded that the United States refocus its foreign aid programme on Africa; and what later came to be called the "Development Fund for Africa" was legislated, earmarking a substantial portion of the AID budget in support of agriculture, health, education, and population programmes on that continent. To the general demand for expertise on rural development came the specific need for persons knowledgeable about rural life in Africa, especially in the francophone countries that had borne the brunt of the drought.

Thirdly, the ending of the Vietnam war transformed the idea of government service from an anathema to a moral imperative *if* it could help improve the conditions of life of drought-afflicted poor majorities of these countries. Of course, the American foreign aid programme continued to be justified in terms of its role in the global competition against the Soviet Union. If the Soviet Union seemed to embrace one country, the USA committed itself either to an armed opposition within that state or to its nearest hostile neighbour. There were even in this curious tango occasional changes of partners, as when the Soviets took and American-spurned Ethiopia and we began a bizarre courtship with Somalia. The demise of the "east-west" competition has been seized on by those inside and outside the US Congress who have long opposed the foreign aid programme, in their drive to reduce or eliminate its funding.

In the early 1970s, there was only a pitifully small number of American anthropologists with extensive field experience in francophone sahelian Africa. I

was one of them, having done fieldwork in southeastern Niger on nomadic-sedentary relationships in a transitional ecological zone during 1967-1969, and again in 1970 and 1972. In 1974-1975, I was seconded from my University to direct social science research on rural development programmes and projects in West Africa. Based in Abidjan, our geographic scope extended from Mauritania in the north to Chad in the east, and Zaire in the south, including almost every country encompassed within that enormous triangle. Most of our activities dealt with pastoral and small farmer production systems. Our rhetoric stressed "equity," "gender," "appropriate" and "capital-savings technology," and "basic human needs"; ten years later, "environmental sustainability," "policy-based dialogue," and "private sector/privatisation" were added to the litany–equity, basic human needs, and appropriate technology, while they did not entirely disappear, retreated in importance.

In some senses, it was just as well that anthropology and development had enjoyed a ten-to-fifteen year separation from the late 1950s to the early 1970s, because it was only towards the end of that period that the discipline experienced "a paradigm shift…away from cultural relativism, structuralism, and evolutionism towards models informed by political ecology and…political economy" [Horowitz (1994:4)].

The anthropology of the 1970s was better prepared than its predecessors to deal with the dynamism and complexity of rural communities, and with the effects on rural systems of the political economies in which they were enmeshed. While much earlier anthropology had emphasised the uniqueness of each cultural situation and its structural stability, anthropologists trained in the 1960s and 1970s were more disposed to see both cross-cultural regularities, allowing for comparison, as well as internal heterogeneity, conflict, and creativity leading to social change. The ecological perspective in anthropology directed students to explore relations between productive technologies and the environment, and the social, economic, political, and ideological institutions of society. It also facilitated sectoral studies and comparisons…[Horowitz and Painter (1986:2)].

I do not want to rehearse further the history of anthropology in development, although it has had a florescence that few of us twenty years ago would have dared predict in public. As an example, as recently as ten years ago, the World Bank, where economists battle lawyers and, occasionally, political scientists and public administration specialists for domination, had only a couple of direct-hire anthropologists, sociologists, and maybe geographers on the staff. Today, there are more than 40 (although how many will remain after the Bank completes its 1995 reorganisation and downsizing is uncertain). The niche created for anthropologists was clearly a result of the Bank's belated response to environmental issues in development, forced on it largely by non-governmental environmental and human rights organisations. Similar pressures have led the Bank to issue Operational Directives on Gender, Poverty Alleviation, and

Indigenous Peoples, expanding the arena within which its non-economist social scientists operate. (Some, both within and outside the Bank, believe that these openings have little impact on the Bank's *real* business: approving loans. I will not pursue that issue here.)

What I would like to explore with you today is not the history of anthropology in development, but rather some of its principal accomplishments and its principal challenges as this century and millennium draw to a close. Rather than attempt a comprehensive listing, I would like to tell you about some of the actions in which my colleagues and I at the Institute for Development Anthropology have been and remain personally involved. Carried out in Africa and in Asia, and to a lesser extent in Central and South America, these involve river-basin developments associated with the construction of high dams and interventions in pastoral production systems on arid and semi-arid rangelands, both of which impact on the management of natural resources.

DAMS

The issues of water supply and management have moved to the centre of the development agendas in many countries, and older unipurpose or even dual-purpose (i.e., irrigation and power) approaches are today subject to intensive examination and debate. According to a recent World Bank report [Kirmani and Rangeley (1994: vii)].

Many developing countries are facing serious problems in meeting the rapidly growing water demands for domestic, industrial, irrigation, power, and other uses. The marginal cost of additional supplies is increasing, water quality is deteriorating, ecology and biodiversity problems are aggravating, and intersectoral conflicts are becoming more frequent. These issues are more difficult and often intractable in international river basins where riparian countries are unable to establish cooperative arrangements to plan and use the available water resources effectively.

As the major multilateral funding source for river basin development, the World Bank has received much criticism from international non-governmental and environmental organisations [Majot (1995)] for what some have seen as its reckless support for actions that are neither socially, nor economically, nor environmentally sustainable, generating a debate within the Bank that has resulted in some extraordinarily self-critical internal assessments [World Bank (1994)]. As I have written [Horowitz (1994:iv-73-74)].

Economic development involving the construction of high dams on tropical rivers has become an increasingly contentious area, opposing in often strident language conservationists and advocates of indigenous peoples, on the one hand, and some civil engineers and development planners, on the other. The contest is clear and uncompromising [see "The Debate over Large Dams," *Civil Engineering* (August

1991)] reflecting zero-sum thinking on both sides. Despite rhetoric acknowledging a multiplicity of objectives in dam construction, whose "purposes include providing clean and adequate water supplies for drinking and irrigation, flood control, navigation, hydroelectric power, fish and wildlife enhancement, recreation and water quality" [Veltrop (1992:iii)], those responsible for power generation resist demands of downstream users of water in excess of power requirements, irrigation engineers see flood-recession agriculture as wasteful, managers of potable water supplies tend to have jaundiced views of recreational uses, and so on. Concerns about environmental and socioeconomic costs manifested by conservationists and human rights advocates are absolutely legitimate, but in their opposition to *any* dam construction they appear to write off also valid demands from the urban and industrial sectors for cheap, reliable electricity, and of agronomists for expanded irrigation. Reflecting on the controversy, Scudder writes (1989:4): "Taken too far, such concerns will doom millions of low-income people to worsening poverty with all the accompanying misery. Indeed, such concerns may even lead to increasing environmental degradation" (in part as thermal and nuclear plants are built instead of hydropower installations).

Beginning in the early 1980s, the Institute for Development Anthropology began a long-term study of population resettlement from the reservoir above the Manantali Dam on a major tributary of the Senegal River in Mali. Some ten years earlier, in 1972, Mali, Mauritania, and Senegal created a Senegal Valley Development Authority (OMVS) that was responsible for building the Diama salt-intrusion barrage some 27 km from the mouth, and the Manantali High Dam about 1,000 km upriver. Among the objectives of this massive undertaking were the generation of hydropower of 800 gigawatt-hours/year, provision of landlocked Mali with direct barge access to the sea, and expansion of irrigation. Several years after OMVS was organised, the World Bank undertook a survey of the irrigation potential of the basin inspired by "a need for rapid increase in food crop production which has not kept pace with population growth" [World Bank (1975:I)]. The report concluded that because of low rainfall irrigation was the "only viable alternative," and it foresaw an expansion of irrigation from the then current 13,000 ha mostly in the delta to more than 400,000 ha within a forty-year period. It acknowledged that "low-yielding" flood-recession cultivation (FRC) was practised on upto100,000 ha in a year of good floods. Most of the river's waters were seen, however, as "wasted," flowing "unused into the Atlantic Ocean." The report clearly recommended that FRC be continued:

The irrigation schemes being constructed or under preparation would in part develop lands now used for FRC. However, FRC is expected to remain an important component in food crops production of the Basin for the foreseeable future. In theory it should be possible to improve and possibly expand FRC by upstream storage and regulating the flow of the Senegal River [although] there are a number

of technical questions to be overcome before this potential can be quantified. In the meantime, and as a minimum, upstream storage and regulation of river flows would have to recognise this established use of flood waters and take measures to at least sustain the agricultural benefits presently so generated" (ibid.:22).

Our focus on the 10,000 Malinke-speaking peoples to be relocated was consistent with the general notion that it is this population–and the "hosts" among whom they were to be resettled–who are most likely to be adversely affected by river-basin development, the so-called "PAPs" ("project-affected people") of much of the South Asian development literature. The World Bank's guidelines on dam-affected resettlement refer uniquely to these upstream peoples. It became clear to us that among the stakeholders whose lives were likely to be worsened by operation of the Manantali Dam were the upwards of a million riparian residents in Senegal and Mauritania who lived *downstream* from the dam-site.[1] Fortunately, we were able to gain support from the Government of Senegal and from USAID/Dakar to undertake a three-year study of the effects on these people of the river's new flow regime. We initially selected three villages in the middle Valley, and subsequently expanded the sample to thirty-two.

Although the Middle Valley is in a low rainfall area, with an average annual precipitation of 250-500 mm, traditionally it is densely populated by smallholders who practise diverse production activities, allowing for multiple harvests. During the short summer rainy season, millet is grown on the sandy uplands just beyond the valley, as well as on some elevated areas, such as the natural levees, within the valley. During this season, herds of ruminant livestock (cattle, goats, sheep, and some camels) pasture on rainfed grasses even further away from the valley, to limit incursions on the cultivated millet fields. When the mature millet is harvested approximately 100 days after planting, the animals are then brought onto the cropped fields, browsing the fresh millet stalks and manuring the land, while farmers shift from the sandy hills to the rich alluvial vertisols of the flood plains, and as the waters recede these plains are sown in sorghum, maize, and cowpeas. These have a similar maturation period of approximately 100 days, during which there is no rainfall. The plants mature drawing on residual soil humidity, sending their roots deeply into the ground. Following the recession harvest, livestock descend from the cropped rainfed fields, and browse the crop stover and nutritious shrubs and grasses that colonise uncultivated sections of the plain. During the period when the plains are inundated, some 10,000 fishers move from the main channel of the river onto the land, and the combined annual yields from these two habitats exceeded 30,000 tonnes. Immature

[1]"Least analysed by either academics or those responsible for feasibility studies…are river basin residents who are neither relocatees or hosts. Such project-affected people also tend to be left out of the type of environmental and socioeconomic development guidelines first pioneered by the World Bank… Yet in situation after situation they constitute the majority of those whose living standards are adversely affected by river basin development activities" [Scudder (1995); see also Horowitz (1991)].

fish are protected from larger predators on the richly manured soils of he floodplain.

Thus the traditional production system of the Middle Valley included rainfed millet farming; flood-recession (or "spate irrigated") maize, sorghum, and cowpeas; pastoral livestock raising; and fishing. Since the drought of 1968-1973, a number of small "village irrigation perimeters" of less than 50 hectares each have been established, and these now add a fifth dimension to the production inventory. These perimeters tend to be built on the natural levees, where close proximity to the river economises on the costs of pumping. Only rarely are they placed on the floodplain itself, in part because of the far more elaborate bunding needed to protect them from floods and in part because the floodplain is considered too valuable for recession cultivation.

Despite the World Bank's early recognition of what would today be called the "environmental sustainability" of the pre-dam production system and its ability to support large human, livestock, and fish populations, as well as a dense flood dependent woodlands and wildlife, and an aquifer dependent on the flood for its periodic recharging, irrigation became the almost single focus of donor activity in the region. Each of the major multilateral and bilateral funding agencies saw in the dams a mechanism whereby the costs of pumping could be reduced by lowering the peaks and raising the hollows of annual flows. Everywhere it was assumed that flood-dependent production was an archaism that would be replaced by modern irrigation schemes. The initial expansion would be in the Delta and Lower Valley, where the Diama Dam blocked the upstream movement of saline ocean waters, but over time it was assumed that the entire 375,000-400,000 ha lateral plain in Mauritania and Senegal (and a small amount in Mali) would be devoted to pump schemes.

Our research team believed that the true benefits of the existing production system could be quantified and that the figures would allow for a more realistic comparison with the projected costs and benefits of replacing it with irrigation. We never challenged the building of the dams themselves, since Diama had already been completed and Manantali was well under construction when our fieldwork began. We sought rather to test the hypothesis that a management strategy for the dams that incorporated an artificial flood allowing for the pre-dam production array to continue would provide greater "benefits to local, regional, and national economies…than they would be under a water regime that markedly limited the flood to maximise hydropower and irrigation. Our research was informed by a desire to see the residents of the valley become beneficiaries rather than victims of development, while their urban compatriots also profit from more reliable and potentially cheaper electricity" [Salem-Murdock and Horowitz (1991:9)].

Although the study was directed by anthropologists, there were hydrologists on the research team, and they critically re-examined the arguments about the water storage requirements of hydropower which had initially concluded that an artificial

or *augmented* flood (since the point would be to coordinate the release from Manantali with the peak flows of the two uncontrolled tributaries that joined the mainstream below the dam) would be too costly in terms of power foregone. Running computer simulations back to 1904, the hydrologists concluded that, contrary to the claims of the consultant engineers, the rate of reservoir recharge during the period of the planned release was sufficient to support and augmented flood that would enhance smallholder production and environmental sustainability without competing for power. In 925 out of the 975 months for which we had flow data, waters from the Manantali reservoir could have sustained both 74 megawatts of continuous output and provided a flood on at least 50,000 hectares of arable land. Our calculations were subsequently supported by the World Bank's appraisal of the energy project, which anticipates a rate of return of more than 15 percent even with an artificial flood larger than any we had contemplated. "Tous les scenarios…presentent une bonne rentabilite economique…" [Tractebel *et al.* (1991:2-3)].

The anthropologists task was to compare the economic returns from village irrigated perimeters and flood-recession cultivation and to compare the total returns from production with and without an artificial flood. Rather than base comparisons uniquely on returns per unit land, as is customary in these assessments, we also looked at returns per unit labour and per unit capital invested. Our work was informed by a World Bank (1987) review of two decades of rural development projects. The review indicted these anticipated rates of return based uniquely on land yields as inflated, and concluded that the failure to meet these rates was due to ignorance of the totality of factors of production.

In terms of yields per unit land, irrigation clearly outperforms flood recession cultivation: irrigation could produce a rice crop worth between $500 and $837 per hectare, many times greater than the $57 to $115 from a hectare of flood-recession sorghum. Yet the Government of Senegal, which was the monopolist buyer of the rice harvest, was losing almost $0.50 per kilogram, because of its assumption of the costs of perimeter construction and through subsidising the fuel and other inputs required for production [Engelhard (1989:22)]. The structural adjustment programme under which Senegal functions today precludes such assumptions and subsidies. But even when the government assumed those costs, farmers were ill-disposed to work the perimeters in years when rainfall was adequate for dryland and recession farming. While land yields were high, the labour and capital intensivity of irrigation made it unattractive when less costly alternatives were present. In terms of yields-per-unit capital consumed in production, rice has a gross output-to-costs ratio of only 2.32-3.06:: 1, whereas recession sorghum generated a ratio of 5.61-5.77 : : 1.

The same advantage holds for labour, with recession farming providing a much higher return to labour and thereby contributing to household food stocks while freeing labour to engage in off-farm activities that are more remunerative.

While irrigated rice farming consumes labour at 501 to 727 days per hectare, flood-recession sorghum requires only 23 to 62 days per hectare [Salem-Murdock and Horowitz (1991:10)].

A day's labour on flood-recession sorghum produced a crop worth between $ 1.25 and $ 2.50; comparable figures for irrigated rice are between $ 0.81 and $ 1.36. The claim that the labour demands of irrigation would slow down the rural exodus in the Middle Valley is falsified because the net returns from urban employment, even in the informal sector, greatly exceed those from irrigation, and remittances allow the family to recover the lost local value of migrant labour. This loss of labour power is less critical in rainfed and recession agriculture, since these are also less demanding of labour. "The paradox of irrigation is that effective production requires both a good deal of liquid capital and a large, stable labour supply, but yields relatively poor returns to both" (ibid.). Since irrigation in the middle Senegal valley does not retard the pace of young male migration, the increased workload on the schemes is disproportionately assumed by women, children, and the elderly; yet women have not enjoyed a corresponding increase in autonomy and economic well-being. By 1978, several years after the first irrigated perimeters were introduced in the region, women provided more than half the labour on the schemes, compared with about one-third of the labour on recession fields. While they provide more than half the labour, women do not enjoy land rights on perimeters, and are rarely allowed to have full membership in the water-user associations [Horowitz and Salem-Murdock (1993: 323-325)].

What are the returns to producers from the other elements of the "traditional" system? Fishing is estimated to average 70kg/ha/year. In 1990, local fishers were receiving about $ 2.00/kg, or $ 140 per hectare. Adding that to the value of sorghum, each hectare yields between $ 196 and $ 276. Termination of the annual flood will not only remove the floodplain from the habitat available to fish, adversely affecting their continued reproduction, but the run-off from agricultural chemicals used on irrigated perimeters would also negatively impact on that reproduction. When the enhanced carrying capacity of the floodplain as pasture is calculated in terms of increased yields in milk, meat, and calves as compared with rainfed pasture alone, a figure of $ 70/hectare is calculated, raising the productive value of the habitat to between $ 266 and $ 345/ha.

We then examined the cost impacts of termination of the flood on woodland yields and on aquifer recharge. The latter was fairly straightforward. According to the team hydrologist [Hollis (1990 and 1990a)], aquifer recharge is primarily due to infiltration of flood waters. Since the villagers tap this aquifer with shallow wells for domestic use, livestock, and small gardens hand-watered by women, the drying up of these wells, should the flood be terminated, would either force the people to use less sure and potable supplies or force the government to attempt to tap the deep aquifer

through expensive bore holes. Using data from a recent water-supply project in Senegal [Horsfield (1988)] we calculated that provisioning 300,000 residents in Senegal alone would cost approximately $40,000,000. (We did not attempt to estimate the costs along the right bank in Mauritania.) However, there is some evidence that, costly as it is, this would prove to be only a short-term solution, since both the shallow *and* the deep aquifers may be connected and their combined recharge be dependent on the flood. Furthermore, it is likely that the reduced hydrostatic pressure in those aquifers would favour a subsurface migration of saline ocean waters, destroying their potability.

The riverine woodlands are dominated by the *acacia nilotica* ("gonakié" in the local Pulaar, and "sunt" in Arabic), a flood-dependent species. According to a Dutch environmental analysis [van Lavieren and van Wetten (1990:24)], the sustainable yield of these woodlands is 8.2 m^3/ha/year. The tree is the major source both of fuel and construction wood in the region, and there is a vigorous, if illegal, export of charcoal to less woodland-endowed areas. We do not have longitudinal data on the value of wood nor have we attempted to estimate its importance as arboreal pasture and as a refuge area for migrating birds. But these clearly increase the per hectare value of the flood-dependent production system that will be eliminated if the dams are managed conventionally.

There is reason to hope that they won't be. In 1990, the Institute presented its findings to the Government of Senegal, and six months later, citing our work, the Government amended its Left Bank Master Plan to include a permanent artificial flood for the Senegal Valley. While Senegal is only one of the three OMVS member countries, and Mali and Mauritania have not agreed to the shift, senior officials from OMVS scheduled several days at the Institute in December 1994 to review the hydrological, economic, environmental, and social soundness of our proposal. The World Bank may condition its financing of the energy component of the Project on acceptance of the artificial flood, and it is planning a research project to test alternative water management scenarios for the Manantali and Diama dams, not only to maintain the natural and agrarian productivity of the downstream environment but also to reduce the incidence of such water-borne diseases as malaria and schistosomiasis. If our proposal is ultimately adopted, it will be the first instance in the developing world in which the waters impounded by a high-power dam will be used also for such purposes. And it may provide a model for the management of other dam-regulated tropical river systems.

Evidence from other areas suggests that our approach may well have utility beyond the Senegal Valley. In the low rainfall sahelian region of northeastern Nigeria, for example, prior to the completion of the Tiga (1974) and Challawa Gorge (1992) irrigation dams, the 5,000 km^2 Hadejia-Jama' are interfluvial floodplain constituted a zone of extraordinary ecological productivity, sustaining a population of about a million people. According to the

World Conservation Union (IUCN) study, "The economic value of production from the wetlands is very large, many times greater than that of all the irrigation schemes for which the inflowing waters are dammed, diverted and their waters used" [Hollis *et al*. (1993:7)]. This production, similar to the middle Senegal valley, included a seasonal succession of rainfed agriculture between June and September, flood-recession cultivation beginning with the drawdown at the end of the rainy season, small-scale irrigation in the dry season, fishing, and pastoralism. The system was not only sequential, but each element was integrated with all the others, such that alterations in any one of them would ramify, often adversely, through the others. Thus, herders grazed their stock on the millet stalks left after the rainfed harvest, and on sorghum, maize, and rice stover from the recession harvest, meanwhile manuring the land for the benefit of both farming and fishing. Additionally, the wetlands supported a large avian wildlife, contributed to woodland regeneration, and provided for a recharge of the subsurface aquifer.

The construction of irrigation dams on the Hadejia and Jama' are rivers–continuing today with building the Kafin Zaki impoundment–does not take land out of the floodplain since the large irrigated perimeters are sited considerably upstream. But they do compete for water. In an interesting economic analysis of the comparative values of irrigated and floodplain production, the IUCN team asked: What are the returns from each 1,000 m^3 of water? The answer is that

> …with an annual water requirement of 15,000 m^3 per ha, the Kano River Project is highly intensive in its water use. When expressed in terms of water input rather than in hectarage cultivated, current net economic benefits are extremely low around Naira 1.10 [$US 0.147] per 10^3 m^3 of water used … Net project economic benefits are only Naira 0.02 [$US 0.0027] per 10^3m^3 of water input. In comparison, the flood-recession agriculture of the floodplain requires substantially less water. Thus, even when the "maximum" annual water input to the floodplain of 2549 10^6m^3 is used, net floodplain agricultural benefits currently amount to Naira 21.6 [$US 2.88] per 10^3m^3 of river water inflow. Total net economic benefits from agriculture, fishing and fuelwood amount to Naira 31.8 [$US 4.24] per 10^3m^3 of river water inflow [ibid., 205].

Given these data, why did Nigeria divert water from the wetlands where it would have generated a return greater than 1500 times that from the irrigated schemes? At least part of the answer is that the data were not given; that is, neither the planners, nor the implementers, nor the fund-givers asked about the opportunity costs in water of replacing traditional production with irrigation. It was simply assumed that the advantage lay with the newer rather than with the older system. It was so self-evidentially the case that demonstration was not required.[2]

[2]IUCN has sponsored another extraordinarily useful multi-disciplinary study of an African wetland in Botswana [see Schudder *et al*. (1993)].

The lesson is that the *a priori* dismissal of an existing production system and the assumption that such systems are capable of only marginal improvements at best are fraught with danger. The implication is that we need far more collaboration among economists, technicians, and anthropologists than is customary today, and that this collaboration should start at the very beginning of the planning cycle. Far too often, non-economist social scientists, when they are invited to participate, are called in at a relatively late stage in the design cycle, frequently after an activity is already committed and funded, when their task is to persuade local peoples that the changes will indeed prove beneficial. Such merchandising can only add to the generally unsatisfactory performance of rural development interventions in improving production, producer well-being, and environmental health.

Let us examine these points in another area, that of development among pastoral herders.

COWS

Whereas river-basin development has engendered a vigorous discussion in recent years, and the untrammelled enthusiasm once shown for large impoundments and total flood controls is now waning among many major donors–currently, the Mekong River Basin constitutes a fiercely contested terrain opposing environmentalists and engineers–and dam impacts on people and environments are beginning to figure into the discussions, pastoral herding continues to receive the almost unanimously hostile press it has since the Tunisian, Ibn Khaldun, took up cudgels against the Bedouin in the 14th century:

…civilisation always collapsed in places where the Arabs took over and conquered. When the [Bedouin] pushed through from their homeland to ifriqiyah [Tunisia] the Maghrib [today's Morocco and Algeria]…the flat territory…was completely ruined [Ibn Khaldun (1967:304-5)].

Compare this with the writings of a 19th Century colonial administrator in the Middle East and with *two* late 20th Century development documents from a major UN agency:

...wherever [the Bedouin] goes, he brings with him ruin, violence, and neglect. To call him a "son of the desert" is a misnomer; half the desert owes its existence to him… if the military authorities were to…take from them every camel and sheep which they possess, they would no longer be able to roam over the deserts, but would be compelled to settle down to agricultural pursuits or starve…they might thus be tamed and turned into useful members of the community [Palmer (1977:297, 299-300)].

…caring for nothing, disdaining manual labour, balking at paying taxes, and being unwilling to sell their animals [the pastoralists] do not make the economic contribution to their countries that is rightfully expected of them [FAO (1973:14)].

> [Degradation on rangelands] is basically a problem of the misuse of land…[and] much of the problem results from the customs, value systems and attitudes of the people concerning grazing lands and livestock, together with the lack of government mechanisms for effective control [FAO (1980:56)].[3]

There is a remarkable continuity in these claims, despite the half millennium that separates them. It is less important to speculate on the reasons why a medieval Arab historian or a Victorian administrator in British Palestine had such antipathy for herders than to understand why those sentiments continue to inform the design and implementation of the so-called "livestock sector" development projects, which include at least some and often all of the following elements: sedentarisation of nomads; increased off-take through marketing; shift from a subsistence dairy base to a commercial meat base; and privatisation of communal resources of land and water. Apart from some commercial dairying and some widespread vaccination campaigns that reduced the frequency of contagious epizootic diseases, almost none of the projects worked. Degradation was not reversed; productivity was not increased; and herder incomes, rather than rising, generally fell [Horowitz (1979, 1986)].

The reason why these projects failed almost everywhere they were tried is that they fundamentally misunderstood the ecology and sociology of pastoral production systems. Planners were misled also by anthropology that saw pastoralism, as presented by some of the British structuralists, as a special kind of kinship system [e.g., Evans-Pritchard (1940)], or, as presented by American cultural anthropologists, as some kind of ideological concept [e.g., Herskovits (1953)]. It was the environ-mentally and economically informed anthropology of pastoralism that emerged in the 1960s and after, with the seminal studies of Fredrik Barth in Iran (1961, 1964), that challenged the mythology of pastoralism and provided a basis if not for spectacular improvements in pastoral production (at least for interventions that would not worsen the already difficult conditions).

The principal myth that anthropologists confronted was that herders are interested in the numbers of their animals but indifferent to their quality. This myth appears commonly in the literature, often expressed in terms of herders, looking on livestock as symbols of prestige, rather than as productive assets.

The central thesis of this view is that the objective of each traditional pastoralist is to own the largest number of animals, irrespective of their quality or the available forage [Montsi (1985:24)]. This objective is seen not as part of an investment strategy that seeks to convert the income or increase of the herd into other values, but is uniquely a matter of prestige: the larger the herd, the more

[3]FAO (1994:III 5) now acknowledges that "In spite of several decades of experience in range resources and utilisation, FAO attention to the social aspects of development in pastoral areas and the implication of national policies, whether directly or indirectly affecting pastoralists' survival strategies, is relatively recent".

important is the herder [Nestel *et al*. (1973:14)]. As evidence for the essential irrationality of this practice, development planners claim to have discovered perverse or "backward bending" supply curves, in which the number of animals sold varies inversely with market prices [cf. Swift (1975:451)].

The second myth was that herding was fundamentally anti-conservationist, and that herders lived in highly competitive Hobbesian communities. This "mainstream" view of pastoralism [Sandford (1983)] received an enormous boost in 1968, when the bioethicist Garrett Hardin (1968) published his now famous article on "The Tragedy of the Commons", Hardin felt that a recurrent disjunction between communal access to land and individual ownership of livestock inevitably results in herders' rapacious competitiveness that degrades the environment, since the benefits of over-consumption pertain uniquely to the over-consumer whereas the costs are shared by all users of the resource. The article's appearance in the prestigious journal *Science* endowed it with an unusual scientific benediction, and Hardin's argument was invoked in countless development documents that saw pastoral herders as the principal cause of their own misfortunes, what appeared after the sahelian drought as the progressive inability of the rangeland to support the herds. Those opposed to communal land use enveloped their arguments in seemingly objective and quantifiable notions of "stocking rates" and "carrying capacities," and hundreds of millions of dollars were poured into sedentarisation on ranches, feedlots, range "management" through some kinds of privatisation, pastoral units and pastoral associations, imposed stock reductions, new water points, improved veterinary medicine, efforts at genetic modifications of livestock, and new markets in efforts to achieve what today would be called "environmentally sustainable development." The projects failed in part because they misunderstood the environmental and climatic imperatives that made movement, informed by the shifting and unpredictable availability of pasture and water, absolutely essential for survival.

The third myth was a claimed egalitarian structure to pastoral societies (which curiously seems discrepant with the notion of competition among herders to maximise herd numbers), and even the great Fredrik Barth misunderstood the wealth hierarchies among Iranian Basseri in his attempt to demonstrate that imperatives of labour and livestock forced on the pastoralists a very narrow range of difference in herd size, varying only between roughly 60 and 200 adult sheep.

What anthropologists discovered was that far from being egalitarian, internally homogeneous organisations, pastoral societies were internally segmented by class, and often age and gender, and these segmentations were becoming increasingly prominent as the factors of pastoral production became more and more commodified. The ethnographic literature pointed to case after case in which not only were livestock being accumulated in the hands of a minority of owners–often persons from non-pastoral groups such as merchants and government officials–but

also these wealthy owners were able to privatise or limit to themselves access to the more productive pastures. Even in such formerly egalitarian communities such as the WoDaaBee of Niger, a shepherd class of non-owners emerged after the drought of the late 1960s and early 1970s, persons whose herds had fallen below the minimum to maintain demographic reproduction [White (1984)]. In the past, such individuals might reconstitute their herds through borrowing, but the nature of the moral community has so shifted that those with animals surplus to their needs are no longer willing to loan them. Shepherds work for wages or even for as little as a share in the milk produced.

A fourth myth was that women in pastoral societies are economically irrelevant. Here again the early anthropologists have to assume some of the blame, because their research rarely explored gender relations of pastoral production and reproduction. From a legalistic point of view, this ignorance of women in the pastoral economy is understandable, since pastoral women rarely have *de jure* ownership rights over animals. Male dominance is guaranteed by the nearly universal gender-discriminatory inheritance rules, rooted, as Gudrun Dahl taught us, in androcentric kinship systems that perpetuate men's economic interests (1987). [See also Beck (1980) and Goldstein and Beall (1991).]

Despite the jural rules of ownership, women's contributions are essential to the viability of nomadic herding. Yet the status of women continues to deteriorate as pastoral societies in general have been forced to diversify economically, to lose pastoral areas to the expansion of agriculture, urban centres, and even of nature preserves and game parks, to experience worsening terms of trade between pastoral and agricultural products, and to undergo rapid social differentiation and assaults on the moral bases of their communities.

In 1990, the United Nations Development Fund for Women and the United Nations Development Programme invited the Institute for Development Anthropology to provide them with a state-of-knowledge report on women in herding societies [Horowitz and Jowkar (1992)], in the hope that a gender-sensitive approach to pastoral development could be initiated. The research programme was informed by the notion that development planners' ignorance of the economic roles of women in pastoral societies–indeed, ignorance of pastoral socioeconomy and political ecology in general–contributed to the poor performance of "livestock sector" projects in semi-arid and arid regions; a failure stemming "from the ensemble of false generalisations held by planners and the faulty methods pursued by implementers…" [Bonfiglioli (1992:6)].

The research found that women's responsibility for herd management was in fact increasing almost everywhere, since the overall deterioration of pastoral economies were forcing men to migrate as labourers on irrigated schemes, mechanised farms, to urban areas, and overseas. In some cases, earnings from this

migration were actually invested in livestock purchases, increasing herd size and intensifying the labour demands on women. Yet, echoing the situation of women on irrigated perimeters, women were rarely accorded the jural authority such management required to be optimally effective. In some regions, Islamic injunctions about *purdah* constrained women's abilities to transhume with the herds, when household men were absent.

Despite the mounting importance of women in pastoral production systems, development projects continue to be implemented *as if* women remained economically marginal.

The most pernicious myth about pastoral peoples is the assumption that pastoralism–like flood-recession cultivation–represents an archaic adaptation, a static system that once may have had economic relevance but one that is no longer capable of supporting a population and does not contribute its share to the national economy. Far from being static, pastoralism has undergone profound transformations in response to its location in the global, as well as regional and national, political economy. Control over land, labour, and water is shifting from household herd managers to small élites, some of whom come from herding communities but many more of whom are absentee herd owners from farming, merchant, and civil service/government/military backgrounds who have political influence and privileged ties to capital. The vast majority of herders, impoverished and politically disprivileged, find themselves with neither enough animals to sustain their families nor sufficient access to range and water. There is thus a steady movement either out of herding or a shift from herd owner to hired shepherd status.

Many questions about specific herding communities remain to be answered, but we now have the basis for a more informed approach to development that will genuinely enhance this form of production, which not only provides a meaningful way of life to millions of dryland peoples around the globe but also constitutes a remarkably efficient means of converting otherwise unpalatable vegetation into meat, dairy products, traction, manure, hides, and wool, that is, into products that directly contribute to human survival. Despite the adverse press of the last 500 years that accuses pastoralism of parasitism and environmental destructiveness, it is the unique production system sustainably adapted to some of the least well-endowed areas of the earth.

CONCLUSION

I have emphasised the work of my colleagues and myself not because it is any more profound or useful than that of hundreds of other anthropologists, geographers, and rural sociologists concerned with the social, political, and economic transformations of agrarian societies in developing countries; but simply because I am most familiar with it. I hope that in the process of exposing some of the myths

about these agrarian systems, I have also challenged the one that anthropologists are adversaries of development, attempting to derail the locomotive of history that is bringing us into the 21st century. We do not object to development, but we seek a development that in the process of accelerating the transformations that bring these rural peoples into the global political economy, also renders them beneficiaries rather than victims of the process.

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