Livestock Grazing and Biodiversity Conservation: Comments on Saberwal

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In a paper that combines archival research with empirical field data, Saberwal (1996) questioned an assumption that underlies conservation efforts worldwide, that human land-use practices lead to land degradation. In his work on the pastoral Gaddi community in western Himalaya, Saberwal tries to show (1) that government policy to curtail Gaddi grazing practices in northwest India has been based on this assumption, (2) that there has been no scientific information to suggest that Gaddi grazing leads to degradation of native plant and animal communities, and (3) through his own field data, that Gaddi grazing has an insignificant impact on plant communities at the landscape level. He concludes with an appeal to discard the notion that humans and biodiversity conservation are incompatible. We agree completely that traditional human land-use need not lead to degradation and in fact could enhance conservation objectives. Our own work suggests this (e.g., Mishra & Johnsingh 1996). Based partly on new data, however, we question the adequacy of the information and data set on which Saberwal has based his contentions. We also discuss several other pertinent conservation issues related to pastoralism in this region, issues neglected by Saberwal.

Saberwal's argument is based on four sets of information. The first is an observation made by Grieve (1920), a forest officer, who had expressed concern over degradation of Gaddi wintering areas in Siwalik Hills. Saberwal asserts that ". . . despite continued use by herders these jungles have not reverted to bare, eroding hills as predicted by Grieve in 1920." According to Saberwal, the fact that the livestock population in the grazing grounds is much higher now seems to satisfy well the permanence (sustainability) criterion specified by Grieve (1920). In a clear reversal of the causal relationship between the two, he claims that "a growing rather than a declining cattle population attests to the regenerative capacities of these forests." We do not believe that an increasing livestock population is indicative of sustainable use of pastures (or of "a permanence criterion"). With the lack of any site-specific comparative data on changes in soil erosion rates, vegetation composition, structure, or cover, we find these arguments naive. Saberwal has overlooked that degradation is a process, not an event characterized by "bare, eroding hills." In the parts of Siwalik hills for which data are available, there is evidence of depletion of forest cover due to grazing and biomass removal (Das et al. 1996).

Saberwal's second set of evidence comes from transect-based data on plant species abundance and biomass in these wintering areas. Saberwal cautions that the impact of Gaddi livestock on vegetation is probably overshadowed by that of the settled cultivators' livestock, which outnumber the former by 7 to nearly 30 times. In any case, the two areas studied by Saberwal are not really comparable due to inherent site differences. He does not comment on the impact of grazing on plant diversity because of the "confounding influences of site differences" (p. 746). Nonetheless, he makes other comparisons and claims that the high-intensity grazing area had more grass and shrub biomass. He concludes that the vegetation differences in the two areas simply indicate that they are at different seral stages, and he uses this argument to question the concern that livestock grazing is leading to land degradation. To us, the fact that the intensively grazed area had greater shrub and grass biomass despite a stocking rate nine times higher (124 versus 14/ha) does not make sense. If the data and sites were comparable enough to deserve mentioning and the sampling was adequate, one would have expected a lower standing biomass (though not necessarily productivity) in the intensively grazed site. The only other explanation would be the abundance of graze-resistant (nonfodder) species contributing to the biomass in the intensively grazed site, a sign of the degradation process. Several unpalatable species (e.g., *Cassia tora*, *Sida cordifolia*, *Ageratum conyzoides*, *Adhatoda vasica*) take over intensively grazed sites in the Siwaliks (G. S. Rawat, personal observation).

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There are other inadequacies in the data set that Saberwal claims "counter(s) the notion that livestock grazing is leading to large-scale degradation" (p. 745). Saberwal's sampling efforts were insignificant and do not afford representative coverage of his study sites. Among the different vegetation variables, the largest area sampled by him was for tree density, which represented less than 1% coverage of either of the study sites. For shrubs the coverage was as low as 0.02% in one area and 0.0026% in the other, and biomass was even lower (0.0001–0.001%). The high standard deviations associated with various vegetation parameters reported by him are indicative of this.

Our own experience in the Siwalik, the Himalaya, and the trans-Himalaya (e.g., Rawat & Pangtey 1987; Rawat & Uniyal 1993; Bhat & Rawat 1995; Mishra & Johnsingh 1996; Mishra 1997) has acquainted us with the extreme heterogeneity in the vegetation structure and composition of these mountains, which change substantially with slight local changes in variables such as elevation, aspect, slope, and soil. To illustrate this point, we sampled a typical Siwalik slope (ca. 30 ha) of dry Siwalik sal (*Shorea robusta*) forest (Rawat et al., unpublished data). We laid 10 circular plots each on the hill base, the middle slope, and the ridge top (elevational gradient 300 m). Plot sizes for tree and shrub density were the same as Saberwal's. For herbaceous biomass we clipped 1-m^2 plots. We plotted a performance curve of the coefficient of variation (CV) in vegetation parameters against sample size (number of randomized plots). None of the variables showed a significant decline in CV, even when the data from all 30 plots were used (higher than Saberwal's sampling effort at least for tree and shrub density; Fig. 1). We do not claim any similarity in vegetation or grazing history between this area and Saberwal's study site. The data, however, demonstrate the extent of heterogeneity that characterizes the Siwalik vegetation and cast further doubt on the adequacy of Saberwal's sampling effort.

Plant species–abundance data from the alpine meadows, Gaddi summer grounds, constitute Saberwal's third set of evidence. Using data from transects (one each) radiating 250 m out of five Gaddi camps, Saberwal concludes that the spread of *Rumex neplaensis*, a graze-resistant weed, in response to Gaddi livestock grazing is highly localized and not a cause for concern. It is surprising that Saberwal chose to examine the response to livestock grazing of a single nitrophilous weed and did not consider several other graze-resistant species, such as *Anaphalis cuneifolia*, *Urtica dioica*, *Iris kumaonensis*, *Thermopsis barbata*, and *Viburnum* sp., that abound in heavily grazed sites in the alpine meadows of Western Himalaya (Shah 1988; G. S. Rawat, personal observation). In any case, his data are not fully representative of the grazing grounds because herder camps are almost never randomly located but are biased by factors such as the availability of water, fuel wood, and natural protection from inclement weather. Furthermore, his low sampling intensity (total area sampled, 78.5 m^2) is unlikely to have accounted for the high heterogeneity in the vegetation of alpine meadows (Kikuchi & Ohba 1988).

Saberwal also fails to examine the responses of rare and threatened plants to Gaddi grazing. Our studies in the Valley of Flowers National Park (similar to Gaddi summer grounds), where control sites were compared with grazed areas (10 km^2, summer density approximately 42 goat and sheep/km^2), illustrate this concern (Kala et al. 1997). Eleven plant species listed in the Indian Red Data Book (Nayar & Sastry 1987) occur in the region. Of these, three species of *Cypripedium* are completely absent in the grazed areas. Similarly, other rare and valuable medicinal herbs, such as *Dactylorhiza hatagirea*, *Angelica glauca*, *Megacarpaea polyandra*, have significantly reduced densities in the grazed meadows. Thus, simply stressing that Gaddi grazing at the most causes a localized reduction in one index of plant diversity—species richness—can be very misleading from a conservation viewpoint.

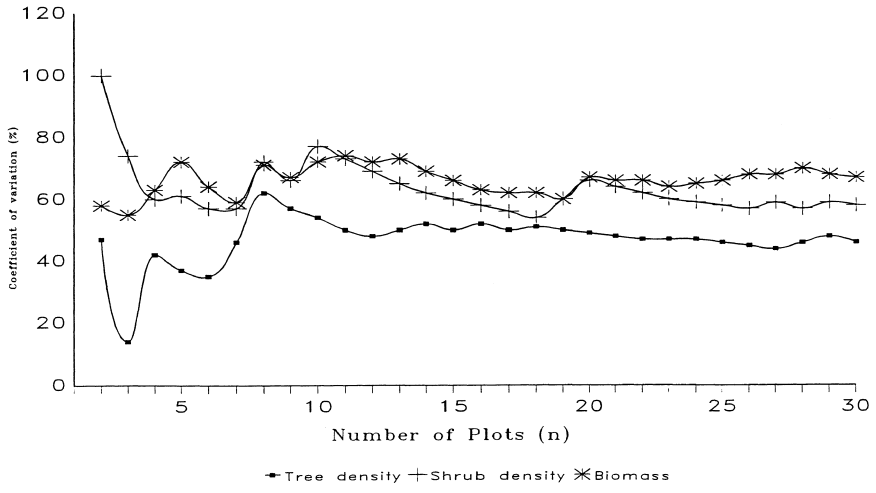

Figure 1. Relationship between sample size and coefficient of variation in vegetation attributes in the Siwalik Hills.

The author's last set of evidence comes from his "talks with hunters." He admits that he saw no native ungulates except for some trophies of poached animals, but he states that "Hunters told me how easily these ungulates and musk deer can be shot in November. . . . Talks with hunters suggest the possible presence of a healthy large-mammal community." In the absence of any effort to estimate the abundance of wild animals or their evidence, speculation based entirely on an unspecified number of hunters' accounts, the reliability of which we have no means of assessing, is untenable.

Saberwal fails to analyze an aspect of pastoral lifestyle that has potentially important bearing on conservation policy: demographic and socioeconomic change. This is especially relevant in his case because a segment of the present Gaddi population, according to him, does not have traditional grazing rights or has lost its grazing rights to alternative forms of land use. Our ongoing research on livestock grazing by a sedentary agropastoral Buddhist community in the trans-Himalaya indicates the serious consequences of socioeconomic change for conservation efforts (Mishra 1997). For instance, a transition from the subsistence economy (agropastoralism, barter) to a market economy (cultivation of cash crops, selling livestock) in the last decade has been accompanied by a drastic increase in livestock holding. This seems to have resulted in the escalation of human-wildlife conflict in the form of livestock depredation by wild carnivores and the retaliatory persecution of the carnivores by the agropastoralists (Mishra 1997).

We join Saberwal in emphasizing the need to rethink and debate the merit of the protectionist conservation philosophy and the assumptions upon which it is based. At the same time, it is important that presumptions and premature conclusions such as those of Saberwal are avoided in conservation research. Not unlike the government policy he questioned, showing that it was based on an assumption lacking scientific evidence, Saberwal himself seems to have proceeded with the assumption that Gaddi grazing has not caused degradation and has tried to prove the point with inadequate "scientific evidence."

We are aware of an increasing polarization among conservationists in India between the "pro-people" and the "pro-wildlife" groups. The former accuses the latter of being elitist and insensitive to the fact that local human communities have had traditional access to wilderness areas and have been using the natural resources "sustainably." On the other hand, the pro-wildlife group accuses the pro-people group of being unrealistic and utopian. Conservation biology cannot be totally positivistic and devoid of value judgements, and the tension between scientific objectivity and public responsibility will continue to plague the conservation community globally (Barry & Oelschlaeger 1996; Noss 1996). Nevertheless, we urge conservation biologists to work together, to debate in a healthy environment with adequate empirical field data, and to desist from fueling the polarity between pro-people and pro-wildlife groups. This can be realized if ideological differences and individual world views on social issues are set aside, and if research is aimed toward achieving scientific objectivity.

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