Grassland ecosystem and grazing policy

In the food web, herbivores are established to play an important role in maintaining the ecological health of an ecosystem by consuming a sizeable quantity of available vegetation. With the evolution of biodiversity conservation theory, grazing and browsing of herbivores has been generally treated as an unsustainable practice for long-term conservation of wild flora. As a result, livestock grazing has been stopped in the protected areas, especially in the National Parks. However, after the ban on livestock grazing, there seems to be chaos on the continuation of this policy mainly due to (i) violation of rights of local pastoral communities, and (ii) diverse sets of opinion on its impact on natural vegetation.

There is resentment among various forest dwellers (semi-arid, arid, tropical, sub-tropical, temperate, alpine, sub-alpine) over continuing the ongoing conservation policy of banning the livestock in protected areas. One of the reasons for the resentment is the wastage of forage, as it is not being used wisely. In the tropical grasslands, grasses are burnt as this is one of the traditional practices of maintaining grasslands. This is done in spite of the fact that the grasslands can be used for livestock grazing.

The removal of livestock from grasslands also indicates establishing forests over a period due to secondary succession if not burnt, harvested, and eradicated by some mechanical ways. The conservation policy seems to be following the preservationistic approach, if the utilitarian process is overlooked. The fear of grasslands becoming endangered due to invasion by trees if not maintained mechanically, is widespread all across the globe.

It is also established that response to grazing is more diverse and depends on its evolutionary and climatic context in different regions[1]. The alpine meadows lying above timberline being a different entity obtain different response to livestock grazing due to severe cool climate and major precipitation in the form of snow. However, there have been diverse opinions on the ban of livestock grazing in the alpine meadows of a world heritage site, the Nanda Devi Biosphere Reserve in the Indian subcontinent. The Valley of Flowers is one of its two National Parks that lies above timberline and is also famous for its more than 500 colourful flowering plant species[2].

After the declaration of the Valley of Flowers as a National Park in 1982, it has been argued that removal of livestock grazing has resulted in the proliferation of a tall knot weed, *Polygonum polystachyum* that is causing the decline of native flowering plants. Research conducted over a decade in this valley on this conservation-oriented problem has demonstrated that *P. polystachyum* is not a threat to the valley's native vegetation and its ecosystem, as it grows in unstable land areas such as freshly eroded, avalanche-prone, past camping and bouldery areas. There are reports on similar trends and habitat preferences of genus *Polygonum* elsewhere[3]. Moreover, the lack of knowledge on the seasonality of alpine plants is also fuelling the controversy[4].

Considering the importance of grasslands, livestock grazing practices and joint natural resources management along with eco-development concepts, there is an urgent need to develop a strong and viable grazing policy for livestock grazing, and ecosystem and environment management. Moreover, in view of the diverse climatic and geographic set-up, it is necessary to develop a separate grazing policy for the mountainous ecosystem, especially the Himalaya.

1. Perevolotsky, A. and Seligman, N. G., *BioScience*, 1998, **48**, 1007–1017.
2. Kala, C. P., *Curr. Sci.*, 2005, **89**, 919–920.
3. Sultan, S. E., Wilczek, A. M., Hann, S. D. and Brosi, B. J., *J. Ecol.*, 1998, **86**, 363–383.
4. Kala, C. P., *Biodivers. Conserv.*, 2004, **13**, 985–995.

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Classifying species at risk: Conservation problem

Increasing worldwide concern over the present state of biodiversity has now given a new lease of life for exploratory studies. Neglected in the past, our knowledge about the floristic and faunistic diversity of the world as well as our country is far from complete[1]. The impacts of human activities have led to severe changes in natural ecosystems that have resulted in extinction of many plant and animal species, and are threatening many more. International Union for Conservation of Nature and Natural Resources (IUCN) compiles databases about species at risk on a worldwide scale. The classification method most widely used was developed by IUCN, utilizing the population size or trends in other factors associated with the vulnerability to extinction.

IUCN classifies species in the following categories: extinct, extinct in wild, threatened, lower risk and data deficient (indeterminate). Indeterminate species are taxa known to belong to any of the threatened categories, but lacking enough information to assign them in an appropriate category (critically endangered/endangered/vulnerable). According to the 1997 IUCN Red List of Threatened Plants, globally 33,418 species are included under threatened category. Of this, 4070 species are under the status of indeterminate. India is one of the megadiversity nations in the world. It has about 17,000 species of flowering plants and about 5400 endemic species. Of the 1236 threatened species in India, 690 species are placed under indeterminate status[2]. That is, 12.2% of species at global level and 55.8%

at the Indian level were grouped in indeterminate category. A large number of Indian species falls under indeterminate category, since we do not have any solid quantitative data. This is a sad and inadequate situation from the scientific point of view. In India, a lot of work needs to be done on identification, mapping and distribution of indigenous species for developing strategies for their conservation. The detailed information further strengthens the conservation of threatened plants.

In any attempt to develop high priority 'Conservation area matrix', endemic flora and fauna take precedence over other 'wide' species, as endemics once lost, is a loss of biodiversity forever[3]. Many species of our endemic flora are known only from type localities and some of them have not been collected after the type collections. Of the 47 species known from type collection in the Eastern Ghats, only three have found place in the *Red Data Book*[4]. It is now for the botanists in different parts of the world to critically examine the entries in the *Red Data Book* and IUCN Red Lists and prepare a list of threatened plants. In order to understand the rarity of species, it is necessary to study the biology of species and environmental factors affecting the species. This will draw attention to programmes of conservation of the threatened species. We need to raise the levels of our perception and evaluation.

1. Reddy, C. S., Reddy, K. N. and Raju, V. S., *Supplement to Flora of Andhra Pradesh, India*, Deep Publications, New Delhi, 2008.
2. Kameswara Rao, C., Geetha, B. L. and Geetha, S., Report, Botanical Survey of India, Kolkata, 2003.
3. Nayar, M. P., Report, Tropical Botanic Garden and Research Institute, Thiruvananthapuram, 1996.
4. Reddy, C. S., Brahmam, M. and Raju, V. S., *J. Econ. Taxon. Bot.*, 2006, **30**, 755–772.

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Looking beyond number of publications and journal impact factor

According to the current scenario, the criteria for any level of candidacy evaluation among scientists seem to be centred first on the impact factor of journals (JIF)[1] and on number of publications ($\Sigma_{\rm Pub}$). While doing so, we should not overlook the possibility and probability of attaining both criteria, as the JIF and the temporal pace to accumulate $\Sigma_{\rm Pub}$ vary across subjects and/or fields of research. Only the glaring high-impact journals like *Nature*, *Science* and *PNAS* allow space for wide- and multi-disciplinary research articles. Obviously, these journals are open to a wide array of researchers dealing with science, and those publishing in these journals, on any topic, get the same impact factor.

However, as a matter of fact, researchers use to publish frequently in subject-specialized journals. Here we must note that the average/median JIF of each subject and then its relevant sub-fields markedly vary (source – Journal Citation Reports 2006, ISI Web of Science). Take for instance the two extreme fields in biology, in terms of median and aggregate impact factor; cell biology (the high end) and entomology (the low end). Accordingly, if we compare and/or analyse the researchers in the aforementioned fields, we would definitely find notable differences in average/aggregate impact factor of, say for instance, ten publications of a cell biologist and ten publications of an entomologist. This is at least widely known among scientists and academic visionaries.

But what is still seldom noticed/considered is the intra-field variation in impact factors. Let us take ecology as an example. This major discipline has several sub-disciplines, some of which are inter *inter-disciplinary* (e.g. physiological ecology, chemical ecology and molecular ecology) and others are inter *intra-disciplinary* (e.g. plant ecology, animal ecology, community ecology, evolutionary ecology, ecosystem ecology and conservation ecology). Conceivably, we have many sub-fields branching out from each and every sub-disciplinary tree. So, scientists working in the various subjects indicated above, vary remarkably in their pace for quantity ($\Sigma_{\rm Pub}$) and quality (average impact factor). Consequently, the number of citations per paper would vary across the subjects indicated above and it also entails several other factors[2–4].

Even if we explore within a level playing field, the histogram of most early-career scientists' publications will have a peak near average JIF of their respective subject. Furthermore, it is not uncommon for researchers to have significant/groundbreaking contributions in journals with JIF less than their (other) usual/minor contributions in journals that may have relatively high JIF. These are possible because of various reasons: (1) compatibility between the contributions and scope of the journals, (2) as groundbreaking contributions arise incidentally, one might wish to publish it quickly with enthusiasm, even in a low- or medium-impact journal, before acquiring enough data to document it in high-impact journals.

So, this gives rise to a complex scenario on how to evaluate publications of different candidates, peaking near average JIF. The solution is to carefully consider the significant contributions (through publications as well as other contributions that lead to the development of new projects in the laboratory) made by a candidate, rather than just looking at JIF and $\Sigma_{\rm Pub}$. This is an important criterion that is being often overlooked. Though mean number of genuine citations[3,5] (i.e. excluding attacking and self-citations) per paper or *h*-index[5] is being considered a key tool, it is not applicable for early career scientists[4].

Only in the education and research centres of excellence, do the juries have