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## ENVIRONMENT

# Our biodiversity, our life, our future



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Kamaljit S. Bawa

AUGUST 02, 2010 17:29 IST

UPDATED: AUGUST 28, 2010 15:41 IST

## What can arrest the steady decline of our ecosystems?

Life is unique to our planet. It is earth's most precious asset. And there is plenty of it. We do not know the exact number of species: many estimates range from 10 to 12 million. India may have close to a million species, the vast majority of which remain to be named or described. These hundreds and thousands of species in India live in many different types of ecological communities or ecosystems spread from deep seas to mountain tops.

The extraordinary richness of life that surrounds us in the form of diverse arrays of organisms, ecological communities, and natural landscapes, also called biodiversity, sustains such human activities as agriculture, forestry, and fisheries, and is the basis of our civilisation. The fossil fuels such as coal, oil and natural gas that support our industry are derived from plants and animals that dominated life on earth millions of years ago. Biodiversity also has immense aesthetic, cultural, and spiritual value.

This biodiversity, a product of billions of years of evolution, has been rapidly declining in recent years – a victim of humans' large ecological footprint on earth. Climate change will exacerbate the rapid loss. Because of our intimate association with



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great examples of this diversity. Humans carry hundreds of different species of bacteria – critical to the performance of our bodily functions. Biologists have indeed described hundreds of thousands of species on earth. Yet, much of the diversity of life on our planet remains to be described. Out of an estimated 12 million species on the planet, only 1.8 million species have been named and described.

For India, perhaps no more than 100,000 of the estimated one million species have been described. The rate of description of new species for India does not exceed 300 per year. With about 900,000 species that remain to be described and discovered, it will be several millennia before India's biodiversity is fully catalogued.

The science of discovering, describing, and cataloguing species – taxonomy – has been in a state of decline for decades even though cataloguing of life forms the basis of conservation – we cannot conserve, if we do not know what to conserve. The sense of urgency for strengthening taxonomy and its sister discipline systematic biology is underscored not only by ever increasing loss of biodiversity, but also by the need to fight diseases in humans and agricultural pests, to meet new challenges in agriculture, forestry and fisheries, and to examine ecological impacts of genetically-modified organisms.

India, like almost all other places in the world, has unique biodiversity. However, the number of species that are unique to India is high. Biologists have identified 34 global hotspots of biodiversity. These hotspots have two common features: a very high rate of biodiversity loss, and high proportion of endemic species or species that are unique to that particular hotspot. The landmass of India incorporates four of these 34 global hotspots: the Western Ghats, the Himalayas, Indo-Burma (northeast India, south of Brahmaputra) and Sundaland (Nicobar Islands). We do not have up-to-date species lists even for our protected areas such as national parks, tiger reserves, and wildlife sanctuaries, let alone hotspots of global significance.

We need to review and strengthen our efforts to catalogue life in India by creating centres of excellence in systematic biology and taxonomy, and by the use of tools and opportunities provided by information technology. Platforms such as those developed by India Biodiversity Portal ([www.indiabiodiversity.org](http://www.indiabiodiversity.org)) can involve students and citizens in large numbers to document biodiversity. At the same time, we need to build a cadre of taxonomists trained in modern approaches at world's leading centres of taxonomy to rejuvenate the field.

### Current approach to monitoring

Biodiversity throughout the world is declining, and more so in India, due to expanding human populations, increasing consumption, growing trade in natural products, misguided policies, and poor governance. The extent of this decline is not known. The Forest Survey of India monitors change in forest cover, and publishes a report on the state of forest cover every two years, but there are at least four problems with this type of monitoring. First, the Forest Survey of India rules determining what is 'forest cover' are rather biased towards overestimation. Open degraded forests are included under the term 'forest'.

Second, the monitoring process looks at change in forest cover and not in forest composition that can alter due to a variety of factors including the spread of exotic invasive species.

Third, ecosystems other than forest ecosystems such as deserts, grasslands, freshwater and marine ecosystems are not covered, because the mandate of the Forest Survey of India is restricted to areas classified as forests.

Fourth, even this limited monitoring does not identify causes of biodiversity change, and is thus unhelpful in making policy decisions to combat change.

In any case, even the figures provided by the Forest Survey of India indicate decline in dense forest cover over the last several years. Moreover, the figures show a substantial increase in open forest cover. Independent studies published in a variety of journals indicate change in forest cover at a much higher level than the overall, average figures provided by the Forest Survey of India.



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... have found that invasive species, *Eucalyptus camaldulensis*, has rapidly spread throughout the DRT sanctuary and has probably led to the decline of native trees several-fold, even though the forest cover in the sanctuary has not significantly changed.

Clearly, India needs a comprehensive programme to monitor its biodiversity, assess drivers of changes in biodiversity, and build local capacity to minimise loss and foster sustainable use of biodiversity. We should not wake up suddenly one day, as we have done in the past, to find that our tigers are disappearing, watersheds are being degraded, and the natural habitats are being lost at an alarming rate.

India may be the only large country with huge scientific capability to lack a serious programme to monitor the state of its ecosystems. Because the major drivers of habitat loss or change are rooted in political, economic and social factors, India needs to develop a monitoring programme that is focused not only on biodiversity, but also on interactions between nature and society, and how such interactions are changing over time. Such a programme that I believe is now being considered by the Ministry of Environment and Forests could be unique in the world, and should allow us to not only monitor change, but also combat biodiversity losses.

We also have to get rid of the mistaken notion that complex natural ecosystems, once destroyed at one place can be easily created elsewhere. Such a notion is evident in government's compensatory afforestation programmes that implicitly assume first that natural ecosystems such as forests can often be created *de novo*. Policy makers need to distinguish between a stand of trees and a natural forest with diversity of species, and a myriad of ecological interactions and processes, evolved over millions of years. Indeed, degraded forests can be restored, but the word "restoration" that has a great potential, is often lacking in the vocabulary of people who manage our natural assets. Even in many of the so-called joint forest management programmes, with regeneration of degraded forests as the main plank, restoration of native forests in many cases has been replaced by planting, often, of non-native trees.

### **Partnerships for sustaining life**

In a country with more than one billion people and aspirations of an annual economic growth rate of 9 – 10 per cent, how do we conserve biodiversity? Biodiversity is threatened not only by demographic and development pressures, but also by climate change. All these pressures are likely to intensify in the immediate future.

Our approach to conservation has been largely based on the paradigm of creating national parks, tiger reserves, wildlife sanctuaries and other protected areas managed by the State. This approach, borrowed from the West, has several flaws. First and foremost, people, particularly indigenous or tribal groups that number in millions live inside or at the periphery of protected areas, and rely on biodiversity for sustaining their livelihoods. Such people have been largely disenfranchised and have no role in management. In fact, in many cases, centralised management of biodiversity has created conflicts between people and managers of protected areas. These conflicts have endangered rather than enhanced conservation.

Second, substantial and unique biodiversity exists outside protected areas, but the focus on the protected area approach has resulted in lack of clear strategy to conserve biodiversity outside protected areas.

Third, the protected area approach remains wildlife-centric. Thus the government and international agencies have made huge investments in conservation of tigers and elephants, but with questionable results. Undoubtedly these organisms deserve extraordinary measures for protection. However often it is claimed that these are "umbrella" species, whose protection will lead to the protection of other species in the ecosystem. The problem with this notion is that tigers and elephants are not umbrella species for all ecosystems. The vast majority of India's ecosystems does not have, and never had, tigers and elephants.

Clearly, we need to develop a more nuanced and a more comprehensive strategy to protect all our biodiversity inside and outside protected areas. Equally important, we urgently need alternative approaches to conservation that can supplement the protected area approach. Conservation has to be much more inclusive than at present. It must include local communities as key partners in safeguarding our precious biodiversity.



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Overall, India is blessed with unique and an enormous amount of biodiversity that sustains many of our economic endeavours, and provides aesthetic, cultural and spiritual values. This biodiversity is declining, and this decline is threatening our survival. As a country that seeks to be a global power, we have a special responsibility to document, monitor and conserve our most precious asset. Meeting this responsibility will entail a fundamental shift in the ways we describe, assess changes, and conserve biodiversity.

**Kamaljit S. Bawa** ([kamal.bawa@umb.edu](mailto:kamal.bawa@umb.edu)) is president of the Bangalore-based Ashoka Trust for Research in Ecology and the Environment; Distinguished Professor of Biology at the University of Massachusetts, Boston, and Giorgio Ruffolo Fellow in Sustainability Science at Harvard University. His book, Conservation Biology: A Primer for South Asia, with Richard Primack and Meera Oommen as co-authors, will be published by the Universities Press.

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