

Science in the wilderness: the predicament of scientific research in India's wildlife reserves

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Ecology and allied scientific disciplines aim to understand patterns and processes pertaining to wild species, their ecosystems and their relationships with humans. India's wildlife reserves are important 'living laboratories' for these disciplines. Today, there is a disturbing trend across India where scientists are increasingly denied access to wildlife reserves for scientific research or are seriously impeded, without scope for redress. Although official wildlife management rhetoric emphasizes the need for scientific research, in reality, it is viewed as undesirable and permitted, if at all, as a concession, subject to the discretion of individual forest officials. With no enabling legislative or policy framework to promote and apply science in our wildlife reserves, we are concerned that the future of many scientific disciplines in India is being jeopardized. Here, we provide an analysis of this issue and outline steps needed to promote scientific research in our natural areas.

Keywords: Environment, role of science, science policy, scientific freedom.

AS an enterprise of organized scepticism, science has a very rich past in India and has played a vital role in our civilization¹. India, as a nation, has historically made fundamental commitments to the promotion of scientific inquiry in a wide range of disciplines across various governmental and non-governmental institutions and at varying levels^{2,3}. Today, the government's guiding policy documents on science and technology envision the creation of

a knowledge-based society, where science is at the centre of decision-making⁴. And indeed, in many scientific fields, such a vision has rapidly been translated into reality through a series of enabling steps at various levels, ranging from legislation, policy, and even funding support⁵. Prime examples of this include institutions such as the Indian Council for Medical Research and the Indian Council for Agricultural Research, which are not only engaged in science and scientific learning in biomedical and agricultural research, but also play an active part in supporting research and extending research findings into changes at the policy and implementation levels. Similar examples may be found in the Council for Scientific and Industrial Research, Indian Space Research Organization, Department of Science and Technology, Department of Biotechnology and, to an extent, the Indian Council for Forestry Research and Education. In order to catalyse the creation of a knowledge-based society, a Knowledge Commission has also been recently set up by the Government to take steps needed to create, disseminate and apply knowledge in various fields of human endeavour⁶. Scientific disciplines, particularly in the areas of information and communication technology, astronomy, medicine and molecular biology have bloomed under a range of enabling measures.

Unfortunately, however, an equally important set of scientific disciplines concerned with the understanding, management and conservation of the country's unique natural heritage of wild ecosystems and species today face a bleak future despite substantial and well-intentioned

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support to research by the Union Ministry of Environment and Forests. At a time when there is a pressing need to advance our knowledge about nature and its interaction with society, the very bureaucracy that is supposed to encourage, facilitate and nurture scientific inquiry has been increasingly placing hurdles in the conduct of scientific research in our wildlife reserves. Scientists from a variety of disciplines and across a range of institutions are being arbitrarily denied access to wildlife reserves for research, or offered restricted access by forest departments. While the world looks more and more to the sciences of ecology and conservation biology for answers to our environmental dilemmas, many of our bureaucrats, with notable exceptions, have chosen to curb science.

This is unfortunate for two reasons. First, with its wide range of wild species and ecosystems ranging from the depths of our oceans to the high Himalaya, and from deserts to tropical rainforests, India is endowed with a unique and diverse natural and cultural heritage. This provides us a singular opportunity to advance new knowledge and emerge as a global leader in the areas of ecology and conservation biology. Second, we are witnessing an unprecedented rate of habitat degradation that has profound economic, social and political consequences. Yet, in our country, scientific inquiry is being throttled in a field where it is perhaps most urgently needed.

Although there are examples from the past of legitimate research activities of individual researchers and scientific institutions being sporadically restricted within wildlife reserves, this trend has become widespread and regular in recent times. In one of the first serious considerations of this issue, in 2005, the Tiger Task Force (TTF), constituted by the Prime Minister following the extinction of tigers from Sariska Tiger Reserve, underlined the need for high-quality scientific research in our wildlife areas that stood up not just to peer-review standards but also to wider public scrutiny. Noting that research had been facing 'some serious problems', the TTF also stated that '*wildlife research, unlike most other research areas, is extremely dependent on the cooperation of the protected area administration, as all protected areas are controlled and access is only through the bureaucracy in charge. Therefore, without any pre-agreed rules, the relationship is highly dependent on the individuals concerned*'⁷. More recently, the National Forest Commission (NFC), set up by the Government of India, went even further in its explication of the problem. The mandate of the NFC was to review existing forest-related policy and legal frameworks, their impact from ecological, economic, social and cultural viewpoints, and suggest specific policy options for achieving sustainable forest and wildlife management as well as ecological security. In their recently submitted report, the NFC states, *One of the goals of setting up PAs is to increase our understanding of the ecosystems and biological processes, for the advancement of science. This can only be achieved through research and monitor-*

*ing. Research and monitoring are also essential for planning conservation management and for evaluating its efficacy. ...Despite the importance of research, there is no legislation that promotes and facilitates research in natural habitats, whether these are PAs, reserved forests, community land, farmland, etc. In fact, there are several legislations that discourage research. The interpretation of 'research' (permits, funds, entry, etc.) is often left to the whims and fancies of decision makers. Fundamental research on species and ecosystems may look academic to a PA manager but it is essential for the advancement of science and also for long-term monitoring of species/ecosystem*⁸.

In this article, we re-emphasize the need for scientific research and monitoring in our natural areas, examine the reasons for its curtailment, consider the implications of the prevailing state of affairs for the affected scientific disciplines, and also discuss possible measures to remedy the situation.

The value of science

It is relevant to ask why scientific research is needed at all in our natural areas. As natural habitats and populations of wild species are being fragmented and are dwindling countrywide, protected areas (The terms 'wildlife reserve' and 'protected area' (abbreviated as PA) are used interchangeably in this article to refer to India's national parks, wildlife sanctuaries and tiger reserves.) and reserved forests are the most important remaining spaces where research in many scientific fields can be carried out. This includes a vast array of fields such as ecology (of individuals, populations, communities, ecosystems and landscapes), animal behaviour and cognition, evolution and biological diversity studies, systematics and taxonomy, natural history, conservation biology, restoration ecology, human ecology, sociology, ecological history, natural resource management, hydrology, ecological economics, and sustainable use. Indeed, these landscapes have also been important foundries of traditional knowledge from which many of these scientific disciplines continue to draw value. Such research is invaluable not only in documenting and understanding our rich natural heritage for its own sake, but also for problem-solving applications particularly relevant to their conservation. Taxonomic research provides a good case in point. Without assessments of the status of an organism, it is not possible to decide on the kind of conservation action the organism needs. Status assessments require proper identification of organisms, and this, particularly for groups like reptiles, amphibians, insects, grasses and even rainforest trees, often require the collection and study of specimens. Similarly, scientific research is also as essential as a constructive auditing tool of wildlife and natural resource management systems, to monitor their effectiveness and design course-corrections. This facet has been widely recognized not only in docu-

ments such as the TTF and the NFC reports, but also in international conventions and programmes such as the Convention on Biological Diversity⁹ and Man and Biosphere Program, to which India is a signatory. Without such a tool, it would be impossible to judge, for instance, whether we are doing an adequate job of habitat protection, whether a network of wildlife reserves is adequately representative of our ecosystems, or even to know where our biodiversity hotspots lie and where our rare and endangered wildlife occurs.

While there is still a modicum of acceptance about applied research in natural areas, basic research is still considered largely irrelevant to conservation. One of the best examples of the influence of basic research on conservation comes from community ecology. In the 1960s, two of the world's best known biologists, Robert MacArthur and E. O. Wilson proposed the theory of island biogeography to explain species numbers on islands¹⁰. Based on colonization and extinction rates depending on island distance and size, this theory originated from an inquiry into species patterns. Although emanating completely from fundamental research, the island biogeography theory has led to important applied rules for designing wildlife reserve networks to help maximize species diversity. In a world of increasingly fragmented forests and habitats, island biogeography and subsequent paradigms like metapopulation biology have come to play a significant role in conservation action. Thus, it is important to recognize the value of fundamental research, even without the promise or possibility of immediate application.

The edifice of many of these scientific disciplines is built on the rather humble foundations of observing nature. Science of a high order is often possible in many of these disciplines even without sophisticated infrastructure or instrumentation. Much that we know about the origin of life, the evolution of species, the evolution of intelligence, or optimal design of wildlife reserves have been gleaned with just a pair of binoculars, a field notebook and unfettered access to natural areas such as wildlife sanctuaries and national parks. For this reason, there are a wide range of institutions, small and big, both within the umbrella of the state and outside, that carry out research in these disciplines in our country. Particularly in the fields of natural history, ecology, behaviour and conservation, important contributions have come not only from professional scientists, but even from serious amateurs and the knowledge of local people.

Hindering science: roots of the problem

Wildlife reserves are managed by state forest departments under the Wild Life (Protection) Act (WLPA), 1972, a legislation drafted with the primary mandate of protecting forests and wildlife from exploitation and illegal activities. Given this overarching mandate, the WLPA does not have an enabling legislative or policy framework governing

scientific research within protected areas. All scientific research within natural areas or on wildlife species are today 'managed' using provisions of the WLPA that are primarily meant to curtail unlawful activities. Permissions to conduct research in protected areas today are totally subject to a discretionary permit issued by the state's Chief Wildlife Warden.

Historically, the forest department has served as a silvicultural and law-enforcement body charged with maximizing revenue from forests by raising and extracting timber, as well as by excluding miscreants and plugging revenue leakages. In recent times, with the ascendance of biological conservation as an overriding objective for creating and maintaining natural areas, the policing approach of the forest department became an important means to conservation, as testified by the preservationist thrust of India's conservation programmes even to this day¹¹. Broader public participation, in general, and the role of science in knowledge-generation and problem-solving in particular, has largely remained insignificant in the management of India's wildlife reserves⁸.

Although the civil society or non-governmental bodies that are implementing small-scale conservation interventions increasingly try to base their actions on available scientific research, the bureaucracy apparently sees neither the need nor benefit in supporting and using science in reserve management. On the contrary, independent scientific research, particularly in the fields of ecology and conservation biology, has begun to play an important but inconvenient role in identifying conservation threats and problems, not only from external agents, but also from inadequacies in internal reserve management policy and practice (e.g., civil engineering solutions to conservation problems). Further, research has also begun to focus its inquiry on monitoring the effectiveness of management action in combating conservation pressures. In many instances, research results or observations of researchers have been viewed as a source of embarrassment by the forest departments, particularly where it explicitly addresses activities within the park that are technically illegal such as livestock grazing or hunting. In the prevailing policy scenario that fails to give science the constructive role it rightly deserves, scientists are sometimes seen in the bureaucracy as finger-pointing busybodies with vested agendas and dishonourable motives, with no commitment to collaboration or collective action. Another excuse for excluding research is that it holds no relevance to management. The stated need of forest departments for management-oriented research is commendable but needs to be addressed, not by imposing unrealistic expectations on independent scientists, but perhaps by instituting funding programmes through which these specific management-oriented questions may be answered through research.

Against this background, permissions to conduct research in protected areas today are commonly denied without any justification and with absolutely no means of appeal or

redress. Even when access is permitted, it is often done with a suite of restrictions based on little other than bureaucratic whimsy. For example, to enter a certain protected area for research, one set of researchers are charged several hundred rupees per day of research work, the same as levied on casual tourists whereas the same park levies no such fee on another set of researchers. Similarly, forest departments have placed unjustified restrictions on areas where or times when research may be carried out. These restrictions are particularly crippling where research involves handling of animals (such as bird ringing, radio tagging, or wildlife health research) because they are treated on par with hunting. It is not unusual that the grant of permits is often conditional upon adherence to particular research objectives and methods, and necessitates forced modification of study goals. In many cases, officials have demanded co-authorship on publications as a precondition for the permit of work in a park. Numerous individual cases of research being impeded are listed by the TTF itself⁷.

More recently, there have also been instances where research carried out by independent, non-governmental institutions have been specifically targeted for restriction on grounds that scientific research in wildlife reserves should be the exclusive province of a handful of governmental research institutions. Scientific research, in effect, has been deemed an undesirable activity, and permitted only as a concession, subject entirely to the discretion of the forest department (often, to single individuals within the department). By making a vast and rich library of nature in our country the feudal estate of a single government department, we are in serious danger of not only of stunting the sciences that depend on this library, but also of demeaning our constitution, its commitment to democratic values, administrative accountability and freedom of expression.

The consequences

The consequences of the prevailing whimsy in dealing with scientific research in our wilderness areas are extremely disturbing, to say the least. It has increasingly ensured that, only certain kinds of research can be done, if at all, only certain institutions can do it, and only certain methods can be used to do this research, often with severe restrictions on sample sizes, location, duration and timing of research. These decisions are seldom made with any scientific basis, or by a body of scientists qualified to judge these matters, and with no scope for appeal. We submit that science without independence is highly suspect and sub-par either academically or in its application. These regulations on the use of natural areas for scientific research affect nearly all professionals and institutions that define the fields of ecology and conservation biology in the country and are effectively limiting the growth of these fields in India.

While scientific freedom is essential, it is not to say that science should be beyond accountability. We do not need just science, but good science. Peer review is a widely accepted method that strives to ensure that the quality and accountability of the scientific enterprise is kept up, and this needs to be instituted as the guiding principle for scientific research in natural areas, as in scientific disciplines. Every single ingredient of the scientific research, proposed in a natural area – be it location, duration, goals, methods or results – should stand the test of scrutiny by scientific peers. And so long as it does, research should not only be permitted but even actively supported, be it basic or applied in nature.

Needless to add, care must be taken in the process of peer-review to ensure that scientific research and its methods meet nationally and internationally accepted norms for the ethical treatment of animals as well as take into account the conservation status of a focal species or ecosystem. Furthermore, there is also the larger issue of making science more accessible to the common man and open to public scrutiny, something has been pointed out by the TTF. There is hence a need to establish open online archives of scientific information where research papers and reports can be uploaded and are available to forest departments as well as the public at large. This would enhance the accountability of the scientific community to officials who manage natural areas as well as to the wider society.

Required actions

Given the analysis above, we believe that urgent systemic changes are needed to encourage scientific research in our natural areas as well as foster the scientific basis of natural resource management in India. A possible institutional arrangement to resolve this impasse has been suggested in the TTF report, in the chapter on the Research Agenda⁷. The structure suggested therein would be a vast improvement over the existing situation. Nevertheless, we need to keep the possibility open that it could evolve further through a wider active consultative process that involves scientists and managers.

As part of its follow-up on the TTF's recommendations, the Ministry of Environment and Forests (MoEF) has recently taken a long-needed step of setting up a committee '*to formulate guidelines for scientific research in protected areas in consultation with experts from National Board for Wildlife*'. While this, in itself, it is a welcome step, there are some important issues concerning the working of the committee that do need to be raised.

One, it must be recognized at the outset that the guidelines being formulated have a very broad sweep and essentially define the scope of many scientific disciplines in the country, including ecology and conservation biology. Besides these, the guidelines also affect a whole range of other natural science disciplines such as biotechnology

and pharmaceuticals, and social science disciplines such as anthropology and sociology. Therefore, it is of utmost importance that these guidelines take into account, not only the concerns of officials, but also of the wider scientific community that will be affected.

Two, given the broad scope of these guidelines, it must be emphasized that the process of formulating these guidelines needs to involve a wider community of practising scientists across scientific disciplines and institutions, governmental as well as non-governmental. In fact, this model of policy formulation has been employed effectively by the MoEF in the course of the TTF's work, and deserves to be replicated in this instance as well. The composition or method of functioning of the current committee, regrettably, does not reflect this important need.

Three, the work of the committee, unfortunately, has been a rather closed affair. Not only have most scientists or scientific institutions not been consulted, but there is also no explicit direction to the committee that the guidelines emerging from their efforts be opened to a wider public review. Such a review is absolutely essential in order for the committee to raise and address the concerns of professional scientists whose work will be affected by these guidelines.

Therefore, we believe that the participation in the committee needs to be considerably broadened and public hearings be held, as was done by the TTF, where all stakeholders including professional scientists and officials, are given an opportunity to place on record their concerns. Thereafter, the guiding document, once drafted, must be placed on the Ministry of Environment and Forests website as well as circulated to concerned scientific institutions for wider review for a specified but reasonable period of time. Subsequently, the committee may finalize the guidelines for ratification by the National Board for Wildlife. For the committee to conclude its mission without taking these factors into consideration would not only be unfortunate, but also fundamentally unjust.

In a wider context, it must also be recognized that the current formulation of the Wild Life (Protection) Act, 1972 is ultimately at the root of the problem of scientific research in natural areas. Presently, it does not provide for a constructive role to research in the generation and application of scientific knowledge to manage and conserve India's wild species and natural habitats. An amendment is needed whereby science and scientific research are recognized as important and desirable activities in natural areas. Such an amendment should also establish incentive structures for the generation and application of scientific knowledge in the management and conservation of natural areas, both within wildlife reserves and outside.

The way forward

The Indian society represents a unique juxtaposition of deep-rooted traditions of questioning and inquiry, with a

public ethic that values non-human life forms. As a nation still widely concerned with the loss of biodiversity and degradation of our natural ecosystems, it is important that we bring together these traditions by cultivating good science in our natural areas, just as we have done in other scientific disciplines. This would of course require scientists to recognize their larger role in society and invest more effort in communicating their work to the government and society at large. At the same time, institutions entrusted with safeguarding the nation's natural resources too have an important and positive role to play in fostering such a healthy relationship between nature study and nature conservation. From this perspective, the forest department, as the custodian of the country's natural resources, should be likened more to a librarian than a gate-guard. Scientific research, after all, is no more than reading nature's library. In such a public library, the librarian may issue library cards, lend books and encourage reading, but does not prevent people from using the library or decide what books a user may read in it. Such a priceless library, no doubt, must be protected against vandalism, but it is equally important that this is done without closing the library to legitimate and responsible use.

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