Chapter 9

Research and Monitoring of species

Research and monitoring is one of the critical components to form a strategy for maintaining and improvising any system. Scientific research and monitoring of biodiversity in a PA is a prerequisite for wildlife management involving conservation and sustainable development. The resultant scientific research and monitoring is very critical in the form of generating information (data) which is vital from a management point of view and to take decisions in solving day to day or long term management problems. While all research may not be important from a management point of view, certain amount of research inputs becomes inevitable while preparing a proper Management Plan/Tiger Conservation Plan for better conservation of the biodiversity.

9.1 Non-monitoring of research activities

As natural habitats and populations of wild species are being fragmented and are dwindling country wide, Protected Areas and Reserve Forests are the only areas where our flora and fauna species are thriving and appropriate research is the call of the hour to save these. This includes a wide array of fields such as ecology (of individuals, populations, communities, ecosystems, and landscapes), animal behaviour and cognition, evolution and biological diversity studies, systematic and taxonomy, natural history, conservation biology, restoration biology, *etc*. Further, 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[72].

The Sawarkar guidelines[73] states[74] that management in time draws support and authenticity from research. The planning and management systems need to encourage research, experimentation and monitoring and use the generated information to the advantage of management. The National Wildlife Action Plan 2002-2016 (NWAP) states that Research and Monitoring are very crucial for understating nature and is an essential tool in evaluating the conservation status of species and their habitats. Project Tiger, 1972 also enlists research as one of the major agenda / issue.

Wildlife research is taken up in Karnataka at regular intervals and many Non-Government Organisations (NGO) and individuals take up these research works using external funding.

[72] Science in the wilderness: the predicament of scientific research in India's wildlife reserves, M.D. Madhusudan et al, Current science, Vol 91, No 8, 25 October 2006.

[73] A guide to Planning Wildlife Management in Protected Areas and Managed Landscapes by Vishwas B Sawarkar, Wildlife Institute of India – based on which the MPs are prepared

[74] in Paragraph 5.5.5 (140)

PCCF-WL grants permission for undertaking research or studies. It is mandatory that a copy of the research report be submitted to the Department on completion of study / research. It was observed that during the period from 2011-12 to 2015-16, permission was accorded to conduct research in 129 cases. The details of permission accorded, reports received and on-going studies are shown in **Table 9.1:**

Table 9.1: Protected Area-wise details of permissions accorded for Research, Reports received, on-going Projects and Reports yet to be received during the period 2011-12 to 2015-16

Name of the PA	Permission accorded	Reports received as on date	On-going research projects	Reports yet to be received
Bandipur TR	23	5	5	13
Bhadra TR	3	0	0	3
BRT Tiger Reserve	40	0	0	40
Cauvery Wildlife Sanctuary	6	3	3	0
Dandeli Anshi TR	11	0	3	8
Kudremukh Wildlife Division (3 WLS)	13	0	1	12
Madikeri Wildlife Division (3 WLS)	17	1	2	14
Malai Mahadeswara WLS	0	0	0	0
Nagarahole TR	16	0	4	12
Sharavathy WLS	0	0	0	0
Total	129	9	18	102

(Source: Details furnished by Karnataka Forest Department)

Against 129 permissions accorded for research / studies, only nine reports have been received by the Department while 18 research activities were still on-going. Reports in respect of 102 cases had not yet been submitted to the Department and status of these cases had not been monitored by the Department. We observed that there were substantial delay in submission of research reports and details of which are given in **Table 9.2.**

Table 9.2: Period of delay in submission of Research Reports

Delay in submission of research reports			
One year	Two years	Three years	Four years
36	47	14	05

(Source: Details furnished by the Department)

Non-submission of reports in large numbers cast doubt about whether research activities permitted were taken up at all by the concerned individuals or were completed as stipulated. The Department was also not making use of the relevant research outcomes for better management of PAs, wherever Study Reports were submitted.

Unlike as mentioned in the NWAP and Management Plans, there was no formation of the Research Advisory Committee for scrutinizing, evaluating, approving and monitoring the research activities. PCCF-WL, in reply stated that a State Level Research Advisory Committee has been constituted

(October 2012) for monitoring research activities. However, we noticed that the Committee had met only twice (November 2012 and February 2015) since its inception and only issues related to trees and seeds were discussed. The committee neither scrutinised the reports, nor evaluated the findings. Accordingly, there were no suggestions for their application or any monitoring of the progress in submission of reports, wherever they were completed.

It was generally seen that most of the Protected Areas have readily available information on large mammals, common birds and reptiles, *etc*. However, except for major flagship species like the tiger, elephant, and to some extent the lion-tailed macaque and some ungulates, there was inadequate or no information on species distribution, population trends or densities, and habitat requirements in case of many lesser known mammals, amphibians, reptiles and butterflies.

The basic criteria to draw a Conservation Plan or a Management Plan for a given area are the availability of the checklist of flora and fauna of that area. However, on scrutiny of MP / TCPs of the 14 selected PAs, we observed that only six PAs have recorded amphibians and butterflies and their checklists were provided in their MP / TCPs. Of the six PAs, Sharavathy WLS, BRT and Bandipur TRs have listed 6, 14 and 25 amphibian species respectively (**Table 9.3**) which indicates that data gathering was inadequate since these PAs fall under WG-NBR region which is home to 227 amphibian species and hence does not reflect the true picture of the given habitat.

Table 9.3: Statement on inclusion of amphibians and butterflies in the Management Plan/Tiger Conservation Plans

Sl No	PAs	Amphibians			Butterflies		
		Recorded	Listed	Checklist	Recorded	Listed	Checklist
1	Bandipur TR	25	--	Ab	--	--	Ab
2	DATR TR	138	27	Ab	--	41	P
3	BRT TR	--	14	P	--	115	P
4	Nagarahole TR	--	--	--	--		--
5	Bharda TR	--	--	Ab	--	52	P
6	Kudremukh NP	--	35	P	--	149	P
7	Someshwara WLS	--	--	Ab	--	--	Ab
8	Mookambika WLS	--	--	Ab	--	--	Ab
9	Sharavathy WLS	--	06	P	--		Ab
10	Talacauvery WLS	--	35	P	--	104	P
11	Pushpagiri WLS	--	35	P	--	104	P
12	Brahmagiri WLS	--	--	Ab	--	--	Ab
13	M.M. WLS	--	--	Na	--	--	Na
14	Cauvery WLS	--	--	Ab	--	--	Ab

Source: Details furnished by the Department
Legend: Ab-Absent, P-Present, Na-Not applicable (MP not prepared yet)

Many of these lesser known species are important bio-indicators and they play a vital role in ecological balance and also play an important role in assessing the health of the forest. Such incomplete recordings of these lesser known fauna, which are as important as any other charismatic species (like tiger or elephant), show the lack of attention of the Department in conserving the PAs at landscape level.

Further, the Management Plans had identified areas of research, but to what extent these were taken up is not on record. Many of the research areas identified in the MP / TCPs are problems associated with management issues like socio-economic issues of human habitation in and around the PAs, land use pattern, assessing invasion of exotic weeds and developing strategies for its control, man animal conflicts, public roads and safety of wildlife, *etc*. However, we observed that most of the research works prescribed by the Management Plan were not taken up which could have helped in better management and conservation. Further, none of the PAs had in-house research labs even to address the basic requirements such as soil analysis, pathogens, to store culture etc., Research involving complex problems like animal behaviour and cognition, evolution and biological diversity studies, systematic and taxonomy, natural history, conservation biology, restoration biology or community studies needs special skills and expertise and thus there is need for linkages with organisations possessing such research capabilities. The Protected Area management can use all available expert agencies, local institutions, local universities and NGOs, *etc.,* for research, investigations, survey and even for monitoring. Some of the prominent wildlife research institutes are Wildlife Institute of India, Zoological Survey of India, Botanical Survey India, Forest Survey of India, Forest Research Institute, ICFRE[75], IISc, SACON[76] and NCBS[77], *etc*. However, we observed that except in few cases, none of the other PA managements had tied up with any research institute to get better inputs and new perspectives to conserve the PA better.

We observed from the MP / TCPs that research area is one of the most neglected areas in the Protected Areas which needs immediate attention. In most of the Protected Areas, research and monitoring have suffered in the past mainly due to lack of policy, poor infrastructure for research, lack of training to front line staff, inadequate funding, attaching low priorities, weak coordination between wildlife managers and research institutes, differences in the research priority of the Protected Area and research institutes and misuse of research permissions by some individual researchers / research organizations etc. If research activities were given priority, these are carried out regularly and properly implemented, many management issues like arresting the spread of *lantana* and other invasive weeds, mitigation of human wildlife conflict, changing of socio-economic status of fringe villages / enclosures, rehabilitations, clearance of encroachments, *etc.*, could have been dealt with better and more scientifically.

Recommendation 14: Department should ensure that all pending research reports are submitted and examined. Research on lesser known fauna may be promoted. Research areas mentioned in Tiger Conservation Plans and Management Plans may be taken up immediately. Department may consider linkage with expert agencies like researchers, ecologists, wildlife scientists to take up research in an integrated manner.

[75] Indian Council of Forestry Research and Education
[76] Salim Ali Centre for Ornithology and Natural History
[77] National Centre for Biological Sciences

9.2 Monitoring of Species

Monitoring is critical to determine trends in biological diversity over space and time with an emphasis on evaluating the effectiveness of management actions and policies. In any PA, monitoring of various aspects like population estimation of flora and fauna, tree cover, human wildlife conflict incidences, crop raiding, *etc*., gives out the actual status of species and incidences which helps the Department in formulating strategies for better conservation and management.

Monitoring is both short-term and long-term, involving biotic or abiotic parameters so as to assess the status of the entity. But what requires to be monitored has to be established and depending on analytical tools, the techniques and procedures need to be suggested. Monitoring may have several aspects to it, but the central function of monitoring is establishing trends and change. Trends will be revealed by analysis of a time series data, their interpretation and evaluation.

The taxonomic monitoring forms the basis of the full inventory of life on earth. Research and monitoring plays a very important role in understanding population dynamics and the status of any given species in an area and throws light on how to conserve these species for future. In most of the PAs, monitoring of tigers and elephants are carried out regularly and a trend is understood and certain measures are taken to conserve them. This is evidenced by the trend of their increasing numbers. Similarly, to some extent the prey base of tigers, *i.e.* the ungulates are also monitored and their estimates are available. However, as per the Department's records, the rest of the diversity are not being monitored regularly in the PAs. In the absence of this, status of many endangered and endemic species like the lion-tailed macaque (*Macaca silenus*) (LTM), Nilgiri langur (*Semnopithecus johnii*) and many more lesser-known species could not be ascertained. Further, some of the individual research outputs[78] have shown alarming declining trends of some endemic species while some have reported new species from this biologically rich hotspot as detailed below.

Lion-tailed macaque is one of the endemic species of primates in the world - found only in Western Ghat forests of Southern India covering three States -- Karnataka, Tamil Nadu and Kerala. Because of its highly selective feeding habits, limited range of occupancy (c. 2,500 sq km), delayed sexual maturity, long inter-birth interval, low turnover and small wild population, it is categorized as endangered on the International Union for Conservation of Nature (IUCN) - Red List, 2008. Habitat loss coupled with fragmentation and hunting, has severely affected their population and globally their estimated total population is between 3,500-4,000 individuals.

[78] Kumara H.N and Anindya Shina (2009) Decline of the endangered lion-tailed macaque Macaca silenus in the Western Ghats, India. Oryx 43(2),

Fig 9.1 Lion tailed macaque in its habitat
Source: Image taken during field visits by Audit.

In the state of Karnataka, LTMs are recorded from Kudremukh NP, Mookambika WLS, Someshwara WLS, Sharavathi WLS, Brahmagiri WLS, Pushpagiri WLS and Talacauvery WLS. As per the estimates recorded by various scientists working in this field in Karnataka, a total of 116 groups[79] of LTMs were recorded during 1985 but had declined sharply to 61 groups as recorded during 2008[80]. Though regarded as one of the most endangered species globally and endemic to Southern India, no proper monitoring was taken up by the Department to properly assess the population. In the absence of this, there was no plan of action in place to protect LTMs, which is on the brink of extinction. Similarly, another primate endemic to this region and endangered is the *Nilgiri langur* which also faces the same situation and their numbers are yet to be estimated.

Further, there are lesser known fauna like amphibians, bats, butterflies, etc. which are a neglected lot. They are natural bio-indicators of a forest's well-being, playing an important role in pollination and as natural insect controllers. Even with slight alterations in their habitat, their population can either decline or may be wiped out locally from that habitat. Today many scientists / researchers are finding new species in the Western Ghats, especially amphibians. As per research / study reports[81], Western Ghats have 227 amphibian species out of the total 412 species found in the country, accounting for 55 *per cent* of the country's amphibian diversity. Out of the 227 species, 212 species (93.4 *per cent*) are endemic to the Western Ghats.

[79] Group size varies from 8 to 32 individuals

[80] Kumara H.N and Anindya Shina (2009) Decline of the endangered lion-tailed macaque Macaca silenus in the Western Ghats, India. Oryx 43(2)

[81] Amphibians of Western Ghats 2016 and Frost et al (2006) entitled The Amphibian Tree of Life

Based on IUCN criteria, 17 species are critically endangered, 31 are endangered, 17 are vulnerable, 5 are near threatened and 33 are least concern species. The status of remaining 124 species is either data deficient or not evaluated. Since the year 2000, out of 227 amphibian species, 118 new species have been found in the Western Ghats.

In response, the Government, during the Exit Conference, accepted the absence of a mechanism to monitor research projects and agreed to mark a day annually for discussion and presentation of papers on the research activities taken up in the PAs. Further, it was also proposed that a compilation of the proceedings / research papers would be brought out for use in better management of PAs.

Departmental research should be "problem solving studies", based on a consultative process involving PA management, local people and overall ground reality prevailing in our tropical setting. The research, monitoring and training aspects should cover the overall habitat management and should be focused at landscape level in Protected Areas. In the absence of scientific data, it would be inappropriate to draw effective strategies for long term goals and prepare a Management Plan for better conservation of biodiversity. Research and monitoring of biodiversity is an essential prerequisite for its conservation, management and sustainable utilisation. Thus the failure to take up research by the Department and non-monitoring of Research done by others clearly indicates the lack of application of the Department in this regard. With lack of research input and proper monitoring, major problems like increased human wildlife conflicts and that of invasive species like *lantana* continued to be a major threat in our Protected Areas till date. Lack of institutional setup to coordinate research progress was also noted by the DCF, Kudremukh Wildlife Division.

Recommendation 15: All endemic species need to be monitored so that appropriate conservation plan can be drawn for better management at landscape level. Government may consider establishing basic research laboratory in each of the Protected Areas.