LIVE ZOOLOGY BEYOND THE CLASSROOM: A NEW ERA OF SCIENCE EDUCATION

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The curriculum of zoology in most of the universities, colleges and schools in India used to emphasise the study of dead animals in the form of dissection, vivisection, museum specimens and histological slides are designated as 'dead zoology'. Those species, evolved and came into existence in nature during the course of millions of years of evolution, are facing severe threats of survival due to extensive exploitation in the name of zoological studies in the classrooms. 'Live Zoology' means the study of organisms in their natural habitats without disturbing them, it literally means "teaching beyond the boundaries of classroom" and to study their interrelationship and importance as vital component of various food chains and food webs. 'Live Zoology' helps in the conservation of various ecologically important species. The concept of Live Zoology, introduced by Professor K.K. Sharma, is one of the most efficient tools to make zoology subject more understandable and increase the capacity building of students not only for identification, biosystematics and nomenclature but also for behavioural interaction with environment and organisms of same and other species. The 'Live Zoology' concept became so popular and effective in a relatively short period of time and a complete documentation of biodiversity status of many faunal species came into existence in the zoology departments of various academic institutions. With the help of this concept, now about 280 birds, 12 anurans, 25 lizards, 30 snakes and 120 butterfly species have been reported from various localities of Rajasthan and the additions of species in the list are still going on. Continuous education and concern of live zoology must be provided to all the aforesaid stakeholders (students, pre-service teachers and teachers) to gain proper awareness about the zoology subject and standards of bioethics. The educational experiences with the live zoology and wildlife can facilitate the development of positive attitudes towards animals and to restore the population status of declining species too.

Key words: *Live zoology, bioethics, understandable, biodiversity.*

Introduction

In most education institutions the curriculum of zoology has been oriented to study the animal from dead and preserved specimens purchased from the suppliers. Teachers and students are not aware about the basic information of faunal diversity present in their nearby areas. MDS University, Ajmer decided in year 2010 to study animals in nature, the concept was designated as 'Live Zoology' by Professor K. K. Sharma of MDS University, Ajmer (Sharma, et al., 2011). 'Live Zoology' means study of organisms in their natural habitats without disturbing them. And also to study their interrelationship and importance as vital component of various food chains and food webs. 'Live Zoology' also helps in preparing conservation strategies of various ecologically important species. Previously for systematic study, dead specimens were required that included collection, killing and preservation of different types of animal species that lead to severe loss of biodiversity while studying the live zoology that unnecessary killing is not required. Thus the 'Live Zoology' is a new eco-friendly humane approach to study the world of nature's treasure without exploiting it. This has great

advantages above the previous methods of studying the zoology. Simultaneously, it also helps the students, pre-service teachers and teachers to understand the subject in a better way and its various aspects too. Many organisations have started the study of zoology in nature, this resulted in documentation of large number of animal species which were not known earlier from their study areas. The concept became so popular that in August 2013, University Grants Commission, New Delhi released its guidelines for development of zoology curriculum meant for the entire country.

Methodology

After banning the dissection and animal use in teaching by UGC and other policy making bodies, there is urgent need to compensate the workload and marks distribution. To fulfil these requirements 'Live Zoology' and 'Digital Alternatives' play key roles. Thus, requirement of understanding the subject with appropriate tool will be maintained. In live zoology students have to spend more or little time into nature to observe organisms and their behaviour that not only increases the knowledge of students but also encourages the students to think in real situations about study of zoology. Several techniques were available for generating species lists or information on species richness for a site. These general techniques have been used for both long term and short term sampling projects, although long term sampling often includes both data retrieval and fieldwork and thus is more eclectic. Survey protocols, viz. Ad hoc Search Method, Visual Encounter Survey method, Transect Method, Point Count Method, Quadrate sampling technique and Call based identification tools are used to document the species.

Results and Discussions

During the conventional practice of learning and teaching of zoology in most of the universities, colleges and schools in India, it used to emphasise the study of dead animals in the form of dissection/vivisection, museum specimens and histological slides designated as 'dead zoology'. According to an estimate several animals were sacrificed for the fulfilment of these requirements at various levels of schools, undergraduate and post graduate programmes concerned to Zoology (Table 1). Those species evolved and came into existence in nature during the course of millions of years of evolution are facing severe threats of survival due to extensive exploitation in the name of zoological studies in classrooms (Sharma, et al., 2012).

After implementation of UGC regulation, to compensate the workload and marks, 'Live Zoology' was introduced with the aim of proper scientific documentation of faunal diversity. Students were assigned with the various objectives of documentation, behavioural observations and seasonal variation of faunal diversity available to the nearby areas of institution or student's residential area according to their convenience. This innovative practice with the approach of beyond the classroom teaching triggers a new zeal in students and teachers to understand the subject along with the message of biodiversity conservation as no killing was involved in this humane protocol (Sharma, et al., 2013a and b).
The impact of this new approach started a new era in zoology studies and several new species were recorded. The outcome of this approach was initiated as complete documentation of biodiversity and population

Table 1

Species used in dissection and study of other aspects of zoology at various levels of education

S. No.	Animal Species	Expected Number of Individuals
	Consequences of animal use in dissection in school education	
1.	Earthworm	1,35,48,145
2.	Cockroach	1,35,48,145
3.	Rat	81,28,887
4.	Frog	81,28,887
	Consequences of animal use in dissection in graduate-level education	
1.	Earthworm	9,47,613
2.	Cockroach	9,47,613
3.	Prawn	9,47,613
4.	Pila	9,47,613
5.	Scoliodon	9,47,613
6.	Frog	9,47,613
7.	Rat	9,47,613
	Consequences of animal use in dissection in post graduate-level education	
1.	Earthworm	69, 072
2.	Sepia	69, 072
3.	Loligo	69, 072
4.	Scoliodon	69, 072
5.	Rat	69, 072

status of many faunal species, about 280 birds, 12 anurans (belonging to 4 families), 25 lizards (belonging to 7 families), 30 snakes (belonging to 6 families) and 120 butterflies (belonging to 5 families) species have been reported from various localities of Rajasthan.

The outcomes in the form of publication of Range Extension and New Records (3 new records for Rajasthan (Figs. 1: a, b and c) and 15 new locality records); New Observation (one albinism record in crow); Behavioural Interactions (12 behavioural interactions records about feeding, prey-predator, defence, cannibalism, reproduction, etc.) and documentation of species/checklist/faunal diversity (documentation of faunal diversity of specific geographical range or area) was done and several in process (Table 2).

Table 2

Key outcomes of live zoology based studies

S. No.	Key Category	Specific Outcomes	Number of Research Publication
1.	Range extension and new records	Three new records for Rajasthan fifteen new locality records	18
2.	New observation	One albinism record in crow	1
3.	Behavioural interactions	Twelve behavioural interactions records about feeding, prey-predator, defence, cannibalism, reproduction, etc.	15
4.	Documentation of species/checklist/ faunal diversity	Documentation of faunal diversity of specific geographical range or area	1 book 1 book chapter 8 publications

Fig. 1 a: Tailed Jay Butterfly; b: Indian Painted Frog and c: Western Reef Egret)

Conclusion

Live zoology concept not only helps in the species documentation but also helps to assess the species status to refine their conservation strategies. It helps in long term planning as Live Zoology Information System (ZIS) will enrich biodiversity database and help in planning and management for conservation of biodiversity. Simultaneously, live zoology concept is emphasising studies of animals in natural conditions avoiding unnecessary killing, capturing, preserving of animals to study them in dead condition. This helps the students, pre-service teachers and teachers to understand the zoology subject in better way and also provide new fields of job opportunities in various governmental and private sectors.

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