COMMENTARY

Utilization of wild caught animals in education: a case of rampant vivisections in India

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Vivisection as a learning tool has been debated vigorously in academia. Such debates have led to the formulation of policies and laws on ethical treatment of animals. With the rapid depletion of living planet resources[1], large-scale utilization of wild caught animals for vivisection in education, expands this debate beyond ethical treatment of animals. The use of wild caught animals and plants in vivisection is bound to negatively impact the populations of species under such exploitation. Also, an equally important negative impact on the sensitivity of the students to conservation issues cannot be ignored[2].

Across the world, vivisections are considered indispensable to teach animal anatomy and physiology at the secondary school, undergraduate and graduate levels. Perfunctory reasons such as: (i) it is the only way to provide meaning to communications about anatomy, physiology and health; (ii) model is complete and no simulation can replicate an actual organ or organism; (iii) media tools such as pictures, models and computer simulations fail to provide the full sensory experience of sound, smell, and touch that dissection provides; are offered in order to sustain this insidious practice in education[3,4]. An alternative to vivisection would be less expensive and less harmful to students, by avoiding exposure to harmful preservatives and pathogens. Studies have shown that the performances and understanding of the students in their disciplines improved because of the use of alternatives to vivisection[5,6]. Therefore, many countries have either banned or regulated vivisection in education. Other countries, either continue to debate or show benign neglect.

A structured questionnaire survey was conducted among students pursuing an undergraduate degree in zoology, in the colleges of Delhi University (DU) to document: (i) the species and the magnitude of its use in classroom vivisections; (ii) the levels of awareness with regard to the conservation status of the species used for vivisections among students; (iii) the opinion of students on vivisection as a learning tool in the curriculum of the undergraduate degree programme in zoology at DU.

Out of the wild caught species used in vivisections, Indian apple snail *Pila globosa,* cattle leech *Hirudinaria* sp. and sea urchin *Echinus* sp. have not been evaluated by IUCN. Spadenose shark *Scoliodon laticaudus*, an inshore species found in South East Asia and North East Africa, has been classified as 'Near Threatened', mainly because of the threat of over fishing[7]. Indian Bullfrog *Hoplobatrachus tigerinus* and *H. crassus* have been given the status of 'Least Concern', though the population of the latter is thought to be declining. Indian Bullfrog, heavily exported for commercial purposes in the past, is listed in the Appendix II of CITES[8,9]. All these species have a wide distribution in India and neighbouring countries. The spadenose shark and the Indian Bullfrog are listed under Schedule I, Part II (A) and Schedule IV respectively, of the Wildlife (Protection) Act, 1972 in India[10]. Vivisection of other animals in education has been discouraged under Section 17(2)(d) of The Prevention of Cruelty to Animals Act, 1960 in India[11]. The ongoing use of animals for vivisection in education in India, documented through this study, is in violation of these legal provisions.

Initially, an inventory of the species used in vivisections in the undergraduate colleges was made by interacting with the staff and the students. A questionnaire was designed including only the most commonly used species for vivisections in the undergraduate degree programme. The survey was conducted in 14 out of 16 colleges of DU, targeting students in the third year of the Bachelor's degree programme in zoology. The structured questionnaire (Appendix 1) was filled by 114 students consisting of 80 females and 34 males, between July 2008 and February 2009. The total number of students studying in that year was 275. The species involved in the vivisections were identified with the help of professional taxonomists. In the case of the Indian Bullfrog, there were two species, viz. *H. tigerinus* and *H. crassus*, and it was difficult to distinguish them. Therefore, the results of the survey pertaining to frogs refer to both these species. Data on earthworm, cockroach and cattle leech were not analysed and therefore the magnitude of vivisection of these species is not reported here. The cost in Indian rupees (INR) of the wild caught animals used in vivisections was found out through interviews.

One-tailed *t*-test was performed to test the differences in the rating of usefulness of vivisection as a learning tool (Q.4), between respondents who felt that vivisections significantly enhanced their knowledge and those who felt otherwise (Q.3). In order to find out if the awareness on laws pertaining to protection of wild animals influenced their opinion on vivisection (Q.8. and Q.9.), a chi-square test was performed. Because catastrophic amphibian declines have been publicized worldwide and highlighted through popular media, we wanted to know if the students were aware of the threats amphibian populations were facing (Q.12). The data were analysed and graphs were drawn using MS Excel 2007.

The species that were used in vivisections were earthworm (*Pheretima* sp.), American cockroach (*Periplaneta americana*), Indian apple snail (*Pila globosa*), cattle leech (*Hirudinaria* sp.), prawns, sea urchin (*Echinus* sp.), spadenose shark (*Scoliodon laticaudus*), giant river catfish (*Sperata seenghala*), Indian bull frog (*Hoplobatrachus tigerinus*), Jerdon's Bullfrog (*H. crassus*), rock pigeon (*Columba livia*) and house rat (*Rattus rattus*). A large proportion (6 out of 11) of species, used in vivisections was wild caught. In the case of spadenose shark 94.8%, giant river catfish 84.2%, Indian Bullfrog 96.5%, rock pigeon 47.4%, house rat 100%, sea urchin 100% and Indian apple snail 92.1% of the respondents used these species for vivisection during their course work. In the case of the sea urchin, two individuals were used by every respondent for vivisection during their course work. With all other species, the number of animals used for vivisection varied among the respondents. The class intervals of number of animals used for vivisection (Figure 1)

Appendix 1. Questionnaire

Date: Name:

College: Course: Year:

Q.1. Have you performed vivisections of animals as part of your course?   Yes ☐   No ☐

If Yes

Q.2. Vivisections performed on:

(Tick in the boxes for the animals on which you have performed vivisections, followed by writing no. of individuals you have vivisected in the next box. Leave the boxes for other animals blank.)

No. of individuals dissected

Earthworm (*Pheretima* sp.)   ☐

Leech (*Hirudinaria* sp.)   ☐

Cockroach (*Periplaneta americana*)   ☐

Prawn   ☐

Apple snail (*Pila globosa*)   ☐

Sea urchin (*Echinus* sp.)   ☐

Dog fish (*Scoliodon* sp.)   ☐

Catfish (*Mystus* sp. Now – *Sperata*)   ☐

Bullfrog (*Hoplobatrachus tigerinus*)   ☐

Blue rock pigeon (*Columba livia*)   ☐

Rat (*Rattus rattus*)   ☐

Any other:_____

Q.3. Do you feel that vivisections significantly enhance your knowledge in zoology?   Yes ☐   No ☐

Q.4. On a scale of 1–10, how useful would you rate vivisection as a learning tool?   _____

Q.5. Are you aware of the possible impacts to the population of animals used in vivisection?   Yes ☐   No ☐

Q.6. Do you feel that vivisections of animals caught from the wild will impact their population or their habitats?   Yes ☐   No ☐

Q.7. On a scale of 1–10, how useful would you rate vivisection of wild animals as a learning tool in your curriculum?   _____

Q.8. Are you aware that some of the wild animals used in vivisections are protected under law?   Yes ☐   No ☐

Q.9. Do you feel that vivisections of wild animals protected under law should be carried out as part of your curriculum?   Yes ☐   No ☐

Q.10. In what way do you feel internal anatomy of animals should be taught in your course? (Tick the boxes in front of chosen options)

1. Demonstration of vivisection of a wild animal   ☐
2. Viewing a presentation on vivisection   ☐
3. Computer-aided interactive session   ☐
4. Individual vivisection of wild animals   ☐
5. Vivisection of cultured animals   ☐

Q.11. If there were alternatives to vivisections of wild animals, would you advocate those tools to be used in the course?   Yes ☐   No ☐

Q.12. Are you aware of the threats amphibian populations face and that they are declining worldwide?   Yes ☐   No ☐

Q.13. Do you feel that finding alternatives to vivisection of amphibians in colleges will help in reducing the threats to their population?   Yes ☐ No ☐

with the highest percentage of respondents were: spadenose shark (2–5); giant river catfish (2–5); Indian Bullfrog (6–10); rock pigeon (0); house rat (2–5) and Indian apple snail (2–5). The costs of wild caught animals for one individual each in INR were: sea urchin – 15, Indian apple snail – 4, spadenose shark – 10, giant river catfish – 10, Indian Bullfrog – 20 and house rat – 25.

With regard to the level of awareness among respondents: (i) 59.6% of them were aware of the status of protection given to some of the species used in vivisections; (ii) 74.6% claimed to be aware of the possible impacts on the populations of species used in vivisections, and (iii) 42.1% claimed to be aware of the threats amphibian populations face and that they are declining worldwide.

Majority of the respondents (82.3%) felt that vivisections significantly enhanced their knowledge in animal anatomy. The average rating of usefulness by respondents who felt that vivisections were not a useful learning tool (mean = 4.28, SE = 0.38), was significantly lower than that by those who felt otherwise (mean = 7.08, SE = 0.20; one-tailed t-test: $t = -6.06$, d$f = 110$, $P < 0.01$). Majority (79.8%) of the respondents felt that the demand of wild caught species for vivisection impacted the natural populations of the species. Majority (82.5%) of the respondents also felt that vivisection of wild animals protected under law, should not be carried out as part of their curriculum. The awareness of the respondents on the animals used in vivisection under legal protection, did not influence their opinion on whether vivisection of such animals should be part of their curriculum (chi-square test: χ^2 0.22, d$f = 1$, $P > 0.05$). Only 45.7% of all respondents favoured any form of vivisection in their curriculum (Figure 2). The most intense form of exploitation of animals (individual vivisections) was also the least favoured (11.2%) by them (Figure 2). The respondents seemed to favour the use of computer-aided learning tools replacing vivisection in their curriculum altogether (Figure 2). Majority (91.2%) of the respondents chose to advocate for alternatives to vivisection, to be used in their curriculum. Further, 91.2% also felt that finding alternatives to vivisection of frogs will help in reducing the threats to their population.

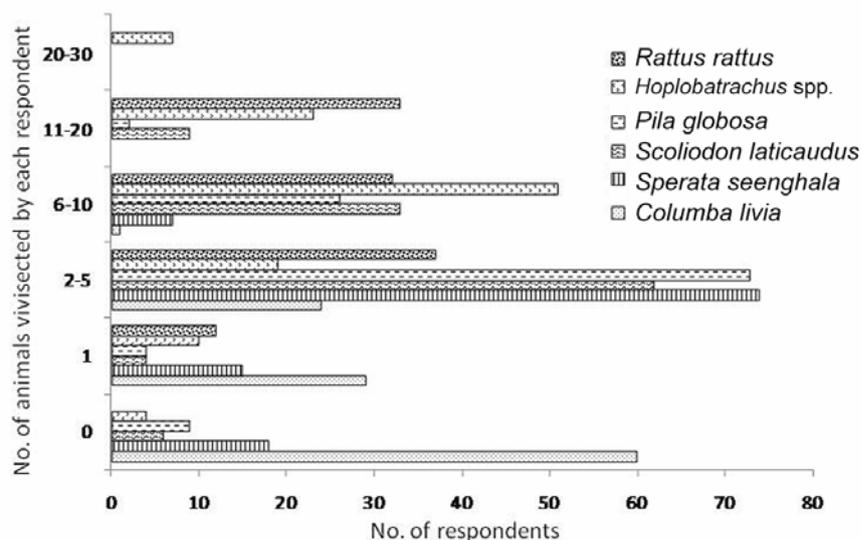Vivisection is rampant in modern biology education in India. Our survey

Figure 1. Frequency distribution of the number of individuals of each species used in vivisection by the respondents ($N = 114$).
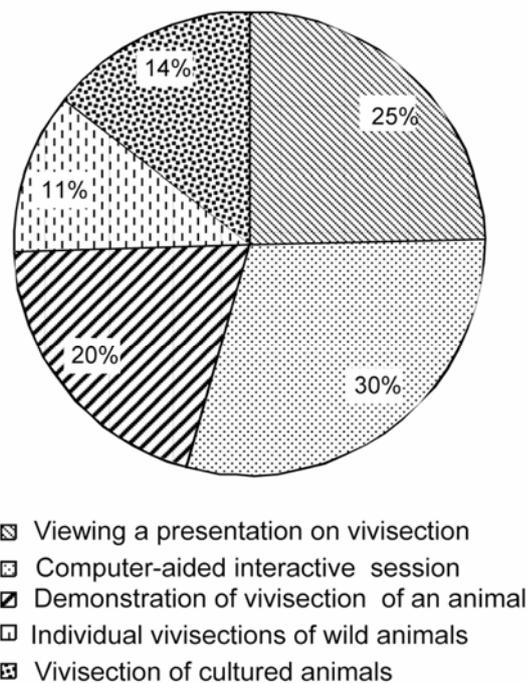

Figure 2. Percentage composition of opinions of the respondents on vivisection and its alternatives ($N = 223$).

reveals that several wild caught invertebrates and vertebrates are being used in biology education. The magnitude of the utilization of wild caught species for vivisections is alarming. There is an uncontrolled, large-scale utilization of both wild caught and cultured animals, indicating a thriving trade on them. Our survey provides a baseline on the volume of the trade which has implications for the populations of these species.

The cost of animals used in vivisection is low, indicating their widespread exploitation. Spadenose shark and Indian Bullfrog, despite being protected by legislation, cost only 10 and 20 INR respectively. The Indian apple snail is the lowest priced among wild caught animals, at just 4 INR. The price of Indian Bullfrog, recorded previously in the context of frog-legs trade was about 1.7, 2 and 3 INR for one individual in 1965,

1975 and 1985 respectively[12,13]. Therefore, the cost of the Indian Bullfrog has increased seven fold in the last 25 years. However, the frog is easily affordable for vivisection even today.

Vivisection is considered to be a desensitizing experience for students, sending a mixed message to them[14]. An underlying conflict between thoughts and practices among students is revealed from the moderate to high levels of awareness among respondents regarding the status of protection and impacts on populations of species on the one hand; and the large number of vivisections required to perform by them on the other. In 2008, a global campaign commemorated as the 'Year of the frog', created awareness on the threats amphibian populations face and their worldwide decline. However, in the student population that was surveyed, their awareness to these issues was not different from that about the legal protection and the impacts on the populations of species used in vivisection.

Majority of the respondents in the survey felt that vivisection was a useful tool in learning biology and also rated it as an effective learning tool. Vivisections are touted as the only way to provide meaning to communications about anatomy, physiology and health[4]. The respondents differentiated between the use of wild caught and cultured animals for vivisections. A large proportion of the respondents felt that the off-take from the wild will impact the populations of species, and vivisections should not be performed on wild species that are protected. However, their heightened awareness about biological conservation did not influence their opinion on whether vivisections should be part of their curriculum. This might be because, the respondents felt powerless to influence a change in their curriculum. Several studies have compared vivisections with other teaching tools in terms of their value as an instructional aid. Computer simulations and models have been found to be as effective or in some cases, more effective learning tools than vivisection[5,6,15,16]. An overwhelming choice made by the respondents in our survey for alternatives to vivisection, is a clear indication that vivisections are the least favoured among various options. The level of awareness among the respondents on the impacts of vivisection on the populations of wild caught animals seems to have been the basis for the choices they made. Vivisections are mandatory in the current biology curriculum in important universities in India. If such rampant exploitation continues, it will harm the populations of species and the conservation ethics being nurtured among the students in the universities.

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