

# On the costs of zoological reference collections in the Indian context

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*There is paucity of information today on the cost of collecting and maintaining biological reference collections which constitute the material basis for biodiversity assessments. The cost of collecting and accessioning zoological specimens by the Zoological Survey of India, based on 3 case studies, one each in 1973, 1983 and 1996, is quantified. The reference collections bring the flavour of nature into the inner city and lead to a greater understanding of biodiversity which will be in some direct proportion to the investment in its documentation.*

BIODIVERSITY which is the degree of variety in nature, has been described as the world's most fundamental capital stock. Biological reference collections constitute the material basis for biodiversity assessments. They serve as proof or supporting evidence for the identity of a particular organism and for the existence of that entity at a certain location at a particular point in time. The advent of computerized information handling and manipulation together with molecular technology means that such reference collections will become strongly supplemented with extensive and permanent recorded observations, images and genetic data. According to Duckworth *et al.*<sup>1</sup>, there are some 2.5 billion specimens in preserved biological reference collections worldwide. Systematic Agenda 2000 (ref. 2) estimated that the cost of the current annual global level of research and infrastructural support for systematic biology, including support for collection and preservation, is about US \$500 million. A consequence of the broad range of preserved non-living materials which comprise museum reference collections calls for drawing of thoughtful policies for resourcing the collection and long-term maintenance of the materials.

## Costs of biological reference collections

The costs for the collection and care of biological reference collections vary greatly from place to place and also for the different collections made. There have been only a few attempts to quantify the costs of collection of biological specimens from the world over. Even when such estimates have been made, they were based on a few studies carried out in USA, UK and Australia and that too only of the floral components. Thus in a report on the systematic botany resources in the United

States<sup>3</sup> it was estimated that the cost of a well prepared, identified, accessioned and inserted herbarium specimen ranged from US \$6.45 to 7.68. These figures, valid about 18 years ago, did not include the often considerable costs of collecting the specimens in the first place. Besides, estimates vary depending on the purpose of the collections and the type of specimens. Thus collection costs varied from US \$18 per plant specimen in an ethnobotanical study<sup>4</sup> to US \$26 per plant accession for a collection trip in South America<sup>5</sup>. While in Australia the mean cost for collection and curation of a botanical specimen worked out to A \$52.5 in 1994 (ref. 6), in UK Howie<sup>7</sup> estimated the cost at £20 per museum specimen treated, conserved and stored, including staff and material cost.

## Cost of collection of zoological specimens by the ZSI

Because of the paucity of data on the costs of collection of faunal resources from the world over and the nonavailability of any such data from the Indian context on the biological specimens, an attempt has been made to quantify the cost of collection of zoological specimens based on three extensive surveys carried out by the Zoological Survey of India through the years. These surveys were selected at random and were led by the author. The surveys carried out by the ZSI have been chosen simply because the author is most familiar with them and because the ZSI, one of the oldest and pioneer institutions of its kind in the world, has been carrying out extensive faunistic surveys through more than 8 decades of its existence. The cost-efficient estimates were made taking into account the following major components.

- a) Salary component of the participants for the survey period.

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- b) Cost of travel and daily allowances.
- c) Contingent expenses incurred during the survey.
- d) Cost of hiring vehicles/boats, etc. when office vehicles were not used.
- e) Approximate normal costs of subsidized government accommodation used by the survey parties.
- f) Costs of preservatives, chemicals, etc. used for collection/preservation of specimens in the field.
- g) Relative costs of equipments, etc. used during the surveys.
- h) Relative cost of hiring vehicles when office vehicle is used for the survey.
- i) Cost of engaging fishermen, field guides, etc. for helping with the collections.
- j) Component of pension and related benefits based on an average life-span of 70 years and service period of 30 years.

The average cost of a zoological specimen collected from the field and brought to the ZSI's Head Office, Calcutta from Gujarat State in November, 1973 worked out to Rs 1.37 while for one accession through a collection trip in Kerala in 1983 it was Rs 5.80. On the basis of a recent estimate made in November, 1996 it worked out to Rs 12.50 for a specimen collected and brought to SRS, ZSI, Madras from Anamalai Hills in Tamil Nadu State.

These calculations were based on specimens of the groups ranging from protozoans to mammals and did not take into account the plankton samples involving a few thousands of specimens collected during each survey tour. Besides, value of the ecological observations and population estimates of 90 to 180 species of birds, 30 to 68 species of mammals and some species of snakes observed during each survey, which could not be quantified, did not form elements in the estimation.

Fossils, birds and mammals, especially larger ones, may cost one or two orders of magnitude more than other types of material. However, when spread over the useful 'life' of specimens, which extends forward indefinitely, this initial cost is not high compared with annual maintenance costs<sup>8</sup>.

## Conclusions

The natural history museums where the collections are mostly housed, bring the flavour of nature into the inner

city where people otherwise have felt themselves to be too isolated from the plants and animals of natural ecosystems<sup>9</sup>. All great museums combine public programmes with research and collections because the exhibits and educational activities for the visitors are given strength, vigour and currency of content through the synergistic interactions of the museum's public programme's staff with the scientists and their collections behind the scenes.

The economic cost-benefits of investments in biological reference collections are difficult to quantify but the ability of the world to reap the benefits of a greater understanding of biodiversity will be in some direct proportion to the investment in its documentation and study<sup>10</sup>. The costs of establishing, maintaining and increasing accessibility to specimens and data held in reference collections will be an integral component of proposals to realize the full potential of Earth's biodiversity resources, although there is still debate as to whether support for the service roles of collections could be to the detriment of the vitality of systematics as a scientific discipline.

1. Duckworth, W. D., Genoways, H. H. and Rose, C. L., *Chronicle of our Environmental Heritage*, National Institute for the Conservation of Cultural Property, Washington D.C., 1993.
2. Systematic Agenda 2000, Technical Report, 1994.
3. Payne, W. W., *The Costs of Services. Cary Arboretum of the New York Botanical Garden, Millbrook, New York*, 1979, vol. 2, pp. 1-50.
4. Halloy, S., *Fundación Amigos de la Naturaleza*, Santa Cruz, Bolivia, 1994, pp. 1-30.
5. Halloy, S., MAF Technology Report, Invermay, 1990, pp. 1-20.
6. Nielsen, E. S. and West, L. G., in *Systematics and Conservation Evaluation* (eds Forey, P. L. et al.), Clarendon Press, Oxford, 1994, pp. 101-121.
7. Howie, F. M. P., *Life Sciences*, Miscellaneous Publications, Royal Ontario Museum, Toronto, 1986, pp. 1-6.
8. Hawksworth, D. L., *Global Biodiversity Assessment*, U.N.E.P. 1995, Part I, vol. 8, pp. 549-605.
9. Tyler, J. C., *Nat. Hist. Res.*, 1994, 3, 51-66.
10. Renner, S. S. and Ricklefs, R. E., *TREE*, 1994, 9, 78.

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