A Preliminary Report of the Faunal Remains from Damdama

P.K. Thomas, P.P. Joglekar, V.D. Mishra[1], J.N. Pandey[1] and J.N. Pal[1]

Department of Archaeology
Deccan College
Pune 411 006

1 Department of Ancient History, Culture and Archaeology
University of Allahabad
Allahabad 211 002

Abstract

Damdama — a Mesolithic site in Pratapgarh District (Uttar Pradesh) was excavated by Allahabad University between 1982 and 1987. The analysis did not reveal bones of any domestic animal among thousands of bone fragments. The fauna comprised a wide spectrum of mammals as large as the elephant, the gaur and the rhinoceros, and as small as the pigmy hog. The faunal exploitation indicates a cyclical trend in resource management where an increase/decrease in mammalian resources was compensated by parallel changes in the avian fauna and the aquatic fauna.

Introduction

Excavations were conducted at Damdama (a Mesolithic site in Pratapgarh District, Uttar Pradesh) between 1982 and 1987 by Allahabad University (Pandey 1990).

The site at Damdama is one of the very few stratified Mesolithic settlements in the country and thus is of great importance. The other stratified Mesolithic sites in the Ganga valley are Mahadaha and Sarai Nahar Rai (Fig. 1). The Mesolithic is vital to our understanding of man and animal interactions in the ancient past for two reasons. Firstly, this phase is transitional between the 'hunting-gathering' and the 'food production' modes of subsistence, and secondly, because it was during this period that the process of domestication began (Thomas and Joglekar 1994).

The sites of Damdama, Sarai Nahar Rai and Mahadaha have provided us with interesting faunal materials. Alur (1980) had identified bones of domestic animals from these Ganga valley sites. However, his identification of domestic species at the sites of Mahadaha and Sarai Nahar Rai is not convincing. The time bracket for Damdama and the other Ganga valley sites is much earlier than for other Mesolithic sites in the country. At such an early stage, one does not expect to find evidence of full-fledged domestic fauna, especially cattle which are usually associated with an agricultural society. This is the preliminary report of the analysis of material from Damadama done for the first time.

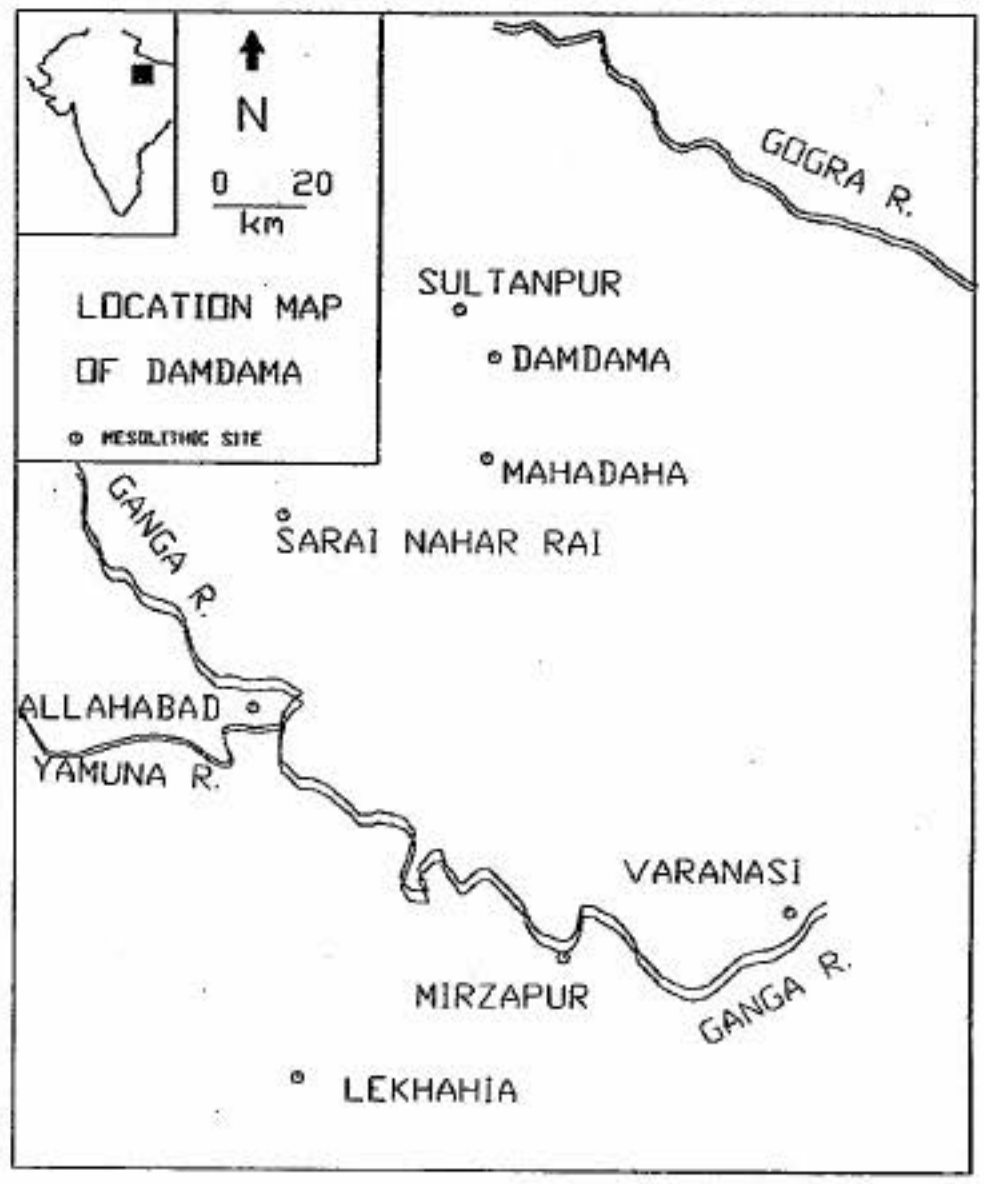

Fig. 1: Location map of Damdama, Allahabad, Mirzapur, Sultanpur and Varanasi

The Faunal Material

The faunal material from Damdama was systematically collected by the excavators, by sieving the entire deposit. More than 21,000 bone fragments were retrieved during the course of the excavations (Table 1).

A detailed study of the entire collection was carried out with the help of the reference skeletons housed in the Deccan College Archaeozoology Laboratory. Identification was done on two levels - the first level NISP included the bones that could be identified to at least the generic level, and the second level NISP was for fragments that could only be classified as belonging to Family. The bones that could neither be identified to either Genus or Family were treated as unidentified fragments. A majority of the fragments were very tiny and measured about 1-3 cm in length. About 90% of these bone fragments were charred, especially those recovered from the main habitational area.

On an average 27% of the bone material was identifiable for each of the 10 layers at Damdama. The level of identification varied between 19.16 and 37.58% (Table 2 and Fig. 2).

The large amount of unidentifiable bones indicates a high degree of fragmentation. This high fragmentation could have resulted both from human as well as non-human activity. The bones at Damdama do not show much evidence of modification due to scavenger activity (Table 3). Although the large number of fragments found at Damdama could perhaps be explained as being the result of

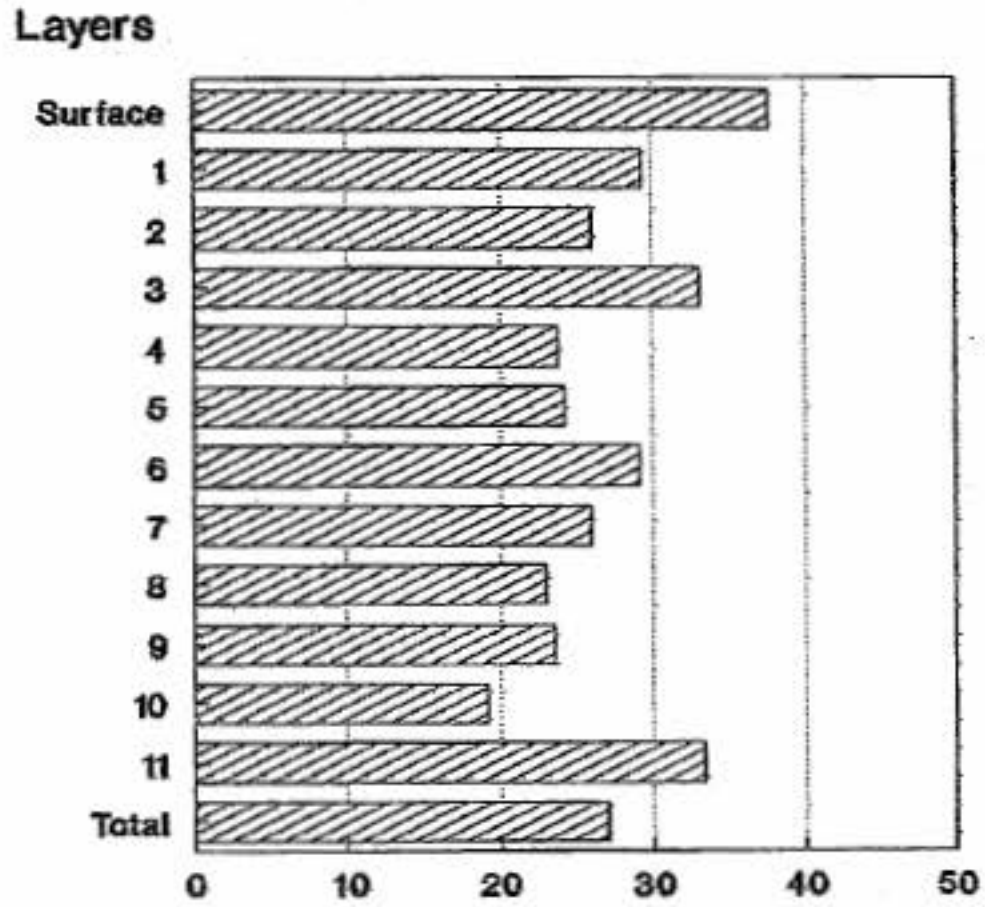

Fig. 2: Histogram of the level of identifiability at Damdama

human activities such as cutting, smashing and roasting bones to extract grease, we are unable to explain the quantity of charred bones (as high as about 90%: Table 3) as a part of food processing activities. Most of these bones were completely charred and some even calcinated. If the

Table 1: Summary of the faunal material from Damdama

Season	1983	1984	1985	1986	1987	Total
Identified	746	662	623	662	2999	5692
Unidentified	2195	2258	2424	942	7597	15416
Total Fragments	2941	2920	3047	1604	10596	21108
NISP%	25.36	22.67	20.45	41.27	28.30	26.97

NISP: Number of Identified Specimens

Table 2: Level of identification in layers 1-11 at Damdama

Layer	NISP	UF	TF	%NISP	Layer	NISP	UF	TF	%NISP
Surface	286	475	761	37.58	6	262	638	900	29.11
1	3060	8357	10417	29.37	7	139	396	535	25.98
2	880	2502	3382	26.02	8	172	575	747	23.02
3	397	800	1197	33.16	9	140	455	595	23.53
4	128	410	538	23.79	10	87	367	454	19.16
5	140	439	579	24.18	11	1	2	3	33.33
Total						5692	15416	21108	26.97

NISP: Number of Identified Specimens UF: Unidentified Fragments TF: Total Fragments

Table 3: Marks observed on the bones at Damdama

Marks to be observed	**No.**	**% $**
Charring Activity @	5077	89.19
Cut Marks	65	1.14
Butchering Marks ™	4	0.07
Rodent Gnawing Marks	1	0.01
Carnivore Gnawing Marks	2	0.03
Rolled Bones	20	0.35
Bone Tools	50	0.88
Porous Bone	1	0.01
Fossilized Bones	7	0.12
Pathological Conditions	3	0.05
Holes	4	0.07
Later Intrusions	25	0.44

$ Calculated with respect to total NISP (5692) @ (Completely charred 4850- 85.21% and turned white 1-0.01%)

bones had meat on them, such charring would have completely burned the meat and thus they would have been of no use as food. It is interesting to note that a considerable number of bones showed charring only on one surface, which leads us to speculate that this might have happened due to site clearing processes involving burning to remove vegetation.

The Species

More than 30 species of animals have been identified comprising mammals, birds, reptiles, fish and molluscs (Table 4). Mammals constituted the major share of NISP-77.39%, followed by reptiles (12.1%), birds (8.96%), fish (1.25%) and molluscs (0.30%) (Table 4, Fig. 3).

The majority species among the mammals are six species of deer (Table 5, Fig. 4), which together constituted 2874 (70.89%) bones. Of these the mouse deer and the musk deer are negligible (only 2 and 1 bone, respectively). The antelopes and gazelles formed a very small part, i.e. 92 bones (2.26%). Interestingly wild pigs (*Sus scrofa*) were more important than the antelopes (2.52%). Thus, it is clear that the Mesolithic people at Damdama were mainly dependent on venison.

It was rather surprising, to find a few bones of large mammals like elephants, rhinoceros, gaur and wild buffalo in the collection. Of these gaur, wild buffalo and *Bos* sp. (possibly wild cattle and partly not separable from the gaur) constitute 8.24% and are the second most numerous bones after the deer. It is difficult to believe that the Mesolithic people hunted such large beasts for food. We would like to suggest that probably carcasses or isolated bones of these animals were collected and were utilized for making bone tools, since man was also a scavenger apart

Table 4: Distribution of NISP in layers 1-11 at Damdama

	Mammals		**Birds**		**Reptiles**		**Fish**		**Molluscs**		**NISP**
Layer	**NISP**	**%**	**NISP**	**%**	**NISP**	**%**	**NISP**	**%**	**NISP**	**%**	**Total**
Surface	231	80.77	21	7.34	32	11.19	2	0.70	0	0.00	286
1	2425	79.25	241	7.88	353	11.54	35	1.14	6	0.20	3060
2	633	71.93	115	13.07	104	11.82	18	2.05	10	1.14	880
3	328	82.62	24	6.05	42	10.58	2	0.50	1	0.25	397
4	111	86.72	4	3.12	11	8.59	2	1.56	0	0.00	128
5	107	76.43	13	9.29	18	12.86	2	1.43	0	0.00	140
6	189	72.14	43	16.41	27	10.31	3	1.15	0	0.00	262
7	88	63.31	9	6.47	40	28.78	2	1.44	0	0.00	139
8	105	61.05	26	15.12	38	2.09	3	1.74	0	0.00	172
9	112	80.00	11	7.86	15	10.71	2	1.43	0	0.00	140
10	75	86.21	3	3.45	9	10.34	0	0.00	0	0.00	87
11	1	100.00	0	0.00	0	0.00	0	0.00	0	0.00	1
NISP	4405	77.39	510	8.96	689	12.10	71	1.25	17	0.30	5692

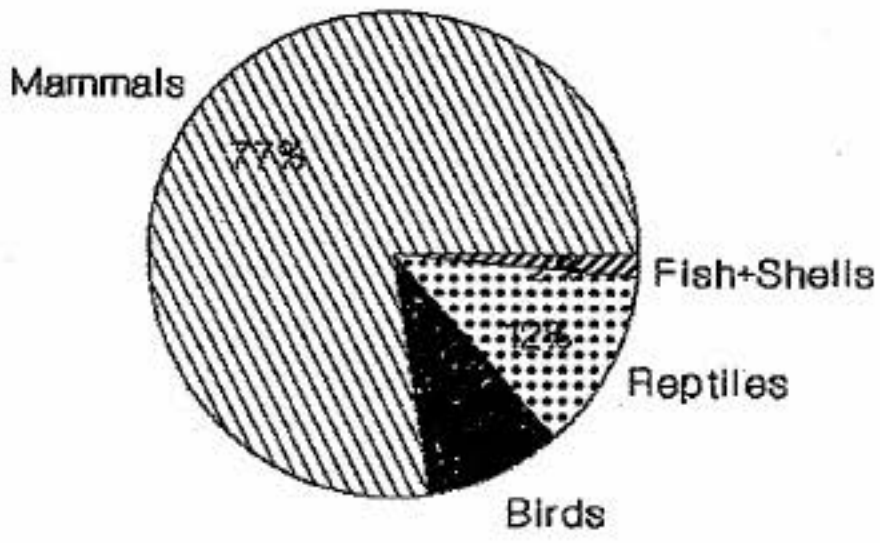

Fig. 3: Pie chart of animal resources (NISP) at Damdama

from being a hunter at that time. The bones of large mammals were concentrated on the eastern part of the site (trenches SA-SD). These bones were well preserved, without much of charring or fragmentation. It is to be noted that a majority of the bones at Damdama have cut marks, so we feel that possibly the bones were cut off from the original carcass and dumped at one place near the settlement for further use.

The presence of some of the animals in the collection is significant. From the available local information it has been learned that a majority of the deer species and antelopes identified from Damdama were still present in this area even half a century ago. However, the evidence of animals like the gaur, the wild buffalo and a small species of pig called *Sus salvanius* needs further investigations.

The gaur or the Indian bison is an animal typical of high altitudes and hilly areas, whereas the topography of the Ganga valley around the site is a plain with alluvial fills and not a suitable habitat for the gaur. Now the question arises if the gaur is not native to the Ganga valley, then where has this animal come from. It is necessary to remember that the raw material which was used for making the microliths was also not available in the vicinity of these sites. Possibly, the Mesolithic people might have crossed the Ganga and obtained the raw material from the Vindhyas. This fails to explain the presence of the pig species - *Sus salvanius*- a tiny animal, smaller than a cat, which is confined to the Terai region at present. Indian gaur is also available in the Terai region. Thus a possibility exists that during the winter season some of these animals may have migrated to the plains where they were killed by predators or trapped by man. At our present level of understanding of the Ganga valley Mesolithic sites, it is still an open question, whether these animals were from the Vindhyas or from the Terai region.

Every second or third bone in this collection was a worked bone,if not a well-made tool. This also perhaps explains the large quantity of small unidentifiable chips that were by-products of the bone tool industry at Damdama. Since stone is scarce, bone was the easiest alternative raw material for tool manufacture.

The Problem of Domesticates at Damdama

Earlier, Alur (1980) had identified domestic animals like sheep, goat, cattle, etc. at two Mesolithic sites of the Ganga valley - Sarai Nahar Rai and Mahadaha. The analysis of bones from Damdama revealed only a single bone of a goat and one of domestic cattle among thousands of bone fragments (both were certainly later intrusions: Table 5). These two fragments were different in appearance and consistency from the rest of the collection.

At Damdama, not only is there no evidence of domestic animals but the probable domesticates are absent as well. To infer local domestication of cattle and sheep/goat at Damdama is not reasonable since the wild ancestors are not found in sufficient numbers in the bone assemblage. Thus, we can affirm that Damdama was a purely hunting-gathering society.

Resource Management at Damdama

The faunal spectrum at Damdama indicated a wide range of animals being exploited both for food as well as for tool making. In order to look for a pattern of resource exploitation, the species were classified according to their live weight. This method has been tested earlier for several Indian archaeological sites (Joglekar in press). Six groups

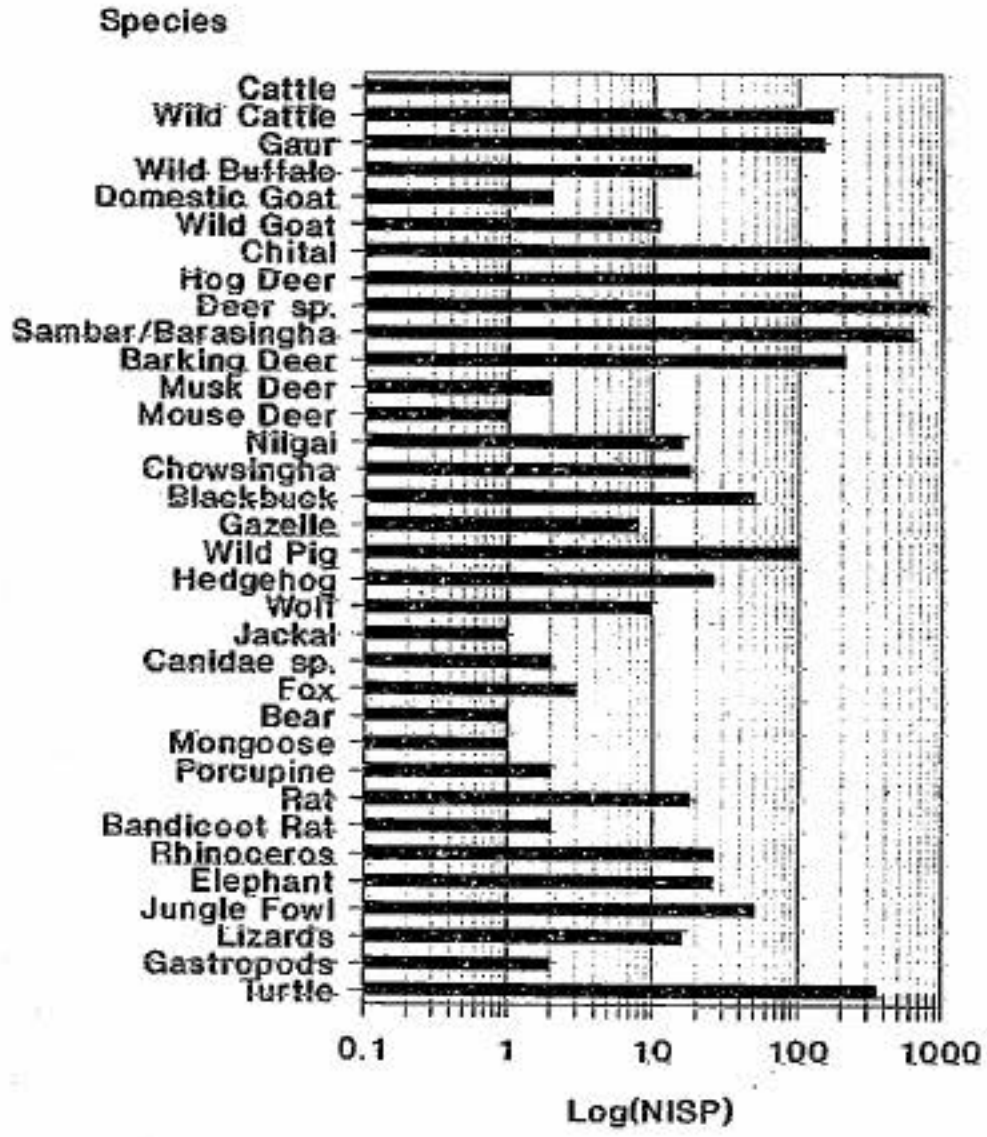

Fig. 4: Log NISP at Damdama

Table 5: First level NISP in layers 1-11 at Damdama

Layer Species	Surface	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	Total	Percent
Bos indicus	-	1	-	-	-	-	-	-	-	-	-	-	1	0.02
Bos sp.	10	82	12	20	11	3	9	4	2	13	3	-	169	4.17
Bos gaurus	4	47	11	47	6	5	11	1	5	5	5	-	147	3.63
Bubalus arnee	6	10	-	-	-	-	1	-	-	-	1	-	18	0.44
Capra (domestic)#	-	-	1	-	-	-	-	-	-	1	-	-	2	0.05
Capra sp. (wild)	1	6	3	-	-	-	-	-	-	-	1	-	11	0.27
Axis axis	60	494	99	44	11	16	31	6	23	6	6	1	797	19.67
Axis porcinus	19	274	67	28	10	22	28	4	16	6	2	-	476	11.75
Axis sp.	28	424	146	40	26	21	32	17	16	10	8	-	768	18.95
Cervus sp.	48	324	90	50	13	12	13	9	9	38	16	-	622	15.35
Muntiacus muntjak	-	141	31	6	2	4	6	3	5	-	10	-	208	5.13
Moschus moschiferus	-	-	-	-	-	1	-	-	-	-	1	-	2	0.05
Tragulus memina	-	-	-	1	-	-	-	-	-	-	-	-	1	0.02
Boselaphus tragocamelus	1	10	5	-	-	-	-	-	-	-	-	-	16	0.39
Tetracerus quadricornis	2	10	3	-	-	-	2	-	-	-	1	-	18	0.44
Antilope cervicapra	3	37	2	1	1	3	-	1	-	2	-	-	50	1.23
Gazella bennetti	-	6	2	-	-	-	-	-	-	-	-	-	8	0.20
Sus scrofa	14	50	12	6	1	1	10	3	2	2	1	-	102	2.52
Sus salvanius	2	13	5	-	-	-	3	1	-	2	-	-	26	0.64
Canis lupus	1	6	-	-	1	-	-	1	-	1	-	-	10	0.25
Canis aureus	-	1	-	-	-	-	-	-	-	-	-	-	1	0.02
Canis sp.	-	2	-	-	-	-	-	-	-	-	-	-	2	0.05
Vulpes bengalensis	-	2	-	-	-	-	-	-	1	-	-	-	3	0.07
Melursus ursinus	-	1	-	-	-	-	-	-	-	-	-	-	1	0.02
Herpestes edwardsi	-	1	-	-	-	-	-	-	-	-	-	-	1	0.02
Hystrix indica	-	1	-	-	-	-	-	-	1	-	-	-	2	0.05
Rattus rattus	-	13	2	-	-	-	-	-	3	-	-	-	18	0.44
Bandicota indica	-	-	-	1	-	-	-	-	1	-	-	-	2	0.05
Rhinoceros unicornis	5	10	3	1	-	2	2	-	2	-	1	-	26	0.64
Elephas maximus	1	4	1	12	2	1	5	-	-	-	-	-	26	0.64
Gallus gallus	3	23	11	1	-	2	9	1	-	1	-	-	51	1.26
Trionyx gangeticus	1	5	2	-	-	-	-	-	-	-	-	-	8	0.20
Lissemys punctata	21	110	49	27	8	12	12	24	21	8	6	-	298	7.35
Chitra indica	3	109	6	2	1	4	12	3		1	1	-	145	3.58
Varanus sp.	-	5	2	1	-	-	1	1	1	-	-	-	11	0.27
Calotes versicolor	-	-	5	-	-	-	-	-	-	-	-	-	5	0.12
Pila globosa	-	2	-	-	-	-	-	-	-	-	-	-	2	0.05
Total	233	2224	570	288	93	109	187	79	111	96	63	1	4054	100

Later intrusion Percentage in the last column is with respect to the grand total

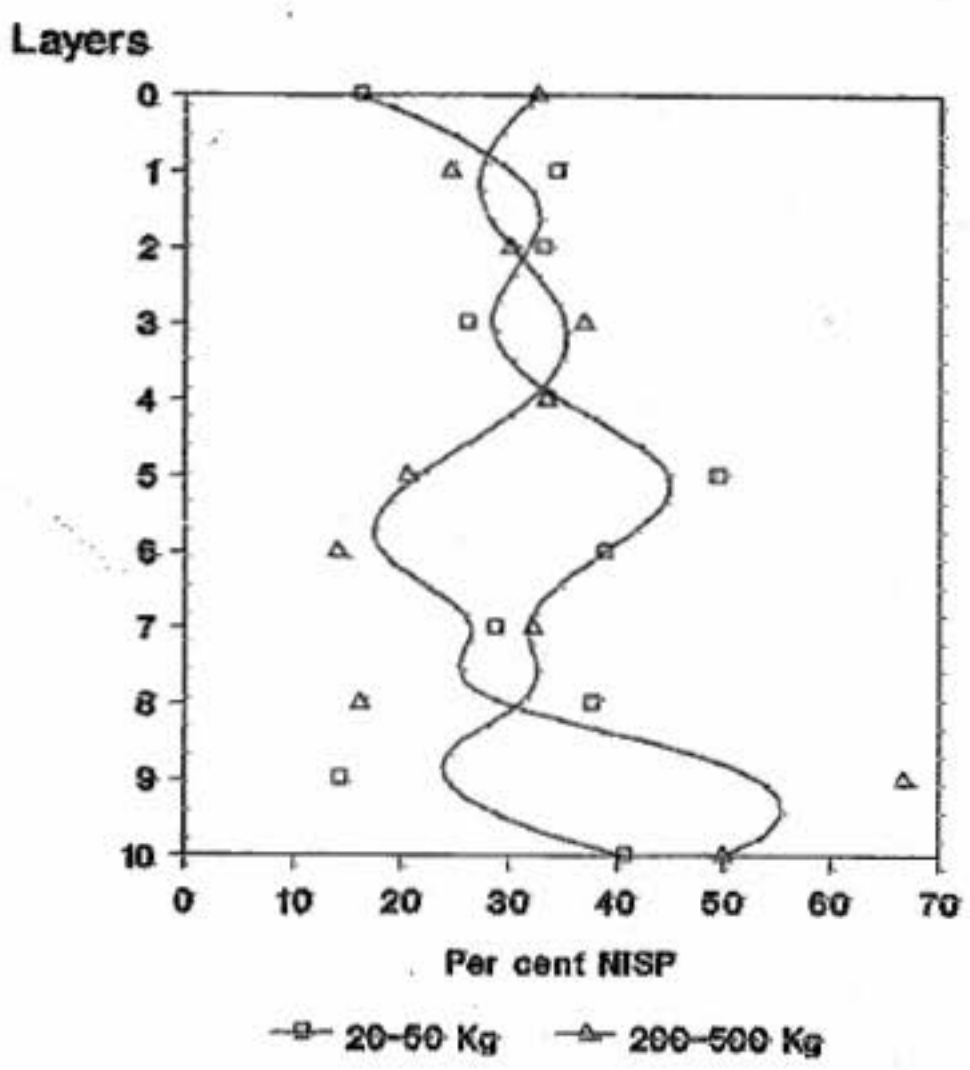

Fig. 5: Animal resources classified according to live weight

were identified based on the live weight of the animals (Table 6), which showed a clear trend throughout different layers. The pattern of exploitation for all the layers is non-random with all size classes being represented. Throughout the occupational levels at Damdama, faunal remains indicated that large species were preferred for some time and then the preference shifted to smaller animals. For example, in layers 10 and 9, the animals hunted mainly belonged to the 200-500 kg class, while in layer 5 the emphasis was more on animals of the 20-50 kg class. These two classes as observed throughout layers 1-10 reflect a mutually compensatory strategy (Fig. 5). In other layers, the proportions varied among different classes. In layer 8, the emphasis was shifted to the 20-50 kg class (41%), but other classes were also hunted. This picture continued till layer 5, where almost half of the animals belonged to the 50-100 kg class. Layers 4 to 1 showed no specific preference as such.

As has been noted earlier, the proportion of non-mammalian animals is noteworthy. In general, about 23% of the identified bones belonged to aquatic (mollusca, fish and reptiles) and avian species. The picture of the relative contribution of aquatic, avian and terrestrial (mammalian) resources indicated that there was a specific trend as to which resource was used as against alternative ones (Table 4, Fig. 6). The proportion of mammals was as high as 86.21%, in layer 10 and as low as 71.93%, in layer 1. Curves of the mammalian and the aquatic contribution showed a marked cyclical trend (tau value= 3.6338 significant at α=0.01), where it was possible to recognize two phases of increase and two of decrease (Table 7, Fig. 7). The increase and decrease in the contribution of mammals was compensated for by a corresponding decrease and increase in birds (Rank Correlation Coefficient= 0.7636, significant at α=0.01). In other words the changes in the use of mammalian resources were mainly compensated by equivalent changes in the hunting of birds. The aquatic resources reached their peak in layer 8, where they contributed as much as 30.22% of the total. In the succeeding layer (7) their contribution registers a sudden drop to 11.45%.

One can see therefore, the proportion of mammals was 86% in layer 10, and then showed an increase as well as decrease relative to this percentage between layer 9 and layer 5, ultimately attaining a similar value, i.e. 86% in layer 4 (see Table 4). Layer 9 and 8 revealed that mammals registered a very small change (from 61 to 63%). However, in these layers the proportion of birds was reduced from 15% to 6%, as against an increase in aquatic resources from 24% to 30%.

Our observation that the relative importance of different animal resources varied considerably from layer to layer is a stimulating one because it opens up several areas of investigation such as the economic considerations of ancient peoples. On the other hand the observed cyclical trend is rather puzzling. Perhaps this trend indicates that

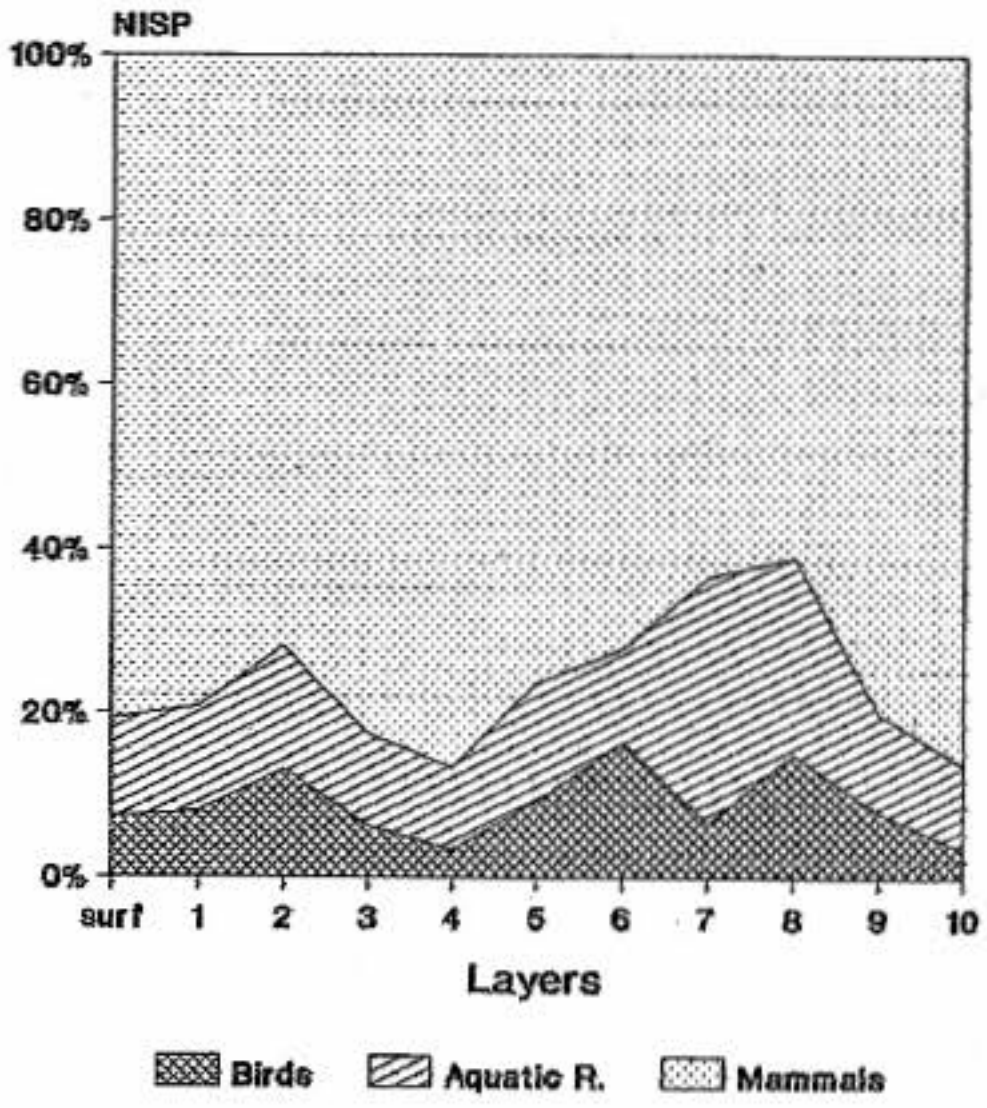

Fig. 6: The relative contribution of animal resources

Table 6: Species counts (NISP) classified according to size at Damdama

Layer	Live Weight in kg (per cent) <5	5-10	10-20	20-50	50-100	100-200	200-500	NISP
S	0.00	0.00	1.99	15.89	40.40	9.27	32.45	151
1	0.22	0.07	1.38	34.04	36.36	3.64	24.29	1375
2	0.00	0.00	1.57	32.92	31.97	3.76	29.78	319
3	0.00	0.00	0.74	25.74	32.35	4.41	36.76	136
4	0.00	0.00	2.56	33.33	28.21	2.56	33.33	39
5	0.00	0.00	0.00	49.15	28.81	1.69	20.34	59
6	0.00	0.00	3.23	38.71	33.33	10.75	13.98	93
7	0.00	0.00	7.14	28.57	21.43	10.71	32.14	28
8	1.79	0.00	0.00	37.50	41.07	3.57	16.07	56
9	0.00	0.00	5.26	14.04	10.53	3.51	66.67	57
10	0.00	0.00	0.00	40.62	6.25	3.12	50.00	32

Size Range	Animals
<5 kg	Mongoose, Red Fox
5-10 kg	Jackal
10-20 kg	Mouse Deer, Pigmy Hog, Wolf
20-50 kg	Chowsingha, Muntjak, Hog Deer, Chinkara, Blackbuck
50-100 kg	Wild Goat, Chital, Musk Deer
100-200 kg	Wild Boar
200-500 kg	Sambar, Nilgai

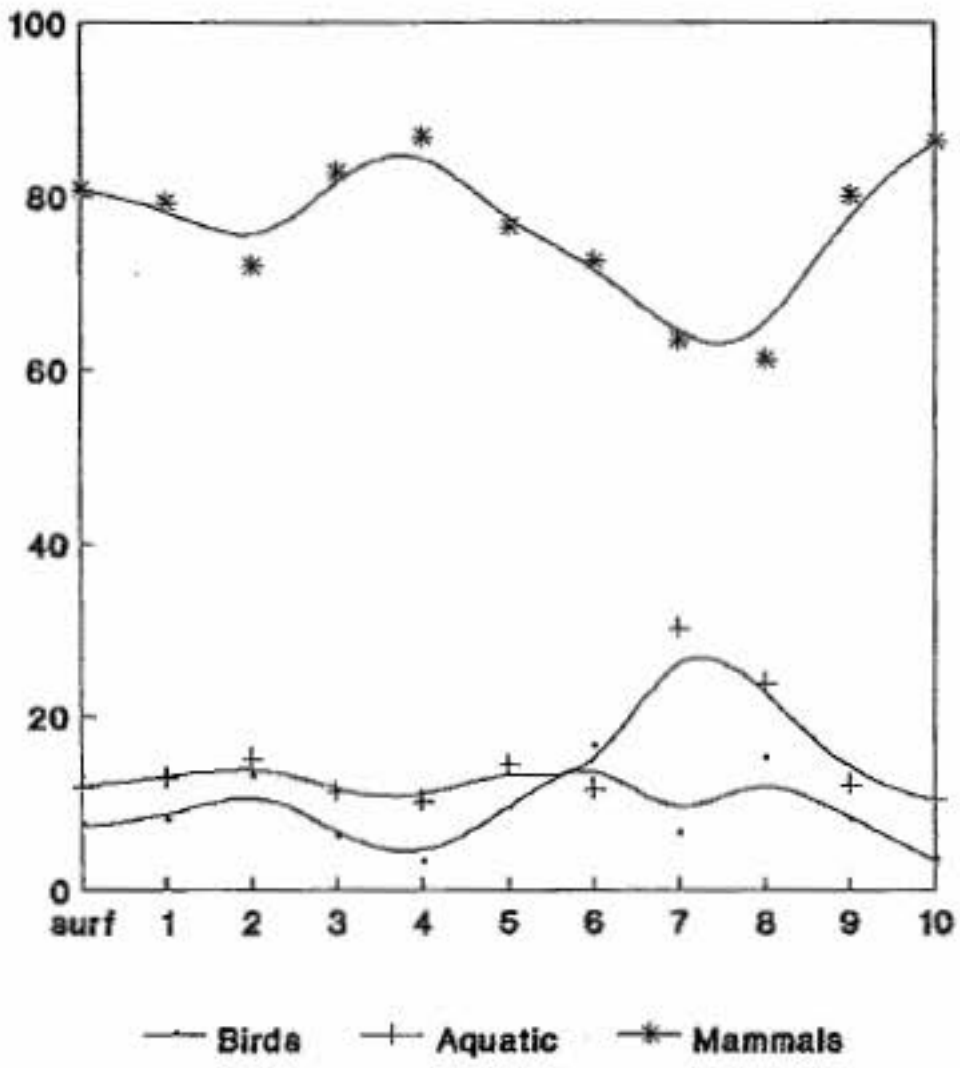

Fig. 7: Trends in mammalian and non-mammalian resource contribution

the inhabitants of Damdama might have exploited one class of mammalian resource for a longer period of time, thereby depleting it to such an extent that other alternatives had to be chosen. If we hypothesise that a sufficient time period was allowed for regeneration, possibly the threatened species might have been naturally regenerated. Further we might also postulate that the paucity of wild mammals perhaps forced the people at Damdama to look for other animal resources in order to fulfill their meat requirements which they did by relying on the exploitation of avian fauna and at times aquatic fauna. Further research is necessary now to be able to understand the reasons for and the mechanisms used by the inhabitants to manage their available natural food resources.

Acknowledgements

The authors are grateful to the Head of the Department of Ancient History, Culture and Archaeology, University of Allahabad for kindly permitting us to examine and study the unpublished faunal material from Damdama housed in the Museum of the Department, as well as for providing the necessary facilities to carry out the work at Allahabad. In addition, P.K. Thomas and P.P. Joglekar wish to thank their co-authors and their families for their warm hospitality during their several visits to Allahabad.

Table 7: Changes in animal resource management at Damdama

Changes in mammal %	Layers	Changes in other resources
decrease	10-8	reduction in mammals mainly compensated by increase in birds
increase	7-5	increase in mammals mainly compensated by a decrease in aquatic resources in layer 7 and by birds in layers 6 and 5
decrease	4-3	reduction in mammals mainly compensated by an increase in birds
increase	2-surface	increase in mammals mainly compensated by aquatic resources in layer 7 and by birds in layer 6 and 5

References

Alur, K.R. 1980. Faunal Remains from Vindhyas and the Ganga valley, in *Excavations at Mahadaha-1977-78* (G.R. Sharma, V.D. Misra and J.N. Pal Eds.), pp. 89-115. Allahabad: University of Allahabad.

Joglekar, P.P. (in press). Species Diversity and Palaeoeconomy, *Proceedings of the International Conference on "Rising Trends in Palaeoanthropology, Environmental Change and Human Response"*. Pune: Deccan College.

Pandey, J.N. 1990. Mesolithic in the Middle Ganga Valley, *Bulletin of the Deccan College Post-Graduate and Research Institute* 49: 311-316.

Thomas, P.K. and P.P. Joglekar 1994. Holocene Faunal Studies in India, *Man and Environment* XIX: 179-203.