

# MARINE EXPLOITATION IN THE THIRD MILLENNIUM BC – THE EASTERN COAST OF PAKISTAN

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**Abstract :** *Fishing has played a significant role in the economy of many societies. This research focuses on subsistence changes within a complex socio-political milieu by reconstructing the role of fishing during the Indus Valley Tradition (ca. 6500 to 1300 BC), located in the area of modern Pakistan and western India. Analytical results from two marine coastal archaeological sites, Balakot and Allahdino, in Pakistan are presented. Fish remains from Balakot suggest a change from local subsistence fishing to an extensive commercial market that is coincident with incorporation into the extra-regional Harappan sphere of influence. Fish remains from Allahdino indicate a local fishing tradition, although skeletal element representation appears related to bone density rather than human behavior.*

**Résumé :** *La pêche a joué un rôle significatif dans l'économie de nombreuses sociétés. À l'intérieur d'un milieu sociopolitique complexe, celui de l'Indus (localisé aujourd'hui au Pakistan et en Inde occidentale), nous nous attachons à mettre en évidence quel rôle a pu jouer la pêche entre 6500 et 1300 BC. Cette étude s'appuie sur l'analyse des résultats obtenus sur deux sites côtiers du Pakistan, Balakot et Allahdino. Les restes de poissons recueillis à Balakot suggèrent le passage d'une pêche destinée à la consommation locale à une pêche tenant sa place dans des échanges commerciaux lointains. Cette extension du marché correspond à celle de l'influence harappéenne lorsqu'elle a dépassé sa région d'origine. Les restes de poissons récoltés à Allahdino suggèrent, en revanche, le maintien d'une pêche à usage local. Notons toutefois que la représentation squelettique paraît plus liée à la densité des os qu'à un comportement humain.*

**Key-Words :** *Pakistan, Indus Valley Tradition, Ethnoarchaeology, Balakot, Allahdino.*

**Mots Clefs :** *Pakistan, Tradition de la vallée de l'Indus, Ethnoarchéologie, Balakot, Allahdino.*

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Fishing has played a significant role in the economy of many societies, reflected in specialized technology and knowledge, settlement location and labor specialization for procurement and processing<sup>1</sup>. This research focuses on subsistence changes within a complex socio-political milieu by reconstructing the role of fishing during the Indus Valley Tradition (ca 6500 to 1300 BC), located in the area of modern Pakistan and western India<sup>2</sup>. Interpretations of archaeological

data are based on ethnoarchaeological research conducted in 1993-1994<sup>3</sup>. Analytical results from two marine coastal archaeological sites in Pakistan are presented. Balakot was a small village that was incorporated into the Harappan sphere of influence and participated in a more extra-regional trading and political environment, while Allahdino is a Harappan period hamlet-sized site.

Specific units of analysis are used below : Minimum Number of Elements (MNE), Minimal Animal Unit (MAU) and %MAU. MNE is based on reconstructed skeletal ele-

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1. DESSE and BESEVAL, 1995.

2. DESSE and DESSE-BERSET, 2005 : DESSE, DESSE-BERSET and DAV-TIAN, 2005

3. BELCHER, 1998.

ments, regardless of side, and estimates skeletal element representation. From MNE, indices of body part frequency were calculated based on Binford's<sup>4</sup> MAU. MAU focuses on cranial/post-cranial distinctions. %MAU values can be calculated by dividing all MAU values by the assemblage's greatest MAU values. This normalizes the various assemblages and makes inter-site as well as intra-site comparisons more meaningful. However, for Haemulidae, calculations of cranial MAU and %MAU would underestimate the total number of cranial elements as the fused neurocrania is counted as a single element instead of the several different bilateral elements that comprise the neurocranial region.

## BALAKOT

Balakot is a small site (0,27 km<sup>2</sup>) on the southeastern side of Las Bela Valley and Sonmiani Bay (fig. 1). It represents southern Baluchistan cultural traditions that were incorporated into the Harappan sphere of influence around 2500 BC. The site has a lower, eastern area (Low Mound), and a higher, steep-sided, western area (High Mound).

From 1973 to 1976, G.F. Dales, Jr. excavated the site with the Department of Archaeology and Museums, Government of Pakistan; approximately 3312 m<sup>2</sup> of the site were exposed<sup>5</sup>. Most the sediments were screened through 6 mm mesh to recover small finds and bones. The site possesses two significant prehistoric occupations that Dales<sup>6</sup> termed Balakotian (Period I) and Harappan (Period 2) occupations.

The earliest occupation is Balakotian and overlies undisturbed alluvium, about 6 m below the present plain level. A recent re-examination of the ceramics suggests that the Balakotian period dates from end of the 4<sup>th</sup> millennium BC or beginning of the 3<sup>rd</sup> millennium BC to around 2700 BC<sup>7</sup>, while the Harappan levels date between 2500 and 2100 BC.

## FISH REMAINS

A total of 7278 skeletal elements has been identified from 10211 bone fragments. One of the most conspicuous skeletal

elements (n = 2070) is the neurocranium of the silver grunter<sup>8</sup> (Haemulidae : *Pomadasys hasta*). Nineteen fish families are represented (table 1); by far the most abundant fish families are marine in origin and include : grunters, marine catfish, jacks/trevellies, and large drums. Cranial elements comprise the vast majority of the entire sample (n = 4096 ; 56 %) based on MNE counts. Vertebral elements account for only 16 % (n = 1169) and, in addition to other post-cranial elements, are relatively under-represented compared to the cranial elements (table 2).

Most of the fish remains originate from the High Mound, associated with the Harappan Period. In fact, the skeletal materials are highly concentrated in that area : 60 % (MNE = 4029) of the total originates from two excavation blocks, associated with a house compound : grunters, drums, marine catfish, and jacks/trevellies dominate this domestic sample with lesser quantities of other fish (including requiem sharks, sea breams, barracudas, and hairtails). There is a cluster of seven requiem shark teeth and a single fragment of the bony cranial support of a cuttlefish, a type of cephalopod. Only a few bones exhibited cut marks (0.1 %, n = 8) in adequate stratigraphic integrity for temporal analysis. These butchery marks are slicing striae and chop marks that lie along the lateral edges of the bones.

## ALLAHDINO

Allahdino is located approximately 45 km east of Karachi (fig. 1). The site is a small mound (0.14 km<sup>2</sup>) that rises 4 m above the modern plain. The main occupation occurred during the Harappan period, 2500 to 1700 BC. Three seasons of excavation (1973-1975) were conducted by Dr. W.A. Fairservis, Jr.<sup>9</sup>. To facilitate the recovery of small finds and bones, site matrix was screened through 6 mm mesh.

## FISH REMAINS

The fish remains consist of 637 bone fragments that represent an MNE of 588. Ten families were identified (table 1); the most common fish are grunters. Other taxa include large drums and several varieties of marine catfish. Vertebrae of

4. BINFORD, 1978.

5. DALES, 1979a, b, 1981, 1982.

6. DALES, 1974, 1979a, b.

7. FRANKE-VOGT, 1998.

8. MEADOW, 1979.

9. FAIRSERVIS, 1973, 1982 ; HOFFMAN, 1976.

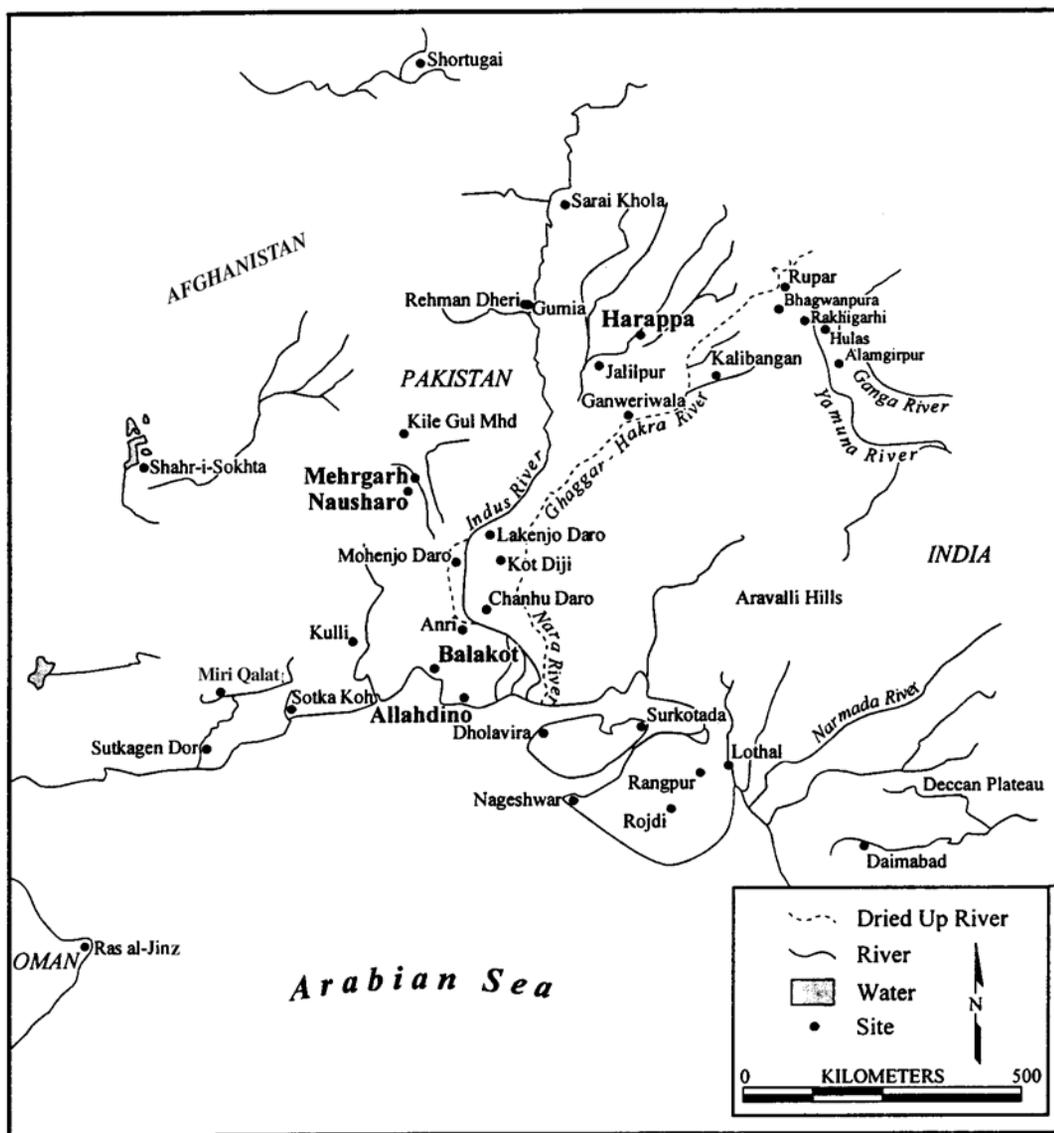


Fig. 1 : Important Archaeological Sites of the Baluchistan and Indus Valley Traditions.

skates and rays are present as well as vertebrae and teeth from requiem sharks. A single element of Siluridae (*Wallago attu*) is present and suggests that some fish came from fresh or brackish water. Freshwater fish can be taken in areas to the north and east, in the nearby Indus Delta area.

Elements such as pectoral and dorsal fin spines appear over-represented (table 2). Otoliths, the vertebral column and cranial remains are also well-represented. By ranking %MAU of specific elements, it is possible to examine the relationship of the Allahdino fish assemblage to bone density ( $\text{gm/cm}^3$ ) of

modern salmonids<sup>10</sup>. Based on rank order comparisons, there is a high correlation between %MAU of the Allahdino assemblage and salmonid bone density<sup>11</sup>. Thus, the skeletal element patterns appear to be at least partially dependent on bone density and, therefore, may not reflect human behavior.

10. FAIRSERVIS, 1973, 1982 ; HOFFMAN, 1976.

11. Spearman = s Rank Order Correlation = 0.057 ; p = 0.006.

Table 1 : Balakot and Allahdino fish taxa representation.

Fish and Cephalopod Taxon	Common Family	Balakot		Allahdino	
		MNE	Percent	MNE	Percent
Unidentified		5	0.07	–	–
Unidentifiable		571	7.8	7	1.24
<b>Cyprinidae*</b>	<b>Carp</b>				–
<i>Labeo sp.*</i>		1	0.01	–	–
<i>Barbus sp.*</i>		1	0.01	–	–
<b>Siluridae*</b>	<b>Catfish</b>	6	0.08	1	0.12
<i>Clarias sp.</i>				1	0.12
<i>Wallago attu</i>				3	0.53
<b>Mastacembelidae*</b>	<b>Spiny Eels</b>	1	0.01	–	–
<b>Haemulidae</b>	<b>Grunts</b>	1	0.01	1	0.12
<i>Pomadasys hasta</i>		4 423	60.8	239	42.38
<i>Pomadasys opercularis</i>		1	0.01	–	–
<b>Sparidae</b>	<b>Sea Breams</b>	12	0.2	4	0.71
<i>Acanthopagrus sp.</i>		10	0.2	8	1.42
<i>Argyrops spinifer</i>		106	1.5	59	10.46
<b>Ariidae</b>	<b>Marine Catfish</b>	90	1.2	9	8.69
<i>Arius dussumieri</i>		187	2.6	12	2.13
<i>Arius maculatus</i>		51	0.7	16	2.84
<i>Arius sona</i>		10	0.2	–	–
<i>Arius thalassinus</i>		391	5.4	28	4.96
<b>Scaridae</b>	<b>Parrotfish</b>	1	0.01	–	–
<b>Sciaenidae</b>	<b>Drums</b>	12	0.2	5	0.89
<i>Protonibea diacanthus</i>		127	1.7	107	18.97
<i>Argyrosomus sp.</i>		3	0.04	–	–
<i>Otolithes ruber</i>				1	0.12
<b>Trichiuridae</b>	<b>Hairtails</b>	8	0.1	–	–
<b>Carangidae</b>	<b>Jacks/Trevallies</b>	472	6.5	14	2.48
<i>Carangoides sp.</i>		6	0.1	–	–
<i>Alectis sp.</i>		1	0.01	1	0.12
<i>Scomberoides commersonianus</i>		649	8.9	30	5.32
<i>Johnius belengarii</i>		6	0.1	4	0.71
<i>Letherhinus sp.</i>		–	–	1	0.12
<i>Trachinotus sp.</i>		3	0.04	–	–
<b>Drepanidae</b>	<b>Spadefish</b>	1	0.01	–	–
<b>Ephippidae</b>	<b>Sicklefish</b>	3	0.04	–	–
<b>Scombridae</b>	<b>Tuna/Mackerels</b>	1	0.01	–	–
<i>Eutthynnus affinis</i>		3	0.04	–	–
<b>Lutjanidae</b>	<b>Snappers</b>	2	0.03	–	–
<b>Mugilidae</b>	<b>Mulletts</b>	1	0.01	–	–
<b>Serranidae</b>	<b>Sea Bass/Groupers</b>	9	0.1	1	0.12
<i>Epinephelus sp.</i>		13	0.2	2	0.35
<b>Sphyraenidae</b>	<b>Barracuda</b>	7	0.1	–	–
<b>Rajiformes</b>	<b>Rays, Skates</b>			1	0.12
<b>Myliobatidae</b>	<b>Eagle Rays</b>	18	0.3	–	–
<b>Carcharhinidae</b>	<b>Requiem Sharks</b>	49	0.7	10	1.77
<i>Carcharhinus leucas</i>		7	0.1	1	0.12
<b>Sepiidae</b>	<b>Cuttlefish (Cephalopod)</b>	10	0.1	–	–
<b>TOTAL</b>		7 279	100.2	473	

\* Fresh or Brackish Water Fishes

**Table 2 :** Balakot and Allahdino skeletal region representation.

Skeletal Region	Balakot		Allahdino		
	MNE	Percent	MNE	MAU	%MAU
Cranial	4 096	56.3	212	3.0	21.6
Otoliths	11	0.2	20	10.0	71.4
Branchial Arch	314	4.3	3	0.1	0.82
Pectoral Girdle	308	4.2	19	1.4	9.7
Pectoral Spines	116	1.6	4	2.0	14.29
Pelvic Girdle	1	0.01	2	1.0	7.14
Vertebral Column	1 169	16.1	184	4.0	28.57
Caudal Vertebrae	169	2.3	7	0.1	0.84
Pterygiophores	62	0.9	4	0.08	0.57
Dorsal Spines	93	1.3	14	14.0	1
Ribs	334	4.6	4	0.2	1.3
Spines	306	4.2	8	–	–
Anal Spines	300	4.1	8	2.0	14.29
Total	7 279	100.1	489		

## DISCUSSION

Both Balakot and Allahdino possess substantial quantities of marine fish remains. However, the skeletal elements represent different behavioral signatures in the archaeological record. The presence and abundance of fish remains from both Balakotian and Harappan periods suggest that Balakot was a fully marine-oriented village site during both occupations while those at Allahdino represent survivability of different skeletal elements.

Taxa found at Balakot are comparable to those found in the kitchen debris recovered from modern fishing villages of Buleji, with the exception of the dominance of *Pomadasys hasta*. Informants from the fishing villages around Kharadar (Karachi) and Buleji have mentioned that certain rocky areas in Sonmiani Bay, just south of Balakot, are particularly good fishing grounds for grunts; however, these fish are common all along the Baluchistan coast. Based on the abundance of grunts, most fishing probably occurred in the fall and spring months. The occurrence of large drums and requiem sharks suggest fishing occurred during the summer monsoon season. It appears that the ancient fishing industry was year-round but focused on the fall and summer months.

The fishing strategies appear to have used both inshore and near shore techniques. Fish such as grunts, snappers, sea bass and sea breams may have been caught using a medium-

sized meshed gill net that was set in the near shore environment, perhaps through the use of boats. Fishing areas appear focused on the rocky mud and sand areas found off the coast in Sonmiani Bay. Other types of nets would include large-meshed bottom nets used for capturing sting-rays and other large batiformes. The sandy and muddy area near the mouth of Miani Khor is an ideal area for capturing these types of fish. Finally, the presence of large drums suggests the use of heavy-duty near shore nets set during the summer monsoon season. These fish can also be caught by setting these nets in the inshore environment.

Patterns of skeletal region representation vary according to archaeological context and butchery patterns. The entire fish skeleton is represented at Balakot, particularly the fin spines from the pectoral, dorsal and caudal fins as well as the branchial arch. The presence of these bones, associated with fins and the gill arch, suggests that the fish were butchered at Balakot proper and not at a specialized processing station outside the village.

At Balakot, there is an intense focus on a single species, the silver grunter (*Pomadasys hasta* account for 61 % of the total fish sample) with cranial remains extremely over-represented<sup>12</sup>. Additionally, over 60 % of the Harappan Period sample from the High Mound is concentrated in a series of rooms along the western side of East Lane. This pattern, with its concentration in a small area of the site, is most similar to modern commercial butchery patterns associated with large-scale trade and distribution. During modern, large-scale butchery associated with regional and global trade, the focus during the process is to dry and salt the body of the fish. Cranial portions are discarded in huge amounts. Fish that are used for local consumption are butchered in a manner that allows the consumption of the cranial portions.

Butchery marks at Balakot are rare; however, modern dried/salted fish are characterized by marks along the medial surfaces. If the heads are being removed due to the sheer volume of butchery and then bodies are prepared for drying, this pattern of medial cut marks would be present on the product that was traded away from the site, not on the discarded remains at the processing area.

This pattern is particularly dramatic when compared with the Balakotian levels of the site. Only twenty fish bones originate from these early levels, but marine catfish, jacks, trevallies and grunters are present. All of these are near-shore fishes

12. Cranial elements represent 6 % of the total sample; neurocrania of *Pomadasys hasta* represent 28 % of the total sample; MEADOW, 1979

that are most easily caught with the use of gill nets, probably in conjunction with the use of boats. This represents a temporal continuity of marine resource use at the site and differs with preliminary statements that suggested marine resources were not extensively utilized during the Balakotian period as compared to the later Harappan period<sup>13</sup>.

Although the Balakotian sample is small, it suggests a non-commercial focus, particularly when compared with the Harappan occupation of the site. This commercial expansion is coincident with an expansion of shell industries. Kenoyer<sup>14</sup> suggests the expansion of shell industries during the Harappan Phase was accomplished through distant kin networks that controlled the means of production and distribution of shell resources. This process may have been coincident with the expansion of dried fish trade to the interior areas.

At Allahdino, while skeletal element representation is partially correlated with bone density and cannot be used directly for reconstruction of human behavior, the use of the cut mark data and skeletal element fragmentation can provide some insight. Taxa include all those fish available in the region today, particularly grunts, various marine catfish, and jacks/trevallies. Grunts are more common during the fall and spring, while fishes such as large drums are especially common during the summer monsoons. Marine catfish are usually caught in bottom nets, while grunts and jacks are caught in fixed gill nets. Trevallies are also quick to take a lure or hook and are often captured by trolling.

Cut marks are concentrated on the post-cranial remains, suggesting that the heads were cooked whole, a common practice in modern Pakistan. The distribution of the cut marks suggests that butchery was focused on processing the post-cranial portions. Fragmentation and portion data from the catfish dorsal and pectoral fin spines suggests that these fish were obtained through a direct mode of distribution.

At Allahdino, fresh fish seems to have been available at a very early stage, probably on a seasonal basis. If fisherfolk directly provided the fish, some form of patronage by occupants of Allahdino may have existed; although, it is difficult to know what goods or services the fisherfolk received for their fish. Alternatively, this distribution of fish remains could indicate that the site occupants were fishing for themselves. Based on the lack of archaeological materials associated with fishing, such net weights or hooks, this seems unlikely.

## CONCLUSIONS

Through the study of subsistence patterns, we can examine food economies in sites that have been incorporated in a much more regional economic and political milieu. The suggestion that dry fish trade occurred needs to be more thoroughly examined with other sites. These studies will allow an understanding of provisioning of urban centers from their surrounding hinterlands<sup>15</sup> and to reconstruct subsistence changes that coincide with the urban origins<sup>16</sup>.

During the transition from village-based to urban societies of the Indus Valley Tradition, the subsistence base broadened from foods that had been exploited for thousands of years, such as wild game, fish and wild plants, to include new food resources such as domestic sheep, goat, cattle and domesticated grains<sup>17</sup>. Instead of being replaced by domesticates, wild resources became specialized foods that were significant for the support of sedentary communities and urban centers. In order to understand these complementary roles, we must obtain detailed information on specific wild foods. Then it is possible to examine aspects of urbanization through changes in the use of food resources.

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13. MEADOW, 1989.

14. KENOYER, 1989

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