Harappa Excavations 1986-1990

A Multidisciplinary Approach to Third Millennium Urbanism

Edited by Richard H. Meadow

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Cover art: Bowl on Stand H88-1002/192-17 associated with Burial 194a
in Harappan Phase Cemetery (see Figure 13.18).

8

Fish Resources in an Early Urban Context at Harappa

William R. Belcher
University of Wisconsin-Madison

Fishing is often neglected in studies of urban societies. This is unfortunate as the study of fish can reveal aspects of subsistence, regional trade, access to resources, and social organization. Coastal and inland relationships can be examined by considering marine and riverine species variation. Seasonal indicators can suggest whether fishing was a full-time or part-time activity. Material from dump and domestic contexts excavated from the inland, urban center of Harappa is used to examine these issues. Limited comparison with the contemporary coastal settlement of Balakot is also presented.

Research during the last 15 years has begun to focus on quantification of the subsistence base during the Harappan Phase of the Indus Tradition. Richard Meadow (1979, 1986, 1989) has focused on a variety of problems concerning mammalian fauna, and there is considerable work in progress on agricultural systems (Costantini 1981; 1984; Reddy, Chapter 10 in this volume; Miller 1987, Chapter 9 in this volume; Weber 1992). The study of fish remains, however, has been virtually ignored in South Asian archaeology. With the exception of material from the coastal site of Balakot (Figure 8.1) that was sorted in a preliminary fashion by Camm Swift and Virginia Butler, no concerted effort has been made to analyze the numerous fish remains from many South Asian sites. To date, few subsistence studies have taken fish into account, although through the years, significant quantities of fish have been recovered (see Meadow 1979 for an exception).

This paper attempts to outline the use of fish within an urban context and to present a predictive model of fish disposal based on the ethnographic literature. Fish remains from a small area of the 1990 Harappa excavations (Figure 8.2) are examined in an effort to understand the use of fish in an urban center. Comparison with the Harappan coastal settlement of Balakot also is presented in order to assess regional differences in the utilization of fish resources.

The study of fish within an urban context can assist in the elucidation of a variety of topics, such as: (1) subsistence, (2) trade, and (3) seasonality. Variation in subsistence can be examined on several levels primarily relating to intra-site and inter-site differences. Analysis of intra-site variation can lead to an understanding of how a site is supported from its surrounding hinterland. Differences within an urban center may be related to varying subsistence practices as well as to differential access to particular resources, perhaps related to aspects of social structure. Inter-site studies allow one to examine variation between sites as they relate to size and function as well as to differing local ecosystems. In order to learn how fisheries were integrated with agricultural cycles, seasonality estimates are necessary. Issues of trade and exchange can be examined with fish remains, as many fish inhabit specific micro-habitats in the aquatic system (Wheeler and Jones 1989). Fish remains will therefore be particularly useful for investigating

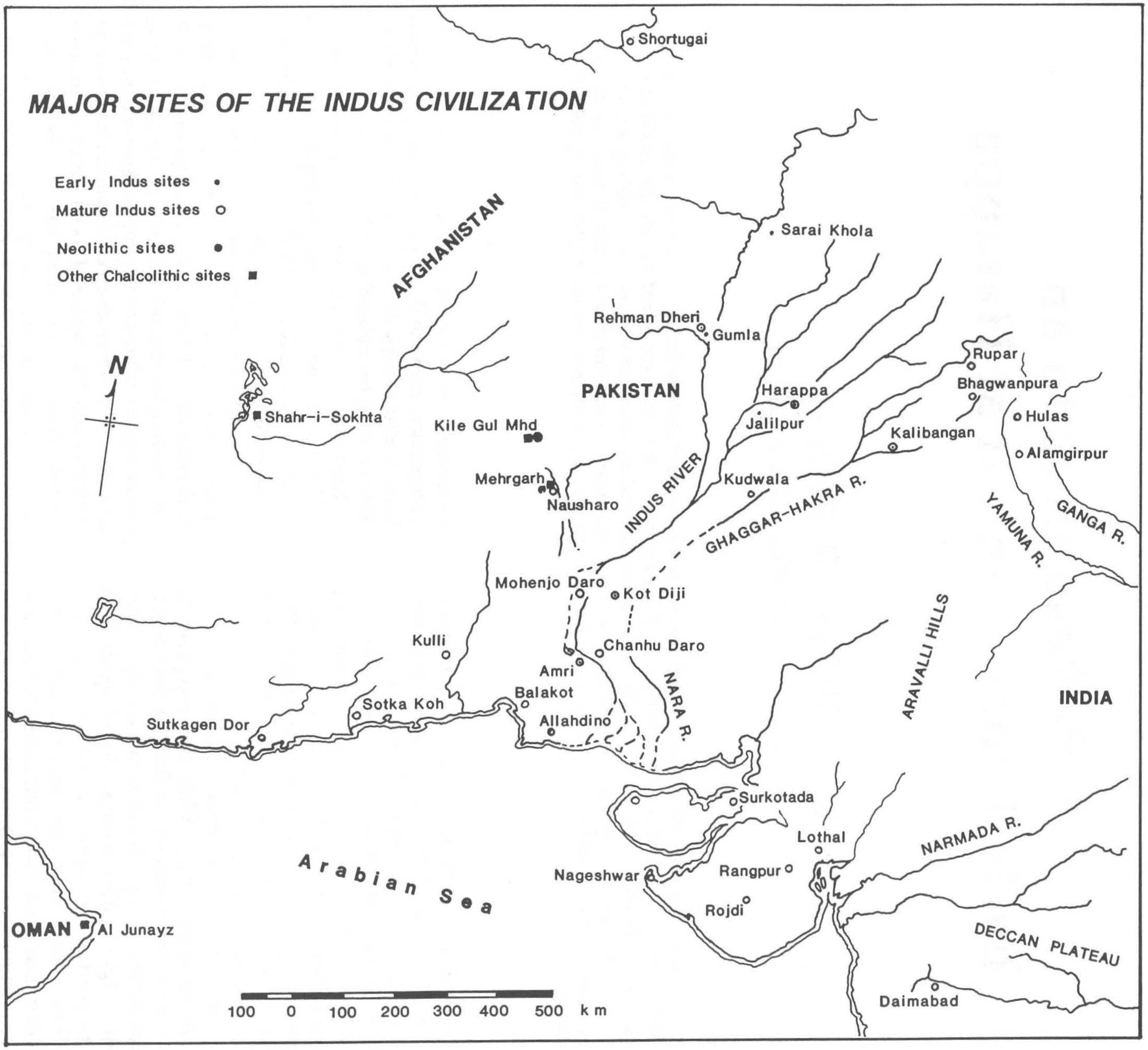

Figure 8.1: Map showing locations of major sites of the Indus Civilization.

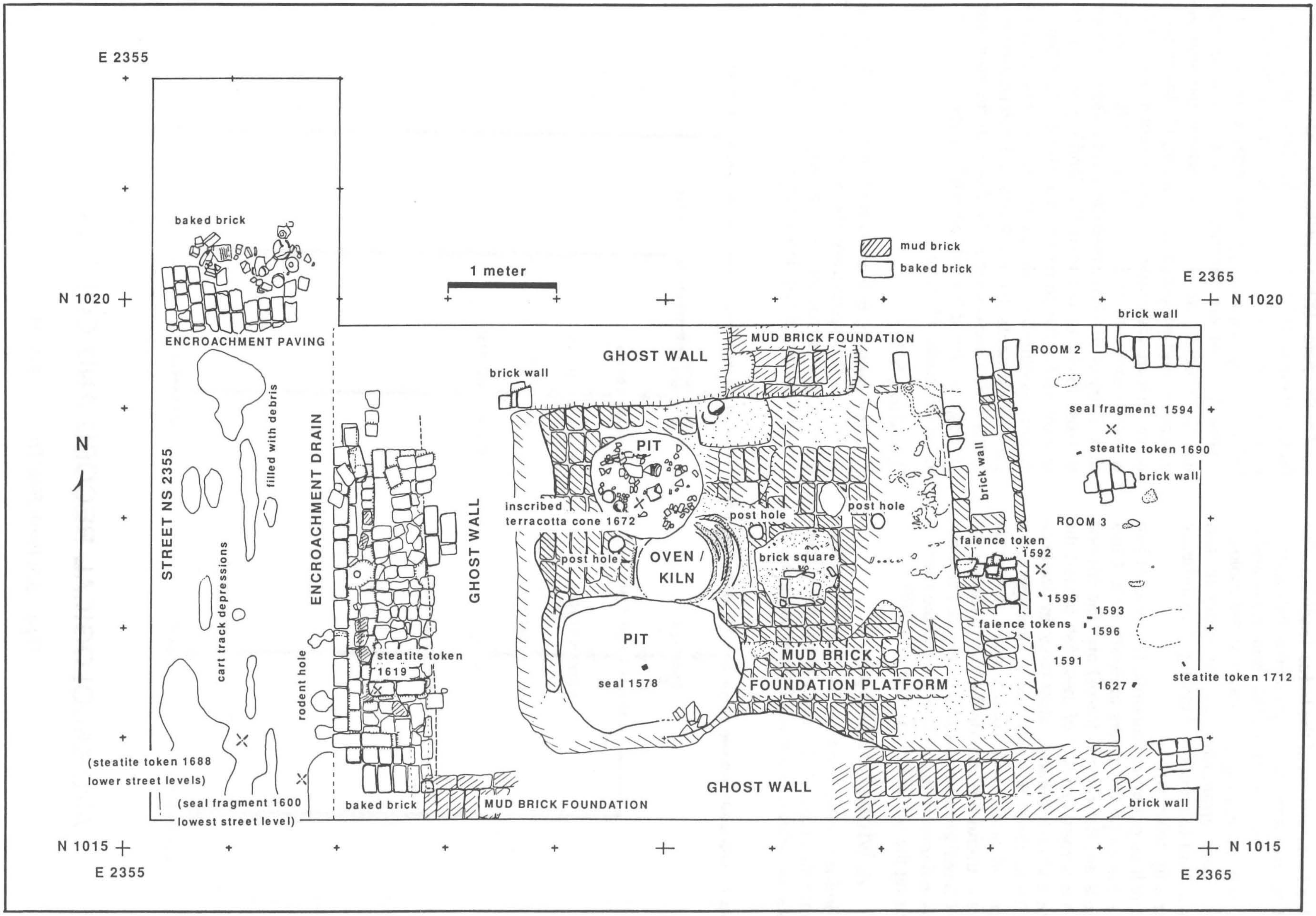

Figure 8.2: Harappa 1990: Plan of house structure (Rooms 1-3) and upper street levels (Street NS2355) in Area C on the southern slope of Mound E.

coastal-inland interactions of the Indus Tradition. The identification and analysis of particular fish species will permit the location of exploitation areas and a reconstruction of appropriate capture technology. Ultimately, these approaches to the study of fish remains will lead to an understanding of an industry that is currently unknown.

Several fish of potential economic importance live within the contemporary rivers of South Asia. Chief among these are the cyprids (carps) and the silurids (catfish). Numerous varieties of these fish inhabit the river Indus and its tributaries. Most range in size from less than 10 to about 50 centimeters, although some large carps and catfish will reach a meter or more in length. Other useful fish include the Indian shad (*Hilsa ilisha*), which will grow up to 40 cm in length. These fish are of seasonal importance as they ascend the rivers to spawn during the winter season (Qureshi 1965).

A Model of Disposal

A preliminary model of how fish may move from capture into the archaeological record has been developed based on ethnographies of fishing communities in South Asia (Khin 1948; Raychaudhuri 1980; Suryanarayana 1977; Tietze 1985). This movement is divided into four systemic states (cf. Schiffer 1972, 1976): (1) the aquatic system (marine or riverine) where the fish are procured; (2) the landing site, usually a beach or riverbank, where the fish are processed and prepared for market; (3) the market, where fish are distributed to the consumer; and (4) the domestic area, where food is prepared for consumption. Entry of fish bone into the archaeological record is most likely to occur at the landing area, in the market, and in the domestic area. This model attempts to deal specifically with the potential combinations of skeletal elements that are likely to be deposited as a catch of fish moves from the fisher to the consumer through the dried/salted fish trade (Figure 8.3) or the fresh fish trade (Figure 8.4).

Landing Site

After capture, fish are sorted by size and species. Particular fish species are always sought as they will bring a higher market price. Sorting is also based on the condition and appearance of the fish. Two forms of

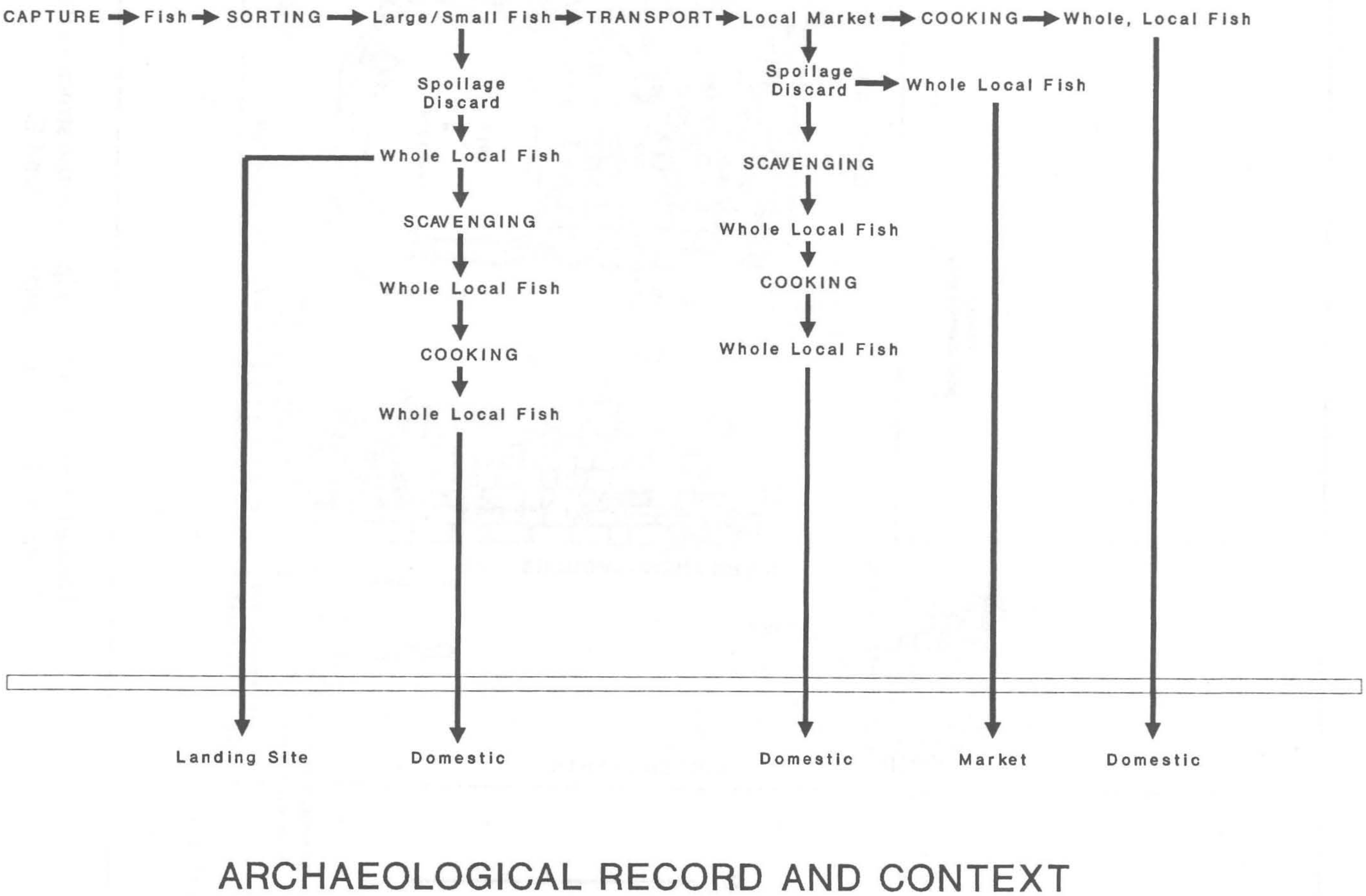

Figure 8.3: Fresh Fish Trade flow chart.

processing can be performed after sorting: fish can be sun-dried or salted, or taken directly to the market in a fresh condition. The major consideration for this stage is distance to market: fresh fish will be taken to local markets, while dried/salted fish will be taken to distant markets.

Dried Fish Trade

Small fish move immediately to sun-drying or salting (more recent developments encourage the use of ice for all fish). Thus, all bone elements are retained within the fish as it moves to the market. However, large fish will usually be butchered, as the meat cannot be adequately dried due to size and otherwise would spoil before reaching the consumer. Often during butchery the cranium will be separated from the body and the entrails removed.

During this latter procedure the pectoral and pelvic girdles may be removed. In contrast, vertebrae are often left in the fish when dried or salted and transported to a regional (distant) market. Thus, one would expect to find the remains of heads and pectoral/pelvic girdles in landing areas when large fish are salted and dried. Decay during the salting/drying stage can cause disposal into the archaeological record; however, human scavenging of both butchered slabs of large fish and whole small fish at the landing site will move these materials directly to the domestic sphere with its own characteristic skeletal part signature.

Market

Markets can be divided into two categories: local markets, near the source of the fish (landing site), and distant markets, extralocal areas to which fish are traded. Local fresh fish are taken directly to the market and distributed to the consumer; varieties of whole fish may be discarded here due to spoilage. Again, scavenging of this discard will move whole, local fish into the domestic sphere. Preparation and cooking of this waste leads to the deposition of bones in the archaeological record at the level of the domestic sphere. Fish are dried and salted for transport to regional or non-local markets. Small fish retain all

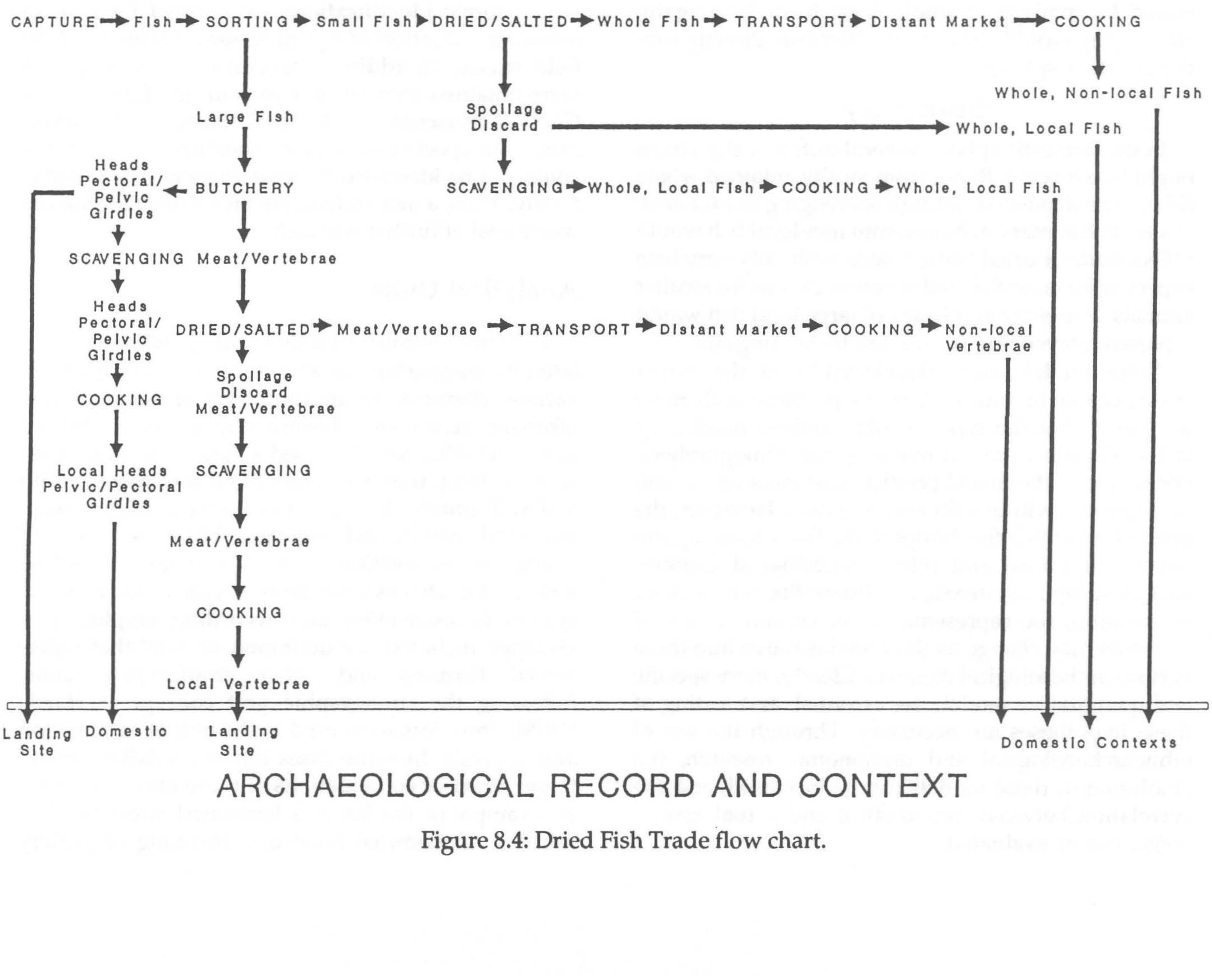

Figure 8.4: Dried Fish Trade flow chart.

bones, while large fish are represented by vertebrae, fin rays and ribs. The important variable here is the distinct element composition and non-local varieties of dried fish that are available to the consumer.

Hypothetical Faunal Assemblages

Context, fish species (local, non-local), and element (skeletal part) representation allow one to evaluate transport/processing mechanisms as the fish move from the fisher to the consumer. If the fish are sorted, processed and dried on the boats while still in the aquatic system, none of the discard will reach the archaeological record. At the landing site, butchery of large fish for salting/drying and spoilage from drying/salting are the primary sources of bones in the archaeological record: (1) small fish would be represented by whole local fish from spoilage, while (2) large local fish would be represented by cranial and pectoral/pelvic elements from butchery and vertebrae from spoilage. As noted previously, however, if people are scavenging at the landing site, these fish remains may move directly to the domestic sphere. At markets, the major source of archaeological bone would be spoilage of whole, local fresh fish. Again, scavenging would move these elements directly into the domestic sphere.

Summary

In the domestic sphere, several different signatures might be expected. Bones from locally obtained whole fish can be deposited through scavenging or exchange at a fresh fish market. Bones from non-local fish would reflect trade of dried/salted catch with only vertebrae expected for large fish and whole skeletons for smaller animals. Vertebrae and heads of large local fish would represent scavenging from a nearby landing site.

These models were developed from the extant ethnographic literature. A major problem with these sources is that the types of observations needed by archaeologists were not made by the ethnographers. For example, the model predicts that most refuse will be deposited within a domestic context. However, the process by which fish bones move from cooking into household refuse and into archaeological contexts such as sump pits, streets, and house floors is unclear. In addition, the representation of certain classes of elements may change as the remains move into these various archaeological contexts. Clearly, more specific and quantitative models are essential, and testing of these hypotheses are necessary. Through the use of ethnoarchaeological and taphonomic research, the resolution of these models can be increased, and the correlation between hypothetical and actual assemblages can be evaluated.

Methodology

Recovery

Usually all faunal samples can be divided into two groups: whole excavation unit samples and partial unit samples usually from fine-screening or flotation. At Harappa, the recovery of subsistence data has been of major concern. Many whole unit samples, therefore, were screened through fine-mesh of 2 mm and thus represent a fine-screened sample. In addition, selected samples were subjected to flotation, with the result that several smaller bone fragments and fish vertebrae were recovered.

Analytical procedure

In many cases, identification to genus or species has been possible. The scientific nomenclature used comes from a variety of sources including Mirza (1975), Qureshi (1965), and Ahmad, Khan, and Mirza (1976). Provenience, element, condition, size or age category, and presence of burning or fracture as well as the number and location of cutmarks were also recorded for each specimen.

Taxonomic identifications were aided by a small reference collection of fish processed during the 1990 field season. In addition, several freshwater species were obtained through a loan from the Los Angeles County Museum of Natural History. However, numerous specimens in the archaeological assemblage could not be identified beyond element and possible family. Thus, a more adequate reference collection is a major goal of further research.

Analytical Units

Minimum number of individuals (MNI) was calculated by comparing left and right sides of particular skeletal elements. In addition, size of elements was taken into account to achieve a more accurate estimate. Grayson (1984) has discussed a variety of procedures for examining number of identified specimens (NISP) and MNI counts. As the unit of aggregation decreases, the MNI count will increase. Thus, in cases of contiguous excavation units, MNI counts could be inflated if treated as separate aggregates. However, the system of excavation and recording employed at Harappa included the definition of 'lots' that represented features and other stratigraphic units, following the stratigraphic unit concept of Harris (1979). Thus, lots were used as the unit of aggregation and analysis. In some cases lots are subdivisions of larger strata or combinations of more than one strata; an example of the latter is laminated street fill. The refitting of mammal bone and rejoining of pottery fragments will be used at a later stage of analysis to redefine the analytical units.

Fish Remains from Harappa

Fish remains were recovered from earlier excavations at Harappa. Prashad (1936) reported several fish bones from the excavations of Vats during the 1920s and 1930s (Vats 1940). However, these were unidentified to species, except for a pectoral spine "probably" from the catfish *Rita rita*.

The 1990 sample reported here is somewhat greater than 1500 fragments of which the total number of identified specimens (NISP) is 856. Over 700 of the smaller pieces in this sample could not be identified beyond the categories: 'fish bone' or 'rib/spine/ray fragment.' Fish bone differs from mammal bone in that it is relatively light and fibrous (Wheeler and Jones 1989:87-88). When poorly preserved, the bone will often spall or flake off and form 'bone dust.' Small ribs, spines, and fin rays are fragile and will fracture into numerous pieces, making the identification of specific taxa extremely difficult.

Of the 856 identified specimens (Figure 8.5), almost half are silurids (catfish). *Wallago attu* accounts for 42% of the total assemblage. In addition, *Mystus* sp. is represented by over 1% of the specimens, while the Ariidae family of marine catfish is attested by a single fragment (0.1%). Unidentified silurids comprise about 4% of the total sample. Carps are also significantly represented. *Labeo* sp. accounts for 6.5% of the specimens and unidentified carp for another 6.5%.

Over 25% of the NISP currently remains unidentified to genus or species. This situation represents the lack of an adequate reference collection. Of these unidentified remains, several minuscule vertebrae were recovered from flotation; these may represent smaller carps or shad.

Context of Fish Remains

Kenoyer (Chapter 4 in this volume) has developed a model that identifies some of the processes responsible for urban growth at Harappa. This model is based on a shifting occupation during the several chronological periods at the site. During Periods 1 and 2, initial growth from a small site to a larger community occurred. At the beginning of Period 3A, expansion of the settlement took place on Mound E. Subsequently, occupation shifted or expanded to Mound AB. In concert with this shift was a lack of civic maintenance and resulting garbage accumulation on Mound E. Kenoyer suggests that this shift may correspond to the development of merchant ruling classes or ruling elites and new socio-economic/political organizations. Subsequently, renewal of Mound E during Period 3B may correspond to decay on Mound AB. During Period 3C, evidence suggests extensive congestion in many areas of the site and a general lack of civic control.

The analysis reported below centers on several samples brought back to the United States from the 1990 excavations, although only the material associated with a single structure are discussed in any detail

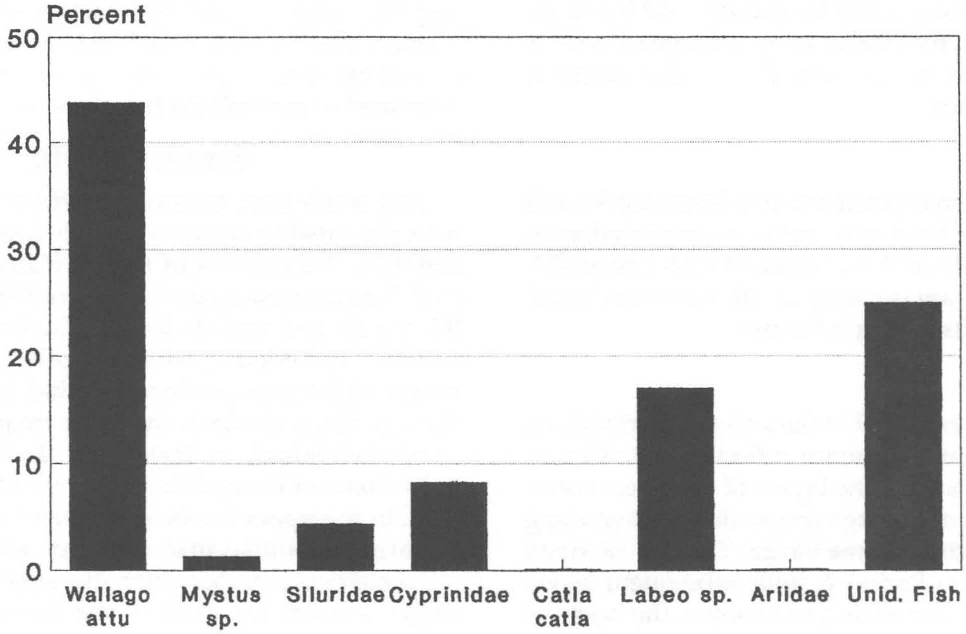

Figure 8.5: Harappa 1990 fish remains (Number of Individual Specimens = 856).

(Figure 8.2). Included are a mud-brick platform in Room 1, two associated rooms (Rooms 2 and 3), several features (N and S Pits, Hearth/Kiln, Brick Square, Brick Structure), and a nearby street. Although several stratigraphic units exist within the area, they have been collapsed into groups (unless otherwise noted) for this preliminary evaluation which includes species and element representation, fish size, and seasonality.

Room 1 (Platform)

The platform appears to be associated with the occupation of the adjacent rooms (2 and 3), although the exact relationship is currently unclear as deposits beneath the platforms were not excavated. Overlying the platform was a gray ashy deposit that contained much of the fish bone. This deposit probably is associated with the decline of Mound E during Period 3A. Two pits (North Pit and South Pit) were dug into the platform and thus post-date its construction. Additionally, the North Pit truncates the hearth/kiln feature in the center of the platform.

A few fragmentary fish bones were recovered from posthole fill. This fill may be associated with abandonment of the platform area. The postholes are thought to represent some form of superstructure over the platform. A few fish bones were recovered from a shallow pit inside the platform area that was filled with ashy debris where later a square structure made of brick bats was constructed. Its function is unknown.

Room 2

This room is thought to belong to Period 3A and 3B. Most of the fish recovered were associated with a Period 3A hearth feature found near the northern portion of the room.

Room 3

Room 3 has been divided into two levels: upper and lower. The lower level is tentatively associated with Period 2. Upper Room 3 is associated with Periods 3A and 3B. A significant quantity of fish bone was found within fill deposits and a pit feature.

Street

Several layers exist within the street and provide an excellent diachronic sequence reflecting activities in the surrounding areas. The layers of the street correspond to periods of garbage accumulation alternating with periods of civic maintenance. The lowest strata can be assigned to Period 2, with subsequent layers being of Period 3. According to Kenoyer, the layers of extensive garbage accumulation should correspond to the decline of Mound E during later Period 3A.

Species and Element Representation from the Whole Area

Based solely on cranial remains, the MNI is 137 (Figure 8.6). The dominant fish within these deposits is the catfish, *Wallago attu*, followed by the carp, *Labeo* sp. A few individuals of another catfish, *Mystus* sp., occur in: (1) the upper layers of Room 3, (2) deposits overlying the platform, and (3) the street level.

An individual of the family *Ariidae* (marine catfish) was recovered from the street levels. Marine catfish are not part of the local fauna and could only have been brought from the marine coastal areas, perhaps through trade.

Two concentrations of individuals are readily apparent: in the street levels and within Room 3. Another concentration occurs within the gray ashy layer that overlies the hearth/kiln feature in the center of the mud-brick platform.

Comparison of the frequency and distribution of elements reveals the general predominance of cranial remains as compared to vertebrae and pectoral/dorsal spines (Figure 8.7). This situation is particularly evident from the street levels and Room 3. A fish has approximately 70 bones in the cranium, although only 50 are usually recovered in archaeological samples (based on personal experience). Number of vertebrae will vary, but a moderate-sized *Wallago attu* has 70 while *Labeo* sp. possesses 45. Thus, if all bones were equally well represented, a skull:vertebra ratio of from about 1:1.4 (for *Wallago attu*) to 1:0.9 (*Labeo* sp.) would be expected. However, from these deposits, a ratio of 1:0.5 occurs. Flotation and fine-screening of the deposits suggest recovery techniques can not be blamed. (See Stewart 1989:80-81 for a similar discussion of ratios of archaeologically recovered elements compared to generalized fish skeletons.)

Street Levels

As a whole unit, the street represents one the areas with the greatest quantity of fish bones (Figures 8.6 and 8.7). The remains of 68 individuals were recovered. The greatest accumulations of fish bone occur in the lowest and middle levels. The lowest levels are assigned to Period 2, while the other concentrations represent the later portion of Period 3A. In most lots, *Wallago attu* represents the most frequently encountered individual, followed by *Labeo* sp. A few individuals of the catfish *Mystus* sp. also were recovered. In the upper levels of the street, a single cranial fragment of Ariidae, marine catfish, was found.

For element representation, the street is treated as a single assemblage; most of the remains came from three lots (excavation units) near the base of the street (Figure 8.8) and thus belong to Period 3A. Cranial

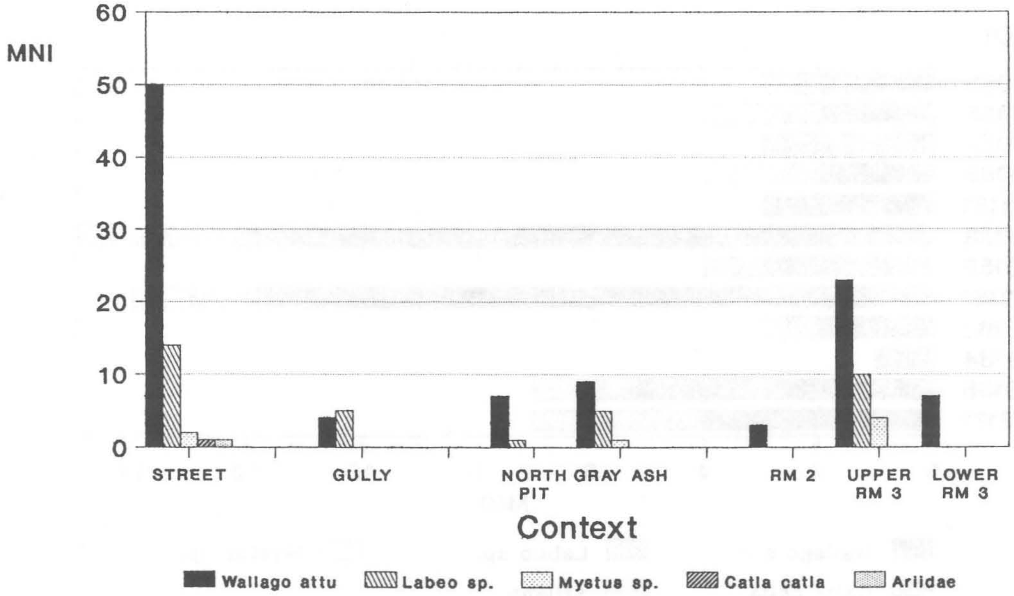

Figure 8.6: Species variation (Minimum Number of Individuals = 137) in Street NS2355 and Rooms 1-3 on south side of Mound E.

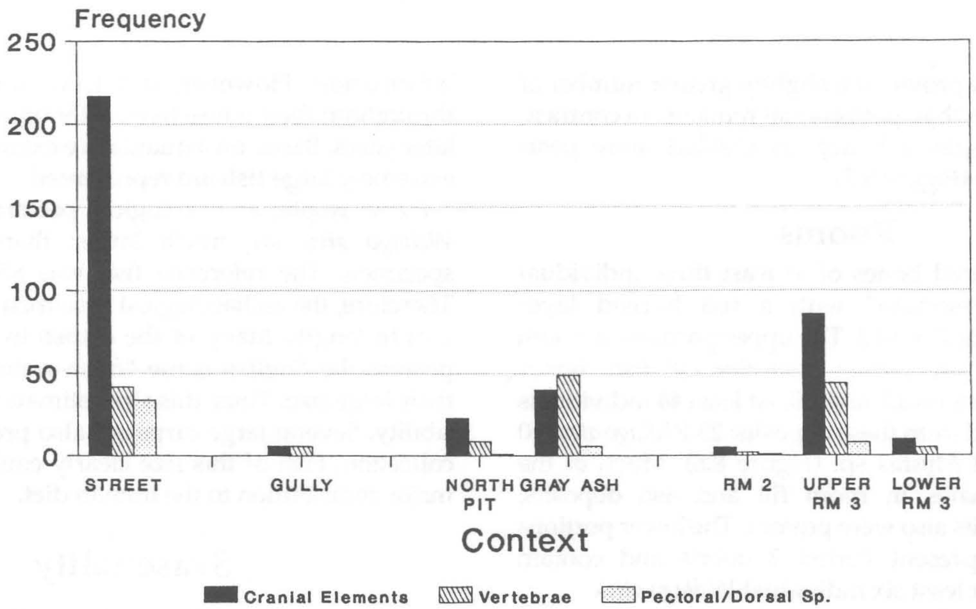

Figure 8.7: Bone element representation in Street NS2355 and Rooms 1-3 on south side of Mound E (NISP = 614).

elements are represented to a much greater degree than post-cranial elements.

Mud-brick Platform Area (Room 1)

No fish bones were recovered from the South Pit or the hearth/kiln feature in the platform area (Room 1). Additionally, no fish bones appear to be associated with the first use of the mud-brick platform. The North Pit contained bones from at least seven individuals: six *Wallago attu* and a single *Labeo* sp. The overlying gray ash yielded the remains of at least fifteen individuals: nine *Wallago attu*, five *Labeo* sp. and a single *Mystus* sp. (Figure 8.6).

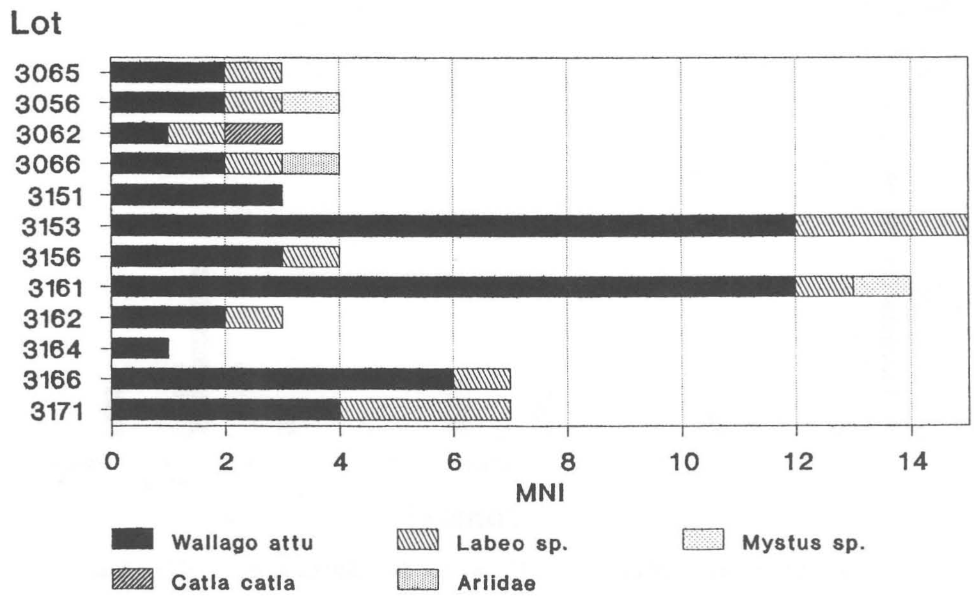

Figure 8.8: Species variation (Minimum Number of Individuals = 68) in Street NS2355; oldest lots occur at the bottom of the graph.

The North Pit provided a slightly greater number of cranial elements than post-cranial remains. In contrast, the overlying gray ash deposit yielded more post-cranial remains (Figure 8.7).

Rooms

Room 2 yielded bones of at least three individual *Wallago attu* associated with a red burned layer deposited during Period 3. The upper portions of Room 3 provided a significant quantity of fish bones attributed to Periods 3A and 3B. At least 44 individuals can be identified from these deposits: 23 *Wallago attu*, 10 *Labeo* sp. and 4 *Mystus* sp. (Figure 8.6). Much of the material originates in room fill and ash deposits, although two pits also were present. The lower portions of Room 3 represent Period 2 debris and contain remains from at least six individual *Wallago attu*.

No significant differences in cranial and post-cranial remains are seen in Room 2 (Figure 8.7). In the upper levels of Room 3, cranial elements again outnumber post-cranial remains, although not to such a degree as in the street. In the lower portions of Room 3, no significant differences occur between these groups of elements.

Size of Fish

No quantitative data exist to accurately estimate the size and meat weight of the fish taxa identified from Harappa. Further research is necessary to obtain this information. However, fish have sustained growth throughout their entire lives, although it diminishes in later years. Based on a qualitative examination, several extremely large fish are represented.

For example, archaeological pectoral fin spines of *Wallago attu* are much larger than the reference specimen. The reference fish was 85 cm in length. Therefore, the archaeological specimen could approach 2 m in length. Many of the catfish in the river Indus possess the English name "fresh-water shark" due to their large size. Thus, this size estimate is not an impossibility. Several large carps are also present within the collection. Fish of this size clearly could have made a major contribution to the human diet.

Seasonality

Incremental growth structures allow an adequate estimate of the season of death in animals. In fish, these structures often are found in otoliths and vertebrae, as well as in the pectoral spines of silurids (Brewer 1987, 1989). However, for any substantive statements to be made, further research must be conducted to understand seasonal growth of those species that are found within the archaeological assemblage.

Interpretation

Due to the preliminary nature of this analysis and the limitations of the reference collection, only initial interpretations can be made. Nevertheless, given the excellent context of the data and its association, these statements are not entirely speculative.

The study of fish remains from the rooms of the house to the east of Street NS2355 reflects the changing use of space through time. Lower deposits of Room 3 possess some fish remains. These probably represent domestic debris. After the hearth/kiln area and the mud-brick platform of Room 1 were abandoned, fish bones were deposited over the top of the platform in a gray ashy stratum. In addition, fish bones were recovered from the North Pit that truncated part of the hearth/kiln. The great increase in fish remains in Room 3 may be associated with use as a dump area during Period 3A.

According to the model presented at the beginning of this paper, most fish bones should be deposited as domestic debris in particular patterns of element and species compositions. Most of the fish found in this collection are locally available, suggesting that the meat was obtained fresh. However, the single cranial fragment of Ariidae, marine catfish, suggests that some dried fish was brought into Harappa from the distant coast. The fact that this cranial fragment is from a small individual also is predicted by the model. Coastal-interior trade of marine shell within the Indus Valley is already known (Dales and Kenoyer 1977; Kenoyer 1983). Further analysis of the unstudied portion of the 1990 sample as well as samples from previous seasons will help to further elucidate this question of the fish trade.

Other archaeological patterns are not as easily intelligible based on the hypothetical assemblages predicted by the model. The elements in Rooms 2 and 3, the gray ash deposit, and the North Pit do suggest fresh fish trade, as most of the cranial and post-cranial elements occur in roughly equal numbers. One would expect cranial remains to predominate in the households of individuals scavenging from a landing site processing large dried fish. However, the great abundance of cranial fragments in association with a moderate number of vertebrae in the street deposits is not fully predicted by the model. This is due to the fact that movement of bones can occur from one archaeological context to another, such as movement from garbage pits or household debris from several surrounding households into the street.

If scavenging were being carried out, one would not expect the proportion of cranial remains to be much higher than vertebrae. However, street debris probably represents the combination of trash from several households; thus, a pure signature of scavenging has been obscured. Further taphonomic and ethnoarchaeological studies are necessary to understand the movement of bone elements into the archaeological record and the possible differential attrition of element classes (i.e., Stewart 1989).

Stewart (1989:86-89) has suggested that bone element attrition differs between species recovered from natural deposits of fish remains. For example, carps have a greater abundance of vertebrae compared to cranial elements. In contrast, catfish are represented by a greater quantity of cranial elements compared to post-cranial and vertebral elements. Although such a pattern needs to be substantiated for the Harappan materials, this may help illuminate the various patterns of element distribution.

The technology used to harvest these fish is currently unknown. However, several copper-based metal fish-hooks (Figure 8.9) have been recovered during past excavations at Harappa (Vats 1940) and Mohenjo-daro (Mackay 1938). The use of nets is a much more efficient means to obtain large numbers of fish, and netting is the dominant method of fishing within South Asia today (e.g., Tietze 1985). Snaring large fish with nets is not uncommon, but some extremely large fish may have been dispatched with spears. In addition to hook-and-line fishing, there is some evidence for the use of fish traps or small nets such as those depicted on a painted sherd from Harappa (Figure 8.9).

Further analysis is necessary, but it is suspected that fish were a significant portion of the diet for certain populations at Harappa. The size and quantity of the captured fish imply that fishing was not a limited activity and that considerable effort went into this industry.

Balakot

In order to contrast the use of fish, the site of Balakot is used. Balakot is a small mound situated near the middle of the Khurkera alluvial plain near the southeastern side of Sonmiani Bay (Figure 8.1). This site is about 90 km northwest of Karachi and was excavated for four seasons, between 1973 and 1976, by George Dales of the University of California-Berkeley and the Pakistan Department of Archaeology (Dales 1974a, 1974b, 1976, 1977, 1979, 1986).

Preliminary sorting by Camm Swift and Virginia Butler as well as limited tabulation by Richard Meadow (1979, 1986, 1989) imply that fish account for about 50% of the specimens for the Harappan occupation at Balakot. As the site is located near a bay, its inhabitants had access to a variety of environmental zones, including riverine, estuarine, protected bay and open, deep-water areas. In addition, the marine zone of a tropical area has a much greater diversity of fauna, especially fish.

A great diversity of fauna occurs at Balakot, including rays, croakers, jacks and sharks. But by far

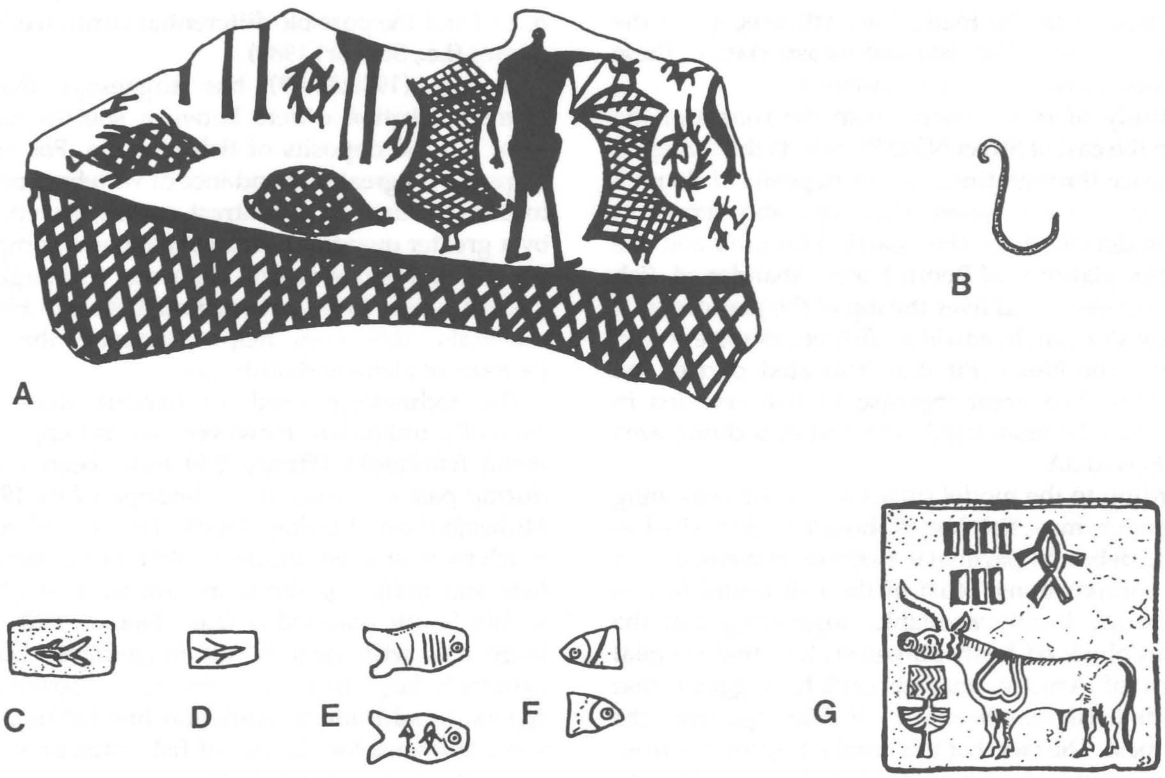

Figure 8.9: Sherd, fishhook, and tokens from Harappa. (A) sherd from Stratum VI, Mound AB, showing fish and human figure with nets or traps (Vats 1940: Pl. LXIX,16; length 11.75 in); (B) copper/bronze fishhook from Mound F, "Great Granary Area, Eastern extension" (Vats 1940: Pl. CXXV,8; length 1.75 in); (C) inscribed fish motif on one face of three-sided faience token from Mound F (Vats 1940: Pl. XCIX, 642; length 0.63 in); (D) inscribed fish motif on one face of three-sided steatite token from Mound F (Vats 1940: Pl. XCVIII, 590; length 0.2 in); (E) obverse and reverse of fish-shaped token in steatite from Mound F (Vats 1940: Pl. XCV,428; length 0.6 in); (F) obverse and reverse of head of fish-shaped token in steatite from unknown provenience (Vats 1940: Pl. XCVII,560; size not stated); (G) unicorn seal of steatite with fish sign from Mound F (Vats 1940: Pl. LXXXIV, a = LXXXV,9; 1.7 in square); all redrawn from Vats (1940) by J.M. Kenoyer.

the most abundant fish is *Pomadasys hasta* or the 'sua' as it is known locally. Currently, MNI estimates of this fish approach 1,500. The fish is estuarine and may represent a particular emphasis on this environment, perhaps during the winter monsoon season when marine fishers rarely will venture out into the open ocean.

Conclusions

Fish appear to have been an important protein source for some populations of the Harappan civilization. Further analysis at Harappa will help identify if there were varying uses of fish in different areas of the site. This intra-site variation may represent differential use of certain resources, probably by various segments of the population. Also there is limited evidence to suggest a marine-interior trade in foodstuffs. Most importantly, it must be emphasized that these fish are not small animals; several from Harappa approach two meters in length, which represents a substantial source of protein.

Inter-site variation is illustrated by the comparison of Balakot with Harappa. Balakot is a small, rural settlement along the marine coast. It appears that nearly 50% of the bones are of marine fish, particularly a single estuarine species.

Kenoyer (1991) has suggested that a major factor leading to the establishment of the integration of the regional sites into an urban society lies in the diversified resource base. During the Harappan phase of the Integration Era (Shaffer 1991), a variety of subsistence strategies were used to support the various communities, urban centers, and the region as a whole. The fishing industry was an important part of this diversified approach to subsistence. Based on the high numbers of individuals represented even in the small areas excavated as well as the large size of some of the individual fish, it is clear that an active and sophisticated fishing industry was present during the Harappan period.

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