PEOPLES OF THE SEA
AND COASTAL ZONE:
AN ANTHROPOLOGICAL PERSPECTIVE

Richard B. Pollnac
International Center for Marine Resource Development
University of Rhode Island
Kingston, R.I. 02881

ABSTRACT

Using cross-cultural data, the paper examines a range of human adaptations to the sea and coastal zone. The model of human ecology is used to provide a structure for the material analyzed, and it also functions to organize the topics covered in the analysis. While examining diversity, the emphasis of the paper is to demonstrate common features which underlie human adaptations to the marine environment.

INTRODUCTION

The paper has two basic objectives: the first is to introduce readers to an anthropological perspective for examining maritime oriented communities. Although the perspective presented here is not the only anthropological perspective, it is broad enough to encompass the approaches used by many anthropologists, and readers can use references cited to branch out into the literature for exposure to other viewpoints. The second goal is to provide an example of some of the techniques that anthropologists use in the analysis of existing literature and cross-cultural data sets to test or generate hypotheses concerning human adaptations to the coastal zone. Non-anthropologist readers may not be familiar with the cross-cultural data sets examined in the paper, and this exposure can serve to lead them to a mass of existing literature applicable to the study of coastal peoples.

Man’s adaptation to living and working on or by the water poses problems which are, in some cases, distinct from those posed by the demands of other environments. In most cases humans have adapted to aquatic environments through cultural means -- through the development of technologies, ideologies, forms of social organization, and ways of thinking which help them fulfill their needs.

Cohen defines adaptation in man as "...the process by which he makes effective use for productive ends of the energy potential in his
habitat." This process includes a complex network of interactions between man's physical environment, technology, social organization, social environment, ideology, and individual biopsychological needs and characteristics. The complexities of these interactions are perhaps most clearly illustrated by the model of human ecology presented by Poggie, Pelto, and Pelto in a discussion of human adaptations (Fig. 1).

![Figure 1. Model of human ecology](image)

The lines connecting all components of this model indicate that a fundamental and important assumption is being made: changes in any one component have the potential of effecting changes in other components. For example, fishermen's workgroups are an element of social organization within a fishing community. The size and composition of these workgroups have, through the years, adapted to a complex interaction of fishing technology, characteristics of the environment where fishing takes place, other aspects of the social organization of the community, as well as attitudes, beliefs and values of the fishermen. In brief, the fishermen's workgroup composition is in some sort of a balance with other parts of the system. A change in technology, one of the key variables in the system, may require changes in workgroups—changes that could upset this balance, resulting in either a period of readjustment where other aspects of the social organization, social environment, and ideology readapt to the changes, or the new technology may be inefficiently used or rejected. Similar types of interrelatedness characterize the various aspects of a marine oriented community. In this paper we
will focus on a few of the paths that can be traced which outline the systemic nature of the interrelationships between characteristics of human society and man's interaction with the sea.

METHODS

Two distinct methods of analysis will be used in this paper. The first one which is clearly less scientific, but potentially as revealing as the other, can be referred to as the method of "apt illustration." In using this method, the author's past research and published research of others will be used to support claims that there are relationships between selected aspects of the physical environment, technology, and society and culture of fishing peoples. This method is potentially biased by material the author has read (and not read), the societies within which he conducted his research, and unconscious biases in selecting material to "support" a claimed relationship; hence, the term "apt illustration."

The second, more scientific method, is referred to as statistical cross-cultural comparisons. Two samples will be used in employing this method, once again one being more scientific, or rigorous, than the other. The more scientific sample is known as the Standard Cross Cultural Sample. As a first step in defining the sample, data on some 1250 societies were examined to identify those with the fullest ethnographic coverage. Those societies were then classified into groups of geographically contiguous societies which were culturally similar. The groups, not necessarily geographically adjacent to one another, were further classified into 200 "world sampling provinces" on the basis of linguistic and cultural similarities indicative of historical connections. Murdock and White further refined these 200 world sampling provinces in 186 "distinctive world areas", and using criteria such as "superiority of ethnographic coverage" and "cultural distinctiveness", one society was drawn from each area. The geographical distribution of the societies in the sample can be found in Table 1.

Table 1. Distribution of Societies in the Standard Cross Cultural Sample.

<table>
<thead>
<tr>
<th>Region</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sub-Saharan Africa</td>
<td>28</td>
</tr>
<tr>
<td>Circum-Mediterranean</td>
<td>28</td>
</tr>
<tr>
<td>East Eurasia</td>
<td>34</td>
</tr>
<tr>
<td>Insular Pacific</td>
<td>31</td>
</tr>
<tr>
<td>North America</td>
<td>33</td>
</tr>
<tr>
<td>South and Central America</td>
<td>32</td>
</tr>
</tbody>
</table>

*Derived from Murdock & White (1969)
The second, less scientific sample consists of all the societies of the Insular Pacific which are coded in the Atlas of World Cultures (N=101). This "unscientific" sample is used for two reasons: first, there are more societies which can be classified as "fishing societies" in this major world area than in any other; and second, within this area there are societies in very close geographical proximity (often on the same small island), for the most part descended from the same cultural tradition (the Malayo-Polynesians) who manifest significantly different emphases on fishing. Eighty of the societies in the sample are derived from the great Malayo-Polynesian migrations which populated much of the Pacific. Twenty-one are either Papuan or Australian (Aboriginal); hence providing the opportunity to control for the cultural variable if necessary. Coding of the variables in these two samples will be discussed in conjunction with specific analyses.

The two methods of analysis discussed above will be applied to illustrate how the model of human ecology can be used to increase our understanding of man's adaptation to the marine environment. In the first example, we will start with the model and selected aspects of the marine physical environment and trace their influences on other aspects of human society and culture which are reflected in the model. To support claims about relationships between various components of the model, "apt illustrations" will be derived from the literature and, where possible, cross-cultural statistical comparisons will be made. The second example will be more inductive in approach than the first which is basically a deductive approach. The second example will involve a "throw it against the wall and see what sticks" approach. The things that "stick" will then be interpreted in light of the model (if possible). In other words, the second example will be more of a hypothesis generating approach than a hypothesis testing approach - the interpretations will be post facto. The two examples together, however, should provide an anthropological perspective on man's adaptation to the sea and coastal zone.

RESULTS AND DISCUSSION

The first example: starting with the model. Numerous aspects of the marine environment have an influence on man's society and culture. Several in combination, however, seem to have a more pervasive effect than others. More than one-third of a century ago, the anthropologist Gordon Hewes emphasized the importance of noting that the prey of fishermen are located in an environment alien to man - a liquid environment, fluid, saline, and always in motion - an environment in which man is biologically ill-equipped to survive. To work in this environment beyond the immediate shoreline humans must support themselves with some sort of a platform, necessarily limited in size. This environment is also relatively flat in comparison with the land except for surface irregularities caused by waves and swell. If one moves beyond sight of land, it becomes relatively featureless. All of these preceding factors in combination result in a condition of relative removal from land-
based society when one is at sea. There is a qualitative difference between being a mile away working one's garden and a mile at sea setting a net. Man's dependence on human technology for sustaining life and returning home is much greater at sea. A spouse can bring you a meal while you work your garden plot or bring the children and share in the work - behavior that becomes much more difficult, if not impossible, when one works at sea. Hence, physical characteristics of the sea result in a kind of social and psychological distance from land - a distance and a sense of isolation that must be reflected in other aspects of the society and culture of fishermen. Let us now turn to an examination of the above observations in terms of the model.

One major and extremely obvious aspect of the marine physical environment is responsible for the cluster of attributes discussed above: it is water, and non-technological man cannot live in water. Humans have thus developed technology to support them on the ocean while they work, and the most prevalent technology is the boat. A boat, however, has limited workspace; thus, there is usually no room for unproductive people. This leaves out the little children. In practically every society around the world women are responsible for caring for small children; hence, they are eliminated from the crew. Interpreted in terms of the model we find that the interaction between the physical environment, technology, and an aspect of the social organization (females are usually responsible for childcare) results in another impact on the social organization: the division of labor by sex with respect to fishing.

Data published by Murdock and Provost concerning the sex allocation of 50 technological activities in 185 societies indicate that in all of the societies where hunting of large aquatic fauna is practiced, it is an activity engaged in exclusively by males. In 58 percent of the societies fishing is exclusively a male activity, predominately male in 31 percent of the societies, a task performed equally by males and females in 6 percent, and in only 5 percent of the societies is fishing performed either predominately or exclusively by females.

The type of fishing most frequently practiced by women is shell fishing. Meehan notes that among the Anbara of the north coast of Australia women can be accompanied by their small children while collecting shellfish in the shallow open sea without either danger to the children or much effect on the gathering yields. Murdock and Provost's data support this in that females are either exclusively or predominantly responsible for gathering small aquatic fauna (e.g., shell-fishing and collecting other small aquatic organisms along the seashore and in tidal pools) in 71 percent of the societies in their sample.

There are, of course, other productive activities that are performed by women in fishing societies. The division of labor by sex is frequently associated with the distribution and marketing system. Fish is a highly perishable product which is not easily stored without complex techniques such as smoking, drying or freezing. Firth notes that a fisherman's catch, in comparison with a farmer's product, needs more outlay in
equipment and labor if it is to be stored. This, he suggests, results in a tendency for a greater development of middlemen among fishermen. Further, a fisherman’s work is physically exhausting, and when he arrives at shore he usually does not have the time or energy to process or distribute his highly perishable product; thus, the distribution of surplus catch is usually performed by a specialist who is often referred to in the literature as a middleman or fish dealer.

In many fishing communities, females take over one or more of the functions of buying, processing, and/or selling fish. Female “middlemen” are found throughout the world in regions as widely spread as the Caribbean, El Salvador, Brazil, almost all of West Africa, India, Thailand, and Okinawa. Sometimes this division of labor functions to keep at least some of the profits within the family - the men fish, and their female relatives sell the product.

The occupation of fishing seems to have a more pervasive influence on the division of labor by sex than simply resulting in females processing and or marketing while the males fish. Pollnac reanalyzed the Murdock and Provost data concerning the division of labor by sex for 50 technological activities. Dividing the sample into groups based on degree of dependence on fishing, he found that societies with a moderate or high dependence on fishing have seven more activities classified as predominantly female activities than societies with less emphasis on fishing. Hence, women appear to have more responsibilities in fishing societies; a finding that is consistent with observations made in modern, industrialized fisheries.

This difference in the division of labor and the additional responsibilities women have in fishing societies must have other ramifications in their society and culture. This is supported by Norr, who reports that women in fishing villages in South India are relatively more independent and free than women in farming villages. She attributes this independence to their economic activities in the marketplace where they sell fish, rice, beer, weave nets, etc. Women also appear to manifest more independence in fishing villages in New England, West Africa, Taiwan and Japan. In many cases this increased independence and responsibility influence the relative prestige of women. For example, in Japan, women in fishing villages are reported to manifest little evidence of the deferential behavior expected of women following the samurai tradition, and their status is higher than women in farming villages. Additionally, Arnoff’s study in St. Kitts suggests that there is more equality between husband and wife among fishermen than cane cutters. There are some exceptions to these findings, however. Knipe reports that despite such added responsibilities, women of Gamric, a Scottish fishing community, enjoy little prestige. He suggests that this is due to the fact that males participate in wider exchange networks - a variable positively correlated with prestige; but he notes that the women’s prestige may have been higher in the past when they were involved in the wider market network.
Although relative independence is a part of the social structure of a community, it should be also reflected as a "state of mind" or a psychological variable, another major aspect of the model. Studies comparing psychological aspects of fishing and non-fishing communities are relatively rare, but TAT material collected among fishing and agricultural people in Japan indicate that farming people place more emphasis on hierarchical relationships among the sexes.29

We might also expect to find evidence for these psychological characteristics reflected in child training practices. For example, the increased responsibility of women in fishing societies suggests that psychological traits such as "responsible" and "self-reliant" would be valued. Hence, we would expect that these traits would be inculcated through socialization.

Data concerning child training for selected characteristics were coded for the 186 societies in the Standard Cross Cultural Sample by Barry, et al.30 Emphasis on self-reliance and responsibility in both early and late girlhood are coded on a scale ranging from one to eleven for all societies within the sample for which the data were available. In the analysis presented here data for each of the scales are dichotomized at the sample mean, resulting in a coding of either low or high emphasis for each trait. Societies scoring at or below the sample mean are coded low emphasis, and the others are coded high emphasis for the trait.

Societies are also classified according to the following five subsistence types: agricultural, pastoral (animal husbandry), fishing, hunting, and gathering. A society was classified into the type that accounted for more than any other single subsistence activity. Societal type was then cross-tabulated with child training practices. The relationship between subsistence pattern and emphasis on self-reliance and responsibility in child training for both early and late girlhood can be found in Tables 2 through 5.

**Table 2. Subsistence pattern cross-tabulated with emphasis on self-reliance in early girlhood socialization.**

<table>
<thead>
<tr>
<th>Subsistence Type</th>
<th>Emphasis on Self-reliance</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>AII</td>
</tr>
<tr>
<td>Low</td>
<td>66</td>
<td>2</td>
</tr>
<tr>
<td>High</td>
<td>35</td>
<td>8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>101</td>
<td>10</td>
</tr>
</tbody>
</table>

A - Agriculture  
AH - Animal Husbandry  
H - Hunting  
F - Fishing  
G - Gathering
Table 3. Subsistence pattern cross-tabulated with emphasis on self-reliance in late girlhood socialization.

<table>
<thead>
<tr>
<th>Subsistence Type</th>
<th>A</th>
<th>AH</th>
<th>F</th>
<th>H</th>
<th>G</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>63</td>
<td>3</td>
<td>11</td>
<td>4</td>
<td>6</td>
<td>87</td>
</tr>
<tr>
<td>High</td>
<td>38</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>4</td>
<td>63</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>101</td>
<td>10</td>
<td>18</td>
<td>11</td>
<td>10</td>
<td>150</td>
</tr>
</tbody>
</table>

The results of the cross-cultural analyses are intriguing. In the discussion presented above, fishing communities were compared either with agricultural communities or all other community types lumped together. The cross-cultural analyses allow one to compare the fishing societies with other societies broken down by subsistence type; hence some unexpected relationships have emerged. Turning first to self-reliance, if fishing societies are compared with all other types lumped together, we find no significant differences in either early or late girlhood. Forty-four percent of the fishing societies place high emphasis on socialization for self-reliance in early girlhood versus 43 percent for all other society types combined \( (x^2 = 0.01, p > .05) \). In late girlhood these statistics are 39 percent versus 42 percent, respectively \( (x^2 = 0.08, p > .05) \). With respect to responsibility, however, the results are in the opposite direction from what we expected. Here we find that while only 22 percent of the fishing societies place high emphasis on socialization for responsibility in early girlhood, fully 56 percent of the other societies do \( (x^2 = 7.32, p < .01) \). The differences between fishing and non-fishing societies, although not as great, are in the same direction for late girlhood \( (30 \text{ versus } 56 \text{ percent respectively, } x^2 = 4.70, p < .05) \).

Table 4. Subsistence pattern cross-tabulated with emphasis on responsibility in early girlhood socialization.

<table>
<thead>
<tr>
<th>Subsistence Type</th>
<th>A</th>
<th>AH</th>
<th>F</th>
<th>H</th>
<th>G</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>41</td>
<td>4</td>
<td>14</td>
<td>5</td>
<td>6</td>
<td>70</td>
</tr>
<tr>
<td>High</td>
<td>53</td>
<td>10</td>
<td>4</td>
<td>6</td>
<td>3</td>
<td>76</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>94</td>
<td>14</td>
<td>18</td>
<td>11</td>
<td>9</td>
<td>146</td>
</tr>
</tbody>
</table>
Table 5. Subsistence pattern cross-tabulated with emphasis on responsibility in late girlhood socialization.

<table>
<thead>
<tr>
<th>Subsistence Type</th>
<th>Responsibility</th>
<th>A</th>
<th>AH</th>
<th>F</th>
<th>H</th>
<th>G</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td></td>
<td>44</td>
<td>5</td>
<td>14</td>
<td>4</td>
<td>6</td>
<td>73</td>
</tr>
<tr>
<td>High</td>
<td></td>
<td>55</td>
<td>10</td>
<td>6</td>
<td>7</td>
<td>3</td>
<td>81</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>99</td>
<td>15</td>
<td>20</td>
<td>11</td>
<td>9</td>
<td>154</td>
</tr>
</tbody>
</table>

A pair-by-pair comparison of fishing societies with the other types also provides some interesting results. Turning first to self-reliance, we find that comparing agricultural and fishing communities the results are in the expected direction but not statistically significant. Forty-four percent of the fishing societies place high emphasis on socialization for self-reliance in early girlhood versus 35 percent of the agricultural societies ($x^2 = 0.63, p > .05$). For late girlhood the percentages are 39 and 38 percent, respectively. Comparing fishing societies with pastoral, hunting, and gathering societies, however, we find that the results are in the opposite direction - a smaller percentage of fishing societies place a higher emphasis on socialization for self-reliance among females than any of the other three societal types. This generalization breaks down only for the comparison between gathering and fishing societies at the late girlhood socialization level where there is only a one percent difference. The sample sizes in these pair-by-pair comparisons are rather small; hence, the differences could have occurred by chance. For example, a statistical test of the largest difference, that between pastoral and fishing societies for early girlhood socialization for self-reliance (80 versus 44 percent placing a high emphasis respectively) indicates that the difference is not statistically significant ($x^2 = 3.32, p > .05$). None of the comparisons for the self-reliance variable are statistically significant, but the fact that the pastoral, hunting, and gathering societies manifest differences in the same direction suggests that more research is called for.

Pair-by-pair comparisons for the responsibility variable are, for the most part, in the opposite direction from what was expected, and most are statistically significant. These comparisons suggest that fishing societies are quite similar to gathering societies with respect to socialization for responsibility among females. With respect to hunting societies, a larger percentage place a high emphasis on socialization for responsibility in both early and late girlhood than fishing societies, but the differences are not statistically significant ($x^2 = 3.16$ and 3.30 respectively, $p > .05$). Both pastoral and agricultural societies are more likely to place a high emphasis on socialization for responsibility among females.
Seventy-one percent of the pastoral and 56 percent of the agricultural societies place high emphasis in early girlhood in contrast to only 22 percent of the fishing societies ($x^2 = 7.05$ and 7.74 respectively, $p < .01$). The same relationship holds for late girlhood where the statistics are 67 and 56 versus 30 percent respectively ($x^2 = 4.34$ and 4.64 respectively, $p < .05$).

It is difficult to explain these findings at the present time. The data indicate that females perform more tasks in fishing societies. We conducted a comparison of the same sample of societies here and find that there is not a statistically significant difference between fishing and other societies in terms of emphasis on socialization for self-reliance among females. More surprisingly we find that agricultural pastoral, and hunting societies in contrast to fishing societies, put more emphasis on socialization for responsibility among females. Perhaps the additional tasks performed by females in fishing societies are not viewed as being very important; hence, an emphasis on self-reliance and responsibility is not essential as it would be if the activities directly impacted the major subsistence source. Further, the cross-cultural sample is composed of traditional societies where most fishing is done on one-day trips. These day-long trips would not put the burdens on females that are found in modern fishing societies where the men are at sea for extended periods of time.

Turning back to the model, it is clear that the longer fishermen stay at sea, the more effect their absence will have on the family.\textsuperscript{23,31,32} Orbach indicates the importance of close, extended families for wives and children while the fishermen are at sea.\textsuperscript{24} On the basis of these observations one might expect a tendency for women to want to live near their kinsmen for support while the husband is away fishing, hence, resulting in a matrilocality bias in residence. Unfortunately, very little data concerning residence patterns exists concerning modern long trip fisheries. Danowski notes that both the man’s and the woman’s family are almost equally geographically accessible in Rhode Island.\textsuperscript{25} Kuiper, however, lends some support to the hypothesis by noting that although post-marital residence is mainly neolocal for Scottish fishermen from Camrie, if the woman does not come from her husband’s fishing community there is a tendency for the couple to move to the wife’s community.\textsuperscript{26} Finally, DeVos and Wagatsuma note that among Japanese fishing people the wife’s relationship with her parents is better maintained, and unilateral patrilineal ties do not tend to develop as strongly as in agricultural communities.\textsuperscript{20}

We will conclude this section of the paper at this point. In this section an example was provided to demonstrate how the model of human ecology can be used to link together various aspects of fishing society and culture with aspects of the marine environment. We focused on only one salient feature of the marine environment, that is how the occupation of fishing results in greater relative removal from land-based society than other terrestrial pursuits. The relationships discussed are illustrated in Figure 2. Obviously many more paths could
be traced connecting the various components of the model in illustrating its application to marine fishing societies. Nevertheless, this presentation is sufficient to illustrate one anthropological perspective and the use of the model to generate hypotheses that can be compared with the literature and other data.

Figure 2. Relationships between variables discussed in text.

The second example: using the model to interpret the data. Science proceeds through both deductive and inductive methods. In this example the approach will be basically inductive. Here, however, the computer will be used to scan data and discern relationships. Relationships discovered will then be interpreted in terms of the model, if possible.

The analyses in this section involve comparison of societies in the Insular Pacific sample discussed above. For purposes of comparison the societies will be dichotomized into two groups: those in which fishing contributes either nothing or a low amount to subsistence, and those in which fishing contributes a moderate to high amount to subsistence. The societies in the former group depend on fishing for 25 percent or less of their subsistence, and those in the latter 26 percent or more. There are 55 societies in the first group and 46 in the second.

The first variable examined is the prevailing mode of obtaining a wife. The results of the cross-tabulation are in Table 6. Table 6 clearly indicates differences between the two groups. Societies with a higher
dependence on fishing tend to have either no exchange or a reciprocal type of exchange (the first three rows in the table).

Table 6. Mode of marriage cross-tabulated with dependence on fishing in Insular Pacific Societies.

<table>
<thead>
<tr>
<th>Mode of Marriage</th>
<th>Dependence on Fishing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low</td>
</tr>
<tr>
<td>No significant exchange</td>
<td>11</td>
</tr>
<tr>
<td>Reciprocal gift exchange</td>
<td>3</td>
</tr>
<tr>
<td>Exchange of female kin</td>
<td>7</td>
</tr>
<tr>
<td>Dowry</td>
<td>2</td>
</tr>
<tr>
<td>Token brideprice</td>
<td>2</td>
</tr>
<tr>
<td>Bride service</td>
<td>5</td>
</tr>
<tr>
<td>Bride price</td>
<td>25</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>55</td>
</tr>
</tbody>
</table>

Societies with a low dependence on fishing tend to have a directional exchange, such as dowry, bride price, or bride service. If the table is dichotomized to reflect this observation, we find that 62 percent of the low fishing societies use a non-reciprocal type of exchange in contrast to only 26 percent of the high fishing societies ($x^2 = 12.89$, phi = 0.36, p < .001). If we focus only on significant non-reciprocal exchange for a wife (bride price), we find that 45 percent of the low fishing societies have a bride price system in contrast to only 26 percent of the high fishing societies ($x^2 = 4.05$, p < .05).

In order to interpret this finding in terms of the model it is important to note that cultures where wives are obtained by bride price or some other substantial consideration tend to be those where the kin group is patrilineal.35 In the previous section of this paper it was noted that the relative separation of males from land-based society results in a tendency away from patrilineality. A cross-tabulation of relative dependence on fishing with matrilineal kin groups in the Insular Pacific sample indicates that 46 percent of the high fishing societies have matrilineal kin groups in contrast to 25 percent of the low fishing societies ($x^2 = 4.51$, p < .05). Hence, mode of marriage is related to aspects of the marine environment through the tendency toward decreased emphasis on patrilineages and potential for matrilineal bias in fishing communities which was suggested by the model in the previous section of this paper.

Although this section is primarily inductive, it has a tendency to become deductive when we begin to interpret in terms of the model. For example, in interpreting the previous finding we generated a hypothesis concerning lineality and tested it to support our interpretation of the data. Continuing this feedback between the inductive and deductive approach, it can be noted that Murdock indicates that bride price is
less likely if a woman does not leave her community on marriage. In the previous section the model led to the proposal that relative absence of the fisherman spouse would result in a tendency for a wife to want to be located near her relatives, who act as a support group. Hence we would predict that communities with a moderate or high dependence on fishing would not have a rule which would force women to leave their home community on marriage - either the residence pattern would be non-patrilocal, or the communities would not be exogamous. To test these hypotheses, dependence on fishing was cross-tabulated with community exogamy and patrilocal residence.

This analysis indicates that 38 percent of the low fishing societies practice patrilocal residence in contrast to 28 percent of the high fishing societies. Although in the expected direction, the difference is not statistically significant ($x^2 = 1.01$, $p > .05$, one-tailed test). Turning to community exogamy, only 13 percent of the high fishing communities are exogamous in contrast to 28 percent of the low fishing communities ($x^2 = 3.23$, $p < .05$, one-tailed test). The data and the model are in general agreement once again.

As a final example we will examine the relationship between dependence on fishing and family organization in the Insular Pacific data. A cross-tabulation of family organization and dependence on fishing indicates that 22 percent of the high fishing societies have large, extended families in contrast to only 7 percent of the low fishing societies ($x^2 = 4.44$, $p < .05$). Murdock defines large, extended families as "corporate aggregations of smaller family units occupying a single dwelling or a number of adjacent dwellings and normally embracing the families of procreation of at least two siblings or cousins in each of at least two adjacent generations (p. 98)." This finding can be easily interpreted in terms of the model.

It has been suggested that the need for coordination within fishing crews operating on a relatively small vessel at sea, combined with the physical risks of the marine environment, increases both the need for interdependence and the importance of each worker. Safe and profitable operations on a fishing vessel depend on an interdependent and cooperative crew. The use of kinsmen in a crew enhances cooperation within the workgroup and is a common practice in many parts of the world. It follows that an efficient type of household organization would be the large, extended family where these interdependent, cooperative fishing workgroups could pool their production as well as be in close proximity to facilitate shore-side fishery related activities such as maintenance and repair of equipment, beaching boats, and processing—activities which if performed cooperatively will keep the production within the extended family unit.

The preceding examples demonstrate how the model can be used to interpret relationships discovered in data. Once again, we have only examined a few aspects of human adaptations to the marine environment but even this limited example provides evidence for the usefulness of the model of human ecology and an anthropological perspective. The
relationships discovered in this section have been combined with those from the first section and are illustrated in Figure 3.

Figure 3. Relationships between variables discussed in paper.

BIBLIOGRAPHY


