

## **Small-Scale Marine Fisheries - A Training Manual (Peace Corps, 1983, 631 p.)**

### **Week 6: Training**

 **(introduction...)**

 **Session T-67: Introduction to boat repair, maintenance and construction**

 **Session T-68: Blueprint reading special project**

 **Session T-69: Color depth charts special project**

 **Session T-70: Working with groups as an extension worker**

 **Session T-71: Navigation and seamanship - electronics**

 **Session T-72: Fish aggregating devices (fad) special project**

 **Session T-73: Anchoring techniques special project**

 **Session T-74: Project planning - goal setting**

 **Session T-75: Boat repair, construction and maintenance II**

 **Session T-76: Construction of scarf joint special project**

 **Session T-77: Women in development - part I**

 **Session T-78: Boat repair, construction and maintenance III**

 **Session T-79: Fiberglass techniques special project**

 **Session T-80: Women in development - part II**

 **Session T-81: Fish economics and marketing/fish marketing survey - special group project**

 **Session T-82: Small-scale fishing trip II, preparation**

 **Session T-83: Interviews/net mending**



**Session T-84: Navigation and seamanship II**  
**Session T-85: Small-scale fishing trip II**

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**Week 6: Training**

WEEK 5		SESSIONS 67		THRU 85		
MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
<p>AM</p> <p>Session T-67 7:30 AM Introduction to Boat Repair, Maintenance and Construction</p>	<p>Session T-71 7:30 AM Navigation and Seamanship - Electronics</p> <p>Session T-72 10:30 AM SP Fish Aggregating Devices</p>	<p>Session T-75 7:30 AM Boat Repair and Construction II</p>	<p>Session T-78 7:30 AM Boat Repair and Construction III</p>	<p>Session T-81 7:30 AM SGP Fish Economics and Marketing/ Fish Marketing Survey</p> <p>Session T-82 9 AM Small-Scale Fishing Trip II Preparation</p>	<p>Session T-85 5 AM Small-Scale Fishing Trip II</p>	
<p>PM</p> <p>Session T-68 4 PM SP Blueprint Reading</p> <p>Session T-69 5 PM SP Color Depth Charts</p>	<p>Session T-73 4 PM SP Anchoring Techniques</p>	<p>Session T-76 4 PM SP Construction of Scarf Joint</p>	<p>Session T-79 4 PM SP Fiberglass Techniques</p>	<p>Session T-83 2:30 PM Interviews and Nets</p>		

EVE					
Session T-70 7:30 PM Working with Groups as an Extension Worker	Session T-74 7:30 PM Project Planning / Goal Setting	Session T-77 7:30 PM WID I	Session T-80 7:30 PM WID II	Session T-84 7:30 PM Navigation and Seamanship I	

### Week 6, Sessions 67 Thru 85

#### Session T-67: Introduction to boat repair, maintenance and construction

**Time: 7:30 AM**

**Goals:**

- To acquaint trainees with basic fishing vessel repair needs
- To make trainees aware of the needs of proper maintenance and maintenance schedules for small wooden vessels
- To acquaint trainees with proper woodworking tool handling techniques

**Overview:**

**In this session trainees are introduced to the basic steps in small boat repair, maintenance**

**and construction. In the field the PCV will be primarily involved with older, more seasoned fishing boats and should be able to assist in the repair and maintenance of these vessels.**

### **Materials and Equipment:**

- **Small-scale wooden fishing boat in need of repair, scrapers, scrub brushes, knives, ice picks, chalk, flip charts, markers, woodworking tools**

### **Procedures**

<b>Time</b>	<b>Activities</b>
<b>20 Minutes</b>	1. Technical trainer gives short lecture on need of boat repair and maintenance of small boats.
<b>30 Minutes</b>	2. A small boat in need of repair (see Trainer's Notes below) is available for trainees' scrutiny. Technical trainer has trainees examine boat and make list of repairs trainees can see need to be done.
<b>10 Minutes</b>	3. Technical trainer goes over trainees' list and adds repairs that trainees may have overlooked. Trainer now has trainees develop list of methods they would use to make repairs.
<b>3 Hours</b>	4. Technical trainer produces scrapers, scrub brushes, ice picks and chalk. After removing boat from water to pre-arranged site, trainees, under technical trainer's direction, secure boat and proceed to thoroughly clean boat inside and out.
<b>30 Minutes</b>	5. After boat is cleaned trainees are instructed in survey work of checking for rotting planks, timbers, split seams, using ice pick or knife blade.
	6. Boat is marked with chalk on areas of potential problems.
	7. Technical trainer reviews session activities and links to future sessions where repairs will be completed.

**Trainer's Note:**

**Prior arrangements with local fishermen to repair boat is needed as well as locating boat close enough to training facility for trainees to work on. Boat should be in a condition that is not hopeless, i.e., sunk or completely rotted. Also, to allow all trainees experience in survey work and repair, a ratio of one boat per 4-5 trainees is essential.**

**Session T-68: Blueprint reading special project****Time: 4 PM****Goals:**

- **To provide proper instruction in reading blueprints and understanding blueprints to trainees**
- **To acquaint trainees with scale and the need to utilize it in design/construction work**
- **To familiarize trainees with simple line drawings for plans**

**Overview:**

**This session is done by trainee for whom this is a special project. Trainees need to be able to read simple blueprints, comprehend symbols and understand scales.**

**Materials**

- **Flip chart, markers, copies of blueprint (preferably of a small boat)**

**Procedures:**

Time	Activities
	1. Trainee for whom this is a special project gives a. explain what they are

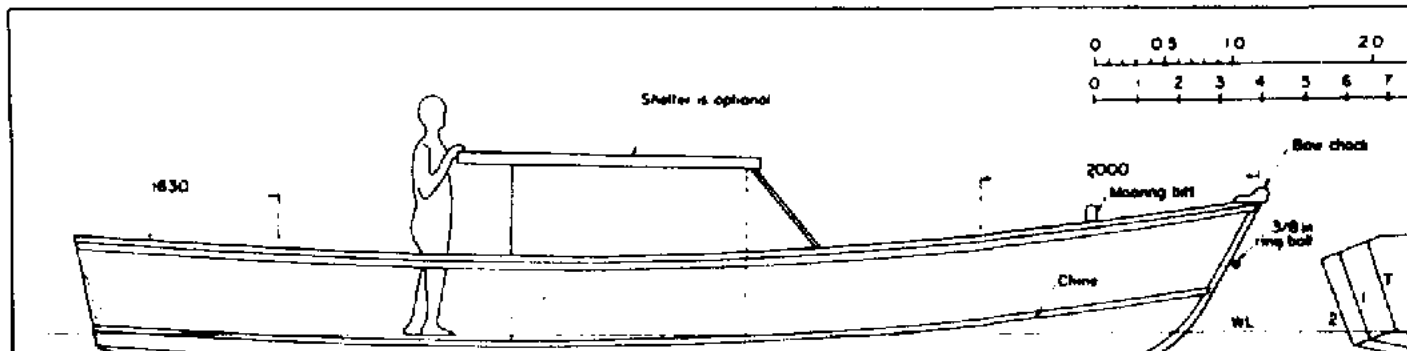
	presentation	
	covering the following aspects of blueprints:	b. how they are used
		c. what symbols mean d. what scale is
	2. Trainee provides examples of blueprints (of boats, preferably) and line drawings (plans of boats without dimensions) and passes them around.	
	3. Trainee ties blueprints and boat building together. Trainees practice reading blueprints.	

### Trainer's Note:

**This is intended to be an informational session. Trainees should be able to read simple blueprint at end of session.**

### References:

- **Olivo, Thomas C. and Payne, Albert. Basic Blue Print Reading and Sketching Delmar Publications. Albany, NY 1978**



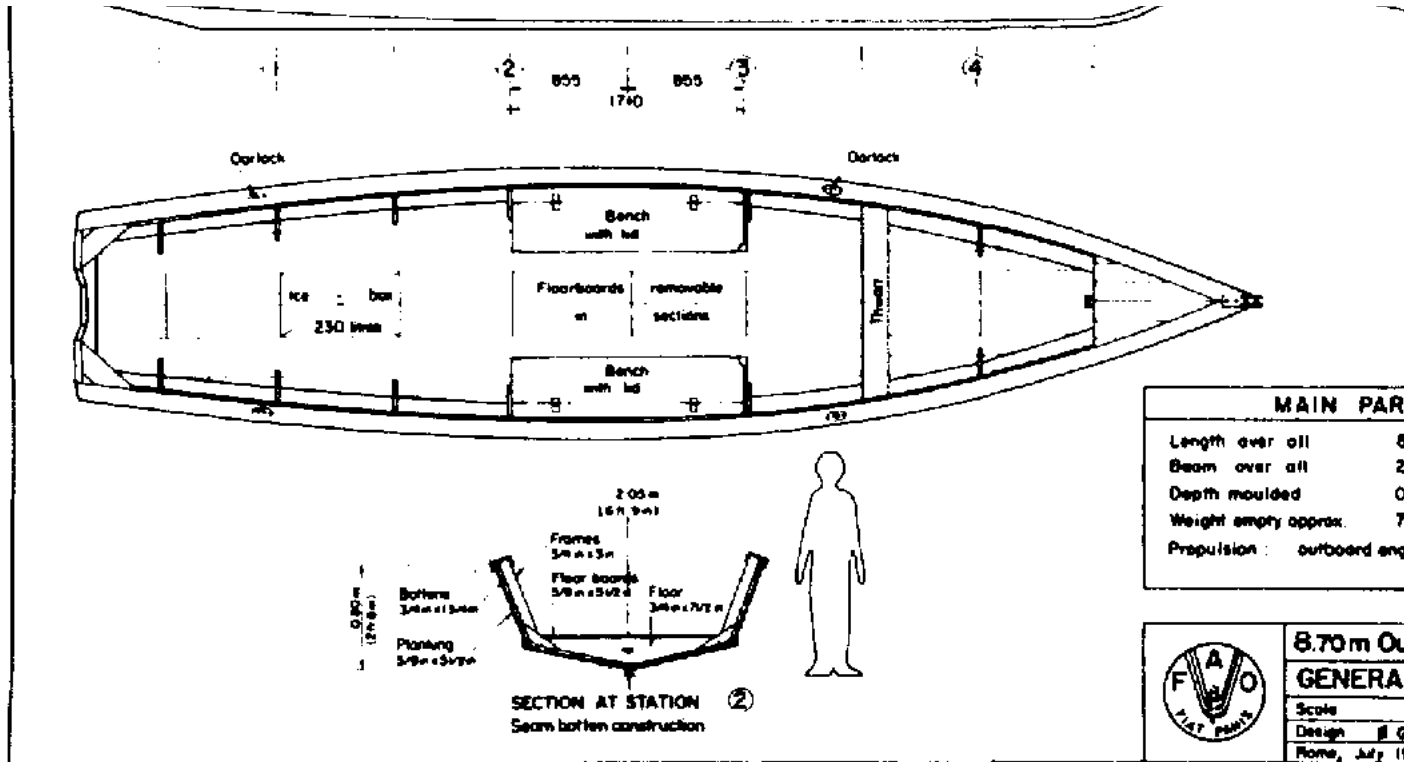
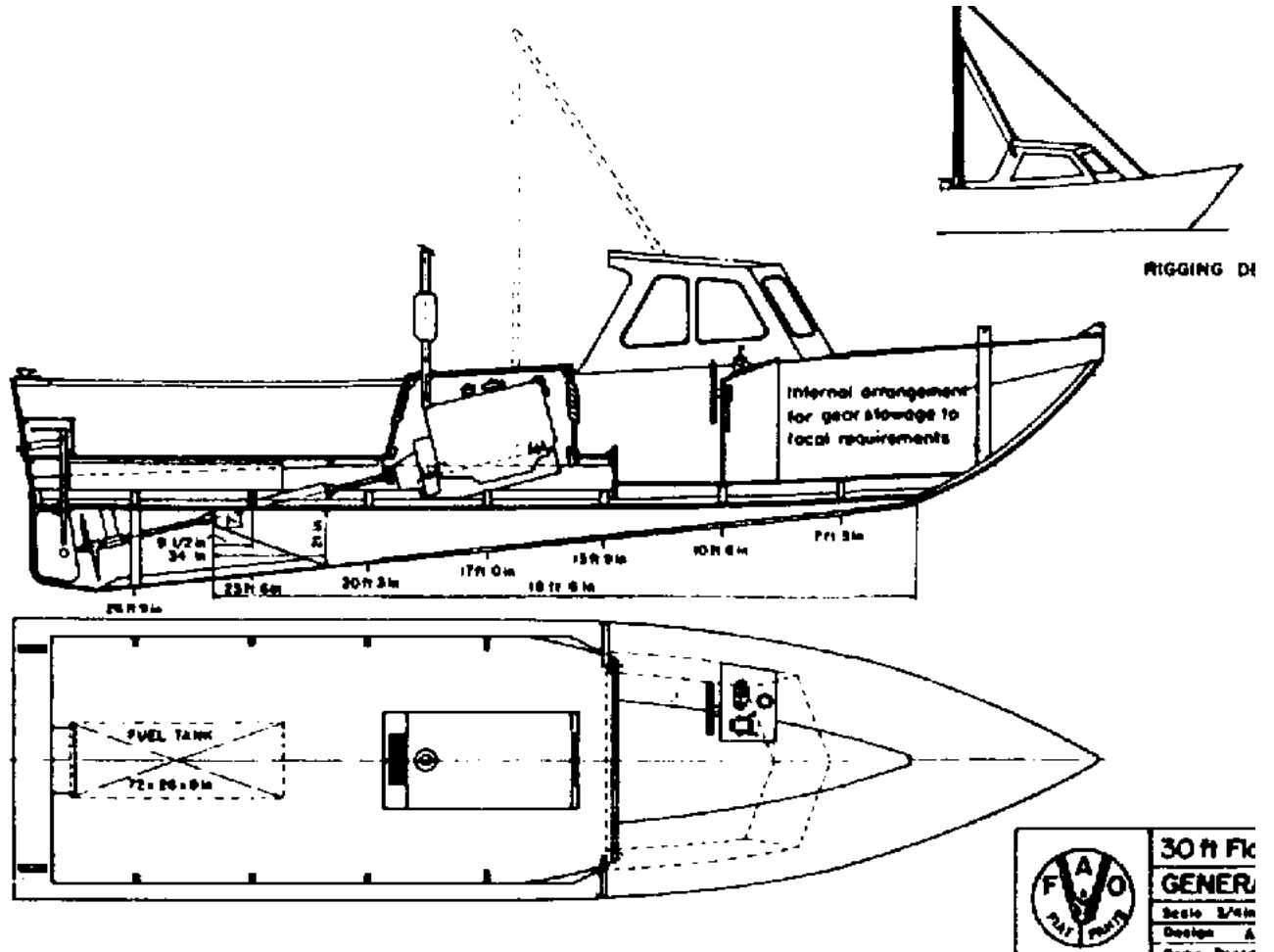


Fig. 1. A 28-ft outboard powered boat suitable for village fishery operations.



	<b>30 ft Fk</b>
	<b>GENERAL</b>
	Scale 3/4" = 1'
	Design A



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**Fig. 2. A 30-ft inboard powered boat based on a Texas dory Sampan Express 30.**

**Session T-69: Color depth charts special project**

**Time: 5 PM**

**Goals:**

- **To enable trainees to understand coloration differences at various depths for fishing purposes**
- **To understand the importance of color when fishing and conducting exploratory surveys**
- **To provide initial understanding of nutrient levels, temperature substrates, suspended particulates in seawater**

**Overview:**

**This session was done as a special project by a trainee. The session should be used to complement the small-scale fishing sequence as well as the reef survey session. In this session trainees become aware of the importance of color to the marine environment, for purposes of camouflage and also fish capture.**

**Procedures:**

Time	Activities	
1 Hour	1. Following is session outline:	
	A. Introduction - wave lengths	1. physical, optical
		2. physiological, visual

	B. Alteration of physical aspects	1. radiation penetration
		- visible light
		- blue/green spectrum
		2. radiation absorption
		- rapid absorption 1 m = 62%
		- H <sub>2</sub> O is highly selective absorber red more than blue/green turbid water
		3. angle of incidence
		- tropical regions
		- temperate regions
	C. Physiological Aspects	1. fish can see color
		- lines, lures can "scare" fish
		- record keeping of lures
	D. Fish coloration	1. camouflage- color - depth
		2. lures for fish capture
	E. Sea Coloration	1. blue seas indicative of poverty
		2. green - thermoclines, turbidity
		3. red, yellow, brown - concentration of dinoflagellates, caepods, diatoms
	2. The following is a sample lecture:	

## COLOR DEPTH CHARTS

**I. Color is the way the brain interprets the wavelength distribution of light entering the eye.**

**A. Color has two aspects - physical or optical, and physiological, or visual.**

**1. The physical, or optical, aspect of color involves the wave length distribution of light.**

**a. The visible spectrum includes wavelengths between 390 nm and 760 nm and, consequently, the colors violet, indigo, blue, green, yellow, orange and red.**

**b. Light entering the eye is either emitted by or reflected from the objects that we see.**

**2. The physiological, or visual, aspect of color involves the interpretation of the wavelength distribution by the eye and the brain.**

**a. The cones of the eye are of three types, and each type is sensitive to a particular band of wavelengths (those which correspond with the red, green and blue components of the spectrum).**

**b. The brain "adds" the messages sent from the three types of cones and thus creates the sensation of color.**

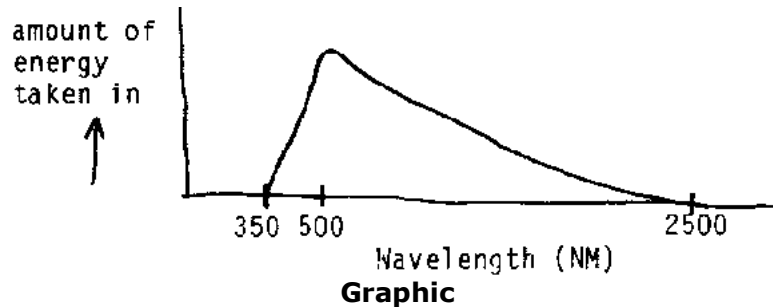
**B. The physical aspect of color is altered in water because the penetration of radiation in water is different from that in air.**

**1. The distribution of energy taken in by the sea is an important factor affecting the penetration of radiation.**

**a. Most of the energy that reaches the sea is in the form of visible light.**

**b. The energy taken in by the sea is greatest in the blue and green region of the spectrum,**

**declines rapidly on the short wave side of the spectrum, and is considerable but declines steadily on the long wave side.**



**2. Radiation that enters the water decreases in passage downward because it is absorbed (converted to another energy form) and it is scattered laterally by impact against suspended particles, colored substances and water molecules.**

**a. Much radiation that passes through the surface of the water is absorbed quickly, some 62% in the first meter in clear water.**

**b. Water is a highly selective absorber and is most penetrable to just those wavelengths which are useful to plants.**

**1. Red is absorbed more rapidly than blue and green.**

**2. Blue and green will penetrate well beyond 100 meters in clear water.**

**c. The scattering of blue radiation among water molecules accounts for the blue color of the ocean (this is similar to the atmospheric effect).**

**d. Turbid water is less penetrable to the shorter wavelengths because it scatters them more quickly, and , as a result, green and yellow penetrate farther than blue in turbid water.**

**3. The angle of incidence of light striking the water surface has little effect on non-reflected light penetration, but the greater the obliquity of the light rays striking the water, the greater the amount of light that is reflected.**

**C. The physiological aspect of color in water may be summarized by the fact that fish can see color.**

**1. Scientists believe that certain color lines and lures do scare fish.**

**2. Many fishermen use color lines and lures and experience no problems.**

**3. An accurate record of lure colors and the depths at which they are effective should be the fisherman's guide.**

**II . The changes which colors undergo in water have significant implications in the determination of fish coloration, lure coloration and the apparent color of the sea.**

**A. Fish are generally colored in such a way that they are protected from predators.**

**1. Fish in the first 150 meters of water are generally blue or transparent so that they blend with the apparent color of the water.**

**2. Fish between 150 meters and 500 meters are generally silvery or gray.**

**3. Fish below 500 meters are generally black or red. a. Loss of sunlight occurs between 500 meters and 750 meters and, at these depths, red will appear black. b. Black fish are usually day feeders while red fish feed at night.**

**B. Lures rely on movement, scent and/or color to attract fish and, therefore, are colored so that they will be seen.**

**1. The distribution of lure colors used in the three depth regions is the inverse of the distribution of fish colors found in those regions.**

**2. Red, orange and black lures will be highly visible in the first 150 meters of water.**

**3. Silver and white lures will be visible between 150 meters and 500 meters but are generally used in all three depth regions.**

**4. Blue and green lures may be visible below 500 meters; yellows lures may be visible if the water is slightly turbid.**

**C. The apparent color of the sea may be a function of suspended substances, temperature or a collection of living organisms.**

**1. Blue seas are generally indicative of poverty as they contain relatively small amounts of suspended matter.**

**2. Green waters may indicate the presence of a thermocline, a coral reef (due to the amount of suspended calcareous material) or high turbidity (i.e. - coastal waters).**

**3. Red, brown and yellow waters appear colored because they contain high concentrations of shrimp, dinoflagellates, caepods or diatoms.**

**Note: A Secchi disc is a disc with pie sections of various colors which is lowered into the water to determine at what depths the various colors cease to be visible.**

**References:**

- **Concise Encyclopedia of the Sciences. Yule, editor. 1978. Zebco Brunswick Company, Tulsa, Oklahoma 74101.**
- **This Great and Wide Sea: An Introduction to Oceanography and Marine**

**Biology. Coker. 1954**

**- Marilyn Berry, PCV Sierra Leone**

**Session T-70: Working with groups as an extension worker**

**Time: 7:30 PM**

**Overview:**

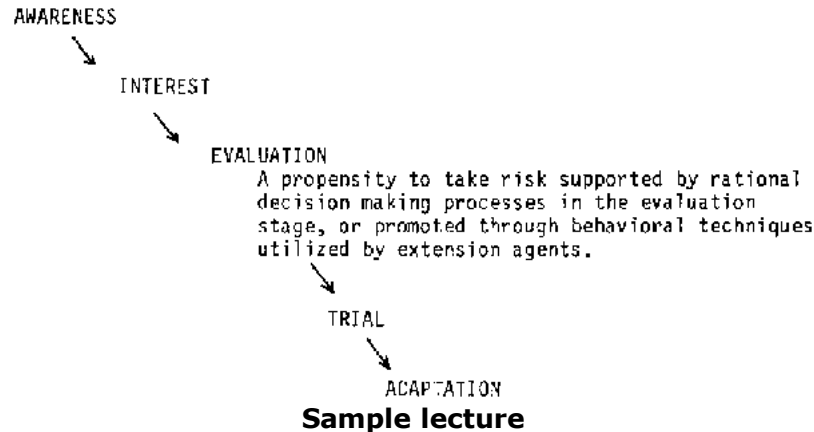
**This session continues to focus on extension work. Working with groups is stressed as a way of doing extension work.**

**Procedures:**

Time	Activities
<b>30 Minutes</b>	1. Trainer gives lecture on why it is best to try to do extension work with groups of people, rather than individuals. Trainer goes into group dynamics and stresses risk taking. (Sample lecture follows)

**Trainer's Note:**

**Lecture should be in your own words, use situations with which you are familiar to stress points.**



## WHY GROUPS ORGANIZE

**Both subsistence fishermen and larger scale fishermen are less disposed to take risk on an individual basis. The behavioral tool however, or the risk-shift phenomenon largely used in a business-making atmosphere, can be used more effectively to promote risk taking by small groups of people involved in collective decision-making.**

**Small groups of people concerned with decisions that involve some element of risk, unlike large group members, will, after engaging in various modes of group discussion, make a collective decision that is far more risky than their individual decision on the same matter would be. Key elements here is that group discussion on a matter of importance must take place to the point of group consensus on that particular matter before the shift occurs.**

**In the case of subsistence fishermen, much depends on the extension agent's ability to explain the risk involved to group members, and consequently show how the new**



**technology substantially exceeds, in cost/benefit advantages, the fishermen's present traditional technology.**

**For example, if an extension agent suggests to a group of fishermen that a particular technology or fishing technique could improve productivity, but is unable to explain how much the technology would cost, where it could be obtained, how to use it and what benefits could be expected from its use, one can rightly predict that conservative influences will prevail and a risk decision will not be taken to adapt the technology.**

**There are four major hypotheses that support the process of group acceptance of risky technical innovations. These four are the leadership, familiarization, diffusion-of-responsibility, and risk-as-value hypothesis. In order for risk-shift to occur, regardless of the particular hypothesis, a group discussion to the point of group consensus on the issue must take place beforehand; for without discussion and consensus the shift will not occur.**

**In the leadership hypothesis, it is believed that certain group members are viewed as both natural risk takers and group leaders who have an above average influence on the rest of the group membership. The risk-shift condition is believed to occur because these people are inclined to be more dominant and/or influential in the group discussions and consequently influence the group in the direction of accepting risk. However, a behavioral problem with the leadership approach is that leaders can be either conservative influencers or risk takers under certain circumstances. This brings us back to the extension agent's ability to explain adequately the nature of the risk involved: An effective group leader can play a very conservative role if he perceives that the extension agent does not know what he/she is talking about or has not adequately explained the risk involved. Once convinced that a suggested program is adequately organized and supported, leaders become effective promoters.**

**Current thought on the role of opinion leaders in village societies is that extension agents**

**should be made aware of the potential effect, negative and/or positive, leaders can have on the transference of new technology to group members.**

**Familiarization: Group discussion allows persons to become more familiar with the issue being discussed and consequently increases familiarity with the issue. As a result of becoming familiar with other group members' attitudes toward the risk, members will be even more willing to take a risk because they know where all the members stand on the particular issue. (Rogers: "There appears to be a pooling effect in media forums (groups) by which those members who begin at lower levels of knowledge, persuasion, or adoption gain more in these respects than do forum group members who begin at higher levels. Knowledge reduces risk".)**

**A group of fishermen (who have attained at least the minimum capacity to function together as a cohesive decision-making unit) in deciding whether or not to take the risk to adopt a new technology, should test the technology by discussing and becoming familiar with its stated objective - to improve production.**

**Diffusion of Responsibility: It is felt that group discussion and cohesion develops emotional bonds between members and frees the individual from full responsibility for his risky decision. An individual feels that his decision has been shaped by the group and if it fails, he is no worse off than the others since they will fail together. It is difficult for fishermen to establish strong emotional bonds with each other, even in many cases, when they are related. Short term groups will probably not develop strong emotional ties in any event.**

**This hypothesis cannot account for cautious shifts. The hypothesis does not specify how the creation of emotional bonds among subjects makes them less concerned about the negative consequences of risky decisions.**

**Most damaging of all appears to be the exchange of relevant information, not the**

**development of emotional bonds that is necessary for the risk-shift to occur.**

**Risk as Cultural Value: This hypothesis maintains that moderate risk has a cultural-value which develops during the life span of a group and consequently individuals come to view themselves as being as willing as their peers (within the group culture) to take risks. The major mode of implementation is peer pressure to conform the deviants who are not reflecting views of the majority of the group's members.**

**All of the hypotheses interact in varying degrees to produce the shift in small group decision-making.**

**Let's go back to familiarization and talk about that process, information exchange, feedback and group discussion.**

## **VARIABLES TO RISK TAKING**

### **Not Known or Understood - Not Within Fisherman's Managerial Competence**

**Fishermen may have heard but the comprehension of what it can do or the effective utilization of the new technology may require additional knowledge and skills which they are not lacking.**

### **Not Socially, Culturally or Psychologically Acceptable**

**A great deal is made in the development literature of those cases where a new practice or a new technique has not been adapted because it would upset too severely the established pattern of social or economic political organization.**

### **Not Technically Viable or Adequately Adapted**

**Very often the new recommended technology has not in fact been locally adapted or tested**

**under conditions which more closely approximate those faced by the fisherman. Fishermen are shrewd and can discern whether practice has had enough adaptive research and local testing to meet their unique local needs.**

### **Not Economically Feasible**

**Probably the biggest single cause of resistance to change is the unprofitability of the new technology as seen by the fisherman. Often the new technology requires the purchase of additional inputs to achieve the higher productivity and these inputs have a cost. Further, when the fisherman compares the expected output plus its associated income with the additional costs of the input, the balance sheet employing the new technology is found wanting.**

### **Not Available**

**often the new technology is imbedded in a physical item. Unless the new item is readily available to the farmer in quantities at the time he needs it, knowledge of its potential contribution to his fish production will not result in its adaption.**

<b>30 Minutes</b>	2. Divide into small groups and give each group a different problem (see examples) to search their own experience for specific examples of situations in which they encountered a similar problem and what solutions were used in that group situation. Would it work in host countries they're soon going to?
	3. Groups give presentations to large group on problems they had, experiences that were similar, and possible solutions:
	Examples:
	o To get outside organizations (including local governments, voluntary organizations and technical departments) to cooperate in fishery extension work.
	o To get local leaders to cooperate by social or religious factions or by other factional

	o To work in a community divided by racial or religious factions or by other factional rivalries.
	o To regain the confidence of a community once it has been lost.
<b>5 Minutes</b>	4. Trainer draws learnings from presentations that would apply to extension work. Asks for generalizations about groups from participants.
	5. Trainer now does summary of the three sessions on extension work. Conclude with the following:

**Relative advantage is the degree to which an innovation is perceived as better than the idea it supercedes. The relative advantage of a new idea, as perceived by members of a social system, is positively related to its rate of adoption.**

**Compatibility is the degree to which an innovation is perceived as consistent with the existing values, past experience, and needs of the receivers. The compatibility of a new idea, as perceived by members of a social system, is positively related to its rate of adoption.**

**Complexity is the degree to which an innovation is perceived as relatively difficult to understand and use. The complexity of an innovation, as perceived by members of a social system, is negatively related to its rate of adoption.**

**Trialability is the degree to which an innovation may be experimented with on a limited basis. The trialability of an innovation, as perceived by members of a social system, is positively related to its rate of adoption.**

**Observability is the degree to which the results of an innovation are visible to others. The observability of an innovation, as perceived by members of a social system, is positively related to its rate of adoption.**

**(Communication of Innovation by Rogers & Shoemaker)**

**After studying more than 1500 publications on the diffusion of ideas and the change process, Rogers and Shoemaker found that extensionists were more successful when they:**

- 1. Expend more effort in change activities with communities;**
- 2. Are community oriented rather than change agency oriented;**
- 3. Propose programs compatible with community needs;**
- 4. Have empathy with their communities and community members;**
- 5. Are similar to their community members;**
- 6. Work through opinion leaders;**
- 7. Have credibility in the eyes of their community;**
- 8. Increase their community's ability to evaluate innovations.**

**References:**

- "Training for the Cross-cultural Mind," The Society for International Education, Training and Research, Washington, D.C., 1980.**
- Everett Rogers and Floyd Shoemaker, Communication of Innovations: A Cross-Cultural Approach, New York Free Press, 1971.**
- Allen D.Jedicka, Praeger Publications, 200 Park Avenue, New York, 10017, Organization for Rural Development. 1977**

**Trainer's Note:**

- **See also The Fisherman's Business Guide, chapter two, "The Decision Making Process," and chapter seven, "Coping with Risk and Uncertainty."**

**Session T-71: Navigation and seamanship - electronics****Time: 7:30 AM****Goals:**

- **To acquaint trainees with the varied assortment of electronic navigation and fish finding gear available to the small-scale fisherman**
- **To enable trainees the opportunity to work with an echo sounder, understand its basic principles of operation, functions and design characteristics**

**Overview:**

**This session is particularly useful to the trainee who will be working in a fishing environment and to those whose work entails workshops of small-scale fishermen. Electronic fishing and navigation equipment is available to small-scale fishermen. Echosounders, previously very expensive pieces of equipment, can now be obtained for less than 1/3 the price of conventional outboard engines. The increased volume of fish catch does pay for the initial expenditure. Radio Direction Finders (RDF) are also available and also at a very nominal cost. The importance of upgrading a small-scale fishing enterprise is paramount in the overall development of the industry. By making available items of equipment that assist in safe navigation and increased production of fish, the need to over exploit fishing grounds decreases. Whereas, the ability of the small-scale fisherman to fish grounds never exploited opens up opportunities which before never**

**existed.**

### **Materials and Equipment:**

- **flip chart, markers, working fish finder/echosounder, Radio Direction Finder (RDF), navigation chart of local area**

### **Procedures:**

<b>Time</b>	<b>Activities</b>
<b>1 Hour</b>	1. Technical trainer starts with informational lecturette, using following outline:
	A. Orientation to Electronics
	1. What are they?
	2. How do they help?
	B. Electronics for the small-scale fisherman
	1. Radio Direction Finder (RDF)
	2. Radios - EPIRB
	3. Echosounders - Depth finders
	C. Basic Principles of Sound Transmission
	1. Sound waves
	- air
	- water
	2. Frequency
	- human
	- fish



	- echosounders
	3. High-Low Frequency
	D. Densities of Mass
	1. Changes with:
	- fish
	- seabed
	- thermoclines
	2. Returning Echos
	- hard/soft seabed
	- swim bladders in fish
	3. Thermoclines
	E. Transducers
	1. Types
	2. Physical shape and size
	3. Transducer location
	F. Transducers Frequency
	1. Size
	2. Depth
	3. Angle
	G. Echo Returns
	1. Seabed ratio 14:1
	2. Fish size
	3. Scale of noise

	5. Scale of paper
<b>1 Hour 45 Minutes</b>	2. Technical trainer now takes trainees out on fishing vessel where they take turns operating an echosounder and RDF.
<b>10 Minutes</b>	3. Trainer wraps up session tying in with other Navigation and Seamanship work. Reminding trainees that they will use echosounder in future fishing sessions and reef survey.

### **Trainer's Note:**

**Advance contact should be made with local fisherman or government agency for use of a boat with selectronic equipment aboard. If technical trainer does not feel comfortable doing this session, an outside resource should be found.**

### **References:**

- **Fisherman's Manual, World Fishing Pub. London 1976, 1982.**
- **FURUNO Electronics, Tokyo, Japan.**

### **Session T-72: Fish aggregating devices (fad) special project**

**Time: 10:30 AM**

### **Goals:**

- **To introduce a fishing system unique to pelagic fisheries**
- **To relate this system to small-scale and commercial fisheries**
- **To make trainees aware of uses of FADs in the fishing community**
- **To design and construct a FAD**

**Overview:**

**This session is to be done as a special project by a trainee. The importance of Fish Aggregating Devices to the fishing industry worldwide is becoming more apparent as its uses increase. Not only are industrial scale fishing operations benefiting, but also small-scale and subsistence level fishing. Linkages back to the Special Project Session of Fuels and Trolling for Spanish Mackerel are made.**

**Materials and Equipment:**

- flip chart, markers, wood working tools, bamboo poles, monofilament line

**Procedures:**

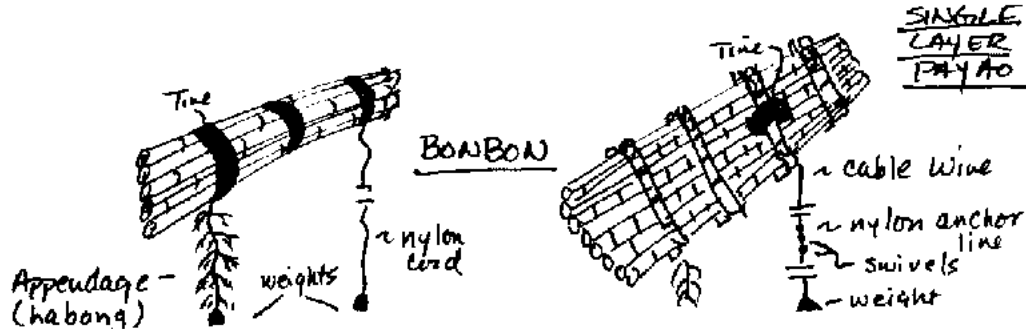
<b>Time</b>	<b>Activities</b>
<b>2 Hours</b>	I. Introduction to Fish Aggregating Devices (FADs).
	A. What is a FAD?
	B. How does it work?
	II. Styles of FADs
	A. Bamboo
	B. Steel
	C. Drum
	D. Hawaii Tire
	III. Design of the FAD
	A. Raft
	B. Appendage
	C. Anchor

	C. Anchor
	D. Anchor connectors
	IV. Small-Scale Fishing
	A. Hand lining
	B. pole and line
	C. Multiple hook and line
	D. Drift gill nets
	E. Ring nets
	F. Bag nets
	V. Industrial Scale Fishing
	A. Purse Seine
	B. Pole and line
	VI. Market Set-up
	A. Organization
	B. Harvest
	C. Estimated Costs
	VII. Construction of a FAD (bamboo)
	A. Design
	B. Construction of a raft
	C. Construction of appendages
	D. Construction of anchor system
	The following is a sample of presentation given during pilot program.

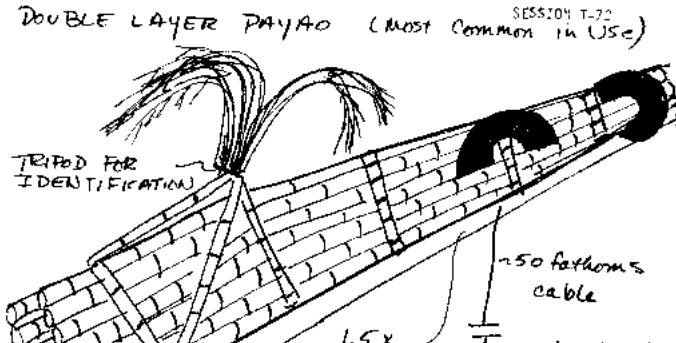
## **FISH AGGREGATING DEVICES (FAD) or "PAYAO"**

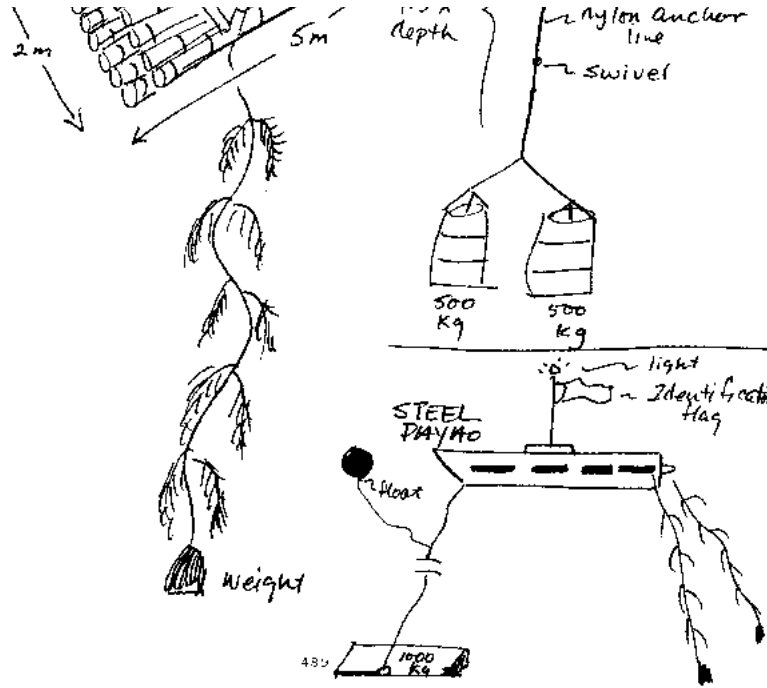
**What is a Payao? An anchored, floating raft which supports submerged bamboo or coconut fronds or some other appendage.**

**The appendage provides habitat for phyto- and zooplankton which attracts small pelagic fish. The small fish which are feeding around the FAD, in turn, attract larger species of fish, such as tuna.**

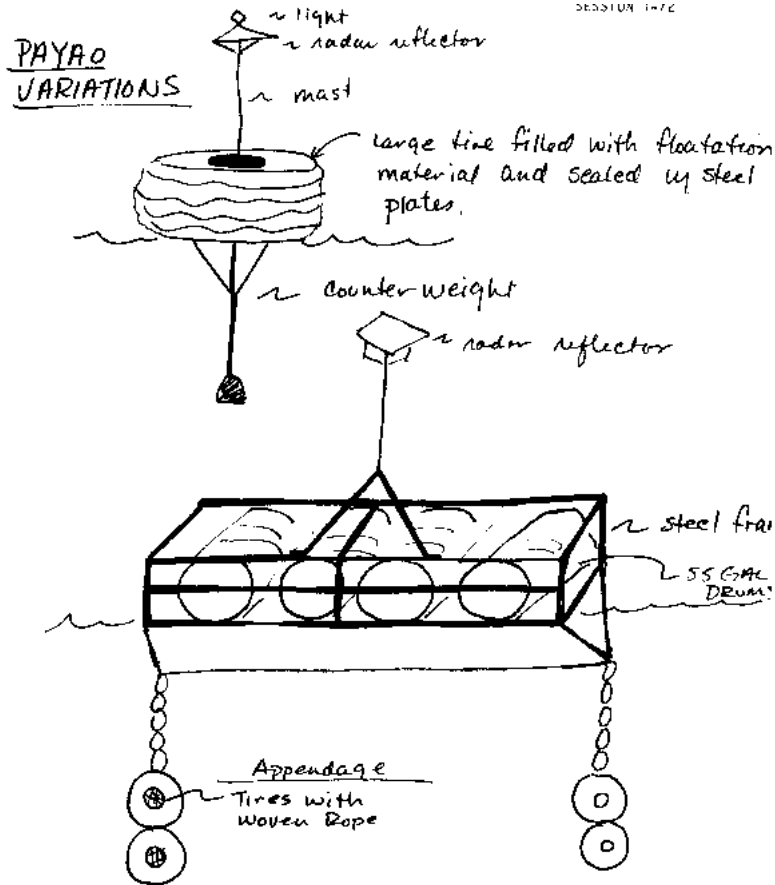


**The evolution of the "PAYAO"**





**Double layer payao (most common in use)**



**Payao variations**

**Small-Scale uses: 1) hand lining, 2) pole and line, 3) multiple hook and line, 4) drift gill nets, 5) ring nets, 6) bag nets.**

**Commercial uses: 1) tuna fishing with purse seine involves caretaker and vessel owner with the caretaker taking 20% of the catch, 2) membership/ cooperative venture, 3) municipality project.**

**Harvest time from setting: 20-30 days.**

**References:**

- **Project Fund Proposal, Peace Corps, Mark Grandoni, 1980**
- **The Commercial Harvesting of Tuna Attracting Payaos: A Possible Boon for Small Scale Fishermen. E.O. Murdy, 1980. ICLARM Newsletter; Also by same author.**
- **Tuna Purse Seining with the Use of Payao. T.P. Sanchez and F.C. Pastoral. Technical Service Division, Bureau of Fisheries and Aquatic Resources.**
- **Fishing Aggregating Devices. Steven Martinson, 1979. Special Report.**  
- Janet Kelly, PCV Papua New Guinea

**Session T-73: Anchoring techniques special project**

**Time: 4 PM**

**Goals:**

- **To make trainees aware of the principles of anchor setting and anchoring**
- **To present an overview of the different types of anchors**



**Overview:**

**This session is presented by a trainee for whom this is a special project. In this session trainees become aware of anchor setting and anchoring techniques.**

**Materials:**

- Flip chart, markers, anchors

**Procedures:**

<b>Time</b>	<b>Activities</b>
<b>1 Hour</b>	I. Anchor identification
	A. Danforth
	B. Plow share
	C. Mushroom
	D. Trawl
	E. Kedge
	F. Grappling Hook
	G. "R" Bar with pipe
	H. Sea anchor
	I. Bag of rocks
	J. Old auto parts
	II. Anchor Structure
	A. Fluke
	B. Shank

	C. Eye
	D. Shackle
	E. Shaft
	F. Tongue
	III. Anchor Setting
	A. Scope 3:1 - 5:1
	B. Currents
	C. Boat Size

**The following is a sample writeup of the special session done by trainee during pilot program.**

## **ANCHORING TECHNIQUES**

### **Anchor Structure:**

**Fluke - swings down to bite into bottom**

**Shank - long straight part of anchor**

**Shackle - attaches the chain to the eye of the anchor**

**Mousing wire - goes through end of pin in shackle around stem to prevent pin from loosening and unscrewing itself**

### **Principles of Anchoring:**

**An anchor operates similarly to the principle of a pick axe. When the pick is driven deep into the ground, it is very difficult to pull out at the same angle as the handle. However, by**

**lifting the handle, leverage is exerted which breaks the pick free.**

**By the same token, the anchor chain allows the pull on the anchor to be in line with the shank (handle). The chain can move and drag from side to side, and the anchor will remain lodged in place. If the chain is pulled up, the shank is lifted upright, loosening the grip of the anchor.**

**The amount of line and chain to be let out will vary according to the water depth, size of boat and weather conditions. Generally, a small boat should have 10-15 ft of chain and the rest will be line.**

**The ratio of line to water depth will vary from 3:1 to 5 or 6:1. Greater amounts of line should be let out for increased winds and rougher weather.**

#### **Setting Anchor:**

**The anchor should be kept in the bow of the boat, the chain and line stacked neatly. Often the line will be marked every 10 feet so you know how much line has been played out at any one time.**

**Bring the boat to the spot where you want to set the anchor. Allow for swings due to wind, current and tidal changes. Drop anchor over the bow and play out line quickly while backing the boat away. When the appropriate amount of line has been let out, fasten off with half hitches onto a cleat on the boat. Apply chaffing gear to the area of line which will rub against the boat - this can be a piece of hose, cloth or anything else which will protect the line. Take bearings of boat position so you will be aware if the anchor begins to drag. It is a good idea to carry a spare anchor in the boat.**

#### **Types of Anchors:**

- 1. Mushroom - for muddy bottoms**
- 2. Kedge - for large ships**
- 3. Plowshare - used by sport boats**
- 4. Danforth - sandy bottom**
- 5. Trawl anchor - for anchoring long lines or nets**
- 6. Grapnel - for anchoring onto reefs or other obstructions**
- 7. "Puerto Real Rebar" - made of railroad tie with rebar welded onto it**
- 8. Pipe filled with cement with rebar hooks**
- 9. Bag of rocks**
- 10. Old auto parts**
- 11. Blocks of cement**

**General rule for anchor weight is 1- 1 1/2 lbs anchor for each ton of the vessel's displacement.**

#### **Sea Anchors:**

**Sea anchors are used to position the boat with the bow into the wind and slow the speed in water depths too great for bottom anchoring. They include special parachute-shaped sea anchors dragged behind the boat, or any object, bucket, box which will allow water current to pass through and create a drag in the water.**

**- Rebecca Hoff, PCV Sierra Leone**

**Session T-74: Project planning - goal setting**

**Time: 7:30 PM**

**Goals:**

- **To integrate the technical material, problems identified and personal learnings into a clarified set of personal and project goals and objectives**
- **To write immediate project goals and those in three months**
- **To identify and list resources needed to accomplish goals**
- **To identify personal learning goals for the next three months**
- **Review learnings and accomplishments in last five weeks of training**

### **Overview:**

**In this session trainees bring together technical learnings/materials and personal learnings into a clarified set of personal and project goals and objectives. They write immediate project goals for the rest of training and write possible goals for next three months. They make a list of resources they are able to ascertain. They will need to accomplish goals they have set for themselves. They will review accomplishments in last five weeks of training and note their own progress.**

### **Materials:**

- **Flip charts, markers, trainees bring journals**

### **Procedures:**

<b>Time</b>	<b>Activities</b>
<b>20 Minutes</b>	1. Trainer opens the session with a brief lecturette on the need for planning for effective Peace Corps Service. Sample lecturette outline follows:

## **Introduction to Planning (Sample Outline for Lecture)**

### **I. The ability to plan is a key characteristic of a professional.**

#### **A. Need for Planning:**

- 1. Necessary for effective Peace Corps Service.**
- 2. Necessary for most host country agencies.**
- 3. Underdevelopment is as much due to poor planning as it is to resource limitations.**

#### **B. The planning process begins with the establishment of clear objectives.**

### **II. The formation of clear useful objectives.**

#### **A. The need for clear objectives.**

- 1. The desired outcome of the project must be clear to plan necessary activities and tasks.**
- 2. Evaluation of project effectiveness requires clear objectives.**

#### **B. The qualities of meaningfully stated objectives.**

- 1. They identify in concrete terms the terminal project situation or behavior and give a picture of what should exist at the end of the project.**
- 2. They identify any pertinent conditions or assumptions that would affect the achievement of the project objectives.**
  - a. To forewarn participants of any possible problems**
  - b. To avoid misunderstandings when objectives are not met due to outside factors.**
- 3. They specify the criteria used to establish acceptable project performance, giving a statement of specific quality, quantity or time necessary for fulfillment.**
- 4. They are stated in concrete non-ambiguous terms: a. Terms often used in objectives that are open to many interpretations.**

- To Motivate people to fish,**
- To Train people in fish marketing,**
- To Understand the essentials of fishing**
- To Encourage fish capture**

**b. Terms open to fewer interpretations:**

- **To Establish a salt making facility capable of producing 1,000 pounds of salt each year,**
- **After participating in the training course participants will be able: To Describe and Demonstrate the following essential skills of a fish extensionist,**
- **After training they will be able to make a list of most common techniques used in anchoring**

**Trainer makes linkages to prior sessions and tells trainees that all the information they have gathered over the past five weeks is to be incorporated into a series of plans for the future.**

<b>15 Minutes</b>	2. Ask each person to review and list their major learnings during training.
<b>15 Minutes</b>	3. Ask each person to review the learning goals they had set for themselves at the start of training and put into a written statement if these goals were reached.
<b>40 Minutes</b>	4. Ask each person to then fill out the following matrix, which considers the specific volunteer project assignment:
	a) When I get to my site, I plan to do the following things first: Goals To Do's By When Resources Needed
	b) Where would I like to be on my project in three months?: Goals To Do's By When Resources Needed
	c) To get to those three month goals, I plan to have accomplished the following in the first six weeks: Goals To Do's By When Resources Needed
<b>10</b>	5. After trainees have completed their matrix. ask them to review the "goals". "to do's"

<b>Minutes</b>	and "resources needed".
	o Is the plan realistic, feasible?
	o What will I do to measure success?
<b>15 Minutes</b>	6. Ask trainees to consider next what they want to set as personal learning or action goals for the next three months, and considering the additional training (language) they will get once in-country.
<b>15 Minutes</b>	7. When trainees have completed their lists, ask them to go back into their same pairs and review each person's plan. The group should be instructed to share only what they feel comfortable sharing.
<b>15 Minutes</b>	8. Close the session by asking:
	a. What have you learned by this process?
	b. Will you be able to apply these tools in your work with the community?

### **Trainer's Note:**

**The trainer must stress to trainees at the start of activity how important it is to be able to conceptualize what you want to happen with your project six weeks, three months, six months down the road. This process of conceptualization also helps identify major information gaps and resource constraints.**

### **Session T-75: Boat repair, construction and maintenance II**

**Time: 7:30 AM**

### **Goals:**

- **To provide trainees with interior vessel maintenance time and increase their awareness**



## for proper wooden boat maintenance schedules

- To increase competence in working with basic wood working concepts in boat repair and construction
- To become aware of simple fastening techniques utilized in repair and construction

### Overview:

This session is another in a series of basic wooden boat maintenance, repair and construction. Work from the previous session on boat repair maintenance and construction are reflected upon, woodworking skills and proper tool handling are again called to attention of the trainees. It is necessary to have trainees work upon a small-scale vessel that does need work done.

### Materials and Equipment:

- Flip chart, markers, woodworking tools, nails, screws, exterior/ interior boat paint, brushes, small-scale fishing boat(s) 18-24 feet

### Procedures:

Time	Activities
<b>10 Minutes</b>	1. Technical trainer introduces session and reviews goals for session. Review previous boat repair session where repair work needed to be done was identified on boat.
<b>10 Minutes</b>	2. Trainer asks for trainee to volunteer to go over proper use of woodworking tools as a refresher for everyone.
<b>3 1/2 Hours</b>	3. Trainer lists work to be done on vessel(s)
	4. checking wood for soundness/rot

	a. checking wood for soundness/rot
	b. scraping
	c. filling holes
	d. replacement of bad wood/planks/ribs
	e. construction of replacement piece (ribs, planks)
	f. installation
	g. painting, puttying

**The trainees are assigned tasks that they are to do for repairing the boat(s). Under the watchful eye of the trainers and with specific individual instruction from time to time trainees proceed to make repairs.**

#### **Trainer's Notes:**

**It is important for trainees to do all steps outlined in trainer list, Section 3 of this session.**

<b>10 Minutes</b>	4. Trainer wraps up session and links to next boat repair and maintenance session.
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#### **References:**

- **Bob Whittier, Boat Maintenance, 1980. International Marine Pub. Camden, Maine**
- **John Scarlet, Wooden Boat Repair Manual, 1981, International Marine Pub. Camden, Maine**

#### **Session T-76: Construction of scarf joint special project**

**Time: 4 PM**

#### **Goals:**

- **To provide step-by-step procedures for construction of a scarf joint**
- **To familiarize trainees with proper techniques used when installing a scarf joint**
- **To provide trainee with technology transfer and group presentation skills**

### **Overview:**

**This session is to be done by a trainee as a special project. There is a need for proper boat building techniques in developing countries, and the "how to's" of a well constructed scarf joint is probably the most important skill needed in boat building that trainees can take with them to their countries of assignment. Procedures:**

<b>Time</b>	<b>Activities</b>
<b>1 Hour</b>	1. "How to build a scarf joint". Trainee introduces session and provides examples of what a scarf joint is.
	2. Trainee gives step-by-step presentation of how to build a scarf joint. Dry run.
	3. Trainee reviews process with other trainees and now applies glue to wood, attaches wood clamps, and nails, pre-set nails into scarf joint.
	4. Review of session (linkage to boat-building session)

### **Reference**

- **Boat Building with Plywood. Glen Witt. International Publishing Company. 1978.**

### **Session T-77: Women in development - part I**

**Time: 7:30 PM**

### **Goals:**

- **To acquaint trainees with WID issues**
- **To heighten trainees' awareness of the significant role women play in the development process**
- **For trainees to look at their work as marine fisheries extensionists and the role that women will play in the success of their program**

### **Overview:**

**Several WID readings are passed out to trainees four days prior to the WID Sessions. Specific reading assignments are given to country-groups of three, with each group told to prepare a presentation to the large group at this session. Reading assignments are given to each group by topic, i.e. women and health, Peace Corps and WID, etc.**

**In this session, trainers have the opportunity to relate personal experiences from their own work in developing countries. It should also be stressed during the discussions that PCV men as well as women need to see themselves as role models in their countries of assignment - for how women should be treated and for what women are capable of achieving.**

### **Materials:**

**• Peace Corps' Programming and Training Journal, Vol IV. No. 6, 1977. Programming for Women and Health. Africa Report: Special Issue on Women and Africa. March-April 1981 Fairy Tales and Facts: Economy, Family, Fertility and the Female. Counting in the Women. Women in Development: Peace Corps Policy. Life on the Global Assembly Line. Integrating Women into Development. The NFE Exchange: Women in Development.**

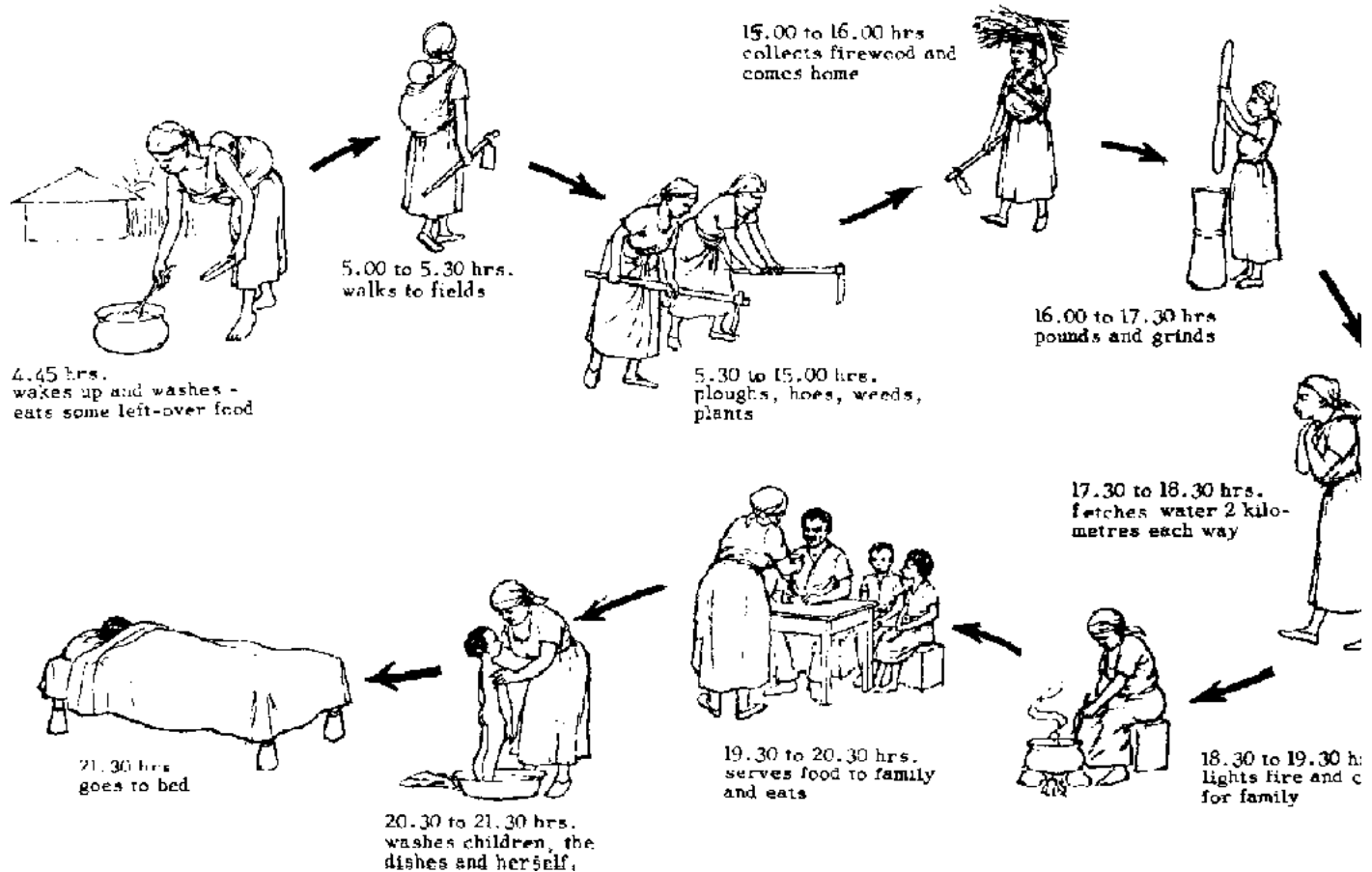
### **Procedures:**

<b>Time</b>	<b>Activities</b>
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<b>2 Hours</b>	1. Small groups have been previously assigned presentations
<b>15 Minutes</b>	for larger group. They will have completed reading assignments and be ready to make presentation which lists at least six to nine points from the readings which could affect their programs. Each presentation should not take over 30 to 40 minutes including group discussion.
<b>5 Minutes</b>	2. Trainer draws closure to the session by emphasizing the predominant role that women play in the processing and marketing of fish in most developing countries.

**Linkage is made to WID - Part II with mention that strategies for assuring involvement in small-scale development programs will be looked at.**

**Although the order in which her tasks are performed may vary, the day for a rural woman during the busy agricultural seasons is likely to be along the following lines:**



Figure

**Session T-78: Boat repair, construction and maintenance III****Time: 7:30 AM****Goals:**

- **To further familiarize trainees with basic wooden boat repair and maintenance.**
- **To have trainees acquire proper woodworking tool handling techniques and to reinforce those skills**

**Overview:**

**From the previous session trainees should have an understanding of the condition of the fishing vessel they are engaged in repairing. To some trainees this is all very basic, to others it is a major renovation. It pays to bear in mind the need to utilize those trainees with previous woodworking skills as transfer agents for those who have as yet few.**

**Materials and Equipment:**

- **Flip chart, markers, woodworking tools, vessel to be repaired, marine paint, brushes**

**Procedures:**

<b>Time</b>	<b>Activities</b>
<b>15 Minutes</b>	1. Technical trainer reviews work accomplished in Sessions 67 and 76.
<b>2 Hours</b>	2. Trainees complete repairs, finish scraping, sanding and caulking.
<b>1 Hour 30 Minutes</b>	3. Vessel(s) are painted both inside and out.

**Trainer's Note:**

**The complexity of the repair to be done on the boat is the determining factor in how much time will be spent on the session. It is important that there be enough vessels for trainees to work on and also that work to be done is of a nature to offer some "challenge".**

### **Session T-79: Fiberglass techniques special project**

**Time: 4 PM**

#### **Goals:**

- **To provide step-by-step procedures for the proper application of fiberglass resin and matting**
- **To familiarize trainees with proper safety techniques to use when working with fiberglass**
- **To provide trainees with technology transfer and group presentation skills**

#### **Overview:**

**This session is to be done by a trainee as a special project. The techniques employed in the correct preparation of fiberglass and its application are needed in developing countries. By providing the trainee with proper steps in mixing preparation, laying matting and application of resin they will be able to transfer these techniques as PCVs.**

#### **Materials:**

- **Flip chart, markers, fiberglass resin, hardener, paint brush, mixing bowl/tray, sand paper, wood**

#### **Procedures**

<b>Time</b>	<b>Activities</b>
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<b>15 Minutes</b>	1. Trainee provides presentation on correct fiber glassing techniques, methods and application and safety.
<b>5 Minutes</b>	2. Trainee demonstrates cutting of matting.
<b>5 Minutes</b>	3. Trainee demonstrates the proper mixing of resin to harder/catalyst.
<b>5 Minutes</b>	4. Trainee demonstrates correct application of resin to fiberglass matting cloth.
<b>5 Minutes</b>	5. Proper sanding technique to piece of wood (with fiberglass dried prior to session) demonstrated to trainees.
<b>20 Minutes</b>	6. Each of the trainees now:
	a. cuts piece of matting
	b. mixes resin to proper consistency
	c. applies resin to matting correctly as previously demonstrated.
<b>15 Minutes</b>	7. Technical trainer does wrap up of boat maintenance construction and repair sessions.

**Reference:**

• **The Fiberglass Repair and Construction Handbook. Jack Wiley. International Marine Publishing Company. 1982.**

**Session T-80: Women in development - part II****Time: 7:30 PM**

**Goals:**

- **To develop strategies for involving women in small-scale development programs**

**Overview:**

**The role of women in small-scale fisheries development efforts should be reflected in the project design and supported by project documentation throughout the life of the project. In this session, trainees develop possible strategies for accomplishing this objective.**

**Materials:**

- **Markers, flip charts, tape**

**Procedures:**

<b>Time</b>	<b>Activities</b>
<b>30 Minutes</b>	1. Trainer gives the following lecture.
	A. Information gathering
	- The division of labour by sex in tasks related to scope of the project.
	- The role of women in decisions likely to affect the success of the project.
	- The extent to which existing extension services reach women.
	- The existence of grassroots-level women's groups which might serve as vehicles for project activities.
	- The social services available in the project area, including water supply, health facilities, schools, housing - how do these particularly affect women? (Day care centers?)
	- The anticipated impact of the project on women's tasks (i.e. household, farming, fishery).

	income, generation) and possible conflicting demands on women's time, especially during peak seasons.
	- The percentage of income (household) contributed by women, and its source.
	- The education level and functional literacy of women, men and children.
	- Opportunities which exist for women in community-level adult education programs.
	<b>B. Project documentation</b>
	- Should describe the situation before project implementation and the changes during implementation and give indications on the future situation.
	<b>C. Project design</b>
	<b>1. Training</b>
	- Does the project contain a training component, and if so, are women benefiting from the program, particularly where the training relates to tasks traditionally performed by women?
	- Do training programs for women reflect the actual roles women play in processing and marketing?
	- Do training programs for women take account of the potential roles women are expected to play in management, etc?
	<b>2. Monitoring and Evaluation</b>
	<b>a. Monitoring project operations</b>
	- Have village women been consulted in the project identification, formation, decision-making, monitoring and evaluation?
	- Is women's component on schedule relative to the rest of the project?
	- What percentage of project funds are earmarked for women? Actually distributed to women?
	<b>b. Monitoring project performance</b>

	- The percentage of women among participants in project activities by type.
	- The ratio of female participants to total potential female participants (females of eligible age within project area)
	- Socio-economic group of female participants.
	- Percentage of women among persons trained.
	- Percentage of women among persons for whom jobs created.
	- Percentage of women among persons receiving credit.
	- Percentage of women among members and leaders of groups organized.
	c. Monitoring project impact
	Economic
	- Percentage increase in income from women's productive activities.
	- Percentage increase in individual income of female participants.
	- Net change in female employment (type, increase/decrease)
	Social
	- Changes in the division of labour by sex (including workload).
	- Changes in the distribution of production resources (credit, inputs, technology).
	- Changes in the distribution of knowledge and skills.
	- Changes in women's community participation.
	- Apparent stresses within intra-familial roles.
<b>1 Hour 30 Minutes</b>	2. Trainer divides group into trios by country to develop a list of strategies for their own programs for integrating women into the design and implementation. Group reports out with strategies listed on newsprint.
<b>10</b>	3. Trainer draws closure to the session. linking back to the sessions on extension and

**Minutes** social cybernetics.

### **Trainer's Notes:**

**Since the reference for this session is the AID guidelines for involving women in AID projects, it's important that the trainer draws from past Peace Corps experience and/or experience from small-scale development projects sufficiently during the lecture so that trainees have enough of a framework for activity 2.**

### **References:**

- **AID Program Guidelines: WID This session developed by Bordman-Joyce, 1982.**

**Session T-81: Fish economics and marketing/fish marketing survey - special group project**

**Time: 7:30 AM**

### **Goals:**

- **To familiarize trainees with market survey techniques**
- **To allow trainees the opportunity to record data on local fish landings and sales**
- **To acquaint trainees with marketing price structures and market inspired changes**
- **To have trainees practice interview skills and market data recording techniques**
- **For the trainee assigned the special group project to practice and build on leadership, communication and technology transfer skills**

### **Overview:**

**This session is to be done as a special group project by a group of trainees with a trainee group leader. The PCV in-country will be involved primarily with the economics of the local small-scale fishery. The marketing aspect has been given a low priority in previous**

**years. It is the responsibility of the PCV to be aware of minor and major shifts in the local fish market price structures - both current and past, in order to determine preferences in the local community/region for fish - processed, unprocessed, etc. By ascertaining the local preferences - new fish types, different processing styles, techniques can be developed to enhance the marketing of fish. This special group project is involved with collecting data from local fish markets, fish sellers and fishermen.**

### Materials:

- flip chart, markers

### Procedures

Time	Activities
<b>4 Weeks prior to session</b>	1. Four weeks prior to this presentation trainee leader determines what data needs to be collected for market survey. He/she sets up format for interviews and determines who should be interviewed. Technical trainer goes over the above steps and either approves plan or has plan revised.
<b>3 Weeks prior to session</b>	2. After technical trainer approves steps for data collection trainee leader with other trainees in group collect data.
<b>1 Week prior to session</b>	3. After data is collected trainee leader compiles data and processes data into report.

<b>1 Hour</b>	4. Lead trainee gives presentation showing group the process for determining what data to gather, from whom, the interpretation of data and the use of this data in forecasting future marketing trends.
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### **Trainer's Note**

**Normally a market survey would take a much longer period of time, and the data would be more valid; however, for the purpose of having trainees understand the process, four to five weeks is adequate.**

### **Session T-82: Small-scale fishing trip II, preparation**

**Time: 9 AM**

#### **Goals:**

- **For trainees to organize and begin preparation for the next day's fishing trip**

#### **Overview:**

**This session is the preliminary work session in preparation for Session 86. The trainees have previously organized and prepared for a fishing trip; this session allows trainees to repeat preparation steps.**

#### **Materials:**

- **Flip chart, markers**

#### **Procedures:**

<b>Time</b>	<b>Activities</b>
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<b>1 Hour</b>	1. Technical trainer previews upcoming fishing trip, Session 86. Covers the following:
	a. departure time
	b. type of fishing on trip
	c. personal gear to prepare
	d. food to prepare
	e. fishing gear to organize
	f. fish processing handling and care
	g. miscellaneous
	h. assigning groups

### **Trainer's Notes:**

**When assigning groups, make sure trainees are in different preparation teams/roles from the first trip.**

### **Session T-83: Interviews/net mending**

**Time: 2:30 PM**

### **Goals:**

- **To conduct individual interviews**
- **For trainees to practice net mending**

### **Overview:**

**This session follows same format as previous Interview/Net Mending session.**



**Session T-84: Navigation and seamanship II****Time: 7:30 PM****Goals:**

- **To provide additional exposure to trainees in navigation skills**
- **To allow trainees to plot their "own" course using proper navigation tools**
- **To familiarize trainees with additional navigation systems**

**Overview:**

**This session provides trainees the opportunity to practice navigation skills, compass work and chart work. Discussion of traditional/electronic navigation systems that small-scale fishermen utilize throughout the marine world also takes place.**

**Materials and Equipment**

- **Flip chart, markers, navigation charts of local waters, parallel rules (1 per 2 trainees), compasses, dividers (1 per 2 trainees), and local tide tables if available Trainer's Notes:**

**This session should reference the following days fishing trip (Session 85) for navigation practice. Again, if the trainer does not feel competent in navigation, a local resource should be brought in.**

**Procedures:**

<b>Time</b>	<b>Activities</b>
<b>50</b>	1. Technical trainer reviews navigation charts using the following outline:

<b>Minutes</b>	
	A. Fishing ground destination
	B. Setting course heading
	C. Use of compass rose on chart
	D. Parallel rule, dividers
	E. Traditional navigation
	- Stars (celestial)
	- Wave/swell patterns
	F. Electronic
	- Loran-C, Decca
	- Sat-Nav Satellite
	- Radio Direction Finders - RDF
<b>30 Minutes</b>	2. Trainees divide into small groups and review navigation charts. Each group plots a course for the following days fishing trip.
<b>30 Minutes</b>	3. Small groups share their proposed courses, with large group, stating their reasons for plotting these courses.
<b>10 Minutes</b>	4. Technical trainer reviews courses and makes appropriate remarks, leads into next session.

### References:

- **Dutton's Navigation and Piloting, E.S. Maloney. Naval Institute Press. Annapolis, Md. 1981.**

### Session T-85: Small-scale fishing trip II

**Time: 4:30 AM**

**Goals:**

- **To provide trainees an opportunity to reinforce skills learned in technical and special project sessions**
- **To provide trainees additional time in which to practice skills**

**Overview:**

**This session reinforces previously practiced skills. Conditions may vary i.e., weather, availability of fish, etc.**

**Materials and Equipment:**

- **Personal Flotation Devices (PFD), fishing gear and apparatus, food for X people, ice for fish, ice box, fish processing, handling and care equipment, fillet and cleaning knives, drinking water, first aid kit, AM/FM radio for weather, blanket for seasick trainees**

**Procedures:**

<b>Time</b>	<b>Activities</b>
<b>12 Hours</b>	1. Fishing trip will include the following:
	a. Fishing trip
	- trolling to fish grounds
	- hand line
	- deep line
	- long line

	- long line
	- nets
	<b>b. Navigation (see Sessions T-50 and T-84)</b>
	- charting course
	- helmsmanship
	<b>c. Diesel maintenance</b>
	- oil, water, belts, hoses
	- checking shaft, rudder, steering
	<b>d. Fish processing handling and care (Session T-51)</b>
	- cleaning of fish
	- proper icing
	<b>e. Clean-up (fishing gear and vessel).</b>

