The People's Republic of Bangladesh

Ministry of Irrigation, Water Development and Flood Control

BANGLADESH FLOOD ACTION PLAN

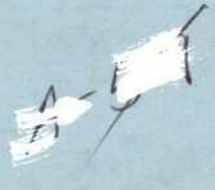
FAP 16 Environmental Study

Environmental Impact Assessment Skills Training Work Shop

MASTER TRAINING FILE

SECTION III

September 1993



ISPAN
IRRIGATION SUPPORT PROJECT FOR ASIA AND THE NEAR EAST
Sponsored by the U.S. Agency for International Development

The People's Republic of Bangladesh

Ministry of Irrigation, Water Development and Flood Control

BANGLADESH FLOOD ACTION PLAN

FAP 16 Environmental Study

Environmental Impact Assessment Skills Training Work Shop

MASTER TRAINING FILE

SECTION III

September 1993

MODULE 3 - 11
EXERCISE, HANDOUT AND OTHER MATERIALS

HOUSEHOLD SURVEY FOR EIA

Background

Household survey is aimed at generating baseline data for doing Environmental Impact Assessment. EIA team members first identifies data available and further data needs to be collected from the field in the light of EIA Guidelines. Field survey instrument in the form of resource questionnaire is designed covering information in the field of (a) sociological aspects, (b) water, sanitation and health, (c) navigation, (d) terrestrial habitat, (e) forest and homestead vegetation, (f) livestock, (g) fishery and (h) hazards and risk assessment.

Sampling Method for Household Survey

Mouza as the smallest administrative unit considered for the survey. These mouzas may be selected on the basis of a multi-stage stratified random sampling method. Stratification involves grouping of mouzas by size in area, by density or number of households in the mouza, socio-economic class and land elevation pattern. These will serve the objective of achieving representativeness of each area in terms of agro-ecological as well socio-economic condition. Number of mouzas and households to be selected will depend on the resource and time availability. Sample mouzas will constitute the Primary Sampling Unit (PSU) and the sample household as the Ultimate Sampling Unit (USU) for conducting interview.

Household Selection Criteria

In sampling the mouza for household survey, the initial step is to list the mouza within the proposed project by area, number of population & households from Population Census, 1991 published by BBS (April 1992). The villages in the study area may be stratified on the basis of land elevation into three groups, i.e. low with less than 1.83 m above mean sea level, medium-low with 1.83 m to 2.13 m and medium high with elevation above 2.13 m. Land level classifications were delineated for the project area prepared on the basis of contour map of BWDB. The sample size may be selected within 5% of total household of the project area. This sample size had proportionately distributed among the mouzas according to their respective household number. This should be statistically valid in selecting sample size. Households are further stratified on the basis of occupational groups.

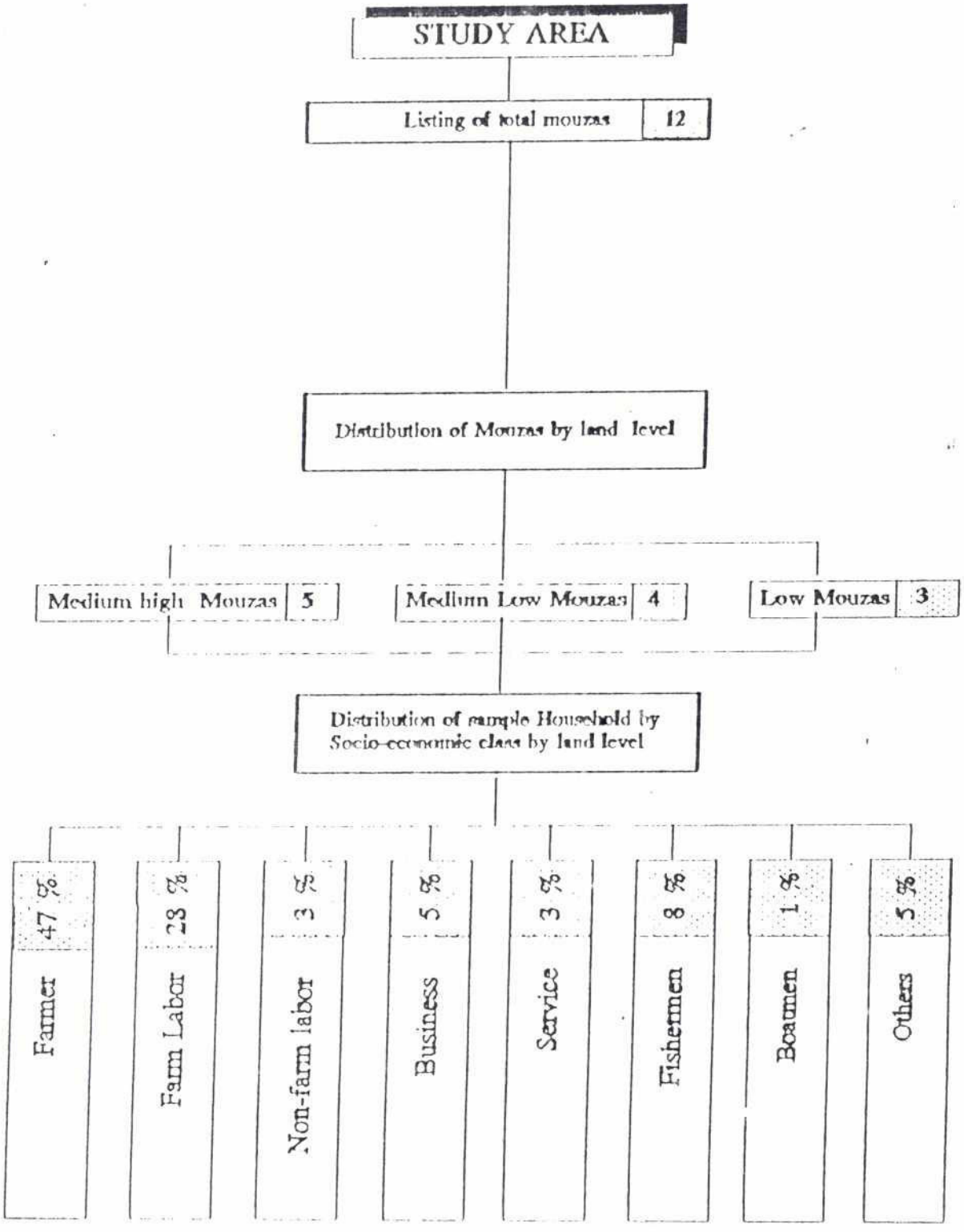


Figure 1 Stratified sampling stages for EIA baseline survey.

Exercise 5

Given the attached descriptive information from Tangail Compartmentalization Project your team should identify the potential publics (that is communities or interest groups) and individuals who should be included in a Peoples Participation Program (PPP).

Attached are three tables and a map. Review the information in the three tables and determine how you would use it to identify these publics and individuals as a first step in developing a PPP. Then identify the potential publics and key individuals.

Table 5.18 Total Area, Households and Population of the Project Area by Subcompartments

Subcompartment No.	Area (km²)	No. of Mouzas/ Ward	No. of Households	Estimated Population[1]	No. Males	No. Females	Population Density (/km²)
1	6.9	5	1,409	8,451	4,349	4102	1228
2	12.8	15	2,497	14,984	7,710	7274	1171
3	6.3	9	3,036	18,215	9,373	8842	2891
4	4.2	2	3,031	18,186	9,358	8828	4351
5	7.5	9	2,171	13,028	6,704	6324	1730
6	2.4	6	297	1,784	918	866	740
7	3.6	4	484	2,903	1,494	1409	809
8	9.0	7	1,523	9,138	4,702	4436	1011
9	6.1	7	1,132	6,792	3,495	3297	1121
10	4.9	6	597	3,580	1,842	1738	735
11	11.3	12	2,901	17,406	8,956	8450	1547
12	10.2	11	2,410	14,459	7,440	7019	1416
13	4.3	7	692	4,150	2,135	2015	976
14	11.4	12	1,858	11,150	5,737	5413	976
15	6.9	15	1,481	8,884	4,571	4313	1288
16	2.6	6(ward)	1,706	10,238	5,268	4970	3938
Lohajang Flood Plain (LFP)	19.7	8	4,514	27,082	13,935	13147	1375
Total CPP Area	139.0	135	31,739	190,430	97,989	92442	1465

[1] Population densities and total population have been calculated using the population figures from the Small Area Atlas of BBS (1991), Population Census and FAP 19 GIS-calculated mouza areas.

Source: ISPAN, GIS database for the CPP (1992)

Table 5.19 Main Occupation of Household Heads in the Project Area

Occupation	Percent of Household Head					
	Project Area			Adjacent Area		
	Rural (N=5918)	Fishing Villages (N=274)	Urban (N=1398)	Rural (N=7263)	Fishing Villages (N=249)	Urban (N=504)
Agriculture	28.5	--	6.3	37.2	0.4	17.8
Agricultural Labor	14.3	--	2.8	14.7	--	8.7
Non-Ag. Labor	7.2	--	7.8	9.6	--	11.3
Service	7.6	--	29.2	8.5	--	6.9
Trading/ Business	8.6	--	18.6	8.5	--	24.8
Fishing	0.1	98.2	2.5	0.1	99.6	--
Inherited Community Profession	15.0	--	3.5	6.6	--	14.3
Transport Worker	9.5	--	14.8	6.1	--	7.9
Others	9.2	1.8	14.5	7.2	--	4.3

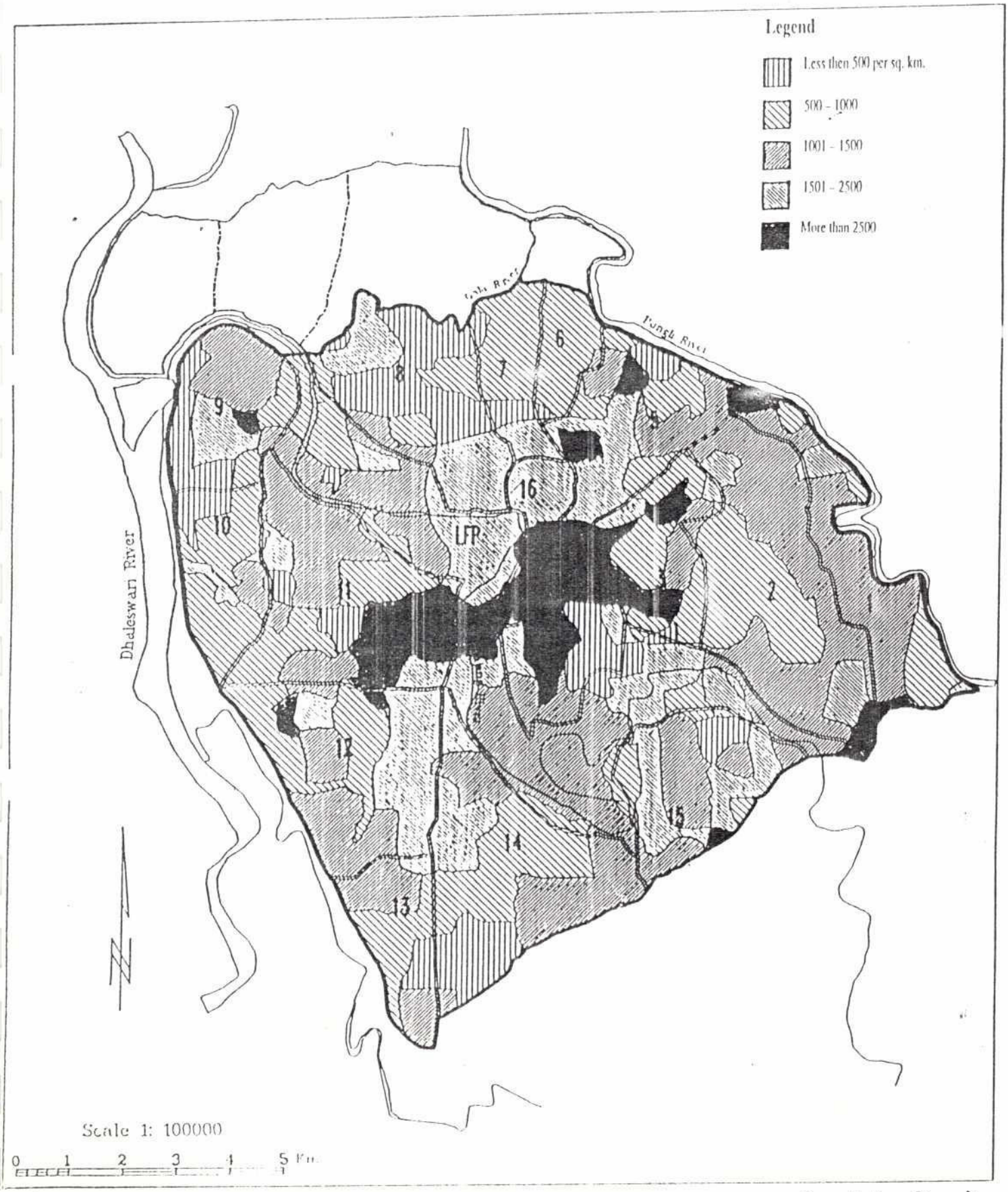
N = number of household heads
Source: FAP 20 (1992c)

Table ~~5.20~~ 3 Classification of Sample Households According to Land Ownership (of Cultivated Land) in the Project and Adjacent Areas

Category	Project Area				Adjacent Area			
	Household		Area		Household		Area	
	No.	%	Ha	%	No.	%	Ha	%
Landless-1 (own no cultivable land)	05	3.8 (3.8)	-	-	08	6.1 (6.1)	-	-
Landless-2 (own up to 0.020 ha cultivable land)	01	0.8 (4.6)	0.012	-	-	-	-	-
Landless-3 (own 0.024-0.202 ha cultivable land)	11	8.3 (12.9)	1.43	1.5 (1.5)	08	6.1 (12.2)	0.88	0.7 (0.7)
Total landless	17	12.9 (12.9)	1.45	1.5 (1.5)	16	12.2 (12.2)	0.88	0.7 (0.7)
Marginal Farmers (own 0.206-0.405 ha cultivable land)	34	25.8 (38.7)	10.93	11.7 (13.2)	29	22.1 (34.3)	9.63	7.7 (8.4)
Small Farmers (own 0.409-1.012 ha cultivable land)	54	40.9 (79.6)	34.21	36.4 (49.6)	48	36.6 (70.9)	31.60	25.4 (33.8)
Medium Farmers (own 1.016-2.024 ha cultivable land)	21	15.8 (95.4)	29.31	31.2 (80.8)	23	17.6 (88.5)	33.99	27.3 (61.1)
Large Farmer-1 (own 2.028-3.036 ha cultivable land)	03	2.3 (97.7)	6.76	7.2 (88.0)	10	7.7 (96.2)	24.07	19.3 (80.4)
Large Farmer-2 (own above 3.036 ha cultivable land)	03	2.3 (100)	11.21	12.0 (100)	5	3.8 (100)	24.46	19.6 (100)
Total large farmer	06	4.6 (100)	17.97	19.2 (100)	15	11.5 (100)	48.53	38.9 (100)
Total	132	100.0	93.87	100.0	131	100.0	124.63	100.0

Figures in parentheses indicate cumulative percentages
Source : FAP 20 (1992c)

Map 5.9



ISPAN

Population Density

Exercise 6

The purpose of the demonstration is to begin to understand interviewing techniques and how to apply them. Observe how the instructors correctly and incorrectly apply interviewing techniques. Use the techniques to appropriately ask your partner the questions handed out to you by the instructor. After 10 minutes give feedback to the interviewer and switch roles.

Exercise 7

Using Sections 4.3.1 and 4.3.2 of vol. 2 of the EIA manual, develop the process needed to design a People's Participation program.

Read the two sections attached and develop a flow diagram, on flip charts, of how the Peoples Participation Process would work. Use the publics you identified in the earlier exercise in order to develop a list of potential publics to participate on the People's Participation Committee.

- Provision of a representative institutional mechanism through which the local people, principally those who would be affected by the project, have the opportunity to decide whether or not the project should proceed. This can be accomplished through the People's Project Committee.

4.3.1 Preparing and Organizing Affected Social Groups:

The EIA Team social organizers should go into the field and begin this step as soon as possible after the decision is taken to move from a pre-feasibility to a feasibility study. The number of social organizers will depend on the size of the program area, but the minimal coverage probably should not be less than one two-person team (one male and one female organizer) for three villages (although this can be adjusted with experience, the socio-economic complexity of the program area and the projected effects of the project).

The primary purpose of the social organizers is to help the poorest and most powerless communities--landless cultivators, marginal fisherfolk, destitute women, tribal and religious minorities, groups dependent on gathering scarce or fragile resources, etc.--work out the implications of program interventions for them, articulate their needs and interests, choose their leaders, and frame their position on the variety of program packages (alternatives, mitigation, compensations, enhancements).

Using the innovative--and effective--local organizational approaches pioneered by BRAC and other NGOs in Bangladesh, the social organizers should facilitate the formation of an informal committee to act as a sounding board for each social group and the selection of a community leader or leaders to represent the specific community on the PPC. Each social group should decide who its leader/spokesperson should be and how he/she should be chosen.

Organizing the poor takes a major effort and considerable time, hence the very early use of social organizers in the project cycle. This is a necessary part of people's participation, however, and FCD/I project executing authorities must ensure that adequate time and resources are devoted to this effort.

Although the lowest echelons of rural society should be their first and primary focus, the social organizers should begin the process of stimulating more privileged groups - - landholders, women who have some assets, local merchants, leasehold fishermen, transport and ferry boat owners - to take an interest in the proposed program and organize to choose their spokespersons. All affected groups in an area, including women, have the right to be heard and to have representation on the PPBP. Indeed, as ample experience in Bangladesh shows, any attempt to exclude the more privileged groups will only create more obstacles to a successful program. The more privileged groups, however, will take less time to produce spokespersons, as they are already represented in *gushtis*, *samajs*, farmers clubs, and *wakf* committees.

It is essential that all EIA team members work quickly to gain a detailed knowledge of the project area and the people to be affected. Much of the information required for the social-economic analysis of the project area is also required for enabling public consultation and participation at the local level. Setting up a people's participation process includes the following information gathering steps already cited in the SIA section.

1. Development of a profile of the people who will be affected by the project.
2. A clear identification should be made of groups that depend on scarce or fragile resources for their livelihoods.
3. A thorough analysis of how women function in all production systems.
4. An identification of sites that are important for cultural, archaeological, historic, or religious reasons.
5. The identification of informal or customary rights to land use or to fishing sites, and to those social groups that depend on them for all or part of their livelihoods. Some of these rights can be seen as heritage rights, such as the past assignment of land or beels to customary religious endowments (*wakfs*) to support mosques, schools, or shrines.
6. An understanding of local social organization in the project area. In order to assess the degree to which formal leaders represent the population, it may be necessary to know how people define their community (*para*, *mauza*, or market networks) and identify their primary and secondary group loyalties. Are such loyalties located in patrilineal kinship groups (*gushtis*), castes (*jati* among Hindus), various kinds of *samaj* organizations (mosque based religio-social groups), charitable trusts (*auqaf*), local credit groups, co-operatives, market or commodity organizations, etc.? Part of the effort here should be to understand local social hierarchy and how social status is interpreted.
7. An understanding of how authority, leadership and mediation (*sailish*) are exercised within and among local social groups. How do local social groups connect with the wider worlds of governmental (political, administrative) authority and regional commerce? It is useful to make a list or data base of key local social groups and their leaders, e.g. *muruhbis*, *jyotedars*, *matabbars*, as well as local government leaders - the ward members and the Chairman of the Union Parishad, as well as panchayat members. Such a data base should also include local influentials: school teachers, the village imam, and others to whom local people look for guidance.
8. An understanding of which groups or leaders, or government bodies, have responsibility/control over access/management of natural resources (e.g., water rights, fishing rights, grazing rights, rights to forage, etc.). This should include an understanding of how such responsibility or control is exercised-- both formally and informally. Information here can also be held in a data base.
9. An identification local groups aware of the proposed project, of local levels of literacy, access to media sources (newspapers, radio, TV), and preferred sources of information.

10. A listing of the grassroots organizations in the project area, e.g. women's groups, formal or informal credit groups, labor organizations, and an examination of their track records and capabilities. This should also be done for NGOs already in direct contact with the affected population.
11. A listing of government officials, ministries, and programs in the project region, including officials responsible for health, agriculture, fisheries, forestry, credit, industrial development, and local government.

4.3.2 Establishing the People's Project Committee (PPC)

All FAPs that initiate feasibility level EIAs should provide for the structured involvement of local people in determining the environmental and social effects of programs, in planning mitigation and enhancements, in negotiating compensation, in deciding whether the project should or should not go ahead, and in planning post-feasibility phases of the project.

EIA teams should keep in mind that participatory strategies that adapt traditional consensual and mediation approaches probably are more likely to work in Bangladesh than imported models. The *samaj*, the *panchayat*, the *sailish* court, the *wakf*, even the contractual element in the patron-client system, are all deeply embedded rural institutions that could be drawn upon when enabling local participation in EIA work. Granted, some of these institutions in parts of the country have been taken over by local powerholders. Whre this is occurring, EIA teams should avoid the corrupted informal local body and work through leaders who have the real support of the people. Despite the abuses of some, everywhere in Bangladesh one can find respected elders or committed younger leaders who would put the interests of the community before their own.

The PPC should be organized at the project or program level, but in large and medium projects sub-PPCs should be organized at that level where the EIA study team determines that technically rational water management decisions should be made as part of the larger program (e.g. around branch streams in a larger watershed, local catchment areas in a larger polder, or at the compartment level). The decision about where to place the PPC, and sub-PPCs where necessary, should keep in mind the expectation that the PPC will continue to have a role in the post-feasibility phase of the project, including construction, operation, and management. The lower down the PPC is placed in a hydraulic system or subsystem, the greater will be the capacity of the affected resource user groups to be involved in the planning, implementation, operation, and maintenance of the program. Clearly experience in setting up the PPC will provide a body of on-going experience about how to do this better.

The hierarchy of program levels could look as follows.

1. FAP programs for small FCD/I (net area to 4,000 ha) would normally have a PPC at the upazila level or below, depending on the size of the program area. PPCs at the upazila level should be

organized and chaired by the Chairman of the upazila parishad or whoever occupies the position in the reformed ex-upazila structure. PPCs at the union or village level, for very small projects, should be chaired and organized by the union parishad Member. The number of people's representatives on the PPC at this level should be around twenty. Larger committees would become unwieldy. PPCs at the upazila, union, and village level, and sub-PPCs at these levels, would have representatives of the resource users groups to be affected by the project/ program as voting members of the Council. These affected groups would be identified by the EIA team and the social organizers would be responsible for facilitating the selection of group representatives, particularly from among the poor and powerless. Proof of election/selection as group representative should be presented in the form of a petition with the signatures/thumb prints of all household heads in the social group, including women where households are headed by women.

2. FAP programs for medium FCD/I (net area in the range of 4,000 to 10,000 ha) would normally have a PPC at the zila level, with sub-PPCs at lower levels organized around technically rational water management areas or structures. Here the PPC should be organized by the local MP, or if the area covers more than one constituency of the Jatiyo Sangshad (Parliament), by the senior MP. Districts might also convene PPCs for small projects which overlap upazila boundaries within districts. In this case, the local MP could appoint one of the upazila chairmen to organize and chair the PPC. Representation at this level of PPC should still be that of the affected resource user groups, elected upward from the sub-PPCs.
3. FAP projects for large FCD/I (e.g., net area above 10,000 hectares, or dealing with major rivers, etc.) would normally have a PPC convened by the BWDB. The PPC at this level should be chaired by a senior MP from the region, and should have representatives from sub-PPCs created around local water management areas by elected district and/or upazila leaders. For programs of national scope, the BWDB and/or Ministry of Environment and Forests would be responsible for convening a national level PPC, with individuals from universities, think tanks, interest group organizations, NGOs, advocacy groups, etc., who would represent the major socio-economic interest groups affected by the program.

It is up to the EIA team (including social organizers) to identify all the resource user groups in a program area. There will be cases where the EIA team will have to decide what is and what is not a resource user group in a particular area. One way to approach this issue would be through PRA methods - ask the local people how they classify social groups. Have them make a social map of their village/para. Follow this by having them make a resource map of their village and other areas (water bodies, embankments, khas areas, etc.) they use. Clearly, experience will help to refine these problems as EIA teams work through such issues in their area and report how they classified local resource users groups.

Once these are identified and their leaders selected, it remains to translate resource user group interest into representation on the PPC. This can be done in several ways.

1. In proportion to the number of households in each resource user group. For example, if 20 percent of the households in a program area are mostly F-2 land farmers, this group would get 20 percent of the representative seats on the PPC. The advantage of this is that it is a "democratic" approach that relates households and (roughly) household livelihoods (local productivity of resource divided by number of households) to resources. The disadvantage is that it may exclude or give weak representation to small, fragile, but nevertheless environmentally important resource users groups. If this approach is chosen, the latter groups should be given weighted representation - that is, at least one seat on the PPC, regardless of their numbers.
2. In proportion to the surface area that each resource user group utilizes in the program area. For example, if open bodies of water where capture fishing households operate constitute 15 percent of a program area, then these households would gain 15 percent of the representative seats on the PPC. The advantage here is that the approach is keyed to the magnitude of resources so that, in effect, "resources" vote on the PPC. The disadvantage is that many resource areas are used by more than one user group - land by cultivators, grazers, and after flooding of lowland - by fishing households; permanent water bodies by fisherfolk and boatmen.
3. By dividing the project area into one adult-one vote PPC constituencies. This would be a fair way to proceed provided the constituencies were drawn in a way to maintain the integrity of resource areas. It would be easy, for example, to put a constituency boundary through an open water body and attach each half to a cultivated area with a larger population. This might end up giving the households living on and around the water body no seat at all, when a fair drawing of constituency lines would have given them one. It would also leave out small, but environmentally important users groups.
4. By giving each resource user group one seat on the PPC. This approach would highlight resources and ensure that even the smallest resource users groups would be represented, but might be resisted by larger populations who believe the weight of their interests is not being given due representation.

No approach is absolutely fair and the experience developed by FAP-20 and the regional study EIA teams should provide valuable information for following studies. In any case, if EIA teams have developed the kind of relationship with social groups suggested in this Manual, the issue of how to choose people's representatives can be worked out in discussions with those who would be affected by the program. The single most important criteria is to ensure that every resource user group in the project area is represented.

Organizing the PPC is the responsibility of the senior elected official at the appropriate level, who should be assisted to the degree necessary by the EIA team, including the social organizers. Until and unless the Government of Bangladesh legislates the devolution of decision making on local water issues to Local Project Committees, and provides a statutory basis for bylaws for such committees, each PPC should set its own procedure, which can be codified in a simple set of bylaws. These should cover membership, meeting procedures, decision making procedures, define a quorum, define the function, duties and powers

of officers, etc. The EIA team can offer information on local organization, or bring in advice from local NGOs, BRAC, or the Grameen Bank if needed.

As regards the role of *ex officio* members and advisory groups, PPCs below the upazila level can decide whether to associate various specialists as nonvoting ex officio/advisory members. These include upazila level specialists in the government nation building departments and local NGO staffers. As a practical matter, the EIA and E&D Teams would function as advisory panels to all PPCs.
The PPCs also can decide whether to associate local NGO staffers, officials of advocacy groups, nationally-known specialists from universities and institutes, etc. as advisory members.

The PPC should perform the following functions during the EIA feasibility study:

1. Provide a statement of program area needs and conditions to the EIA and E&D Teams.
2. Provide a list of proposed program interventions to the EIA and E&D Teams.
3. Review E&D proposed program interventions, including design standards and specific program parameters; suggest modifications or alternatives, or cancellation if desired.
4. Consult with EIA and E&D Teams on proposed mitigation, compensation, and enhancements; review mitigation, compensation, and enhancement plans; suggest modifications or alternatives, if desired (The mitigation/enhancement package should include agreements about local participation in construction, operation, and management - thus setting the stage for an on-going institutional role for the PPC).
5. Review the EIA feasibility report.
6. Review final program plan package.
7. Organize informational scoping sessions in the program area.
8. Organize a local referendum on the project.
9. Decide to approve or disapprove the program package, or send it back for changes.

There is an underlying assumption here that local representatives on the PPC will engage in considerable negotiation about how the program package will look. Clearly, resource users groups that will lose out in a program can choose either to mobilize local opinion against the program or work out a mitigation/compensation/ enhancement package through which they can maintain and improve their livelihoods. In cases where there is a sharp disagreement over the program on the PPC, or in local communities, or where a natural resource will undergo substantial material degradation, the local PPC should organize a local referendum on the program.

4.4 Consulting the Wider Community and Nation

For projects or programs that have a regional or national scope - such as river training or very long embankments - groups at the national level must also be informed and consulted. These include

Exercise 8

The point of this role playing exercise is to obtain information on important environmental components from the village people. There are three different groups for the role play. The first group will consist of villagers, the second will consist of two people from an EIA team, and the last group will be observers. We will perform the role play exercise several times so that everyone will have a chance to participate

Each team will be briefed separately as to what their roles are. A general description of the project is found below.

Project Description:

A FAP flood-control and drainage project was proposed following a flood event in which several villages were inundated and there was loss of crops and property in several villages. The purpose of the proposed project is to reduce or eliminate flooding and thereby improve protection of property, sustainable agricultural production, and general public safety.

Assume that the project area (attached figure) includes two villages. There is a branch river that flows through center of the project area. The main river forms the north and west boundaries of the project area as shown in the figure. A small road joins the two villages. This road has culverts that are currently improperly operating. During the flooding, Village 1 was completely inundated and Village 2 was partially inundated.

The proposed project action is to build an embankment-cum-road along the main river to protect Villages 1 and 2. The embankment is anticipated to be approximately 5 km long and take two years to construct. Project amenities will include restoration and rehabilitation of the branch river drainage in the project area. It will also cause an overall gain in agriculture crops and homestead vegetation production.

The project will cause a potential loss to the capture fish production by decreasing beel area and may also affect marginal and small farmers by taking their land for embankment construction. Char land is expected to decrease by erosion immediately adjacent to the area because of increased current flow. Rice farmers will potentially lose 5 percent of their irrigable under the current design.

EIA Team Roles

Team Leader/Hydrologist
You are a lead hydrologist for the past two years and have more than ten years of experience in hydrology and environmental impact assessment. This is your first time as a Team Leader and you want the meeting (which you will run) to go as smoothly as possible. You are aware of the fact that some of the villagers are unhappy with the project as proposed and feel that their concerns have not yet been adequately addressed. You also know that the MP really wants the project to move forward.

Your job is to make certain the meeting goes smoothly and that everyone is heard from and to identify the IECs from the villagers.

Team Member/Fisheries Specialist
You have been a fisheries biologist for two years. This is your first EIA and first Peoples Participation meeting. You are primarily interested in what the fisherman have to say. You are also interested in the char lands because many people fish in that area.

Your job is to understand the concerns of the fishermen and char land people and identify their IECs.

Team Member/Socioeconomist

You have been a sociologist working in EI seven years. You have worked on 10 EIAs. You are interested in the balance between the water- and land-related economies.

Your job is to identify the IECs concerning health and nutrition, landless, and any others not covered by the first two.

Prior to going to the village determine who will have what role and who will run the meeting.
Your overall team purpose is to determine what each of the villager's Important Environmental Components are. <u>You may not ask the villagers that question directly!</u>

Village Roles

Tenant Farmer
You have rented a plot for the past 8 years and are saving to buy a plot of your own. You are representing the other 100 tenant farmers in the two villages. They are responsible for 25 % of the crop production in the area. Your crop was destroyed in the last flood. You think that controlling the floods is good but are concerned that the embankment will remove too much tenant farmer land. You are also concerned that if it is moved tenant farmers will be cut off from the river since much of their irrigation is from the river.
Your IEC's are:
Potential loss of land and relocation
Irrigation water
Reduced crop damage in protected areas

Petty Trader
You are a successful trader in both villages. Your sales will increase due to the construction activity. After project completion you will be able to travel more easily between the villages thus making more money. You think that the embankment is a wonderful idea and are not afraid to let everyone know it. You will be very forceful in the meeting.
Your IEC is:
Road transportation

Fisherman
You have been living in this area since you had to relocate due to another embankment project 10 years ago. You barely catch enough to support your family. You are representing the other capture fishermen that fish the open waters around the villages. You believe that the embankment will ruin your fishing and force all of you to relocate. You do not want the embankment to go in but don't see how anyone will listen to your concerns.
Your IECs are:
Loss of fishery production/change in occupation
Relocation

Culture Fisherman
You have lived in this area all of your life. You are the only culture fisherman in the two villages. Your stock was wiped out in the last flood and you are still trying to recover financially. You think that the embankment is a good thing. You feel that you can expand your ponds if you know you are safe from floods and that others would build ponds.
Your IECs are:
Flood protection
Livelihood assurance

Landless Unemployed
You have lived here for six months. You live right in an area that will be covered by an embankment and represent 200 people who are in a similar situation. On the one hand you are concerned because, yet again, you are being forced to move without consultation. On the other hand you think that you will get a laboring job working on the embankment.
Your IECs are:
Relocation
Income generation

Livelihood

Char Farmer
You moved here five years ago from another char. You are used to having to relocate due to the char's devolution but feel that this is unfair since normally your char would last for another ten years. You represent 100 families. You are violently opposed to the project and very vocal.
Your IEC's are:
Relocation
Compensation
Loss of livelihood
Inundation/erosion

Village Doctor
You have been in Village 1 for two years and are right out of medical college. You are one of the most educated people in the villages. You are concerned that the beel water area which may expand will become stagnant and put the village at risk for vector and water borne diseases.
Your IEC is:
Water and vector borne disease incidence

NGO Extension Worker
You came to the village one year ago to work on a rice-growing improvement project. You arrived immediately after the flood and saw how much devastation it caused. You are representing the 25 farmers in your cell. Their concerns are that irrigation will become more costly, although some of their rice varieties may change due to the increase in f1 and f2 land types.
Your IECs are:
Irrigation
Changes in cropping patterns and inputs

Local MP
Your family is the oldest one in Village 1. You have been the MP for ten years as your father was before you. You have worked for two years to get the FAP to approve the project and are angry that anyone would say it is bad. You want to see the project start as soon as possible and don't want the EIA holding up the process.
Your IECs are:
Overall improvement for the area

Landed Farmer
You are the largest landowner in the village and represent all the other landowners. While you in general support the project you are concerned that benefits are accruing to the tenant farmers may change the patron-client relationship.
Your IECs are:
Patron-client relationship

Journal 2 (Peoples' Participation)

1. Why is Peoples' Participation an important component of the EIA process?

2. What part of the interview process do I need to work on the most?

3. Why is identifying publics an important part of Peoples' Participation?

4. Why is it important to both obtain and give information during Peoples' Participation?

MODULE - 4
EXERCISE, HANDOUT AND OTHER MATERIALS

Exercise 9

The point of the exercise is to develop skill in identifying IECs from secondary source information. Review the attached information and and answer the questions below.

What IECs were identified?
Were there any gaps in the data?
What would make the process of identifying IECs stronger?

TECHNICAL NOTE TANGAIL FAP 20

SUMMARY SHEET: SUB-COMPARTMENT # 9

Area:Gross - 700 ha. Net Cultivated - 526 ha.

Flooding and Drainage

Early floods in April-May from accumulated rainfall run-off. Lauhajang river water enters through Jugini Khal in the north and then through Kalibari Khal in Dorjippur. Drainage congestion due to silted channels. Re-excavation has been suggested for both the khals.

Agriculture

Transplanted deep water aman including T. aman paddy are damaged by both early and late floods.

Homestead Forest

Harbs, Shrubs, Mango, Jack-fruit, Banana, Plam, Shimul and Guava etc.

Fuel

Jute sticks, remains of sugarcane, paddy and wheat straw, mustard and pulses plants, cow-dung, bushes, dried tree leaves, water hyacinth etc.

Fisheries

Number, type, and area of water bodies with available fish species has been provided. Information on fishing methods, floodplain fishery, fish predation, disease and fish migration have also been provided.

Fishermen

There are about 42 households of professional fishermen living in Kathoa Jogini village. There is a Motsho-Jibi Somity in the said village. Professional fishermen go to Dhaleswari as well as Jamuna rivers in addition to beels and pagars for fishing.

About 4/5 households subsistence fishermen live in Baghil and Keshtopur villages. They fish in beel Baghil, pagars and floodplain.

Wildlife

ArthropodsAgricultural crop pests, honey-bee and butterfly.
MolluscaFresh water muscles - pila and unio
AnnelidsEarthworms, leach and nerrics
AmphibiansToads, frogs and hyla
ReptilesGuishap, snakes, lizards and anzan

MammalsMongoose, bats, jungle cats, nangar and bagdasha
BirdsCrow, shalikm raven heron, kingfisher, kite, owls, Doyel, cuckoos, pigeons and doves.

Navigation

Scarce boats communication as there is no entry or exit route from Lauhajang river. Small boats enter through Jugini Khal in peak season.

Diseases

Diarrhoea, Dysentery, Malaria, Pox, Fever and Skin Diseases.

Non-Farm Activities

Employment Patterns

Wage Rates

Organized Groups

Markets

Education and Literacy

SUMMARY SHEET: SUB-COMPARTMENT # 11

Area: Gross - 1100 ha. Net Cultivated - 940 ha.

Flooding and Drainage

Early floods in June from accumulated rainfall run-off. Louhajang river water enters in July through Gaizabari Khal, Digalia Khal, in the south-east and Kalibari Khal on the north. Water from Sub-Compartments 9 and 10 enter through a link canal from Sapua to Dannya Chowdhury.

Drainage congestion due to silted channels. Re-excavation has been suggested for Goramara Khal, Gaizabari Khal, Digalia Khal and Chillabari Khal.

Navigation

Large boats used to enter though Binnafar Khal before construction of the Drjipara regulator. Presently boat movement is scarce excepting small country boats used for internal movements of people and small freight.

Erosion

Erosion problems near the intake of Chillabari Khal is serious.

Agriculture

Poor drainage damages T. aman, restricts growing of rabi crops and delays HYV Boro plantation.

Fisheries

Number, type, and area of water bodies with available fish species has been provided. Information on fishing methods, floodplain fishery, fish predation, disease and fish migration have also been provided.

Fishermen

About 3-5 professional fishermen live in Sakrail and go for fishing in the nearby rivers, pagars and owner's pond. About 10-12 households of subsistence fisher- men live in Dainnya Sibram and fish in the nearby Ghatakabari and Bara beels.

Wildlife

Arthropods	Mosquito, house-fly, grasshoppers, mantis, butterfly, hone-bee, cockroaches.
Mollusca	Snails and bivalves
Annelids	Leech and earthworms
Amphibians	Toads, frogs and hyla
Reptiles	Guishap, snakes, lizards and anzan

Mammals	Jackle, jungle cats, mongoose, and bagdasha
Birds	Dove, shalik, baoi, cuckoo, crane, kingfisher, kite and pigeons. Migratory birds include Kal-dighiri and bele duck.

Diseases

Diarrhoea, Dysentery, Malaria, Skin Diseases.

Non-Farm Activities

Service, weaving, biri making, fishing, carpentry, petty and seasonal business, oil crushing, wood sawing, transport driving, agricultural and non-agricultural works.

Employment Patterns

Mainly family labour are used, hired labour are used by big farmers and in peak seasons. Both immigration and out-migration of labourers are found. Women are doing household work. 80-90 women from Sakrail, Dannya Shibram and Dannya Chowdhury make biri thonga. A few women are engaged in weaving work, in making fine mat, road management program, gathering seedlings, cotton wrappers (katha) and pottery works.

Wage Rates

Tk. 20-25 with meal in lean season and Tk. 25-35 with meal in peak season for agricultural labourers. Fishermen get a share of the catch or are paid Tk. 30-35 in lean season and Tk. 45-55 in peak season. Biri makers get Tk. 30-40 and carpenters get Tk. 50-60 per day. Wage rates for women labourers are lower as compared with the same for the men.

Organized Groups

Grameen Bank has groups in Basa Khanpur, Dannya Chowdhury and Charpara. BRDB has organised KSS in Sakral and Choto Binnofar villages. SDS mainly dealing with young children have their activities in Dannya Shibram, Dannya Chowdhury and Sakrail villages. Khanpur Janata Samity has been formed by the villagers of Basa Khanpur.

Markets

Education and Literacy

Homestead Forest

Mango, Jack-fruit, Litchi, Banana, Bamboo, Plam tree, Jambura, Berry, Tamarind, Karai, Shimul and Guava.

Fuel

Jute sticks, remains of sugarcane, paddy and wheat straw, mustard and pulses plants, cow-dung, bushes, dried tree leaves, water hyacinth etc.

GD

Exercise 10

The purpose of the exercise is to integrate scoping and bounding by having the trainees evaluate the study area boundary on the attached map.

The attached map indicates the project area and its' EIA study boundary. The project was to train a length of river to improve the drainage capacity and flow near a village. The numbers on the map refer to problems that were reported one year after project implementation. Below are brief descriptions of each problem.

1. This village reported that river height decreased and groundwater levels sank below the current depth of shallow tube wells after project completion.

2. This village reported much increased flooding after completion of project although rains had not increased.

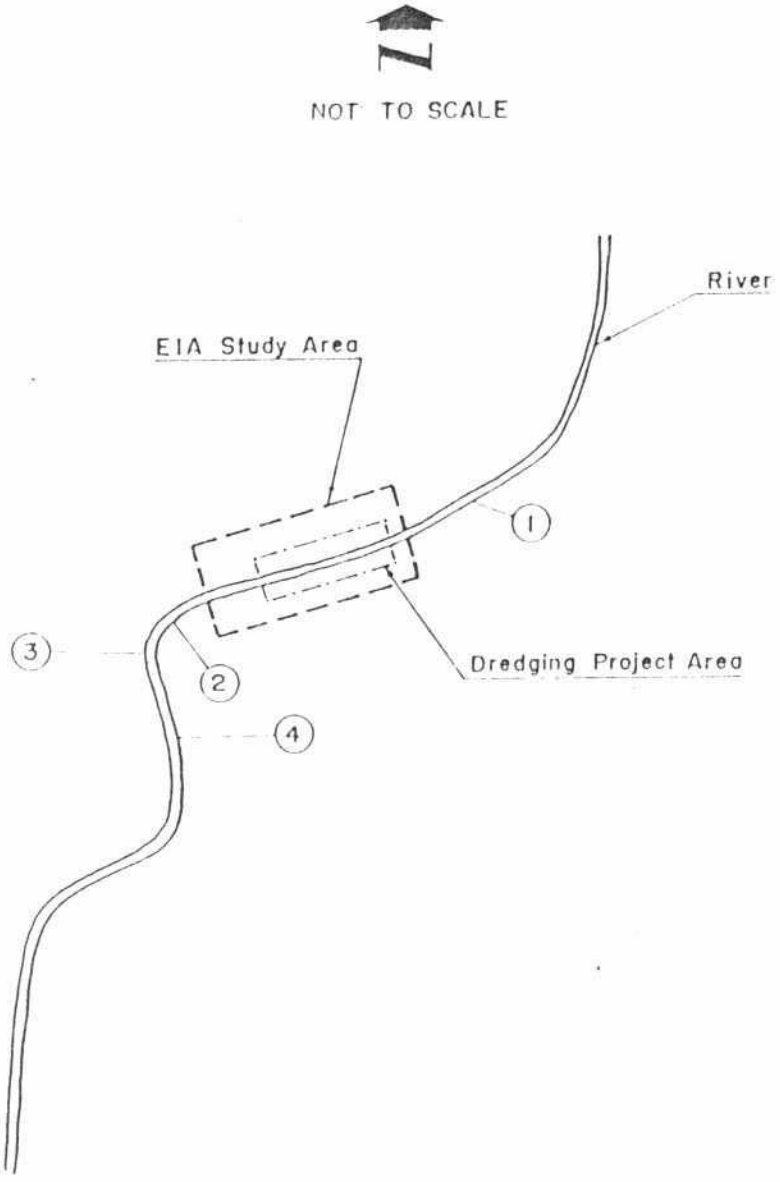
3. This village reports that the river area it fronts has become much shallower due to increased sedimentation. This has led to drainage congestion.

4. This village reports increased turbidity during and after project have changed the fish species composition and caused all of the open capture fishery people to move away.

Given the above information discuss and answer the following questions:

Was the EIA study area boundary adequate for the study?
If so why, if not why not?
If the boundary was not adequate, how could you have changed it?

HYPOTHETICAL DREDGE AND FILL PROJECT
EIA STUDY AREA AND PROJECT AREA MAP



Journal 3 (Scoping and Bounding)

1. How are scoping and bounding related to each other?

2. Is it possible to include **all** impacts in the scope of an EIA?

3. What kinds of data sources are available to perform scoping?

4. How do issues and important environmental components relate to each other?

MODULE - 5
EXERCISE, HANDOUT AND OTHER MATERIALS

Rapid Rural Appraisal(RRA)

RRA is an investigative technique adopted to supplement existing data to carry out skilled observation, group and personal interviews using key informants, key indicators and other simple tools to gain a comprehensive view of the main problems and general trend in a program area. The RRA is fairly quick and effective perusal of an area by trained scientists.

A successful appraisal in an RRA format depends on the following factors:

1. Adopt a flexible approach
2. Recognize and offset biases in approach and attitude
3. Carry out the RRA during the appropriate season
4. Move singly or in a small group
5. Use multiple research strategies
6. Use key indicators
7. Interviws
8. Observation
9. Key informants

Participatory Rural Appraisal(PRA)

PRA is a development of the RRA method in which the target/beneficiary communities are made to involve in investigation and analysis of local issues and problems and how the problems could be resolved. This may be done in the following series of steps:

: assessment of local peoples perception and needs;

: identification of specific groups and consultation with them;

: attention to marginal groups such as the poor, minorities, women, fishermen, boatmen and those dependent on fragile resources;

: identification of essential land and water resources utilized by communities;

HOUSEHOLD SURVEY FOR EIA

Background

Household survey is aimed at generating baseline data for doing Environmental Impact Assessment. EIA team members first identifies data available and further data needs to be collected from the field in the light of EIA Guidelines. Field survey instrument in the form of resource questionnaire is designed covering information in the field of (a) sociological aspects, (b) water, sanitation and health, (c) navigation, (d) terrestrial habitat, (e) forest and homestead vegetation, (f) livestock, (g) fishery and (h) hazards and risk assessment.

Sampling Method for Household Survey

Mouza as the smallest administrative unit considered for the survey. These mouzas may be selected on the basis of a multi-stage stratified random sampling method. Stratification involves grouping of mouzas by size in area, by density or number of households in the mouza, socio-economic class and land elevation pattern. These will serve the objective of achieving representativeness of each area in terms of agro-ecological as well socio-economic condition. Number of mouzas and households to be selected will depend on the resource and time availability. Sample mouzas will constitute the Primary Sampling Unit (PSU) and the sample household as the Ultimate Sampling Unit (USU) for conducting interview.

Household Selection Criteria

In sampling the mouza for household survey, the initial step is to list the mouza within the proposed project by area, number of population & households from Population Census, 1991 published by BBS (April 1992). The villages in the study area may be stratified on the basis of land elevation into three groups, i.e. low with less than 1.83 m above mean sea level, medium-low with 1.83 m to 2.13 m and medium high with elevation above 2.13 m. Land level classifications were delineated for the project area prepared on the basis of contour map of BWDB. The sample size may be selected within 5% of total household of the project area. This sample size had proportionately distributed among the mouzas according to their respective household number. This should be statistically valid in selecting sample size. Households are further stratified on the basis of occupational groups.

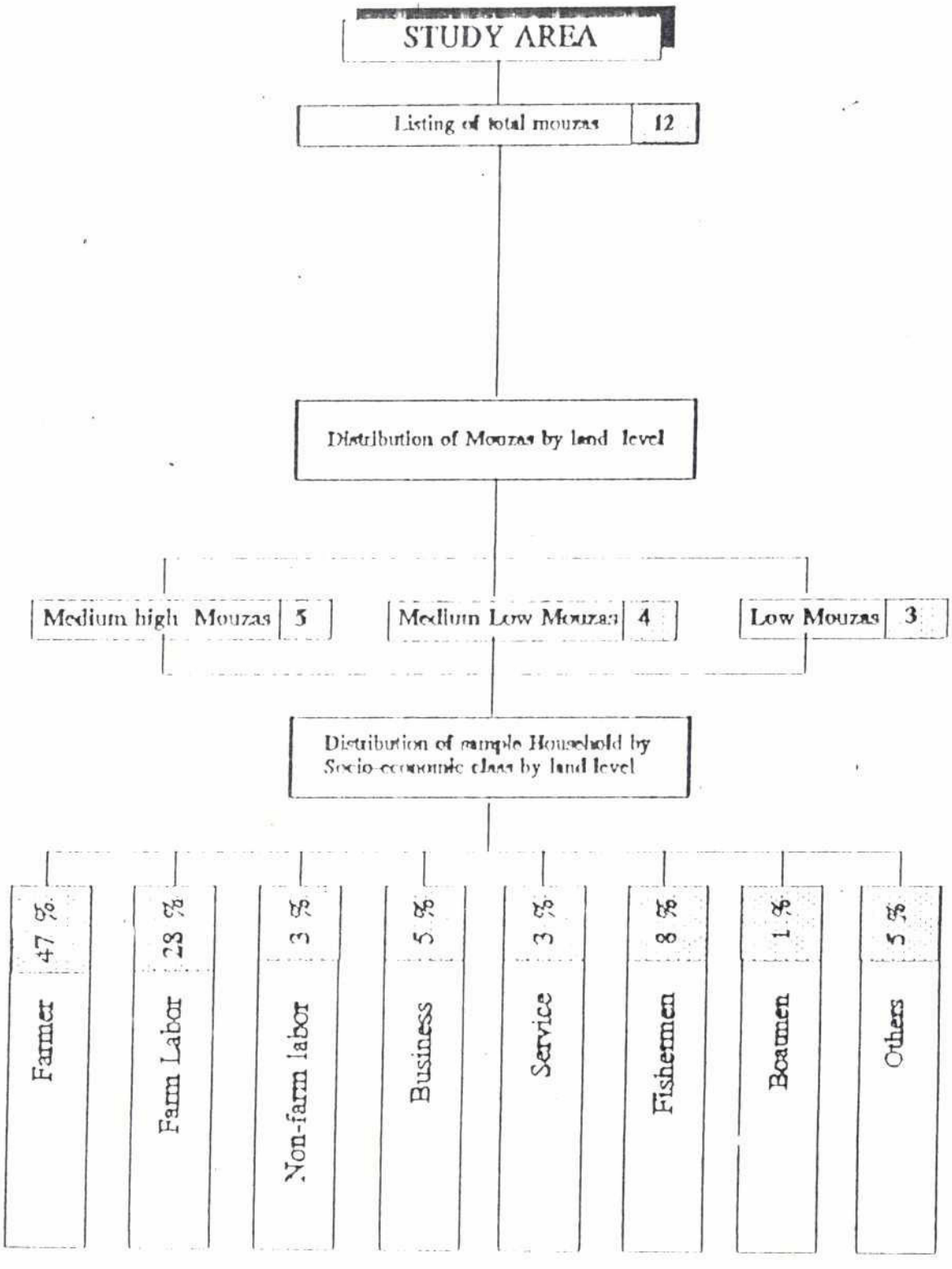


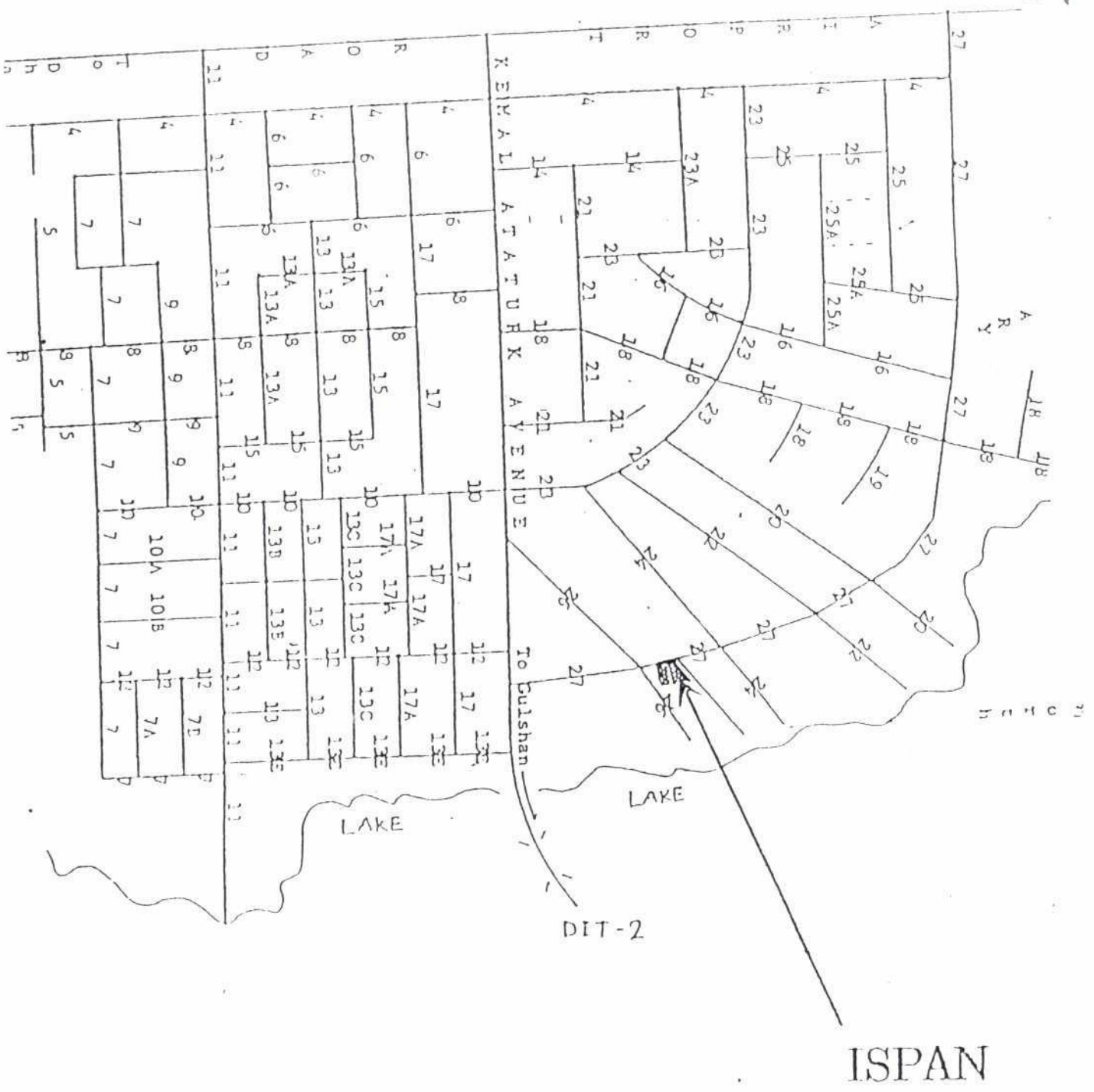
Figure 1 Stratified sampling stages for EIA baseline survey.

Annex 1

Household Survey Method

The study required that the data be representative of both agro-ecological and socio-economic conditions of the study area. Each of the inhabited mouzas within the study area was sampled. From each mouza, 5 percent of the total households were randomly selected on the basis of the household figures found in the 1991 census report (BBS 1992), updated to 1992 with the Union Parishad data. These households were further subdivided according to the occupational category followed by EIP. Distribution of households according to occupational category were computed on the basis of the list of households obtained from the Union Parishad Offices as well as through discussion with Union Parishad Chairmen and key informants. Reconnaissance surveys were conducted for verification of the concentrations of fishing communities in Char Chandra Prashad and Char Bheduria.

The total number of households actually sampled was 424, distributed as shown below. Out of 14 mouzas in the study area, 12 mouzas were actually covered by the survey. Houses in Char Chatkimara in Bhelumia Union have been completely displaced by erosion, and Char Patabunia was found to be uninhabited. Displaced households from Char Chatkimara had settled in Char Bheduria and taken up fishing as the main profession, thus giving a high percentage of professional fishermen not only for Char Bheduria but also for the entire study area.



New Office Address:
House No 49 Road No 27
Banani, Dhaka.
[5 Storied white building]

Telephone : 881 570 - 2
Fax : 883 128

Environmental Systems Research Institute

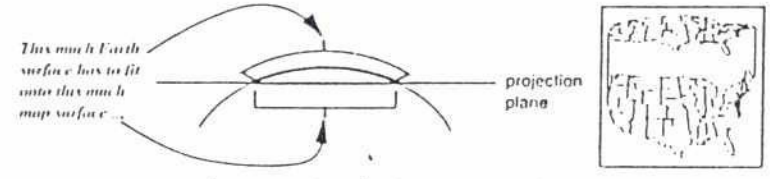
Software News

Map Projections in ARC/INFO

Maps usually represent real-world coordinates that have been projected onto a flat surface. These coordinates represent a real location on the Earth's surface in one of several coordinate systems.

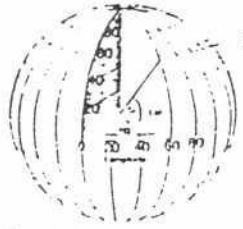
One of the most common coordinate systems is called *Universal Transverse Mercator* (UTM). The units are meters. Some other commonly used coordinate systems for mapping include Lambert Conic Conformal and Albers Conic Equal-Area, with x,y coordinates measured in feet or meters. These coordinate systems are based upon a concept called a *map projection*.

Since the Earth is a sphere, some method must be used to depict a map in two dimensions. Map projections are used to represent all or part of the Earth's surface as a flat map.



...consequently, map projections distort some parameter of the Earth's surface be it distance, area, shape, or direction.

People often consider latitude-longitude measurements to be x,y coordinates; however, they are not. Latitude-longitude is a unit of measure for a spherical coordinate system.



Latitude longitude are angles measured from the Earth's center point to locations on the Earth's surface. Latitude measures angles in a north-south direction; longitude measures angles in an east-west direction.

It is important to stress that the Latitude-longitude geographic reference system is not a map projection. For example, length is constant anywhere within a Cartesian coordinate system, but cannot be consistently measured in degrees of latitude-longitude. In the figure above, note how the meridians (vertical reference lines) converge at the poles, but separate or bulge as they get closer to the equator. One degree of longitude is about 111 km in length at the equator and converges to zero at the North and South Poles.

Latitude and longitude measurements for any location can be projected into a planar coordinate system using a map projection. Thus, latitude-longitude values play an important role in map feature registration.

Both raster and vector data structures utilize map projections to store data in an x,y plane coordinate system.

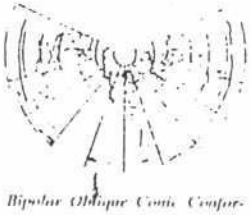
Projections Supported

There are a total of 38 map projections available in the ARC/INFO environment. A descriptive summary of each option is provided below.

Modified Stereographic Conformal for Alaska. This projection was developed to provide a conformal map of Alaska with less scale distortion than other conformal projections. A set of mathematical formulas allows the definition of a conformal transformation between two surfaces.

Albers Conic Equal Area. This conic projection uses two standard parallels to reduce some of the distortion produced when only one standard parallel is used. Although neither shape nor linear scale are truly correct, the distortion of these properties is minimized in the region between the standard parallels. This projection is best suited for land masses that extend more in the east-to-west orientation than those lying north to south.

Azimuthal Equidistant, Zenithal Equidistant. The most significant characteristic of this map projection is that both distance and direction are accurate from the center point. This projection can accommodate all aspects – equatorial, polar, and oblique.



Bipolar Oblique Conic Conformal. This projection was developed specifically for mapping North and South America. It maintains conformality for North and South America. It is based upon the Lambert Conformal Conic, using two oblique conic projections side-by-side.

Bonne. This equal-area projection has true scale along the central meridian and all parallels.

Cassini. This cylindrical projection is unique in that scale is true along the central meridian and along lines perpendicular to the central meridian, while scale is constant along lines parallel to the central meridian. This makes it most suitable for areas of north-south extent.

Chamberlin Trimetric. This is the standard projection developed and used by the National Geographic Society for continental mapping. The distance from three input points to any other point is approximately correct.

Craster Parabolic, Putnins P4. This pseudocylindrical equal-area projection is primarily used for thematic maps of the world.

Cylindrical Equal-Area, Lambert Cylindrical Equal-Area. A cylindrical projection. Type 1 is a normal, perspective projection onto a cylinder tangent at the equator. Type 2 and Type 3 are oblique aspects, from which normal and transverse aspects are also possible.

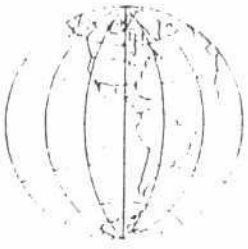
Eckert IV, Eckert VI. These equal-area projections are used primarily for world maps.

Equidistant Conic, Simple Conic, or Conic. This conic projection can be based on one or two standard parallels. As the name implies, all circular parallels are an equal distance from each other, spaced evenly along the meridians. This is true whether one or two parallels are used as the standards.

Simple Cylindrical, Equidistant Cylindrical, Rectangular, or Plate Carrée. This projection is very simple to construct because it forms a grid of equal rectangles. Because of its simple calculations, its usage was more common in the past than it is today. The polar regions are less distorted in scale and area in this projection than they are with the Mercator projection.

McBryde-Thomas Flat-Polar Quartic. This equal area projection is primarily used for world maps.

Gall Stereographic. This is a cylindrical stereographic projection based upon two standard parallels at 45° N and S.



Geographic Reference System, Global Reference System, GRS, or the Spherical Coordinate System. Although GEOGRAPHIC is an option within the ARC/INFO PROJECT command, it is NOT a map projection. The Geographic Reference System consists of latitude and longitude. This system treats the globe as if it were a sphere or spheroid. The sphere is divided into 360 equal parts called degrees. Each degree can be further subdivided into 60 minutes, each composed of 60 seconds. The standard origin is where the Greenwich Prime Meridian meets the equator. All points north of the equator and east of the Prime Meridian are positive. The origin divides the globe into four quadrants: northwest, northeast, southwest, and southeast. Each line of longitude runs north and south and measures the number of degrees east or west of the Prime Meridian. Values range from positive 180 to negative 180 degrees. Lines of latitude run from east to west and measure the number of degrees north or south of the equator. Values range from positive 90 degrees at the North Pole to negative 90 degrees at the South Pole.

Gnomonic, Gnomic. This azimuthal projection uses the center of the Earth as its perspective point. All great circles are straight lines, regardless of the aspect. This is a useful projection for routes of navigation because the great circles highlight routes with the shortest distance.

Great Britain National Grid. This is a Transverse Mercator projected on the Airy spheroid. The central meridian is scaled to 0.9996. The origin is 49° N and 2° W.

Van der Grinten I. This projection is similar to the Mercator projection except that it portrays the world as a circle, with a curved graticule. The overall effect is that area is distorted less than on the Mercator, and the shape is distorted less than on equal-area projections.

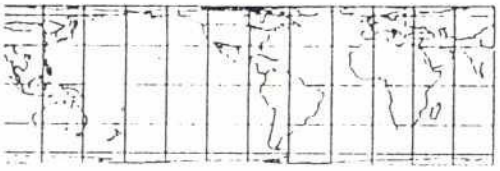
Hammer Aitoff. In this modified azimuthal projection, the central meridian is a straight line half as long as the Equator.

Lambert Conformal Conic. This projection is one of the best for middle latitudes. It is similar to the Albers Conic Equal Area projection except that it portrays shape more accurately than area. The State Plane Coordinate System uses this projection for all state zones that spread east to west.

Lambert Azimuthal Equal Area, Zenithal Equal Area. This projection preserves the area of individual polygons while simultaneously maintaining a true sense of direction from the center. The general pattern of distortion is radial. This projection is best suited for individual land masses that are symmetrically proportioned, either round or square.

Mercator. Originally created to display accurate compass bearings for those traveling on the seas. An additional feature of this projection is that all local shapes are accurate and clearly defined.

Miller Cylindrical. This projection is similar to the Mercator projection except that the polar regions are not as greatly distorted. This modification is accomplished by reducing the distance between lines of latitude as they approach the pole. The modification decreases the distortion in area, but the compromise introduces distortion in local shape and direction.



Modified Polyconic, Bonne, Elliptical Homalographic, and Homalographic. A pseudocylindrical equal area projection, on which all parallels are straight lines and all meridians are equally spaced elliptical arcs, except the central meridian, which is a straight line. The poles are points.

New Zealand National Grid. This is the standard projection for large scale maps of New Zealand.

Oblique Mercator or Oblique Cylindrical Orthomorphic. This is an oblique rotation of the Mercator projection. Developed for conformal mapping of areas that do not follow a north-south or east-west trend, but are instead obliquely oriented.

Continued on page 7.

Environmental Systems Research Institute

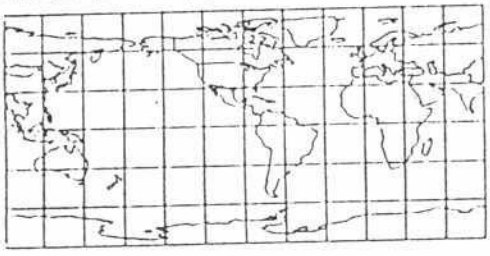
Software News

Projections

Continued from page 6

Orthographic. The perspective of the projection views the globe from an infinite distance. This perspective gives the illusion of a three-dimensional globe. Distortion in size and area near the projection limit appears more realistic than in most other methods of projection (except the Perspective method).

Vertical Near-Side Perspective, Vertical Perspective. This projection is similar to Orthographic in that its perspective is from space. In this projection, the perspective point is not an infinite distance away; instead, the distance can be specified by the user. This projection simulates a photograph taken vertically from a satellite or space vehicle.



Universal Polar Stereographic (UPS) or Polar Stereographic. The Polar Stereographic may be used to accommodate all regions not included in the UTM Coordinate System (regions north of 84° N and 80° S). This form is called UPS, which stands for Universal Polar Stereographic. The projection is equivalent to the polar aspect of the Stereographic projection on a spheroid. The central point is either the North Pole or the South Pole. Of all the polar aspect planar projections, this is the only one that is conformal.

Polyconic. The name of this projection translates into "many cones" and refers to the projection methodology. This affects the shape of the meridians. Unlike other conic projections, the meridians are curved, rather than linear.

Rectified Skewed Orthomorphic. Two special versions of this projection have been implemented to support the mapping standards of Malaysia and Brunei.

Robinson or Orthophanic. In this pseudocylindrical projection, meridians are equally spaced and resemble elliptical arcs, concave toward the central meridian. The central meridian is a straight line 0.51 times the length of the equator. Parallels are equally spaced straight lines between 38° N and S; spacing decreases beyond these limits. The poles are 0.53 times the length of the equator. The projection is based upon tabular coordinates instead of mathematical formulas.

Simple Conic, Equidistant Conic, or Conic. This is the most basic of conic projections and is equidistant.

Sinusoidal, Sanson-Flamsteed. As a world map, this projection maintains equal area despite conformal distortion. Alternative formats reduce the distortion along outer meridians by interrupting the continuity of the projection over the oceans and by recentering the continents around their own central meridians, or vice versa.

Space Oblique Mercator. This projection is nearly conformal and has little scale distortion within the sensing range of an orbiting mapping satellite such as Landsat. This is the first projection to incorporate the Earth's rotation with respect to the orbiting satellite.

State Plane Coordinate System, SPCS. The State Plane Coordinate System is not a projection. It is a coordinate system that divides all 50 states, Puerto Rico, and the U.S. Virgin Islands into over 120 numbered sections, referred to as zones. Depending on its size, each state is represented by anywhere from one to 10 zones. The shape of the zone then determines which projection is most suitable. Three projections are used: the Lambert Conic Conformal (LAMBERT) for zones running east and west, the Transverse Mercator (TRANSVERSE) for zones running north and south, and the Oblique Mercator for one zone only, the panhandle of Alaska. Each zone has an assigned USGS code number, each having a designated central origin specified in degrees.

Stereographic. Of all the azimuthal projections, this is the only one that is conformal. Although all aspects are possible for the spherical Earth with this software, the polar aspect also exists as a separate projection that includes the spheroidal formulas (see Polar).

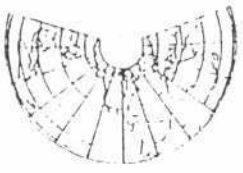
Bartholomew Times. In this pseudocylindrical projection, meridians are equally spaced curves. Parallels are straight lines increasing in separation with distance from the equator.

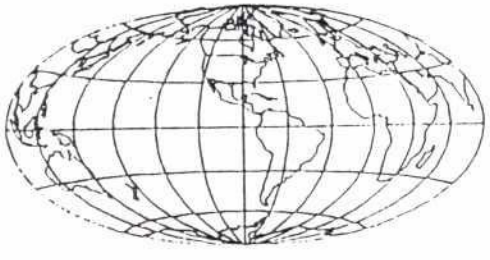
Transverse Mercator. This projection is similar to the Mercator except that the cylinder is longitudinal along a meridian instead of along the equator. The result is a conformal projection that does not maintain true directions. The central meridian is centered on the region to be highlighted. This centering on a specific region minimizes distortion of all properties in that region. As meridians run north and south, this projection is best suited for land masses that also stretch north to south. The State Plane Coordinate System uses this projection for all state zones oriented north to south.

Two-Point Equidistant. This projection shows true distance from either of two chosen points to any other point on a map.

Universal Polar Stereographic (UPS) This form of the Polar Stereographic accommodates all regions not included in the UTM Coordinate System (regions north of 84° N and south of 80° S). The projection is equivalent to the polar aspect of the Stereographic projection of the spheroid with specific parameters. The central point is either the North Pole or the South Pole. Of all the polar aspect planar projections, the Stereographic is the only one that is conformal.

Universal Transverse Mercator (UTM) For the Universal Transverse Mercator System, the globe is divided into 60 zones, each spanning six degrees of longitude. Each zone has its own central meridian. This projection is a specialized application of the Transverse Mercator projection. The limits of each zone are 84° N, 80° S. Regions beyond these limits are accommodated by the Universal Polar Stereographic projection (see Polar or Universal Polar Stereographic).





Datum Conversion

A datum is a set of parameters defining a coordinate system and a set of control points the geometric relationships of which are known, either through measurement or calculation (Dewhurst 1990). One part of defining the coordinate system is the spheroid used to approximate the shape of the Earth.

The North American Datum of 1927 (NAD27) uses the Clarke spheroid of 1866 to represent the shape of the Earth. The origin of this datum is a point on the Earth referred to as Meades Ranch in Kansas. Many NAD27 control points were calculated from observations taken in the 1800s. These calculations were done manually and in sections over many years. Therefore, errors varied from station to station.

The North American Datum of 1983 (NAD83) is based upon both Earth and satellite observations. The origin for this datum is the Earth's center of mass. This affects the surface location of all latitude/longitude values enough to cause locations of previous control points in North America to shift, sometimes as much as 500 feet. A ten-year multinational effort tied together a network of control points for the United States, Canada, Mexico, Greenland, Central America, and the Caribbean.

Because of a lack of homogeneity in the NAD27 calculations, there is no exact formula for transforming between NAD27 and NAD83. A number of methods have been proposed for performing the datum adjustment, ranging from rigorous adjustment of original observations to error-averaging methods for maps that are not directly tied to the National Geodetic Reference System (NGRS).

The adoption of NAD83 required that many users store and use their map data in a coordinate system based upon that datum. However, most users automated their original data layers using NAD27 and continue to do so, primarily because most source data are collected from maps based upon NAD27.

The ARC/INFO PROJECT command contains the NOAA datum transformation known as NADCON. The transformation of points is determined from a minimum curvature surface and has an approximate accuracy of 0.15 to 0.5 meters. This level of accuracy is adequate for mapping at scales of 1:200 and smaller. It is the fastest, simplest, and most accurate datum transformation available. NADCON is an acronym for North American Datum CONversion. It is suitable for the United States, Puerto Rico, and the Virgin Islands, for conversion between NAD27 and NAD83 and conversion to the high precision GPS networks (HPGN) in ARC/INFO Rev. 6.1.1.

NADCON has been incorporated into the PROJECT command. Therefore, PROJECT now performs a limited number of datum conversions, but only between NAD27, NAD83, and HPGN. The datum transformation is accomplished by specifying different input and output datums with the option subcommand, DATUM.

Future development in this area will include the implementation of the Canadian National Transformation for NAD27 and NAD83, and conversion between a large number of international datums via Molodensky or other appropriate transformations.

Coordinate System Definition in ARC/INFO

The map projection, units of measure for x,y, datum, and x- and y-offsets, define the coordinate system in which an ARC/INFO coverage's spatial information is stored. These can affect many operations, such as moving between map projections. The coordinate system for an ARC/INFO geo data set is defined and stored in the PRJ file.

Exercise 11

The purpose of the exercise is to assemble an EIA team from the staff members you have been assigned.

Instructions:

1. Take 10 minutes to introduce yourself (as the charadter you have been assigned) to the other members of your team. Describe to your working group, three aspects of yourself:

   Academic background
   Technical expertise (not necessarily the same as academic)
   Job responsibilities relative to EIA

2. From the information about your team decide what positions each team member should fill.

   Describe your teams strengths and weaknesses relative to EIA.

   What disciplines or areas of specialized expertise is the group missing?

SOCIOLOGIST

Academic Background B.S Sociology, M.S Social Work

Technical Expertise Design and implementation of rural data gathering activities.

Job You have worked for the past five years in designing and administering surveys and questionnaires for EIA studies. You have been responsible for setting up rapid rural appraisals and household surveys and synthesizing the data. You have worked closely with char land people, farmers and culture fishermen. Your job is to help obtain all sociological data from people in the study area and to assist other specialists in getting their data.

AGRONOMIST

Academic Background B.S Agronomy

Technical Expertise You have worked as an agricultural extension agent in livestock.

Job For the last year you have worked on an EIA study assessing the impacts to all areas of agriculture due to the implementation of an off-take scheme. You have worked primarily with rice-growers. Your job is to determine the cropping patterns and yields of all agricultural products (including from the homestead) and predict what impacts might occur.

HYDROLOGIST

Academic Background B.S Civil Engineering

Technical Expertise You have just graduated from school and have no job expertise.

Job Your job is to determine how the engineering activities of the project will affect the land types and whether there will be any additional effects to drainage in the area.

BIOLOGIST

Academic Background B.S Biology, M.S Wildlife Biology

Technical Expertise Design and implementation of biological data gathering activities.

Job You have seven years of EIA experience primarily in the area of identifying impacts on wildlife. You are responsible for gathering data on all aspects of the ecosystem including wildlife, fisheries, vegetation, and forestry.

SOIL SCIENTIST

Academic Background B.S Soil Science

Technical Expertise You have worked in the area of fertilizer application research.

Job You have no EIA experience. You will be responsible for determining how the change in land types may potentially affect the farming in the area of the project.

Exercise 12

Study plan and Strategy Development. The purpose of the exercise is to provide experience in developing a study program based on the available staff and the activities to be accomplished.

Your team has been assigned to perform an EIA at a proposed flood protection and drainage project located on a branch of the Meghna River. The IECs which have been initially identified are:

- Flood protection
- Cropping Pattern
- Drainage congestion
- Endangered species

Using what you now know about your teams multidisciplinary resources, formulate a strategy on how your team will approach the EIA study you have been assigned.

Exercise 13

Develop a plan, based on your strategy from the previous exercise to obtain the data you need. The plan should include details of how you will obtain data on the IECs:

Flood protection
Cropping Pattern
Drainage congestion
Endangered species

Include estimates of whether, and if so how often, the team members will need to go into the field. What sorts of data they will need to collect and why that data is being collected. Be as specific as possible.

MASTERFILE SCHEDULE OF ACTIVITIES
(BY MODULE)

Exercise 14

Given the list of secondary information sources presented below, develop a targetted list of resources necessary for the specialty you have been assigned. First review all of the information material presented to you. Decide how much material is needed for the specialty you have been given. Given the study you designed in the previous exercise, which data sources are most important to you.

WATER RESOURCES DATA SOURCE:

1. Climate

The Water Resources Planning Organization (WARPO) maintains a large computerized database of basic climatological data. They will perform numerous types of statistical data analysis upon request, and will also provide computer files of the raw data. The Bangladesh Agricultural Research Council (BARC) also can provide data obtained from the Bangladesh Meteorological Department (BMD) in MS-DOS format disks.

2. Rainfall

The major source of rainfall data specific to the project area should be the rainfall database prepared by the project planning team. Much of the rainfall data listed above are essential components of agricultural and engineering design of typical FCD and FCD/I projects. If the required data are not available from project planners, rainfall data may be obtained from other sources shown in Table 1. WARPO can also perform extreme value (log Pearson) rainfall frequency analyses on daily rainfall records on request, and will provide the results as a computer disk file.

Table 1. Sources of Rainfall Data

Agency	Output Medium		Format	
	Hard Copy	Disk File		
B'desh Meteorological Department	Daily/Hourly	Yes		Yes
B'desh Water Development Board	Daily		Yes	Yes
B'desh Rice Research Institute	Daily			No
B'desh Agricultural Res. Institute	Daily		Yes	No
B'desh Agricultural Res. Council	Daily/Hourly	Yes		Yes
Master Planning Organization	Daily			Yes

Note 1. BMD's floppy disks are in 8" Tandy TRS-80 format. May be converted to MS-DOS at the Bangladesh University for Engineering and Technology (BUET).

Note 2. The BARC database is obtained from BMD, but is available in MS-DOS format.

Display the locations of the adopted rainfall stations on a map and comment on the length and reliability of the records.

3. Temperature and Relative Humidity

10-day mean, maximum, and minimum temperatures at the data station during the crop calendar of critical crops may be presented in tabular form to support the agronomists on the EIA team. This information is available in regional form in the UNDP/FAO AEZ reports.

If the temperature and relative humidity data are not available from the project planners, other potential sources of such data are listed in Table 2. Display the temperature measurement locations on a map, and comment on the length and reliability of the temperature records.

Table 1. Sources of Temperature and Relative Humidity Data

Agency	Output Medium		Format	
		Copy	Disk	File
B'desh Meteorological Department	Daily/3-hr	Yes		Yes
B'desh Water Development Board	Daily	Yes		Yes
B'desh Rice Research Institute	Daily		Yes	No
B'desh Agricultural Res. Institute	Daily	Yes		No
B'desh Agricultural Res. Council	Daily/3-hr	Yes		Yes
Master Planning Organization	Daily		Yes	Yes

Note 1. BMD's floppy disks are in 8" Tandy TRS-80 format. May be converted to MS-DOS at the Bangladesh University for Engineering and Technology (BUET).
Note 2. The BARC database is obtained from BMD, but is available in MS-DOS format.
Note 3. BARI does not record relative humidity measurements.

The UNDP/FAO AEZ reports show the regional thermal regimes of Bangladesh, as related to the growing seasons of the major cropping systems. If daily mean temperatures for the temperature station(s) are readily available, project budget and time constraints permitting, a table of 10-day mean, maximum, and minimum temperatures that match the 10-day rainfall totals may be useful for EIA purposes.

4. Surface Water

Existing Data Sources

Table 2 gives a list of the major items of water resource and related data collected in Bangladesh as well as the primary data collecting agencies. Secondary sources of data would be some of the major data users such as BARC, RRI, WARPO (MPO) and organizations conducting project studies. In particular, WARPO during the conduct of the NWPP - I & II established a large water resource planning database.

EXISTING DATA SOURCE

They computerized and processed all of the precipitation, streamflow, water level and groundwater data collected from BWDB and others. One of WARPO's mandated functions is to continually update its database and make it accessible to all agencies.

Data can normally be obtained from an agency by submitting a formal written request stating the purpose of the request and the type of data wanted. The agency will charge a fee for providing data in any type of format.

Table 2. Type and Source of Water Resources and Related Data[1]

	Data Collecting Agencies[2]										
Type of Data	BWDB	BADC	BMD	DPHE	WASA	SOB	SPARRSO	DOE	SRDI	BIWTA	Port
1. Precipitation	/		/								
2. Streamflow	/										
3. River WL	/									/	
4. GW Table	/	/		/	/						
5. Aquifer Test	/			/							
6. Drilling Test	/	/		/	/						
7. Sediment Load	/										/
8. Salinity Level	/							/	/		
9. River X Section	/									/	/
10. Water Use	/	/		/	/		/				
11. Land Elevation						/					
12. SW Quality				/	/			/			
13. GW Quality	/	/		/	/			/			
14. Evaporation	/		/								
15. Climatic Data	/		/								
16. Satellite Photo							/				
17. Maps (Topo)						/					
18. Soils Data									/		
19. Cloud Picture							/				
20. Morphological Change	/									/	
21. Flooded Area	/						/				

[1] Source: Interagency Committee Report on Data Improvement (1991)
[2] Acronyms explained in glossary

Surface Water Modelling Center (SWMC)

The SWSMP is developing a suite of mathematical river models at two different scales based on the generalized MIKE 11 software package. The models include a single general model, embracing almost

the whole of Bangladesh, and six regional models, which operate at a greater level of detail. The model is also planned for use in detailed area flood control design, as compartmental models. The boundary conditions are hierarchal; conditions for each submodel are provided from the model higher up in which the submodel is embedded.

Model inputs are rainfall and evaporation, flows from across borders, terrain and river channel geometries, and land factors. Outputs are water levels and flows in river channels and flooded areas on a daily basis throughout the year. In addition, groundwater levels are predicted and estimates of sediment movement and salinity intrusion can be made.

5 Groundwater

There are four agencies in Bangladesh who collect primary data on groundwater, i.e. BWDB, BADC, DPHE and the WASA's (Dhaka and Chittagong). They collect data on the groundwater table, aquifer tests and drilling tests.

A list of BWDB, BADC and DPHE groundwater observation stations is given in Appendix 2 along with maps showing the location of the stations and examples of station records. The listing of each agency's observation stations indicates the period of record of each station as well as the frequency and units of measurement.

The WASA's supply domestic water and monitor groundwater levels in the Dhaka and Chittagong areas. They also make predictions of water levels for different time periods and with different growth patterns.

6. Aquifer Tests

The BWDB have conducted over 200 well tests at production wells installed by the BADC. The wells are pumped at a constant discharge for 72 to 96 hours and the water levels in a series of observation wells are observed, both during pumping and recovery. Some step pumping tests have also been performed. The collected data are then processed and the aquifer characteristics of transmissibility and specific yield determined.

7. Well Logs and Boring Data

The BWDB records the logs of their wells and have over 400 wells on file. Above 500 feet, the materials are sampled with a split spoon sampler. Below 500 feet, the wash material is examined and logged. The sample material is analyzed in the laboratory. The BWDB has also undertaken an investigation of the potential of shallow tubewells by sinking a few wells and evaluating their performance.

8. Water Quality

Water quality data are used to assess the suitability of water to meet a specified need such as potable water supply, agricultural or other uses. As shown in Table 5.4, there are only four agencies who collect data to determine water quality. They are DOE, DPHE, the WASA's and BWDB. DPHE and the

WASA's are primarily concerned with potable water supplies and monitor mostly groundwater quality. BWDB monitors both surface water and groundwater quality; however, surface water monitoring is limited to salinity only. DOE, in its role as Bangladesh's primary environmental agency, is concerned with all aspects of water quality monitoring. However, since they are a newly established agency there is no well-established monitoring program.

9. Salinity

Streamflow salinity has been measured by BWDB since 1965. The measurements are reported as both electrical conductivity in micromhos and chloride concentration in milligrams per liter (mg/l). There have been three types of salinity measuring stations in Bangladesh: (1) monitoring stations, (2) static stations and (3) dynamic stations. All of these stations are located in the Southwest and Southcentral Regions. There are also extremely limited salinity data available from several industries in the Southeast Region.

Salinity is also measured at monitoring stations where samples are taken from the river bank at high and low flows during the period from November through June. There were 80 monitoring stations operating in 1988. The period of sampling is fortnightly. Samples are sent to the laboratory where electro-conductivity and chlorides are measured. Laboratory processing of the samples is slow, with delays ranging from 18 months to 2 years. The data are kept by BWDB in non-computerized format. Photocopies of the data are made available to government approved users.

10. Water Transportation

The Bangladesh Inland Water Transport Authority (BIWTA) has the responsibility for maintenance and conservation of the inland waterways. They are the primary source of data on the extent and condition of the navigation system. Their 1988 Bangladesh Inland Water Transport Master Plan (BIWTMAS) is the most recent and complete source of information.

Other important sources of existing information and data on Bangladesh's inland water transport system are the various studies and sectoral reports conducted by GOB, donor agencies and consultants during recent years. A list is included in the bibliography.

LAND RESOURCES DATA SOURCE:

1. Land Types

Over a period of some 20 years the Soil Resources Development Institute (SRDI) developed a system of 11 land types for use in their Soils Data Processing System (SODAPS). The agroecological zoning (AEZ) system devised by FAO (1988) adopted the same scheme (Table 1). A second system was introduced by MPO (1984) and is in general use for agricultural assessments in Bangladesh (Table 2). The MPO classification system is generally recommended for use in EIAs and agricultural assessments.

Table 1. AEZ Land Type Classification System Developed from the SODAPS Classification.

No.	Land Type	Flooding Depth (cm)	Nature of Flooding
1	Highland	0	Flood free or intermittently flooded
2	Medium Highland 1	0 - 30	Seasonally flooded
3	Medium Highland 1 (Bottomland)	0 - 30	Seasonally flooded, wetlands persist through part of dry season
4	Medium Highland 2	30 - 90	Seasonally flooded
5	Medium Highland 2 (Bottomland)	30 - 90	Seasonally flooded, wetlands persist through part of dry season
6	Medium Lowland	90 - 180	Seasonally flooded
7	Medium Lowland (Bottomland)	90 - 180	Seasonally flooded, wetlands persist through part of dry season
8	Lowland	180 -300	Seasonally flooded
9	Lowland (Bottomland)	180 -300	Seasonally flooded, wetlands persist through part of dry season
10	Very Lowland	> 300	Seasonally flooded
11	Very Lowland	> 300	Seasonally flooded, wetlands may persist through dry season

Source: Soil Resource Development Institute

Table 2. Land Type Classification System According to MPO

Land Type Designation	Flooding Depth (cm)	Nature of Flooding	Agricultural Significance
F_0	0 - 30	Intermit-tent	Suited to HYV rice in wet season
F_1	30 -90	Seasonal	Suited to local varieties of Aus and T. Aman in wet season
F_2	90 -180	Seasonal	Suited to B. Aman in wet season
F_3	> 180	Seasonal	Suited to B. Aman in wet season
F_4	> 180	Seasonal or Perenni-al	Depth, rate and/or timing of flooding do not permit cultivation of B. Aman in wet season

Source: MPO (1987)

2. Land use

Land use maps and information were provided in the Reconnaissance Soil Survey Reports published by the Soil Resources Development Institute (SRDI) in the early 1970s, using survey data from the 1960s, but are now outdated. Land use data and maps of the project area may be available from previous or current feasibility reports. Information on cropping patterns is also available in the Upazila Nirdeshika (Land and Soil Resources User's Manual) series prepared by SRDI, but these data are sometimes inadequate for a full assessment of land use since they do not contain any land use maps and the information provided does not cover many of the items necessary for doing an EIA.

3 Soils

Reconnaissance soil surveys for all greater districts of Bangladesh were carried out in the late 1960s by the then Soil Survey of East Pakistan which now functions as the Soil Resources Development Institute (SRDI) of Bangladesh. The reports were published in 23 volumes in the early 1970s containing both data and maps. Most information in respect of soil association and series, physical and some chemical properties, land capability, crop suitability, agricultural limitations etc. are provided in these reports.

Agro-Ecological Zones (AEZ)

AEZs are described in the *Land Resources Appraisal of Bangladesh for Agricultural Development*, published in 1988 (FAO 1988) in 27 volumes. Data collected through reconnaissance soil surveys in the late 1960s were updated in respect of flood phase and computerized under this study. Meteorological data were also computerized and superimposed on the land resources data base to identify 30 agroecological regions. Data available from this report include soil association and series, physical and some chemical properties, crop suitability and agricultural limitations.

The Agriculture Sector Team (AST) of the Canadian International Development Agency (CIDA) has digitized the AEZ soil maps, and the digital data are also available through FAP 19 (Geographic Information Systems).

Upazila Land and Soil Resources User's Manual

These reports are popularly known as Upazila Nirdeshika. The Bangladesh Agricultural Research Council (BARC) is coordinating the publication of the series of reports for each of the 460 upazilas with the active participation of SRDI, the Department of Agricultural Extension (DAE), the Bangladesh Agricultural Research Institute (BARI) and the Bangladesh Rice Research Institute (BRRI). Reports for more than 150 upazilas have already been published and the rest are expected to be published by 1993.

These reports contain valuable information on soil associations and series, plus data on flood phases, post-monsoon drainage patterns, water holding capacity, pH, organic matter content, nutrient content in respect of calcium, magnesium, potassium, ammonium nitrogen, phosphorus, zinc, sulphur, boron, copper iron, and manganese by soil series.

4. Agriculture

Baseline studies in agriculture are usually a component part of the project feasibility studies. Additional information may be required for the EIA to link agricultural land use to potential positive and negative land, fisheries, wildlife and social impacts. Agricultural baseline studies typically cover the following:

- Area under different cropping patterns by land type;
- Area under individual crops;
- Inputs including human and animal labor used;
- Crop damage;
- Normal and damaged yield level; and
- Crop production.

Data for the items listed above are available from the publications of Bangladesh Bureau of Statistics (BBS). Data on areas under different crops and their production by upazila are available in the Upazila Statistics series and the Bangladesh Census Report of Agriculture and Livestock (latest version is for 1983-84). Crop data from BBS are available only up to 1982-83 and are reported by upazila, so the area boundaries may not coincide with the boundaries of the project under study (which often cut across several different upazilas). Similar types of information are available in the upazila level office of the Department of Agricultural Extension (DAE), but official use of these cannot be made as BBS has the final authority of publishing agricultural statistics.

HUMAN RESOURCES DATA SOURCE:

Useful data on relevant issues regarding human resources can be obtained from a variety of sources including Government Departments and Ministries, donor agencies, NGOs and consulting firms. The Government of Bangladesh publishes a wide variety of official data, much of it in serial publications of the Bangladesh Bureau of Statistics (BBS) containing statistical information. These include:

- Statistical Yearbook of Bangladesh (current volume): a compendium of data on all natural, social and economic sectors.
- Final Report of Bangladesh Population Census, 1981: useful for EIA studies are the District Series and the Thana/Community Series. The latter series has socio-demographic data down to the mouza level.
- *The 1991 Population Census*: field data collection for this census has been completed and initial reports may be available in 1992.
- Bangladesh Census of Agriculture and Livestock, 1983-1984: the Thana Series is the most useful for EIA work. It carries landholding (by type and size) and livestock data down to the mouza level.
- The Yearbook of Agricultural Statistics of Bangladesh: publishes cropping and yield data. It is useful for general reference and standards.
- Report on the Bangladesh Livestock Survey,1983-84, (March 1986): resolved data down to the District level. The volume may be useful for historic reference.
- Bangladesh Census of Non-farm Economic Activities, 1986, (March 1990):provides district volumes on commercial, artisan, industrial, profes sional activities/occupations. Data are resolved down to the mouza level.

Other *BBS publications* that might provide useful information are :

- Thana Statistics, Vols. I to III (land utilization and irrigation, agricultur al output, minor crops, community level social data), latest data: 1987.
- Survey of Ponds, 1982.
- Bangladesh Mosque Census, 1983.
- Final Report on the Census of WAQF Estates, 1986.
- Socio-economic Indicators of Bangladesh, (Second Edition), 1986.
- Rural Credit Survey of Bangladesh, 1987.
- Mouza Based Study of Rural Facilities, 1989: has data by mouza for police stations, tehsil office, hospitals/dispensaries, family planning clinics, veterinary clinics, schools, colleges, hats/bazaars, banks, post offices, and metalled roads. Data are given as distance in km from the mouza to the nearest such facility.
- Report on the Survey of Farm Forestry, 1988
- Report on Bangladesh Handloom Census, 1990
- Selected Statistics and Indicators on Demographic and Socio-economic Situation of Women in Bangladesh. Proceedings of a National Workshop, Dhaka, May 29-30, 1989.
- Survey of Bangladesh: the Survey has topographical maps in fairly large scales: 1:7,000 ft.; 1:15,000; and 1: 50,000. Other maps are available with the Revenue Department (mouza and district maps), the BWDB (1:15,690 and 1:7,845 with 1 foot elevation contours), and the BIWTA . For other maps and series, and for sets of Bangladesh aerial photography, see: *GIS Resources in Bangladesh*, Draft Technical Report, Flood Action Plan, FAP-19 (June 1991).

Other sources of information:

- Floods and flood damage: check locally with the BWDB Executive Engineer at the district, or the Sub-divisional Engineer at the Thana level to obtain reports on flood damage. Another source on flood damage and social disruption is the affected Union Parishad Office.
- General, fish and livestock marketing: the records kept by market franchise holders and their toll collectors provide information on both the wholesale and retail movement of products through local markets.
- Fisheries management: for jalmahals above 20 acres, see ADC (Revenue) at the District level. For *jalmahals* between 3 and 20 acres, see the Thana Fisheries Officer, and for *jalmahals* below 3 acres, see the Union Chairman. The Bangladesh Rural Development Board (BRDB) has a program to develop fisheries cooperatives. Check with BRDB for cooperatives in the program area.
- *Navigation system*: check with the Bangladesh Inland Water Transport Authority (BIWTA) for passenger and freight data on large ferries. The BWDB also collects data on the use of rivers for transportation.

It is also worthwhile to check with local NGOs in the program area. Most NGOs do a socio-economic baseline survey at the start of their program and update their information in subsequent periods.

Some of the libraries that can provide relevant information are :

- United States Agency for International Development (USAID)
- World Bank (WB)
- Food and Agriculture Organization (FAO)
- Centre On Integrated Rural Development For Asia And The Pacific (CIRDAP)
- Association of Development Agencies in Bangladesh (ADAB)
- Bangladesh Institute for Development Studies (BIDS)
- Water Resources Planning Organization (WARPO)
- Early Implementation Projects (EIP)
- Bangladesh Agricultural Research Institute (BARI)
- Bangladesh Rural Advancement Committee (BRAC)
- Bangladesh Academy of Rural Development, Comilla (BARD)
- Institute of Post Graduate Studies in Agriculture (IPSA)

Exercise 15

Compare and contrast two environmental base line case studies. Review the two case studies and provide a report on their completeness. In your report compare the levels of detail for each report and decide if one is more complete than the other. If one report is more complete than the other provide comments on what information is missing and how that might effect the EIA.

EXAMPLE 1

River System and Channel Network

The CPP area covers 16 subcompartments and the Lohajang floodplain (LFP), starting from the offtake of the Lohajang River at Ramdebpur in the NW corner of the project area to Karatia in the SE. The channels in the eastern part of the project area originate mainly from Gala Khal whereas those originating from the Lohajang and Elanjani rivers form the channel network system for the western part of the project. Gala Khal, connecting the Lohajang River to the Pungli River, forms the northern boundary of the project.

Surface Water and Flood

Early flood occurs due to rain in April and May. In the absence of proper drainage, the depressions and low-lying areas receive the runoff and remain inundated. During the monsoon, the water level in the area increases as a result of rain/runoff and riverbank overflow. Water levels in the Dhaleswari River rises towards the end of June when water enters Gala Khal through the Lohajang and Pungli rivers. There is no direct flood water flow from the Pungli River into the project area. Flood water enters the areas between the Lohajang and Dhaleswari/Elanjani rivers through the canals and khals originating from the Lohajang.

Drainage

Drainage congestion has reportedly been the main problem in the CPP area. The existing channel network does not permit adequate drainage. The farmlands located in the low-lying plain are normally inundated by early rainfall in April, May and June. Pre-monsoon drainage does not take place properly because the main channels are either silted up or do not have the capacity to handle the required volumes of water. Poor drainage during this season damages the boro crop at harvesting stage and damages T.aman seedlings.

Land Types and Land Use

Land types are flood depth phases of floodplain soils. More than 50 percent of the flood free land type (F_0) is found in subcompartments 1 and 14 and the subcompartment designated as Lohajang floodplain, whereas almost 50 percent of the flood prone land type (F_3) is found in subcompartments 10, 11 and 12. According to these figures only 4.4 percent of land in the CPP area is considered flood free (F_0).

Cropping Patterns

Cropping patterns in the project area are dictated by hydrologic regime and are essentially based on rice. Pre-monsoon cropping is constrained by drainage congestion, mostly from accumulation of rain runoff. This situation is aggravated in the monsoon season

when flooding resulting from high water level in the Dhaleswari, Lohajang and Pungli rivers limits the crop choice. Post-monsoon drainage congestion also acts as a constraint against crop production. Irrigation using groundwater sources is extensively practiced for growing HYV boro rice in the winter season in sequence with high yielding and local varieties of T. aman on F_1 land type and transplanted deep water aman on F_2 land type. Non-rice crops are grown mostly in non-irrigated land in rotation with rainfed aus and aman rice varieties, depending on the land type. Winter crops are intercropped with sugarcane.

Natural Vegetation

The project area does not have any public land for forests. Some naturally grown trees e.g. kharazora, kadam, koroi and chambal, shrubs e.g. kash, dholkalmi, beth and patipata, and herbs e.g. kalmegh, thankuni and kantanotey are found along the marginal lands of roads and embankments, field strips, canal banks and homesteads. These species are economically important because of their role in providing fuel, timber and herbal medicine.

Homestead Groves and Kitchen Gardens

About 27 percent of the project area is occupied by homesteads. On average, an area of about 0.01 ha in each homestead is used for gardens and groves. About 50 percent of the homestead is used for housing, 25 percent for trees and other vegetation, and 25 percent for vegetable gardening. About 40 percent of the households have a piece of land ranging from 0.02 to 0.3 ha in extent which is located about 0.3 to 0.9m lower than the homestead but normally attached to it. This land is locally referred to as *palan* and is generally used for vegetable gardening for household consumption and/or marketing. Among the homestead groves betelnut, mangoes, jackfruit, citrus species, bamboos and bananas are the dominant trees found in abundance in the elevated areas. Debdaru is dominant in low-lying areas.

Energy Use

The main sources of fuel for cooking in the rural parts of the project area are dried leaves, cow dung, jute sticks and crop residues. Only about 20 percent of urban households use kerosene as a cooking energy source, while the remainder use fuelwood.

Water Quality

Water samples from rivers, beels and ponds were tested for a number of parameters from March through May. They were found to be generally suitable for fish and other aquatic biota. The overall quality of river and beel water was better than the pond water.

Open Water Capture Fisheries

Fish Diversity

As many as 50 species of freshwater fish and four species of small shrimp have been observed in different habitats inside the project area. An abundance of major carps is reported by fishermen/villagers in the area, and is possibly due to floods from the Jamuna River which is rich in major carp parent stock and fry.

During the dry season fish fauna in the CPP area take shelter in the perennial beels and pools of the Lohajang River and become extremely vulnerable to overfishing, particularly in beels.
In the early monsoon (May-June) major carps start spawning in the upper reaches of the Jamuna River and continue up to mid-monsoon (July-August). Their eggs, early fry and some adults flow downstream through the Jamuna River and its distributaries and eventually disperse laterally onto the floodplain in the project area through a number of open khals in late June through early August.

Reliable data on fish production from different open water habitats within the project area is not available. FAP 20 (1992d) has estimated the total open capture fisheries production in the project area at 380 tons/year.

Wildlife

The CPP area supports 177 species of wildlife including 5 amphibians, 17 reptiles, 140 birds and 15 mammals (field observations from April to May 1992). Important wildlife resource components within the project area consist of seven endangered and ten threatened wildlife species that directly or indirectly create benefits or disbenefits to human populations. These wildlife are sensitive to ecological changes caused by changes in the water regime.

Navigation

A combination of road network and navigation routes provides the communities in the CPP area with access to the outside, even during the flood season (except for the deeply flooded areas).

Water transport is commonly used for 3-4 months during the wet season. The Lohajang River passes through the middle of the project area and Tangail town.

Population and Settlements

According to the 1981 census the population in the project area was 190,430 of which 97,988 were male and 92,442 female. There is a large variation in population density between and/or among

subcompartments due to the influence of Tangail town and other semi-urban areas. The project area is densely populated with 1465 person/km^2 in 1981, compared to 605 persons/km^2 for the national average (BBS 1985a).

Livelihood and Subsistencee

The rural and household economy is mainly based on agriculture. Service, business and transport constitute the main occupational sectors for a large number of households in the urban area, while only a few households in the rural area derive their livelihood from such occupations. Inherited community-based profession such as weaving, conch-making, pottery and carpentry is low in the urban area while the percentage for such categories in the rural area is considerably higher.

Trend of Flood Hazards in the CPP Area

Flood is causing damages to crops, homesteads and livestock.

Risks Associated with Drainage Congestion

Drainage congestion is an important environmental problem in the CPP area. People from 11 subcompartments recognized drainage congestion as a major constraint. The main reasons for drainage congestion are siltation of canals and beels and the development activities that lead to the blockage of normal drainage flow. Areas with drainage congestion are associated with the problems of waterborne diseases, skin disease, more vulnerability to fish and livestock diseases, reduction in cultivated land and its socioeconomic consequences. Areas under drainage congestion are subject to health hazard from polluted water due to jute retting.

Risks Associated with Bank Erosion

Bank erosion has been observed in subcompartments 1, 5, 6, 7, 10, 11, 12, 13 and 15, and is one of the severest hazards in the CPP area. More than 50 families in 1991 reportedly have been uprooted due to river bank erosion.

River System and Channel Network

EXAMPLE 2

River System and Channel Network

The CPP area covers 16 subcompartments and the Lohajang floodplain (LFP), starting from the offtake of the Lohajang River at Ramdebpur in the NW corner of the project area to Karatia in the SE. The channels in the eastern part of the project area originate mainly from Gala Khal whereas those originating from the Lohajang and Elanjani rivers form the channel network system for the western part of the project. Gala Khal, connecting the Lohajang River to the Pungli River, forms the northern boundary of the project.

Surface Water and Flood

Early flood occurs due to rain in April and May. In the absence of proper drainage, the depressions and low-lying areas receive the runoff and remain inundated. During the monsoon, the water level in the area increases as a result of rain/runoff and riverbank overflow. Water levels in the Dhaleswari River rises towards the end of June when water enters Gala Khal through the Lohajang and Pungli rivers. There is no direct flood water flow from the Pungli River into the project area. Flood water enters the areas between the Lohajang and Dhaleswari/Elanjani rivers through the canals and khals originating from the Lohajang.

Drainage

Drainage congestion has reportedly been the main problem in the CPP area. The existing channel network does not permit adequate drainage. The farmlands located in the low-lying plain are normally inundated by early rainfall in April, May and June. Pre-monsoon drainage does not take place properly because the main channels are either silted up or do not have the capacity to handle the required volumes of water. Poor drainage during this season damages the boro crop at harvesting stage and damages T.aman seedlings.

Land Types and Land Use

Land types are flood depth phases of floodplain soils. More than 50 percent of the flood free land type (F_0) is found in subcompartments 1 and 14 and the subcompartment designated as Lohajang floodplain, whereas almost 50 percent of the flood prone land type (F_3) is found in subcompartments 10, 11 and 12. According to these figures only 4.4 percent of land in the CPP area is considered flood free (F_0).

Cropping Patterns

Cropping patterns in the project area are dictated by hydrologic regime and are essentially based on rice. Pre-monsoon cropping is constrained by drainage congestion, mostly from accumulation of rain runoff. This situation is aggravated in the monsoon season

when flooding resulting from high water level in the Dhaleswari, Lohajang and Pungli rivers limits the crop choice. Post-monsoon drainage congestion also acts as a constraint against crop production. Irrigation using groundwater sources is extensively practiced for growing HYV boro rice in the winter season in sequence with high yielding and local varieties of T. aman on F_1 land type and transplanted deep water aman on F_2 land type. Non-rice crops are grown mostly in non-irrigated land in rotation with rainfed aus and aman rice varieties, depending on the land type. Winter crops are intercropped with sugarcane.

Agricultural Production

Estimates of areas under different crops, generated by GIS from the cropping pattern and land type data and the results of the land use surveys and interviews with farmers on crop damage were used for determining crop production. It appears that a total of 36,356 tons of cereal including 34,376 tons of paddy is currently produced annually in the project area. Farmers lost an estimated 3175 tons of paddy because of flood damage and drainage congestion.

Natural Vegetation

The project area does not have any public land for forests. Some naturally grown trees e.g. kharazora, kadam, koroi and chambal, shrubs e.g. kash, dholkalmi, beth and patipata, and herbs e.g. kalmegh, thankuni and kantanotey are found along the marginal lands of roads and embankments, field strips, canal banks and homesteads. These species are economically important because of their role in providing fuel, timber and herbal medicine.

Homestead Groves and Kitchen Gardens

About 27 percent of the project area is occupied by homesteads. On average, an area of about 0.01 ha in each homestead is used for gardens and groves. About 50 percent of the homestead is used for housing, 25 percent for trees and other vegetation, and 25 percent for vegetable gardening. About 40 percent of the households have a piece of land ranging from 0.02 to 0.3 ha in extent which is located about 0.3 to 0.9m lower than the homestead but normally attached to it. This land is locally referred to as *palan* and is generally used for vegetable gardening for household consumption and/or marketing. Among the homestead groves betelnut, mangoes, jackfruit, citrus species, bamboos and bananas are the dominant trees found in abundance in the elevated areas. Debdaru is dominant in low-lying areas.

Energy Use

The main sources of fuel for cooking in the rural parts of the project area are dried leaves, cow dung, jute sticks and crop

residues. Only about 20 percent of urban households use kerosene as a cooking energy source, while the remainder use fuelwood.

Water Quality

Water samples from rivers, beels and ponds were tested for a number of parameters from March through May. They were found to be generally suitable for fish and other aquatic biota. The overall quality of river and beel water was better than the pond water.

Open Water Capture Fisheries

Fish Diversity

As many as 50 species of freshwater fish and four species of small shrimp have been observed in different habitats inside the project area. An abundance of major carps is reported by fishermen/villagers in the area, and is possibly due to floods from the Jamuna River which is rich in major carp parent stock and fry.

During the dry season fish fauna in the CPP area take shelter in the perennial beels and pools of the Lohajang River and become extremely vulnerable to overfishing, particularly in beels.
In the early monsoon (May-June) major carps start spawning in the upper reaches of the Jamuna River and continue up to mid-monsoon (July-August). Their eggs, early fry and some adults flow downstream through the Jamuna River and its distributaries and eventually disperse laterally onto the floodplain in the project area through a number of open khals in late June through early August.

Reliable data on fish production from different open water habitats within the project area is not available. FAP 20 (1992d) has estimated the total open capture fisheries production in the project area at 380 tons/year.

Closed Water Culture Fisheries

Culture (pond) fishery is not common in the CPP area. There are about 450 ponds (64 ha) in the area of which 187 (27 ha), 93 (19 ha) and 170 (18 ha) are cultured, culturable and derelict, respectively (DOF 1986). The constraints facing the pond fishery practices include: inundation of ponds by flood water.

Production

The average production of fish from ponds in the CPP area is lower than the national average (1,055 kg/ha/yr, DOF 1989), which may attributable to inappropriate management discussed above. The rate of production of fish in the CPP area was 1239, 851 and 682 kg/ha/yr in cultured, culturable and derelict ponds, respectively

(DOF 1989).

Wildlife

The CPP area supports 177 species of wildlife including 5 amphibians, 17 reptiles, 140 birds and 15 mammals (field observations from April to May 1992). Important wildlife resource components within the project area consist of seven endangered and ten threatened wildlife species that directly or indirectly create benefits or disbenefits to human populations. These wildlife are sensitive to ecological changes caused by changes in the water regime.

Navigation

A combination of road network and navigation routes provides the communities in the CPP area with access to the outside, even during the flood season (except for the deeply flooded areas).

Water transport is commonly used for 3-4 months during the wet season. The Lohajang River passes through the middle of the project area and Tangail town.

Population and Settlements

According to the 1981 census the population in the project area was 190,430 of which 97,988 were male and 92,442 female. There is a large variation in population density between and/or among subcompartments due to the influence of Tangail town and other semi-urban areas. The project area is densely populated with 1465 person/km^2 in 1981, compared to 605 persons/km^2 for the national average (BBS 1985a).

Livelihood and Subsistencee

The rural and household economy is mainly based on agriculture. Service, business and transport constitute the main occupational sectors for a large number of households in the urban area, while only a few households in the rural area derive their livelihood from such occupations. Inherited community-based profession such as weaving, conch-making, pottery and carpentry is low in the urban area, while the percentage for such categories in the rural area is considerably higher.

Health and Nutrition

The most common diseases in the case study area are diarrhoea, intestinal worm infestation, skin diseases and acute respiratory infection. Water-borne diseases e.g. cholera/diarrhoea, typhoid fever, dysentery and jaundice, affect on average more than 27 percent of rural households. Diarrhoeal disease increases during the monsoon and reaches a peak first in the post monsoon period

(September to November) and again in the spring (March to May). Approximately 90 percent of rural households drink safe, tubewell water but in some villages there is severe scarcity of safe water.

Trend of Flood Hazards in the CPP Area

Flood is causing damages to crops, homesteads and livestock.

Risks Associated with Drainage Congestion

Drainage congestion is an important environmental problem in the CPP area. People from 11 subcompartments recognized drainage congestion as a major constraint. The main reasons for drainage congestion are siltation of canals and beels and the development activities that lead to the blockage of normal drainage flow. Areas with drainage congestion are associated with the problems of waterborne diseases, skin disease, more vulnerability to fish and livestock diseases, reduction in cultivated land and its socioeconomic consequences. Areas under drainage congestion are subject to health hazard from polluted water due to jute retting.

Risks Associated with Bank Erosion

Bank erosion has been observed in subcompartments 1, 5, 6, 7, 10, 11, 12, 13 and 15, and is one of the severest hazards in the CPP area. More than 50 families in 1991 reportedly have been uprooted due to river bank erosion.

COMPUTER SKILL

On July 27 we are going to do some GIS exercises that involve computer work. The computer work will be done in two-person teams. In order to match those participants who have a lot of experience working at computers with those who have only some experience, we would like you to answer the questions below.

1. Do you know how to type? (using either two fingers or both hands is fine.)

2. What experience have you had using DOS?

Journal 4 (Study Methods)

1. What three secondary sources might be useful to me in performing research for an EIA study?

2. What is the one area I need to work on in order to become the best EIA study Team Leader I can be?

3. How can I use models such as MKE11 (Mike 11) in an EIA study?

4. What types of data do geographic information systems (GIS) produce?

MODULE - 6
EXERCISE, HANDOUT AND OTHER MATERIALS

Exercise 16

The purpose of exercise is to identify hazards from secondary source materials. The teams will review the Tangail environmental baseline in order to determine the potential hazards for the Tangail area.

Exercise 17

Using the hazards identified in the previous exercise determine the potential risk with which they might be associated. Questions you should answer include:

How can you make use of this data?
How can you define risk and hazard - are they the same?
What would the next step in this process be?

Exercise 18

The purpose of the exercise is to allocate risks across the various resource catergories. Develop a matrix on the flip chart which "quantitatively" allocates risk across the following categories:

Navigation
Land use
Agriculture
Health & nutrition
Fisheries
Livelihood

Using the risks you identified in the previous exercise, score the catergories on a +, -, or 0 basis for whether there is a high medium or low risk to this category.

JOURNAL 5 (HAZARD AND RISK)

1. How are hazard and risk related?

2. Are all hazards equally important?

3. How does my understanding of hazard and risk help me in determining impacts?

4. What is the definition of risk?

MODULE - 7
EXERCISE, HANDOUT AND OTHER MATERIALS

Exercise 19

The purpose of this exercise is to acquaint you with the process of identifying and quantifying (or qualifying) the various impacts from several project options. The matrix attached is based in part on the Tangail EIA case study. Because the matrix is too long to complete in its entirety in this exercise we have provided only some of the data.

The first five columns comprise data obtained in the course of the EIA. Columns 2 and 3 represent the baseline conditions identified in the study and the trend which is the future without the project. Columns 4 and 5 represent the future with project conditions with two different project options. Calculate the relative change due to the two options in columns 6, 7 and 8. What does this information mean?

Quantified Impact Assessment

1. IECs	2. Baseline (Present) Condition	3. Future w/o Project	4. Future with Project Option "A"	5. Future with Project Option "B"	6. Change from baseline to Future w/o-project	7. Change w/Project "A"	8. Change w/Project "B"	9. Impact Assessment	10. Score
Land Type (ha)									
F_2	200	200	375	290					
F_3	650	650	850	800					
F_4	1621	1621	1350	1536					
F_5	973	973	869	923					
Drainage Congestion (ha)	491	Increase	Decrease	NC					
Ground Water	Adequate	Adequate	Adequate	Large Decrease					
Annual Crop Production									
Total area irrigated (ha)	2140	2440	2750	2520					
Total potential paddy production (tons)	14890	16975	19134	17534					
Total paddy production (tons)	13682	15597	17582	16111					
Total rabi production (tons)	2895	2651	3010	2950					
Total jute production (tons)	681	479	603	491					
Total farm labor requirements (x 1000 person days)	1157	1217	1370	1220					
Homesteads									
Housing (ha)	417	493	541	502					
Garden crops (ha)	112	147	193	152					
Tree crops (ha)	89	103	117	108					

Note: NQ = not quantified NC = no change
S = sustainable, SM = sustainable with mitigation,
RM = reversible with mitigation, IR = irreversible,
LM = low magnitude, HM = high magnitude

0

0

Continued

1. IECs	2. Baseline (Present) Condition	3. Future w/o Project	4. Future with Project option "A"	5. Fiture with Project option "B"	6. Change from baseline to Future w/o project	7. Change w/Project "A"	8. Change w/Project "B"	9. Impact Assessment	10. Score
Capture Fisheries									
Annual production (tons)	230	140	127	90					
Professional fisherman household production (kg/yr.)	515	313	284	201					
Subsistence fisherman household production (kg/yr.)	8	6	4	1					
Fish diversity (no. of species)	52	49	38	30					
Culture Fisheries									
Annual Production (tons)	17	24	28	26					
Total employment (persons)	NQ	Increase	Increase	Increase					
Aquatic Habitat (ha)									
Pre-monsoon	275	NC	1100	1000					
Monsoon	4200	NC	4075	4175					
Post-monsoon with drainage congestion	4900	NC	4000	3200					
Post-monsoon without drainage congestion	315	NC	515	NC					
Terrestrial Habitat (ha)									
Pre-monsoon									
Monsoon									
Post-monsoon with drainage congestion									
Post-monsoon without drainage congestion									
Wildlife									
Presently endangered species	7	7	6	2					
Presently threatened species	10	12	14	19					
Presently common species	30	28	26	21					

Note: NQ = not quantified NC = no change
S = sustainable, SM = sustainable with mitigation,
RM = reversible with mitigation, IR = irreversible,
LM = low magnitude, HM = high magnitude

Continued

1. IECs	2. Baseline (Present) Condition	3. Future w/o Project	4. Future with Project Option "A"	5. Future with Projectr Option "B"	6. Change from baseline to Future w/o project	7. Change w/Project "A"	8. Change w/Project "B"	9. Impact Assessment	10. Score
Road communication (km)	115	NC	Increase	NC					
Navigation				NC					
Annuaal passenger trips ('000s)	121	135	157	139					
Annual volume of goods marketed (tons)	900	917	923	895					
Socio-economic									
Subsistence fishing (kg fish/household/year)	NQ	NQ	NQ	NQ					
Crop production wages (annual, w/o food, million Tk.)									
Peak season	81	242	307	291					
Lean season	57	170	210	190					
Construction employment (person/years)	0	0	7515	6207					
O&M employment (no. jobs)	0	0	179	53					
Quality of Life									
Gender issues	NQ	NQ	NQ	NQ					
General Health	NQ	NQ	NQ	NQ					
Nutrition - crop based	NQ	NQ	NQ	NQ					
Nutrition - fish based	NQ	NQ	NQ	NQ					
Vector-borne disease incidence	NQ	NQ	NQ	NQ					
Town									
Drinking water	High Coliform	High Coliform	No Coliform	High Coliform					
Groundwater depletion	.1m/yr.	.15m/yr.	01m/yr.	.1m/yr.					
Flooding hazard	High	High	Low	Medium					
Drainage problems	Yes	Yes	No	Yes					

Note: NQ = not quantified NC = no change
S = sustainable, SM = sustainable with mitigation,
RM = reversible with mitigation, IR = irreversible,
LM = low magnitude, HM = high magnitude

Exercise 20

The purpose of this exercise is to develop "narrative descriptions" of impact types. Using the matrix you completed determine the relative magnitude of impact and the narrative description of that impact. Using the notes at the bottom of the matrix, determine whether the change for each project option is of low or high magnitude (LM or HM) and where it fits between sustainable and irreversible in terms of impact. As you work on this second part of the you will need to develop criteria on which to base these decisions, remember to write them down.

Exercise 21

Assign weights to earlier impact table (from Tangail). The trainees should be able to determine impact type and score. Based on the last exercise develop a scale on which to score the various impacts.

Annex 2

Impact Scoring Categories

Beneficial Impacts			Sustainable	Sustainable with Mitigation	Not Sustainable
Sensitive	Immediate	High Magnitude			
		Low Magnitude			
	Gradual	High Magnitude			
		Low Magnitude			
Less Sensitive	Immediate	High Magnitude			
		Low Magnitude			
	Gradual	High Magnitude			
		Low Magnitude			

Negative Impacts			Irreversible	Reversible with Mitigation	Reversible
Sensitive	Immediate	High Magnitude			
		Low Magnitude			
	Gradual	High Magnitude			
		Low Magnitude			
Less Sensitive	Immediate	High Magnitude			
		Low Magnitude			
	Gradual	High Magnitude			
		Low Magnitude			

Annex 2

Impact Scoring Categories

Beneficial Impacts			Sustainable	Sustainable with Mitigation	Not Sustainable
Sensitive	Immediate	High Magnitude			
		Low Magnitude			
	Gradual	High Magnitude			
		Low Magnitude			
Less Sensitive	Immediate	High Magnitude			
		Low Magnitude			
	Gradual	High Magnitude			
		Low Magnitude			

Negative Impacts			Irreversible	Reversible with Mitigation	Reversible
Sensitive	Immediate	High Magnitude			
		Low Magnitude			
	Gradual	High Magnitude			
		Low Magnitude			
Less Sensitive	Immediate	High Magnitude			
		Low Magnitude			
	Gradual	High Magnitude			
		Low Magnitude			

Journal 6 (Impact Assessment)

1. What is meant by the term impact?

2. Are impacts only quantitative?

3. What is meant by the terms magnitude and reversibility with regard to impacts?

4. How do mitigation plans affect impacts?

MODULE - 8
EXERCISE, HANDOUT AND OTHER MATERIALS

Exercise 22

Develop a complete list of potential material that can be used in an EIA, and then develop a filing system to manage the information.

Exercise 23

Small Group Exercise - 1.25 hr. Prepare a complete list of all the potential meetings which will be held in the course of an EIA project. Indicate the frequency of the meetings and the participation linkages. (Hint - project initiation is the first meeting)

Journal 7 (Communicating and Reporting)

1. What are the major chapters found in an EIA Report?

2. Why is communication during field activities important for an EIA study team?

3. Why is it important to maintain a file of all materials used in preparing an EIA study?

MODULE - 9
EXERCISE, HANDOUT AND OTHER MATERIALS

Chapter 8

RECOMMENDATIONS FOR THE ENVIRONMENTAL MANAGEMENT PLAN (EMP)

This section of the EIA report provides a series of recommendations for consideration in inclusion in the Environmental Management Plan (EMP). This EIA report does not provide a detailed EMP, rather it makes recommendations towards development of such a document which should form the link from the EIA stage through to the implementation stage of the project, should be the environmental equivalent of the engineering design documents and drawings (ISPAN 1992a), and should contain sections pertinent to mitigation and enhancement, monitoring, people's participation, institutional arrangements, compensation arrangements (if applicable), cost estimates for implementation of the EMP and the proposed schedule for implementation.

8.1 Impact Management

8.1.1 Mitigation, Enhancement and Compensation for Structural Objectives

Flood Protection and Regulation

The CPP intends to upgrade the existing embankment to the level of 1988 flood, and provide peripheral structures including main and medium inlets and spillways. These actions would provide protection against flood and would reduce the risk to infrastructure, lives and properties. Several measures are proposed for consideration by the CPP concerning the proposed flood regulation structures.

- Any major structural work such as southern peripheral structures, and the main inlet regulator should be discussed with the appropriate community interest groups prior to the construction. In order to succeed, the CPP must have the support of the wide group of various communities it intends to assist.
- Careful consideration should be given to future developments in the North Central region that may affect the overall operations of the CPP. Those developments may include closure of Dhaleswari because of the proposed Jamuna Bridge (see Chapter 8), and construction of the left embankment of the Brahmaputra.
- The applicability of the mathematical model for water management at subcompartment level involving small water channels should be tested. The test and trial and "phase in" approach of the CPP allows for flexibility in selection, design, and construction of alternative measures that may find to be more appropriate during the course of the project. Continued efforts in data collection particularly water levels are needed to add to the efficiency and adequacy of the mathematical model that is currently used for design and projection purposes.
- The CPP area is heterogeneous in hydrological, agricultural and socioeconomic conditions except for a few subcompartments. More detailed and site-specific information should be collected during the design and planning of structural and non-structural measures.
- Cuts and breaches to the embankments, and the inlet structures and roads should be examined systematically and periodically. Such systematic approach should be included in a detailed repair, operation and maintenance plan for all the major structures.
- Development of a flood preparedness plan for more populated areas should be considered. The plan should include measures for early warning, evacuation, sheltering, disaster relief management of the population at risk in case of abnormal flooding. The proposed Compartment Water Management Board, when in place, should develop the flood preparedness plan and organize periodic awareness training/campaign programs in collaboration with the relevant NGOs and the local authorities. As part of

flood preparedness plan, the said board also should develop a mobilization committee that could act swiftly in case of emergencies. Another mitigation measure is to allocate areas as shelter during the high flood for the people outside the project area. These shelters could be provided by extending the embankments.

- A detailed compensation plan has to be developed in compliance with the existing regulations and traditional norms in Bangladesh for the households who would be losing their land and properties as a result of realignment, construction and upgrading of embankments, roads and other structures (refer to Section 8.2.3 for details)

Capture Fisheries

The CPP would impact significantly capture fisheries production, fish species diversity, and economic activities of full time and subsistence fishermen. Expected reductions in miscellaneous fish would have major impacts on diet of fish-dependent communities and on species diversity. Although the project, under normal circumstances, intends not to block or regulate the Lohajang River flow until July 15, the loss of capture fisheries is estimated approximately between 80 to 100 tons per year if no mitigation measure is taken. In terms of production, this loss could be only partly compensated with expected increase in culture fisheries, up to around 40 tons per year, and this compensatory amount will not accrue to all the landless and poor groups who suffer the losses. Increasing the opportunities for culture fisheries cannot be considered a viable option for fishermen who would be affected, nor a mitigation for biodiversity reduction. Culture fisheries production operations require a different set of inputs, capital infusion and managerial skills to which affected fishermen have no access and no skill to manage.

- A critical component of any mitigation plan would be the development of a structure on the Lohajang River which permits up and downstream passage of adult and juvenile fish. FAP 17 (pers. comm.) have initiated investigations of such a structure and consider that the use of a retracted gate may be feasible. The use of effective fish passes for all regulators in the CPP should be further studied, tested and implemented.
- Consideration should be given to maintaining a high enough water level after July 15 and during the monsoon season by controlled drainage. This measure, if found feasible, would partly maintain the feeding ground for beel fish.
- During the dry season, the water level in perennial beels decreases. Excavation of selected beels available and accessible to the fishermen could be considered. This should increase the survival rate of mature beel fish for the next fishing season. This measure should be studied in the context of effectiveness of the excavation on fish catch and diversity, and water delivery to the excavated beels.
- Although no specific sustainable compensation measure for fishermen impacted can be conceived at this time, the possibility of developing the "beel concept" and fishermen association approach should be considered. The possibility of integrating the beel concept with khas land/jalmahals (that are currently leased out) should be studied. One option would be to take these areas out of the lease system and reserve them as common property resource. Another option would be to form an association of the fishermen with the right to fish those areas.
- Promotion of integrated rice/fish production should be considered as an enhancement measure to increase the economic return from the project. The intensive extension undertaking required to promote this concept is more applicable to progressive farmers in the area. For reasons indicated above, it cannot be considered as a viable substitution, compensation, or mitigation measure for the fishermen affected by the project.

Most of those affected by reduction in capture fisheries do not own land or if they have limited land they do not have the skills required for managing a mixed production scheme. In case of more progressive farmers, the impact of pesticides and chemical fertilizers used rather extensively for HYV crops may not be suitable for fish production.

Navigation

- The main inlet structure and peripheral protection structures would hinder navigation during monsoon. The possibilities for adjusting the major gate structures to allow for navigation should be studied and considered. The structure of the main inlet and operation of gate should be adjusted to accommodate certain level of navigation that is necessary for the economy and communication needs of the community. FAP 20 (1992d) proposes adjusting the structure of the main inlet for allowing 60 percent of the existing level of navigation. It is important to realize at least this level of navigation.
- Provisions should be made to construct passages at the main inlet regulator, at Sadullapur inlet regulator, and other medium regulators for the boat passengers to transfer their goods across those structures.
- Improving the road between the Jugni market and Tangail town is a reasonable partial trade off for reduced navigation.

Groundwater

- There should be a systematic study on the impact of the project on groundwater recharge after implementation of the project. Use of groundwater for irrigation and drinking water would be significantly increased in the project area as a result of increase in irrigable land and population. Controlled river flooding, improving khals and drainage canals and increased abstraction of water for various purposes would impact the recharge of the groundwater.
- Abstraction of groundwater should be monitored continuously and when necessary should be limited to safe (recharge) yield.
- Location and placement of the STWs and DTWs should be controlled and when necessary regulated.
- With expected increasing demand on groundwater, consideration should be given to cooperative development of STWs and DTWs for combined domestic and irrigation uses.

Improved Drainage

In order to enhance the drainage improvement efforts and also facilitate the maintenance of navigation routes, it is recommended that simple and low cost methods to be used to dredge periodically the improved khals and drainage canals. The bandalling method using bamboo mat panels may be applicable to smaller khals. Manual cleaning of smaller canals, and offtake areas, if done regularly, would alley the use of more costly dredging.

Tangail Town

The limited structural intervention proposed for the town does not seem to be adequate in mitigating the potentially serious drainage problem. Although this task is not the mandate of the CPP, efforts should be made to make project expertise available to assist with more comprehensive planning for removing the serious drainage problem in town.

Impacts in Bordering Areas

Most of the areas north and south of the project area would not be affected significantly. The surface water modelling runs indicated that there might be impacts in lowering the water level in the main rivers. Upstream areas would be affected during peak discharges due to ponding effects of the main inlet that would be closed during high flood. This may have impact on homesteads and properties located in subcom-

partments immediately north of the CPP area. Mitigation measures among others may include raising the houses and roads and providing shelter. The possibility of ponding effect of the main inlet when it is closed should be discussed with the communities affected before any mitigation measure is taken.

8.1.2 Mitigation and Enhancement Measures for Institutional Development and Strengthening

Institutional Issues

The need to emphasize people's participation and its institutionalization has been stressed in several studies (FAP 12 1991, FAP 13 1992, FAP 20 1992d). These studies have shown that success and sustainability of FCD/I projects require people's participation in all phases of the project and close collaboration between and within various government and non-government organizations. FAP 20 (1992d) describes a comprehensive program involving all concerned in the process of designing and testing compartmentalization. The stated primary aim of institutionalization program of the CPP is to develop mechanisms for operating and maintaining the compartmental water management system. Institutionalization should allow decisions to be made at the lowest possible level inside the compartment and those living outside the project area, and all those who would be adversely affected. FAP 20 (1992d) proposes an active step-by-step approach aiming at testing, fine-tuning and adapting the institutional arrangements for the CPP area through the following committees:

- Water users groups (WUG) at field level
- Subcompartment water committees (SCWC)
- CPP Executive Committee (CPP/EC)
- Compartment Water Management Board (CWMB)

The concept of compartmentalization is new and in a developmental stage. The concept deviates to a great degree from the established practices of water management in Bangladesh. On the technical side, it is not yet clear how optimal water management objectives would be achieved at the regional, compartmental, subcompartmental, field and/or farm level. With regard to non-technical issues, the project has not yet systematically looked into all the institutional aspects. The ideas developed so far still have to be discussed with and approved by the responsible authorities. While it is not the mandate of the CPP to deal with the broader institutional aspects of water management, it certainly has a great responsibility to address or test several key issues in institutional development that in long term may have national level implications if the compartmentalization concept is to be implemented in other areas. In this context the following recommendations are made.

- A comparative assessment has to be made on the relative interests of different socioeconomic groups (e.g. large vs. small farmers, high vs. low land farmers, paddy vs. jute growers, fishermen vs. boatmen) water management. This assessment would assist in determining the real beneficiaries of the project and ascertain that views of those adversely affected are considered in planning for water management interventions at subcompartment and farm level.
- A strategy has to be developed as to how the beneficiaries would be organized below subcompartmental level.
- It is necessary to determine the spatial expansion of subcompartments over time and the organization(s) responsible.
- It is important to define clearly the role of the NGO (selected or to be selected) and its field staff to carry out community development tasks. Role definition has to be made within the framework of coordination with other local authorities and government agencies.

The followings are more specific recommendations for consideration by the CPP management. They may be considered as mitigation and enhancement measures concerning institutional development and strengthening activities.

- The institutions identified by the CPP (e.g. BWDB, BRDB, DAE, LGED, DOF and Union Parishad) should be given specific responsibilities to implement the mitigation provisions of the EMP, e.g. BWDB in design and construction, maintenance and inspection, relocation and settlement; BRDB in credit delivery and supply of inputs; DAE in integrated pest management and increased use of organic matters; and Union Parishad in income generation programs, tree plantation, improvements in tenancy contracts, property rights and distribution of available khas lands etc. The collaboration and coordination between the various government agencies is particularly important in such activities. Specific areas of collaboration with detailed financial implications need to be spelled out.
- More coordination between local and national NGOs should be realized and what specific task a selected NGO (be it Grameen Bank, Proshika or CARE) would perform is to be clearly spelled out. The existing network of formal and informal institutions should be utilized.
- An Environmental Review Committee comprising representatives from concerned NGO, DOE, LGED, BWDB, DPHE, DOF and District/ Thana level medical practitioners should be formed to assume direct responsibilities regarding environmental monitoring. An alternative is to mandate this task to the proposed Compartment Water Management Board.
- Inter subcompartmental conflicts and conflicts that may arise between people living inside and outside the compartment should be resolved through effective use of the institutional arrangements.
- In the formation of WUGs and SCWCs, the experience of the G.K. Project, Systems Rehabilitation Project and farmers or community managed projects in Taiwan, Tanzania, Indonesia and the Philippines could be gained and lessons learned from these projects could be fruitfully applied in the water management of the Tangail CPP.

Training

Training in both structural and non-structural aspects is vitally important for sustainability of the CPP initiated improved systems for water management. The project has developed a broad training program targeting different groups and subjects. A tentative outline of the training program has been presented in FAP 20 (1992d). The purpose of the training program is to create or strengthen the required skills at various levels in integrated water management, and to develop and test a training package that can be used at other institutions or locations. Specific locations for training, both at home and abroad, including provisions for study tours and excursions, is suggested.

- It is recommended that the training Program should aim at the representatives of beneficiaries, field and technical staff of various line departments and effectively involve people at the grass-roots level.
- Training should be imparted on improved agricultural practices, and other development activities (e.g. IPM, culture fishery, social and community forestry, etc) impacted by the project or developed as project spinoffs. These efforts would enhance the project initiated activities and would help the CPP in achieving its objectives.

8.1.3 Mitigation and Enhancement Measures for Support Activities

As expressed earlier, the CPP would have significant impact on agricultural activities. If all the project objectives are met, it would have spinoff impacts on enhancing the other economic activities in the project area and beyond. The following recommendations target the project and the government and non government institutions in the area to enhance the outputs and maximize the return from the project. These

recommendations could also be considered as mitigation measures to reduce project's negative impact on subsistence fishermen communities who might benefit from the project spinoff developments.

Agriculture Sector

Post project conditions may accelerate polarization process between rich and poor. The process may be checked if credit and training opportunities were made available for optimum utilization of resources. Intensification and diversification of agricultural uses could be realized if landless and marginal farmers (owning <0.40 ha of land) who constitute almost 40 percent of the farmers could access the credit and modern input packages delivery facilities through BRDB, Krishi Bank, NGOs, Grameen Bank and other institutions.

- Grameen Bank should be approached to facilitate credit delivery systems to the landless and women. Improved farm practices such as supply of DTWs, STWs, power tillers and tractors could also be made available through the expansion of Grameen Bank services. Landless cooperatives of the KSS type should be formed in relevant subcompartments so that members of the Landless Contracting Societies could tap various services on appropriate terms and conditions.
- Department of Agricultural Extension (DAE), the relevant NGOs, the Krishi and Grameen Banks and the like should play a key role in introducing technical package for increased production; safe and controlled use of water for irrigation and domestic uses; safe and proper use of pesticides (through integrated pest management practices) and fertilizers; and improved seeds, seedlings and saplings.

Other Sectors

Tangail is known for its handloom and powerloom based textile industries. This industry is important for supplemental household income, particularly for those households that would be adversely affected by the project.

- It is recommended that efforts be made to maintain and enhance the production of this sector in the project area. Other small industries that may be enhanced to reduce the project impact include brass work, bamboo work and pottery. Those efforts should be more in the realms of extension and credit and marketing supports.

Marketing

There are eight major and 27 minor markets in the CPP area. Several of these markets would be adversely affected by the project. Although the plan is to leave the main inlet at Lohajang open until mid-July under normal conditions, the period from mid-July to October would be critical for marketing deliveries.

- Efforts should be made to improve the unmetalled road network connecting the major markets to the main metal roads in order to partially compensate for the residual impact of the project on navigation.

Health and Nutrition

The most common diseases in the Tangail CPP are diarrhoeal, skin disease, dysentery, acute respiratory infection and intestinal worm infestation. Prevalence of water borne diseases are comparatively higher than those of other diseases. Many of these diseases are related to the standing and stagnant water. The project through flood control and drainage improvement would improve the condition. However, expansion of irrigated rice farming may well lead to an increase of all year habitats of disease vectors. Since, malaria exists in the project area, the post project condition may promote malaria.

- Educational and clinical precautions have to be made in order to mitigate negative impacts of malaria.

An important concern is the disease kala azar (visceral leishmaniasis). It has been reported that this disease occurs mainly in flood controlled areas (ISPAN 1992d). Kala azar is endemic in areas above the northern boundary of the CPP area. Currently, the project area is in low risk for this disease.

- The incidence of kala azar must be monitored closely when the project is implemented.

At present, standing water and HTW are used for drinking and domestic purposes. The project, through controlled flooding would indirectly promote the use of groundwater sources. From a health point of view this is highly desirable. Provision of safe all year drinking water, sanitation and community health education programs are the major ways to combat the problem.

- A major health education program should be organized to make people aware about the water borne diseases. Health and environmental NGOs in association with the Public Health Department and Thana Health Complex could mobilize resources to tackle the issues.
- A solution should be sought to minimize the effects of retting on polluting the waterbodies.

The CPP would impact significantly capture fisheries production, fish species diversity, and economic activities of full time and subsistence fishermen. Expected reductions in miscellaneous fish would have major impacts on diet of fish-dependent communities and on species diversity.

- The decrease of fish protein sources from capture fisheries needs to be replaced by sources derived from culture fisheries

Tree Plantation Program

Existing road network in the CPP is approximately 260km. Currently 18km of the road sides have been planted by the local government authority (Thana Afforestation Program). The deforestation rate is relatively high in the project area for domestic fuel and brick field purpose.

- An active tree plantation program along the road and embankments should be reactivated.

8.2 Impact Monitoring and Reporting

8.2.1 Recommended Ecological, Hydrological, Land use, and Socioeconomic Indicators

A monitoring program is needed in order to systematically monitor and evaluate the project's impact on IECs as the project progresses and after the project has been completed. Environmental monitoring requires projects to identify a set of indicators that could be measured, assessed, evaluated periodically to establish a trend of impact. In the context of the CPP, the following criteria is proposed for selection of monitoring indicators in the project area:

- indicators representing the spatial and temporal extent of the project impact;
- indicators representing the most critical IECs identified during EIA; depending on the degree of impact, the IECs should represent the hydrological and biological resources and issues and the socioeconomic issues associated with the impact on those resources;
- indicators that could be measured, monitored and evaluated in certain time intervals and those that could be quantified conveniently;
- indicators that could reflect the impact of mitigation measures; and
- indicators that could show the extent of residual impacts.

Hydrological and Biological Indicators

- Storage capacity of selected beels
- Abundance of selected fish and wildlife species
- Selected homestead and natural plants

- Changes in the areas of F_0, F_1 land types in selected subcompartments
- Groundwater fluctuation
- Groundwater quality at selected sites
- Surface water quality at selected sites

Socioeconomic Indicators

- Amounts of irrigated land at selected subcompartments
- Area and unit area production of boro crop at selected subcompartments
- Area and unit area production of T.D.-Aman at selected subcompartments
- Changes in land ownership and land consolidation and concentration trend in selected subcompartments
- Fish production in selected beels
- Culture fishery production at selected subcompartments
- Homestead food production at selected subcompartments
- Number of boats and level of navigation activities at selected sites
- Number of households living primarily on capture fishery
- Number of breaches on embankments and roads
- Number of STWs at selected subcompartments

8.2.2 Recommendations for Implementation of the Monitoring Plan

Institutional Arrangement and Responsibilities

The CPP is distinct from other FAP projects in concept and objectives. The concept of controlled and semi-controlled flooding is to be tested in Tangail in order to produce criteria, guidelines, manuals and a training and demonstration program for replication elsewhere in Bangladesh. Implementation of the CPP involves a number of governmental institutions. The support of those institutions is vital for successful implementation of the project. Table 8.1 presents a summary list of various governmental and non-governmental organization that should get involved in implementation of the project, and a list of the activities recommended for implementation. Annex 4 includes a list of the NGOs active in the project area.

Indicators Monitoring

The CPP is a pilot project. When this phase of the overall compartmentalization is successfully completed, the concept would be extended to other areas. An integral part of the pilot schemes is to data collection, record keeping, and undertaking various studies to measure/investigate the cause and effect of successes and failures. It is of utmost importance for the CPP to develop a detailed plan for monitoring the indicators as soon as possible. Once the indicators are identified and the purpose for selecting them is well defined, the exact location of sites, the frequency of data collection and monitoring, and the responsible project personnel or relevant government/NGO institutions responsible for the monitoring should be selected and determined. The most appropriate method for data collection, monitoring and reporting would be the application of an adaptive Management Information System, preferably computerized.

8.2.3 Policy and Regulatory Compliance

An important component of monitoring plan is to identify what national policies relate and what regulations apply to the project. Unless otherwise stated, a monitoring plan normally requires the project to comply with those policies and regulations during the course of construction and operation. This section presents a brief overview of the existing policies and regulations in the context of the CPP mandate.

Environmental Policy

The Environment Policy of 1992 (GOB 1992) has identified six general objectives, out of which the following sectoral objectives are applicable to the CPP.

- Water Development, flood control and irrigation: environmentally sound and sustainable development and manage-

Table 8.1 Proposed Institutional Responsibilities in the Implementation of the CPP.

Agencies Involved	Mitigation/Compensation/ Enhancement/Extension program/-Monitoring
Department of Agricultural Extension; SRDI	Balanced use of fertilizer and Insecticide. Intensified agricultural extension work in the project area;
Department of Public Health Engineering;	Increased number of Tubewells for drinking, cooking and bathing purposes for Human and livestock;
Department of Agricultural Extension; Department of Environment; Local Government Institutions	Integrated Pest Management program to reduce use of pesticide/insecticide and maintain surface water quality.
BARC; Department of Environment and Department of Forest; Local Government Institutions	Increased HYV cultivation; Increased cropping intensity; Increased vegetation yield from homestead by planting more economically profitable trees and vegetables/fodder.
FAP 20; Fisheries department; Department of Agricultural extension	Inclusion and monitoring of "fish friendly" regulators; Integrated farming of rice/fish with training of farmers; Increased culture fisheries production.
Ministry of Land; BWDB; Proposed Water Users Groups; NGO	The proposed "Beel" concept to be integrated with khas lands and Jalmahals that are leased out at present. These are to be taken out of the leasing system and reserved as Common Property Resources and habitat for spp. diversity.
FAP 20; Roads and Highways department, Local Government Institutions.	Better road communication, particularly metalled road inside the project; where possible allow for vehicles to cross over the structures. Cross-over arrangements also applies to structures blocking the navigation routes.
Ministry of Land; FAP 20; BWDB	Water Management to retain specified minimum amount of water in the khas land beels during the dry season; preventing of khas lands being settled as agricultural land.
BWDB, FAP 20; NGO	Culture fisheries coops or associations for landless with the help of NGO.
BWDB, Deputy Commissioner, Tangail; Ministry of Land, Ministry of Law and Justice	Financial compensation expedited; Provision for paying interest on compensation money for delayed payment.

ment of water development, drainage and irrigation projects involving both surface and groundwater; maintaining the inland waters free from pollution; arrangement for EIA prior to implementation of water development and management projects; removal of the adverse environmental effects of previous water resources management and flood control projects.

- Agriculture: agricultural development and self sufficiency in food is to be achieved through conservation of agricultural resource base by judicious use of appropriate development and management technology.
- Fisheries: protection, conservation and development of fish habitat; development of fisheries without adversely affecting the mangrove and other ecosystems; re-evaluation of those FCD/I projects found to cause adverse effects on fisheries resources.
- Land: adoption and extension of environmentally and ecologically sound land use practices and conservation of soil fertility; prevention of land erosion and strengthening of the land reclamation program; prevention of soil salinity and alkalinity.
- Forests, wildlife and biodiversity: forest conservation and afforestation programs in order to maintain ecological balance; conservation of wildlife and biodiversity; research program; exchange program of knowledge and experience; conservation and development of national wetlands and migratory bird sanctuaries.

In addition, the Constitution of Bangladesh embodies, among other fundamental principles, conservation of national cultural traditions and heritage, protection of national monuments, objects or places of special artistic or historic importance or interest. The constitution also provides that no property shall be compulsory acquired, nationalized or requisitioned save by authority of law, and with compensation. These policies and principles are to be taken into consideration at various stages of the CPP.

Land Acquisition and Compensation

Most of the peripheral structures proposed by the CPP would follow the present alignment. However, some sections would need upgrading and realignment. In addition, inlet and outlet structures, and erosion protection measures would be undertaken. All these activities would need land acquisition. Land acquisition is done primarily under Land Acquisition Act, 1894; however BWDB has been given the power to acquire land (East Pakistan Water and Power Development Authority Ordinance of 1958 and The Bangladesh Water and Power Development Boards Order of 1972). In addition, The Deputy Commissioner of the respective district has been empowered by the Ministry of Land Administration and Land Reforms to expedite finalization of the land acquisition case on the basis of project proposals. The Deputy Commissioner may proceed under Section 6 of the Acquisition and Requisition of Immovable Property Ordinance 1982 on the strength of a certificate issued by the BWDB or its authorized field unit to the effect that necessary funds have been provided to cover the cost of land acquisition and the same would be placed at their disposal on requisition. (Land Administration Manual, 1987).

However, during the distribution of compensation to interested parties, share of the actual owners of the land acquired has to be ascertained following the laws of inheritance of different religious communities. It is also important that the public be made aware of the provisions of The East Bengal Embankment and Drainage Act, 1952. The Act provides for compensation for damages to any land other than the land acquired for project if the land is injuriously affected, or the right of fishery, right of drainage, right to the use of water, or other right of property. The public is to be made aware that such compensation may be claimed within two years after completion of the project.

Common Property Resources

Common Property Resources are those resource-

es or facilities shared by a community, subject to individual use but not to individual possession; and norms, conventions, institutional rules and other complex set of rules or arrangements specifying rights of joint use. In Bangladesh, it is customary to regard and use all public (i.e. owned by the government) resource as common Property Resources unless otherwise specified by the government. Government restrictions come in the form of provisions of acts and ordinances or in the form of lease arrangements. In the CPP area the Common Property Resources of concern are: jalmahals, khas land and BWDB land, roads under the Roads and Highways Department, Thana Parishad and Union Parishad.

Landless households and subsistence fishermen households are partly dependent on common property resources as a survival strategy. Professional fishermen depend on jalmahals, as well as on private floodplain land for fishing on contractual basis. The Ministry of Land manages the jalmahals and the khas land. However, the customary rights of local people are respected and taken into consideration. These customary rights vary from place to place in Bangladesh as well as from time to time. Some references to these customary rights are to be found in the Easement Act of 1882. There are references to such rights in the lease arrangements of jalmahals and other sairat mahals as well. The Penal Code, 1860, refer to such incorporeal right. For example, in case of leasing out of jalmahals, provisions are to be made for protection of the rights and privileges of the boro land cultivators surrounding the jalmahals. Customary rights in jalmahal ponds that are less than 3 acres and where lease value is less than certain limiting value have been recognized by the government (Land Administration Manual of 1987).Changes in land types, as a result of the CPP, would reduce the size of the jalmahals, hence reducing (a) government revenue earnings through lease (b) access of local people to the jalmahals, and (c) "fugitive" resources such as fish and wildlife. However, total or partial trade off is with BWDB land and roads would increase.

Cultural Heritage/Historical Sites

The Atia Mosque and the Kadim Hammdani Mosque would most probably fall within the CPP or the impact area. Therefore, these two come under consideration within the provisions of Antiquities Act, 1968, and the list of archaeological resources of the Department of Archaeology and Museum of the Government of Bangladesh. The two mosques are on the national list of archaeological resources, and protected by law against misuse, destruction, damage, alteration, injury, defacement, mutilation, mining, quarrying, excavating, blasting, and movement of heavy vehicles. FAP 16 has not identified any other archaeological resources/ historical sites that may need to be considered under the above Act. However, the project area is an old settlement area; therefore while executing the project it would be appropriate to remember that any object or historical site, that is the product of human activity and is older than May 1857, would come under the provisions of this Act.

Exercise 24

Given the information presented on the board match the appropriate mitigation and monitoring activities to the impact. Choose all of the appropriate potential mitigation, or compensation activities and monitoring techniques for each impact listed on the board. It is possible to have more than one of each activity for an impact.

Journal 8 (Environmental Management Plan)

1. What are the four main sections within the EMP?

2. What is the purpose of the EMP?

3. What is the main purpose of the mitigation plan?

4. Who makes the final decision about accepting or rejecting the EMP?

MODULE - 10
EXERCISE, HANDOUT AND OTHER MATERIALS

Exercise 25

The team will review the EIA report and determine its adequacy using the EIA Guidelines.

Because of the more than 80 page length of the EIA case study you are reviewing, it will not be possible for you to read the entire report at this time. Chapters 3 and 4, the environmental description and impact evaluation are the longest chapters, totalling more than 65 pages. We suggest that you discuss amongst yourselves who is best-suited to review the individual chapter sections and have that person perform the review. (For instance, a fisheries person would be most suited to review the freshwater environment and freshwater impacts (Chapters 3.3 and 4.3), an agronomist, engineer or soil scientist might be best suited to reviewing the physical and terrestrial environment and impact sections (Chapters 3.1, 3.2, 4.1 and 4.2). This can be done for each of the section's of Chapters 3 and 4. Chapters 2 and 5 has been omitted from our review because of time constraints. Each team member should read the following sections:

- Executive Summary - pp. v - ix
- Project Setting - Chapter 1 (10 pgs)
- Peoples Participation and Scoping of Public Opinion - Chapter 6 (3 pgs)
- Environmental Management Plan - Chapter 7 (4 pgs)
- Economic Evaluation of Project Impacts and Environmental Management - Chapter 8 (2 pgs)

The major areas for review are:

- Is the data adequate and consistent throughout the report? (Chapters 1,3, & 4)
- Are conclusions supported by the data and its analysis (Chapters 6-8)
- Are all the impacts identified? (Chapter 4)
- Is peoples participation adequate? (Chapter 6)
- Is the EMP reasonable? (Chapter 7)
- Why would you accept or reject the report?

In all cases, you must provide examples of why you believe the data or information is either sufficient or insufficient.

Below is a schedule we suggest you follow in order to complete the exercise.

- Session 3- Form teams, choose group leader and recorder, decide who will review which sections, begin reviewing material listed above.
- Session 4- Finish reviewing material listed above, begin reviewing individual materials.
- Session 5- Finish review of all materials.
- Session 6- Group discussion, prepare flip charts.
- Session 7- Begin presentations. Note: there will be a 10 minute time limit for each group.

Be prepared to present your findings to the group on August 4, wednesday.

Journal 9 (Environmental Impact Assessment Review)

1. Why is careful review of an EIA study report so important?

2. What major things do I need to look out for when preparing an EIA study report?

3. What are the possible outcomes of a review done on my EIA study report?

Post-test Questions

1. How does environmental impact assessment (EIA) fit into the overall project development scheme?

2. At what major points in the EIA cycle should peoples participation be sought?

3. How is scoping used to identify important environmental components?

4. What is the relationship between scoping and bounding in determinig EIA study area?

5. What are the steps in developing an EIA study plan?

6. How is the baseline data used in trend analysis?

7. Explain the difference between risk and hazard.

8. How does impact assessment and evaluation affect other aspects of the EIA process?

9. What are the major chapters of the EIA Report?

10. What is the purpose of the environmental management plan?

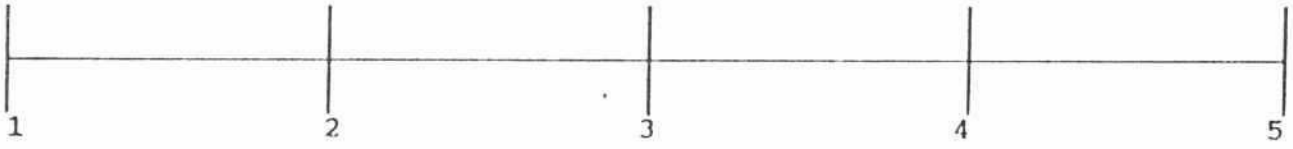
EIA WORKSHOP

FINAL TRAINING EVALUATION

In order to help us design future workshops that respond to your needs, we would like to ask you to share your thoughts and feelings about the workshop you have just completed.

Instructions: Please mark an X on the scale provided, or use the space provided for your comments.

1. Did the workshop achieve its objective of helping you to use the Guidelines to develop and review EIAs?



2. Did the workshop meet your expectations?

Less_____ More_____

Comment:

3. How do you think you will apply the lessons you have learned in the workshop?

4. What area did you:

a. learn the most about?

b. learn the least about?

5. Module by module which topics would you add, delete, emphasize more, emphasize less.

Module 1: Program Introduction

Module 2: Project Development

Module 3: People's Participation

Module 4: Scoping and Bounding

Module 5: Study Methods

Module 6: Hazard and Risk

Module 7: Impact Assessment and Evaluation

Module 8: Communicating and Reporting

Module 9: Environmental Management Plan

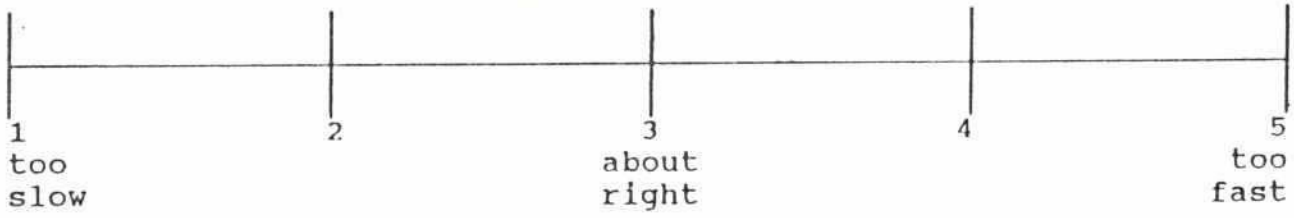
Module 10: EIA Review

6. Which techniques of instruction (lecturettes, practical exercises, group discussions, case study, field trips, journals) did you get:

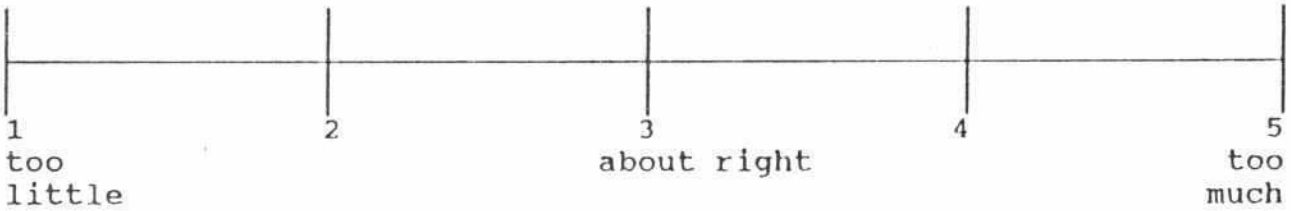
a. The most from:

b. The least from:

7. I thought the pace of the work was:



8. I thought the amount of information covered was:



9. Were the handouts helpful? If no, why not?

10. In what ways could the instructors improve their performance?

11. Would you recommend the workshop to others?

12. Please add other comments you would like to make about any aspect of the workshop.

FIELD TRIP 1 - HANDOUTS

Field Trip No. 1

Objective:

Understand how to identify important environmental components, habitats, and project-related issues in the field.

1. You will be asked to do a field exercise at selected sites where we stop during the field trip.

2. We will stop at the Patakhali-Konai Project near Mirzapur and a FAP project at the Tangail CPP area.

3. Schedule:

Time	Comment
August 23, 1993 07:45 am	Leave SPARRSO for Tangail and Mirzapur. There will be 3 microbuses for transport.
09:30 am	Arrive Mirzapur. Take boat up river to see Patakhali- Konai Project.
10:00 - 11:30 am	View Patakhali - Konai Project.
11:30 pm	Leave Mirzapur for Tangail.
12:00 pm	Arrive Tangail.
12:00 - 1:00 pm	Lunch at Tangail.
1:00 - 2:30 pm	Stop at FAP project near the Elanjani River.
2:30 pm	Leave for Dhaka.
5:00 - 5:30 pm	Arrive SPARRSO.

4. Bring something to write with and to write on.
5. Bring an umbrella.
6. Be prompt for departure to Tangail.

Field Exercise: Field Trip No. 1

Objective: **Understand how to identify important environmental components, habitats, and project-related issues in the field.**

The following directions apply to each of the stops we make:

1. Observe the environment at this stop.
2. Observe the project facilities, activities, and man-made structures at this stop.
3. Identify the habitats you observe.
4. Identify the IECs you observe.
5. Identify evidence of project-related issues from what you see and from what you hear by talking to local people.
7. Relate the evidence of issues to the appropriate IECs.
8. Save your results for discussion in class.

Planned stops during the field trip:

Patakhali-Konai Project:

This project is situated at the confluence of the Langli and Bansi Rivers in Mirzapur Thana, about 4 km northeast of the town of Mirzapur. The project includes embankments that have been built to protect the low-lying lands from floods from the Bansi and Langli Rivers. The flat terrain has two large beels, the Konai Beel and the Para Beel. At the opposite side of the flood-protected country land there is higher forested land.

FAP Project:

The setting is the Elanjani River, floodplain and western embankment of the Tangail CPP area. The embankment in this part of the project area is intended to protect the compartments inside the project area from floods coming from the Elanjani River, just to the west of the embankment. The embankment is to be improved and raised to level for flood protection against a 1988-sized flood. The water conveyance system between the Elanjani River and the project area includes several khals, with culverts. There are several settlements in the vicinity of the embankment and homesteads both inside and outside of the project area.

Trainer's Notes for Field Trip No. 1

Objective: Understand how to identify important environmental components, habitats, and project-related impacts in the field.

1. Attached is the itinerary and exercise instructions for the trainee.

2. The trainee's will work in small groups. Since there will be three microbuses, the trainees in each will make up the respective small group.

3. The representative from Tangail may want to briefly discuss the project layout at Mirzapur and the added facilities for drainage. At the other stops, one of the FAP team members who is familiar with the setting will describe only the main points. For example, at the Pungli River the groups should be told that this is the FAP embankment project and that the embankment will be built to connect with the main embankment (show direction). Point out the Pungli River. Since we want the trainees to do as much as possible on their own we should avoid doing their thinking and doing. Please do not discuss impacts that can be seen.

4. The trainee will be asked to identify IEC's, habitats, and project-related impacts at each of the stops. The object is for the group to identify these things in the field. They should not be told what IEC's or impacts are there until they have finished observing. Then we will have a brief plenary to compare and contrast findings. We may then add our comments.

Field Exercise: Field Trip No. 1

Objective: **Understand how to identify important environmental components, habitats, and project-related issues in the field.**

The following directions apply to each of the stops we make:

1. Observe the environment at this stop.
2. Observe the project facilities, activities, and man-made structures at this stop.
3. Identify the habitats you observe.
4. Identify the IECs you observe.
5. Identify evidence of project-related issues from what you see and from what you hear by talking to local people.
7. Relate the evidence of issues to the appropriate IECs.
8. Save your results for discussion in class.

Planned stops during the field trip:

Patakhali-Konai Project:

This project is situated at the confluence of the Langli and Bansi Rivers in Mirzapur Thana, about 4 km northeast of the town of Mirzapur. The project includes embankments that have been built to protect the low-lying lands from floods from the Bansi and Langli Rivers. The flat terrain has two large beels, the Konai Beel and the Para Beel. At the opposite side of the flood-protected country land there is higher forested land.

FAP Project:

The setting is the Elanjani River, floodplain and western embankment of the Tangail CPP area. The embankment in this part of the project area is intended to protect the compartments inside the project area from floods coming from the Elanjani River, just to the west of the embankment. The embankment is to be improved and raised to level for flood protection against a 1988-sized flood. The water conveyance system between the Elanjani River and the project area includes several khals, with culverts. There are several settlements in the vicinity of the embankment and homesteads both inside and outside of the project area.

PATAKHALI-KONAI

Introduction

The project "Patakhali-Konai" is situated in a bend of the Bangsi river on it's left bank near the confluence of the Bangsi and Langli river in Mirzapur Thana of Tangail district. It is about 4 km north-east of Mirzapur town. This project covers a low lying area of about 2500 ha with a benefitted area of about 1800 ha. The area is formed by two basins, the Konai beel and the Para beel, surrounded by the medium low lands and bordered in the east by undulating forest grounds. The main drainage course in the area is formed by the Konai khal, which flows from the Konai beel in eastern direction towards the Bangsi river.

Physical infrastructures

The project has been constructed in three phases. An index map showing the different components of the project is shown in Annex-1.

1st phase :

The first phase has been implemented in 1979 as the name of Patakhali-Konai with the following physical components -

i) Closure on Bangsi river.

ii) 3.6 km of embankment on both sides of the closure dam.

2nd phase :

This phase has been implemented in the year of 1985 as the name of Extension of Patakhali-Konai project. The following are the physical components under this phase -

i) 5.5 km of embankment

ii) Pipe inlet-10 nos

These two programme were done under EIP programme. Besides the EIP programme, some other works have been done in the period 1983-84 by the other organization which as follows -

i) 5.5 km of embankment from Trimohoni to Salimnagor under FFW in 1983-84.

ii) A cross dam on the old course of the Bangsi river in 1984 by the Thana Parishad.

iii) 2-vents regulator (Konai) at Salimnagor under IDA-955 BD by CIDA in 1983.

3rd phase :

The third phase has been completed in 1989 in the name of Patakhali-Konai ROM project and consists of the following physical components -

i) Re-sectioning of the embankment - 9 km.

ii) Re-excavation of the Bardam khal.

iii) Bardam regulator - 1 vent.

iv) Repairing of the pipe inlets.

Konai regulator (2 vent ; size 152 x 183 cm) :

This regulator was constructed in 1983 under IDA-955 BD by CIDA. In the period, between 1987-89, the regulator was lying redundant as because of the missing of the key of the gate. During visit it has been found in almost good condition. The two gates of the regulator are in operative position. Some damages have been noticed in the return wall on both country and river sides of the regulator. It is also reported by the concerned SDE that there is some damage in loose apron which is now not visible due to the water. It seems that no further emergency repairing work is required for this financial year. Only some oiling, greasing and painting works are necessary for smooth operation of the regulator.

The regulator is used to retain/flash water in the project area in dry season and to drain flash flood in the Pre-monsoon season. But the capacity of the gates are gradually decreasing, as because the drainage canal on both country and river

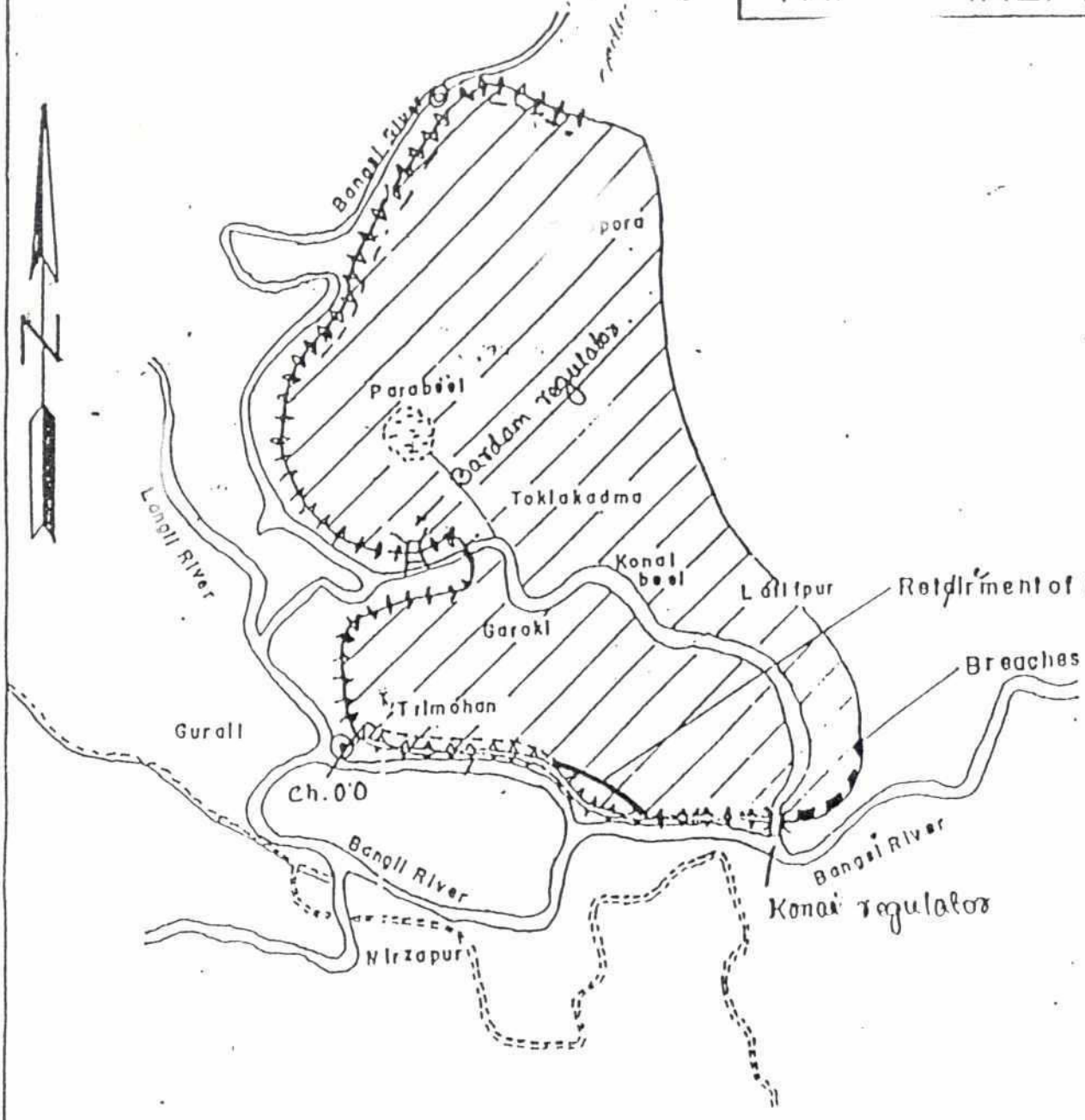
structure but they are not well organized.

Embankment :

Few location of the embankment have been visited near the Konai, Bardam regulator and at Jogirkufa. To the east of the Konai regulator the embankment is in poor shape. Rain cuts, erosions, ghogs have been found in this section. At the place of Jogirkufa and near the Bardam regulator, the embankment is found in almost acceptable position and reasonable shape. But the slope are not properly maintained and the set back is often insufficient. It is reported by the concerned SDE and SO that the reason for the improper slope and insufficient set back is the non-availability of land.

Annex– I

PATI ...ALI-KONAI



River & Khal

Road

Embankment Constructed under F F W

Embankment constr... under E.I.P

Benefi...

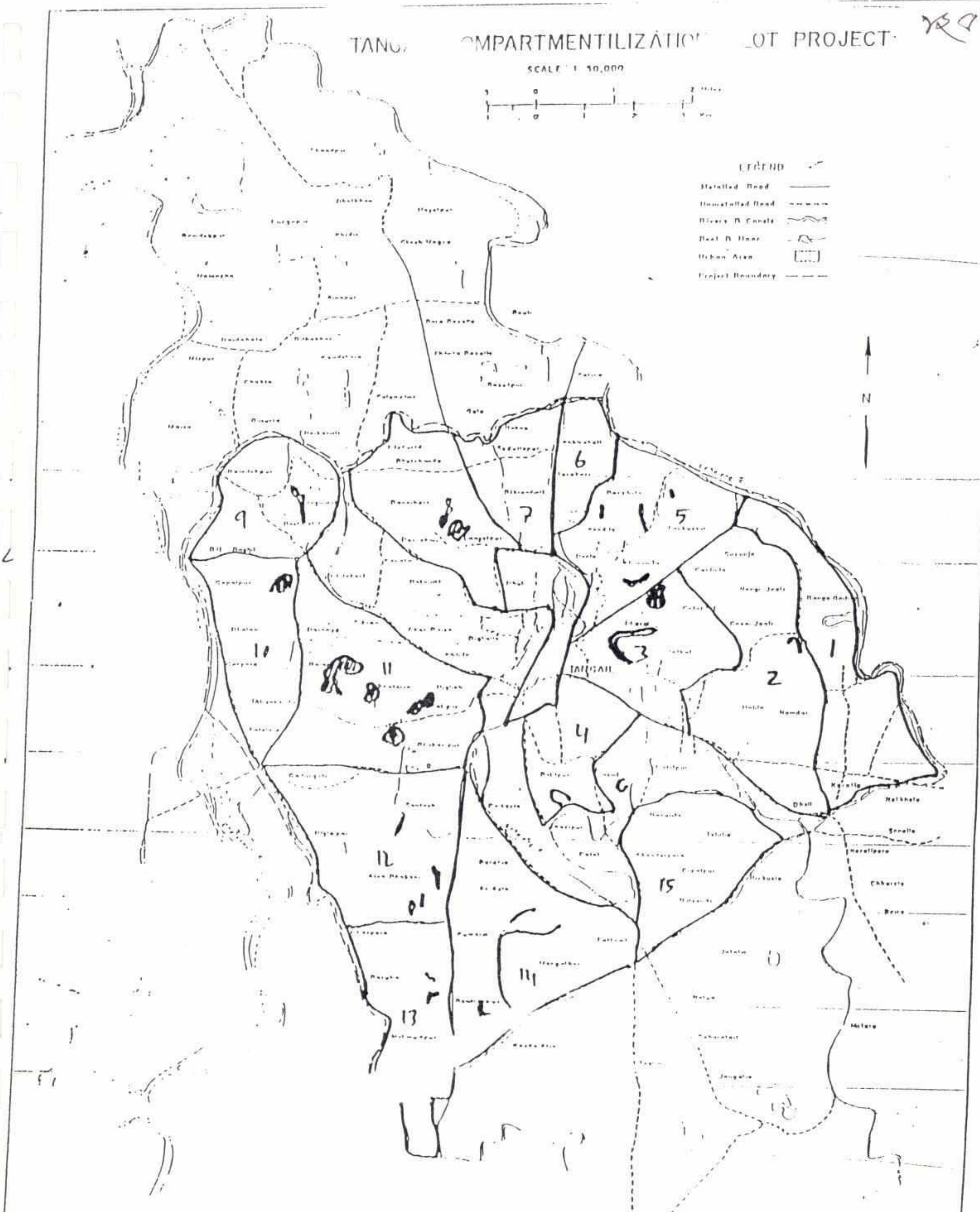
... staff gauge

...nent staff gauge

Existing closure

Existing St...

SCALE:- 1 Inch = 1 mile
(APPROX. 1:63,400)


TANG… …MPARTMENTILIZATIO… …OT PROJECT
SCALE 1:30,000
LEGEND
Metalled Road
Unmetalled Road
Rivers & Canals
Beel & Haor
Urban Area
Project Boundary
N
TANGAIL
Ranga Beel
Dhali
Karatia
Natkhola
Mollara
Chharia
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15

FIELD TRIP 2 - HAND OUTS

Field Trip 2 to Tangail CPP Area

Objective:

- Learn how to correlate remote imagery to the field location and condition.
- Learn how to identify IECs, associated issues, and potential impacts in the field.

The field exercise includes two activities for you to do. The tasks for each activity are as follows:

Stop no. 1:

This stop is in route to the town of Tangail in the Tangail CPP Area.

Locate our position on the topographic map.
What is the distance from a benchmark that can be located on your map?
Locate our position on the Tangail CPP Area map.
Identify the compartments that we are in.
Identify land use in the area.
What are the relative areas of different types of land use?
Can you identify them on the image we brought with us?
Can you identify any polygon area here that can be used to verify the image?
Can you locate our position on the aerial photograph and compare the location to the remote image?
Do the image colors compare well with the land use as you see it? Why?

Stop no. 2:

The setting is the Elanjani River, floodplain and western embankment of the Tangail CPP Area.

Describe the environment and drainage pattern.
Identify the settlements and determine the main livelihood.
What is the function of khals and culverts?
Describe the expected flow when the river is low and when it is in flood stage.
What are there important environmental components that you have observed?

LADESH

EMERGENCY ISSUE

SECOND EDITION

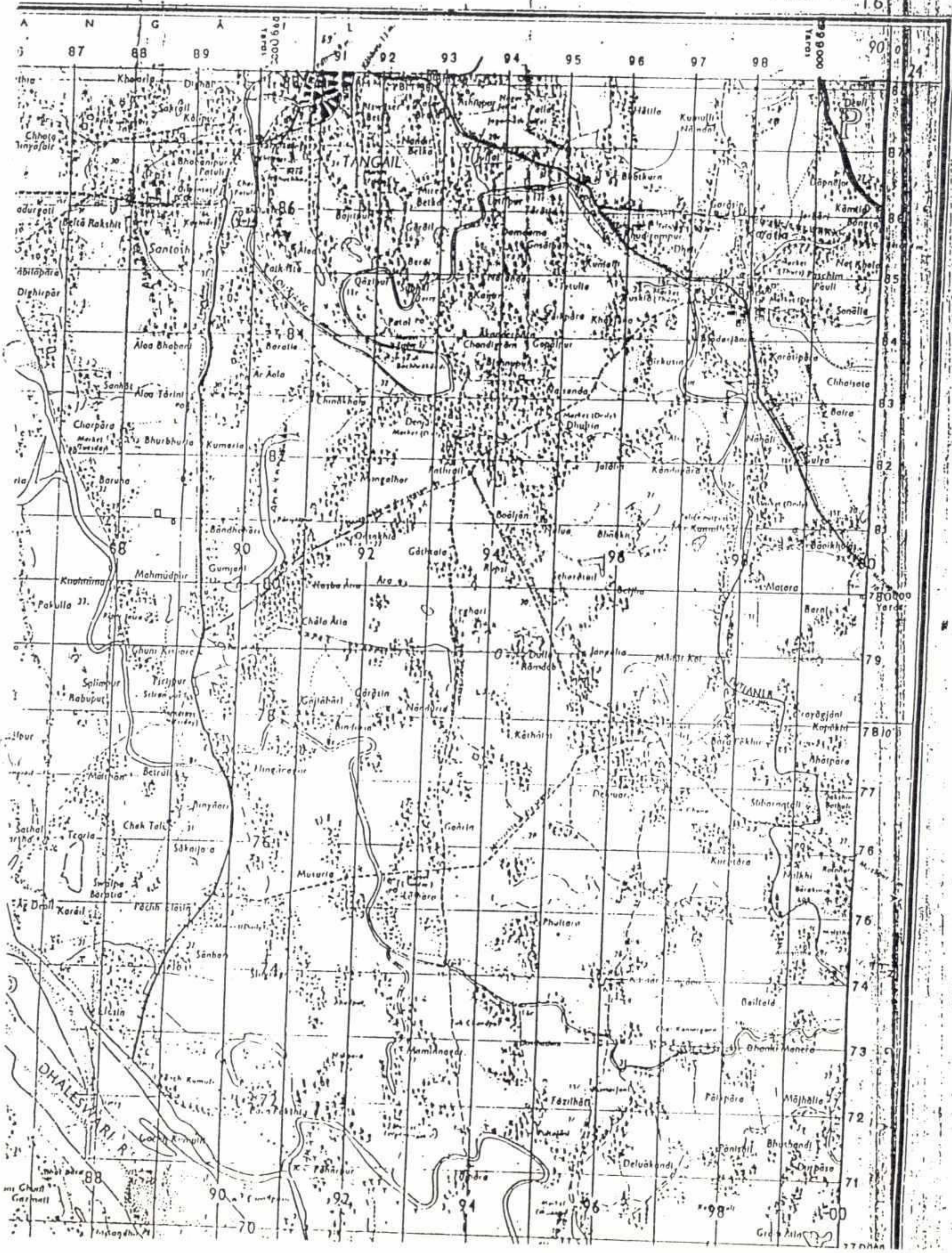
Mean Grid North, in this sheet is 0.0? West of true North.

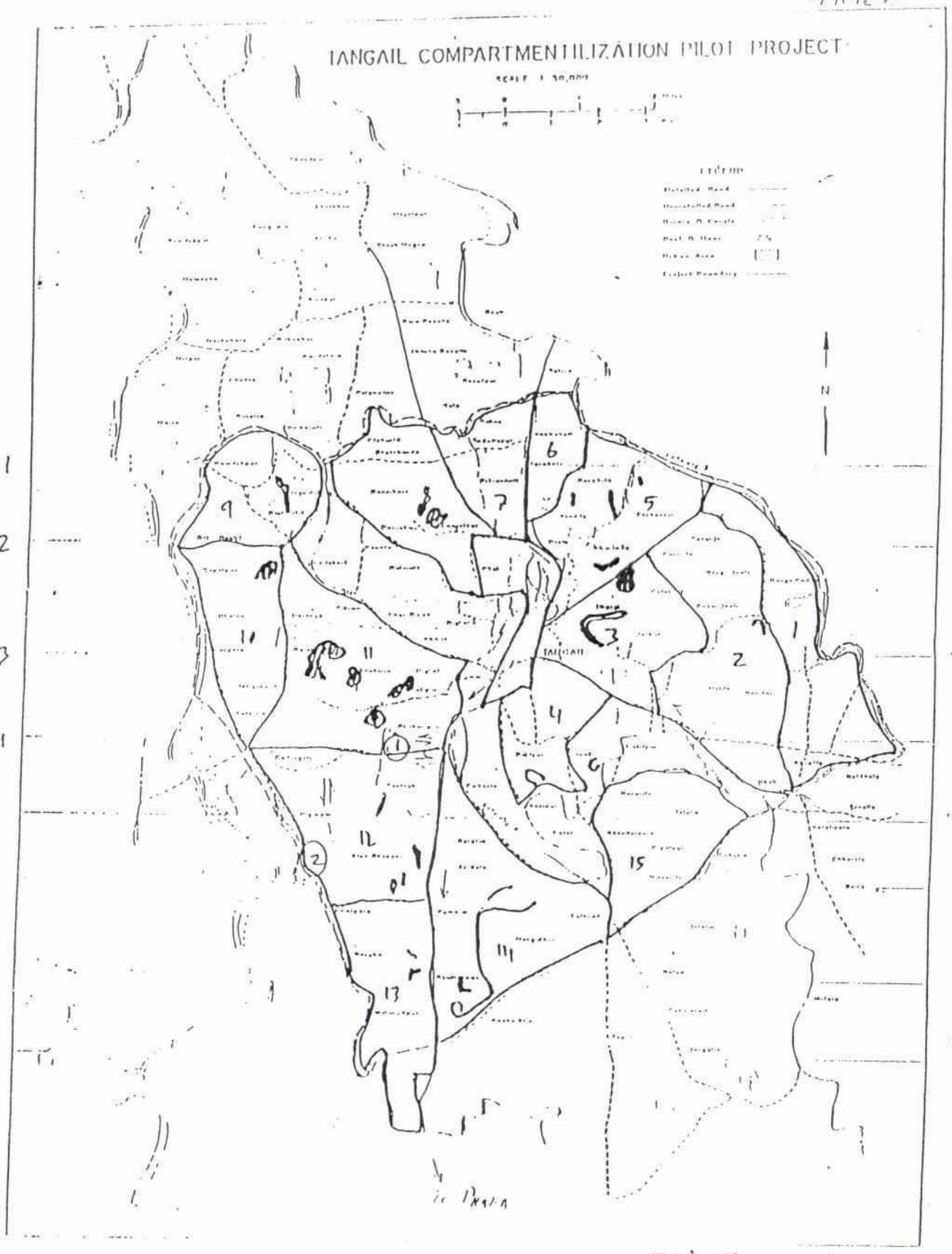
Magnetic Declination about 0° 30' West in 1967.

151

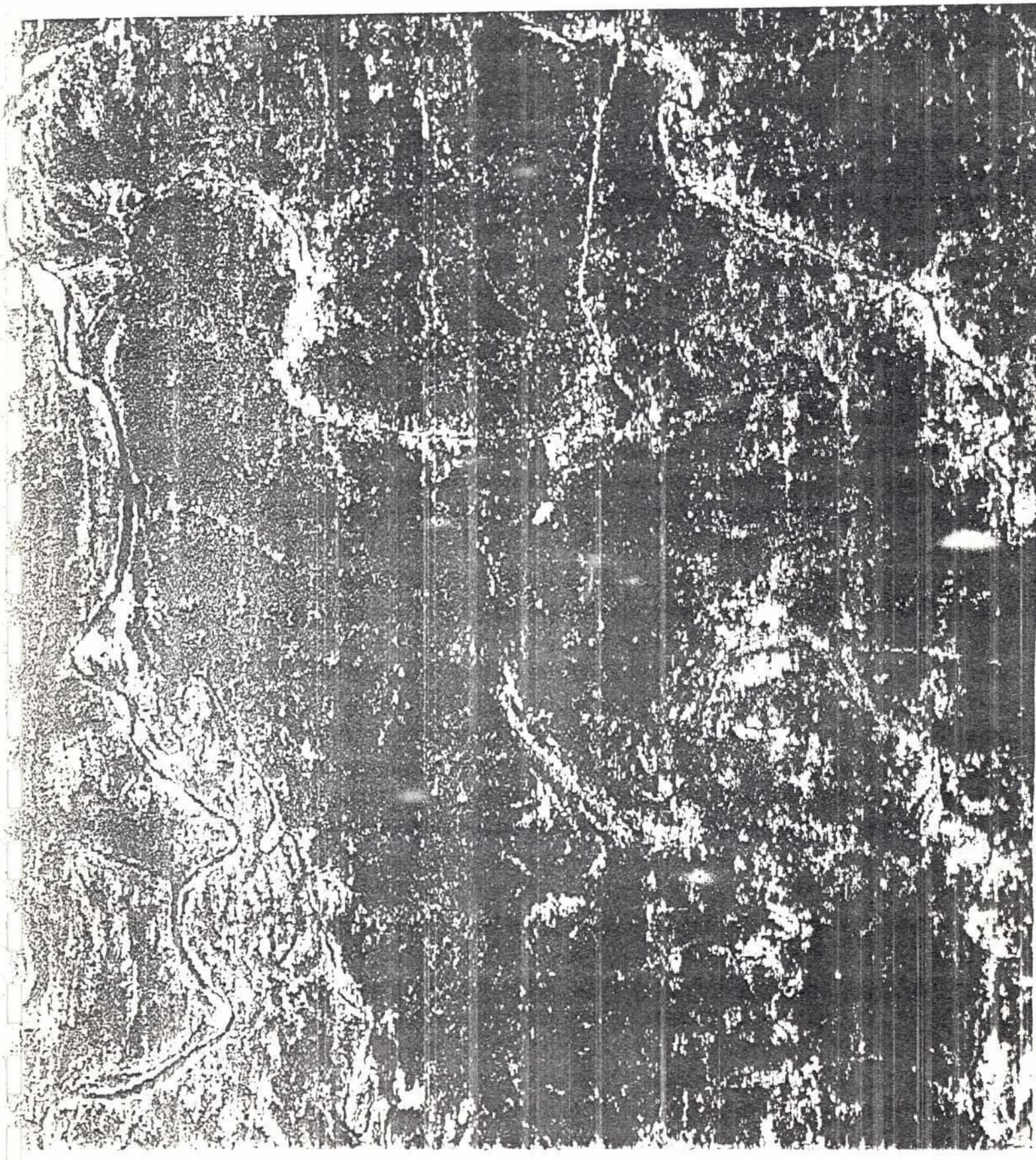
No. 78 H/16

1500





FIA Training Program
Tanghal CPP Area
Field Trip No. 2



FIELD TRIP 3 - HANDOUTS

Field Exercise

Objective:

- Identify impacts of an established project.
- Identify IECs of an undeveloped beel area that you would consider in an EIA study.

This field exercise will include two views (stops): 1) the Dhaka-Narayanganj-Demra Irrigation Project (D-N-D Project), a developed project with an embankment and 2) the adjacent lands that are not yet developed as an embankment area.

Task 1:

At the stop inside of the D-N-D area determine the project components and IECs in the vicinity. Then identify impacts that you think relate to the project, or impacts that you think relate to secondary developments. Please record your findings.

Task 2:

Based on what you just observed in Task 1, identify the IECs that you would consider in an EIA study. For this task assume the project would be similar to the D-N-D Project. Please record your findings.

Be prepared to discuss your findings in the debriefing session when we return from the field.

Good Luck!

The following synopsis of the Dhaka-Narayanganj-Demra Irrigation Project (D-N-D Project) was written in 1963 prior to the construction of the project. Construction of the project started in 1966 and completed in 1968. Thereafter the project was operated to the present time.

SYNOPSIS

The D-N-D Project is located in the southeast suburbs of Dhaka, Bangladesh. Four rivers, Lakhya, Buriganga, Balu, and Dholai Khal, surround the project area. The southern portion, Area I, which is encircled by the Dhaka-Narayanganj-Demra road has a gross area of 14,500 acres (5870 hectares). The northern portion, Area II, north of the Dhaka-Demra road has a gross area of 6,100 acres (2470 hectares). Some 82 percent of the total gross area is cultivable. Most of the land is at present growing one crop of deep water aman, since the fields in the area are inundated every year with 5 to 15 feet (about 0.5 to 4 meters) of water in the flood season.

The proposed scheme of development is to provide irrigation water to the entire area, and flood protection and pump-drainage for the area inside the roads (Area I):

(1) Pumping Plant -- A centrally located pumping plant consists of 4 motor driven axial flow pumps to lift irrigation water from the Lakhya River to the main canals in the dry season. The plant will also pump excess water from rainfall to the Lakhya River during the flood season. Each pump is rated at 53,000 gpm at 16 feet static head. During the irrigation season, three units are sufficient to deliver the maximum demand with one unit as a stand-by, while in the monsoon season all four units with a total discharge of 600 cusecs at 14 feet maximum head will be required.

(2) Irrigation System -- Two main canals around Area I will carry the water from the pumping plant to all of the turnouts for the laterals leading to both Area I and Area II. Other structures, such as sub-laterals, bridges over the main canals, culverts, checks, farm bridges, drainage channels and ditches, wasteways and sluices are provided. Field borders are also included.

(3) Flood Protection Works -- All of the bridge and culvert openings through the road around Area I will be closed with earthfill masonry works. The low places of the road embankment will be raised to the maximum recorded water surface in the river.

Area I:	Proposed 1961 (hectares)	Original 1968 (hectares)	O & M 1986 (hectares)
Gross area	5,860	5,860	5,860
Arable area (kharif)	4,810	4,810	3,320
Irrigable area	4,370	4,370	2,350

Plan Objectives

The plan for the DND irrigation project was to:

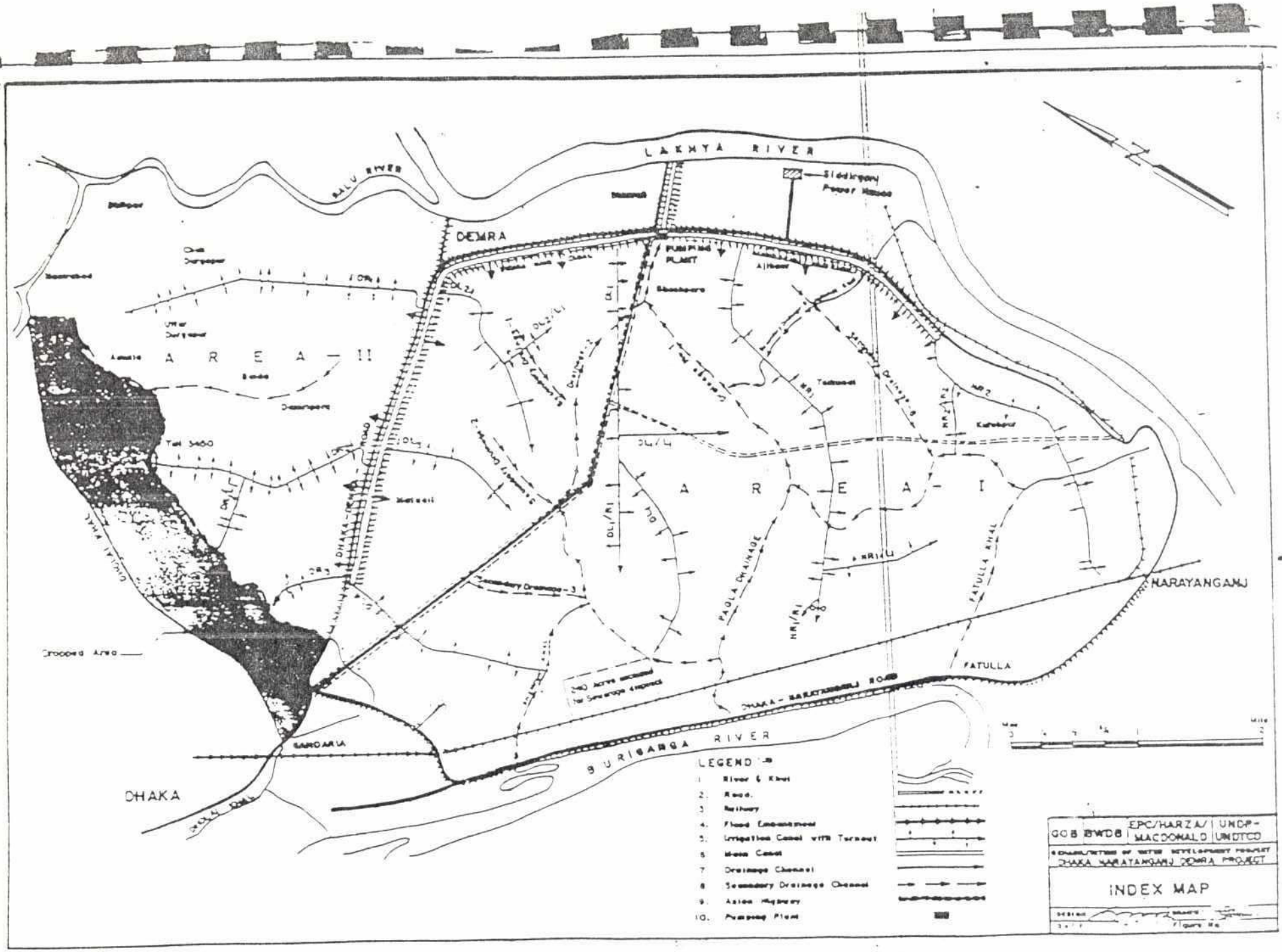
- Increase food production
- Demonstrate the comparison of benefits of irrigation, flood protection, and drainage (Area I) as contrasted to irrigation only (Area II).
- Provide an experimental area for researching the best crop pattern under the two forms of improved agriculture.

It may be emphasized that these objectives were to be met by having the two areas within the same project that were to be served in different fashion. Area I was to have:

- Protection from flooding from the adjacent rivers. Although already surrounded by the embankment the river water entered through the numberous drainage outlets which had to be closed.
- Removal of collected rainwater through a competent drainage system during the monsoon season permitting cropping to continue through that period.
- Irrigation water during the rabi (winter) season.

Meanwhile, Area II was to have only:

- Irrigation water during the rabi (winter) season.


LAKHYA RIVER
DEMRA
AREA - II
AREA - I
HARAYANGANJ
FATULLA
DHAKA
BURIGANGA RIVER
LEGEND
1. River & Khal
2. Road.
3. Railway
4. Flood Embankment
5. Irrigation Canal with Turnout
6. Main Canal
7. Drainage Channel
8. Secondary Drainage Channel
9. Asian Highway
10. Pumping Plant
GOB BWDB EPC/HARZA/MACDONALD UNDP-UNIDO
DHAKA NARAYANGANJ DEMRA PROJECT
INDEX MAP

MID-TERM AND FINAL EVALUATIONS
WORKSHOP 1

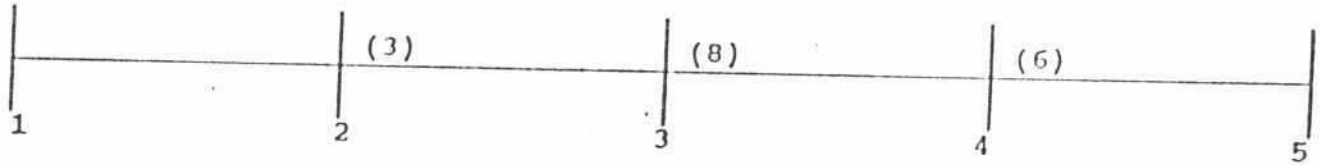
EIA WORKSHOP

MIDTERM TRAINING REVIEW

To help us structure a workshop that responds to your needs, we would like you to share your thoughts and feelings about the workshop to date.

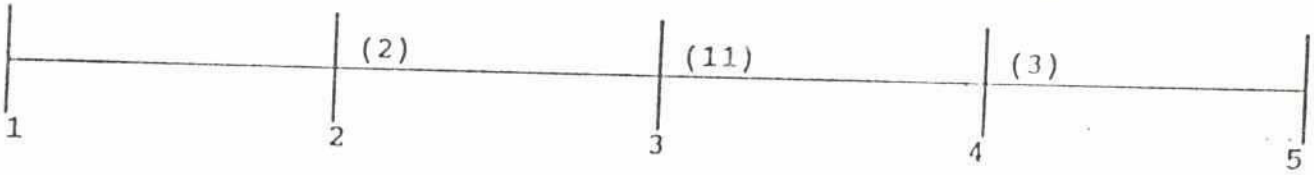
Instructions: Please mark an X on the scale provided.

1. Is the workshop achieving its first objective, that is, to use the EIA Guidelines to develop and review EIAs?



not at all — for the most part — completely

2. Were you clear about what the trainer wanted to accomplish in each session?



not at all — for the most part — completely

3. Which sessions are you not sure about?

-no comment (2)
-none (6)
-baseline studies and data processing resources
-project development
-model session
-SWMC
-Mathematical model session
-Hydrological session
-Exercise 11 & 12
-Study plan, team formation, RRA, PRA, HHS, comparison of baseline studies
-average in all

4. Are you beginning to enhance your skills in:

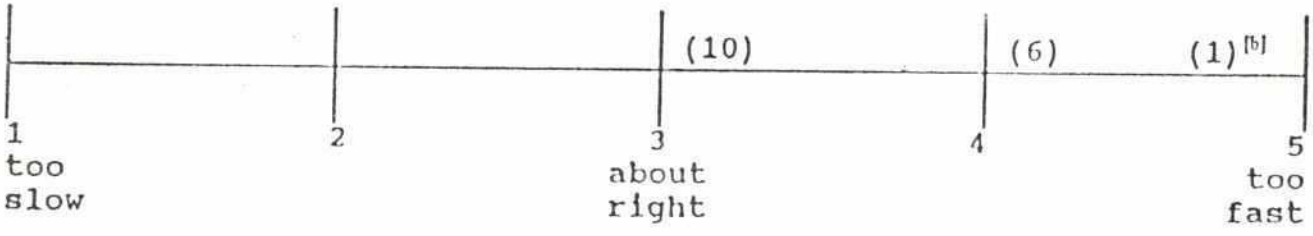
	Not much	Somewhat	Very much
Observation:		(15)	(3)
Interviewing:[a]	(3)	(9)	(4)
Recognizing the components of the planning cycle:	(1)	(13)	(3)
Identifying IEC's:	(3)	(5)	(9)

[a] One response no comment.

5. I would like to learn more about:

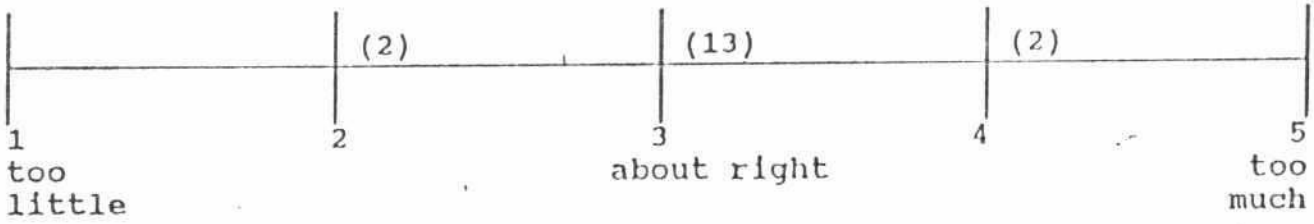
-no comment (1)
-EIA study methods (3)
-team formation
-comparison RRA, PRA, HHS
-practical experience in context Bangladesh
-impact of affluent discharge on water resources
-total steps in a synchronizing way
-GIS to EIA/EMP
-hydrological model
-study plan
-study team leader selection
-use of modelling output for EIA
-hydrological model and of application in EIA study
-project development and survey method
-use of model
-selection of IEC's
-field experience

6. I think the pace of the work is:

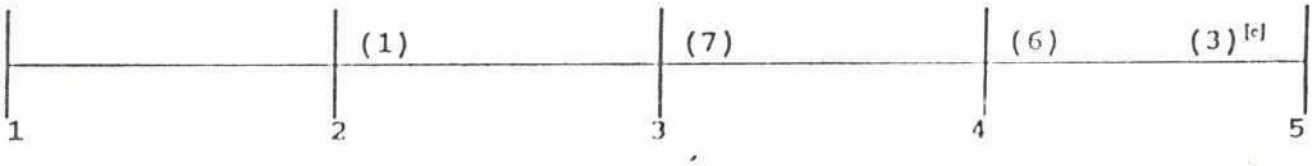


[b] The number in parentheses represents the number of respondents who selected "5".

7. I think the amount of information covered is:

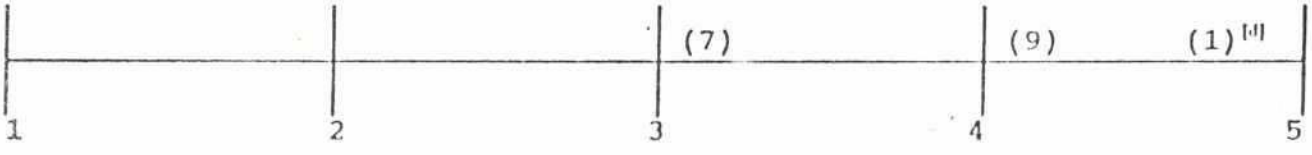


8. I think the exercises are:



[c] The number in parentheses represents the number of respondents who selected "5".

9. I think the handouts are:



[d] The number in parentheses represents the number of respondents who selected "5".

10. I think the trainers could:

-no comment (2)
-describe some specific problems and solutions
-(provide) practical experience
-cite country-based experience
-speak clearly
-do somewhat well
-trainers could train efficiently
-spell out the training/learning approach at the outset, distribute glossary earlier
-trainers training systems are fine
-supply more handouts
-concentrate more on details of EIA case study experience
-more
-teach in more practical way. Analysis of case study
-train
-be more experienced
-quite right
-but sometimes could be little slow

11. I think the facilities are:

-quite okay
-about adequate
-inadequate
-good
-not very good
-okay (2)
-not good, such as water supply
-medium (2)
-adequate (2)
-not sufficient (2)
-somewhat
-sufficient
-good

12. Other Comment:

-left blank (4)
-no comment (3)
-a field trip should be organized in the forest area where wildlife is affected due to implementation of P.W.D. project, e.g. Kaptai: Hydrological Project; coastal embankment project near Sunderban area.
-sometimes outside resource person is not interesting
-steps of EIA should be more clear and synchronized
-workshop is quite useful for practitioners
-training will help me in future
-at the end of the session we will be able to have rather more information about EIA
-external resource personnel made boring
-it is a nice workshop. It will be helpful in future.
-field trip could be done in one place but with more time and detail
-a sociologist is necessary in the faculty staff
-philosophy behind environmental consciousness should be discussed
-field trip to a forest area should be included.

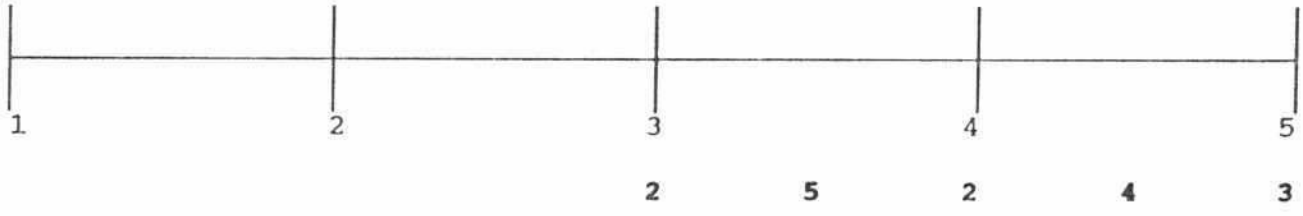
EIA WORKSHOP

FINAL TRAINING EVALUATION

In order to help us design future workshops that respond to your needs, we would like to ask you to share your thoughts and feelings about the workshop you have just completed.

Instructions: Please mark an X on the scale provided, or use the space provided for your comments.

1. Did the workshop achieve its objective of helping you to use the Guidelines to develop and review EIAs?



2 5 2 4 3

2. Did the workshop meet your expectations?

Less_____ More____10_____

Comment:
-gathered more knowledge on EIA
not less not more, but in a considerable way
-not up to mark (3)
-yes, I am satisfied
-I wish to participate in such future workshops
-yes
-expectation was fulfilled
-yes it did

3. How do you think you will apply the lessons you have learned in the workshop?

-in teaching at the university
-in performing EIA studies
-good
-to practice as a future EIA specialist
-yes
-by reviewing some EIA documents

-I will be able to apply the lessons learned from the workshop in the review work after EIA Report of the BWDB project, and it will be helpful in making EIA-study as a team member and to make report
-in my official work and also outside if I get a chance
-through training
-Through training to counterpart and other related person
-risk and hazards
-making feasibility report
-as a practitioner it would help using the ideas in analyzing projects
-during field visitation--to apply the lessons to assess the environmental impact in the project area. To prepare future management plan

4. What area did you:

a. learn the most about?
-EMP
-IECs, Impact analysis
-the procedure of EIA study to be applied in FCD/I projects
-impact assessment
-scoping and bounding (2)
-impact of CPP
-EMP
-Review
-Project Review
-GIS
-EIA study methods
-people's participation, impact assessment, Env. management plan
-scoping, bounding, IEC's, Environmental Management Plan, People's participation
-people's participation

b. learn the least about?
-study methods
-GIS
-Hydrological
-judgement of application
-review of EIA report
-simulation modelling study
-dry season impact
-review after report
-in almost all the parts I learned about 80% of the things in consideration of clarity
-scoping and bounding
-hydrological model
-SWMC
-hazard and risk
-EIA Review technique

5. Module by module which topics would you add, delete, emphasize more, emphasize less.

Module 1: Program Introduction
-okay (2)
-emphasize less
-emphasize more

Module 2: Project Development
-about right
-okay (2)
-emphasize more (2)

Module 3: People's Participation
-add emphasis more
-emphasize more (3)
-okay
-more emphasis needs

Module 4: Scoping and Bounding
-add, emphasis more
-emphasis more (4)
-more emphasize needs

Module 5: Study Methods
-emphasis more (4)
-okay
-more and more emphasize needs

Module 6: Hazard and Risk
-okay (2)
-emphasize more (2)
-more emphasize needs

Module 7: Impact Assessment and Evaluation
-emphasis more (6)
-emphasize more for the next batch
-okay
-more

Module 8: Communicating and Reporting
-ok (2)
-as above [emphasize more for the next batch
-emphasize more (3)
-more

Module 9: Environmental Management Plan
-emphasis more (6)
-as above [emphasize more for the next batch]
-more

Module 10: EIA Review
-emphasis more (4)
-more

6. Which techniques of instruction (lecturettes, practical exercises, group discussions, case study, field trips, journals) did you get:

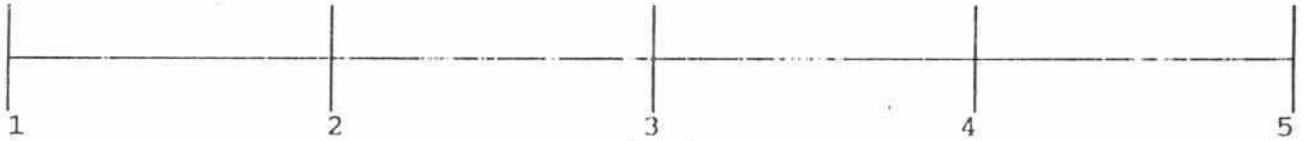
a. The most from:

lecturettes (5)
practical exercises (12)
group discussions (12)
case study (5)
field trips (8)
journals (4)

b. The least from:

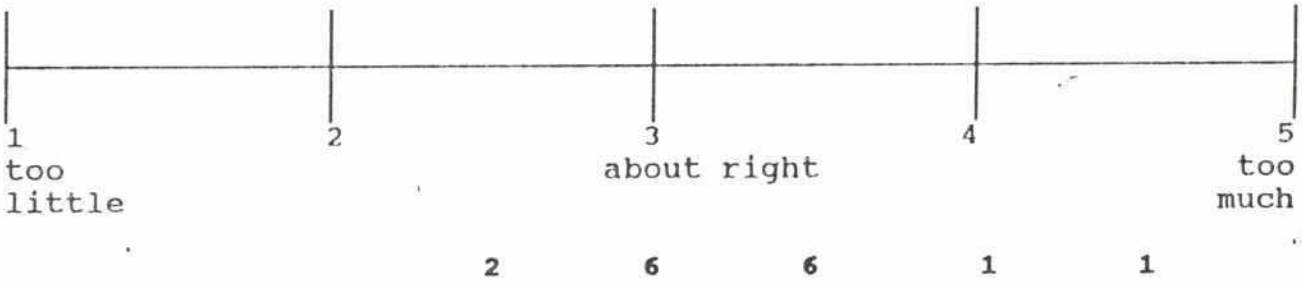
lecturettes (3)
practical exercises
group discussions
case study (3)
field trips (1)
journals (5)

7. I thought the pace of the work was:



7 7 1 1

8. I thought the amount of information covered was:



2 6 6 1 1

9. Were the handouts helpful? If no, why not?
-yes (9)
-yes, but inadequate
-yes, helpful
-yes, very much
-yes, handouts are helpful
-handouts are helpful (2)

10. In what ways could the instructors improve their performance?

giving more examples/by sharing experience
-by providing the conceptual framework first, then giving examples pertaining to the issue/issues, and handing the task over.
-after performing series of EIA training courses
-by providing more relevant handouts prior to the class lecture
-through the distribution of handouts
-by knowing Bengali/English (2)
-by making group from the initial stage of the workshop among the participants
-taking the floor in own control and not giving it to the trainees at any time
-no
-N/A (all are okay)
-the instructors should be more familiar with the Bangladesh problem
-time frame could be expanded
-after explaining elaborating the topics then to give the exercise

11. Would you recommend the workshop to others:

yes (15)
yes, sure

12. Please add other comments you would like to make about any aspect of the workshop.

-no more comments
-the management should more active and cooperative by least
-the trainers were very good, cooperative, learned enough. But in some cases the clarity was not up to the mark about the basic idea of the things. But, as a new concept of Environment (EIA) in the world they are good enough.
-the team leader is very experienced and learned enough with a very good behavior
-Mr. Joe is a god man with straight thinking, knowledgeable on topics and a good teacher. He is more specific than the others.
-Mr. Maze is also good teacher, knowledgeable but not tactful to handle the situation. He sometimes can't understand the speaking and pronunciation of participants: but he has a good command over the topics.
-More advanced training is needed to keep hold the knowledge in the field and build the participants advanced practitioner of EIA
-I suggest that:
    1. more guest lecturers should be invited to address in their respective fields
    2. smaller groups could be formed so that everyone can take participation in the exercises
    3. time is very short to cover all the EIA aspects (20 days)
    4. more field trips should be arranged
-the workshop will be more than one month
-such type of workshop may be continued for others and develop a broader course
-no comment
-I have no comments
-I think only 19 days for training is not sufficient. It should be more
-financial incentive to be enhanced
-good food to be served
-time period for the exercises should be more than as provided to understand the task more clearly
-the quality of snacks/food provided is poor and sometimes hazardous in stomach
-Along with the foreign experts, Bangladeshi counterparts should be in the faculty staff
-modules could be devised in two ways: 1) conceptual 2) empirical
-sociologist is a must in the faculty
-recruitment of participants should be done appropriately
-if any higher stage training/workshop on EIA will hold then the participants of this group should be invited to skill-up their EIA knowledge
-well managed

MID-TERM AND FINAL EVALUATIONS
WORKSHOP 2

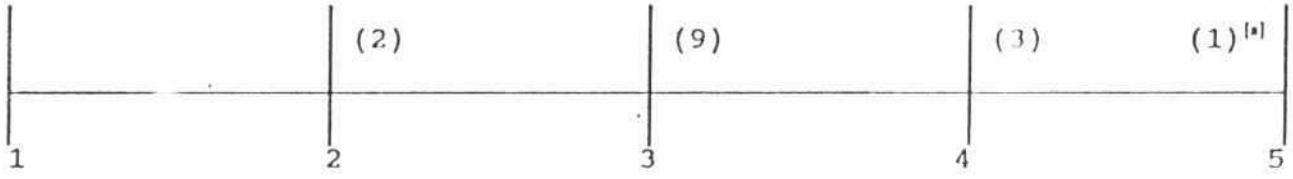
EIA WORKSHOP

MIDTERM TRAINI[illegible] REVIEW

To help us structure a [illegible]hop that responds to your needs, we would like you to shar[illegible]ur thoughts and feelings about the workshop to date.

Instructions: Please mark an X on the scale provided.

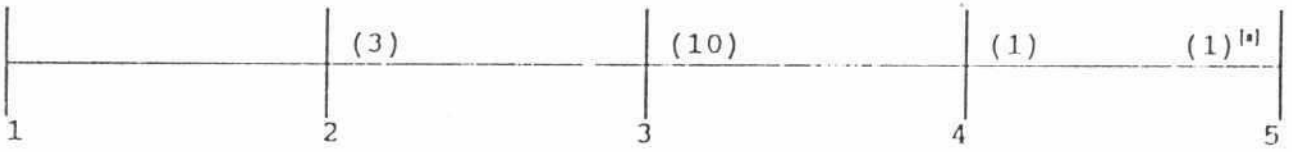
1. Is the workshop achieving its first objective, that is, to use the EIA Guidelines to develop and review EIAs?



[a] The number in parentheses represents the number of respondents who selected "5".

not at all — for the most part — completely

2. Were you clear about what the trainer wanted to accomplish in each session?



not at all — for the most part — completely

3. Which sessions are you not sure about?

-all sessions were good
-GIS and remote sensing (2)
-Peoples' Participation (2)
-Project Development
-Study Methods
-Assessment and Evalu[illegible] [b]
-not applicable (2)
-Hazard and Risk (2) [b]
-Sc[illegible]ing and Bounding
[illegible]e methodology of EIA
-Ecosystem and Environment
-Communicating and Reporting [b]

[b] The module and [illegible]ns relating to the comment have not yet been covered[illegible] training workshop.

4. Are you beginning to enhance your skills in:

	Not much	Somewhat	Very much
Observation:	(1)	(9)	(4)
Interviewing:[c]	(2)	(8)	(4)
Recognizing the components of the planning cycle:		(8)	(7)
Identifying IEC's:[d]	(3)	(6)	(4)

[c] One response no comment; [d] two no response.

5. I would like to learn more about:

-not applicable

-identifying IECs at Peoples' Participation in EIA

-Scoping and Bounding (2)

-Communicating and Reporting [b]

-GIS practice

-review about EIA

-summing up environment, its habitats, IECs issues, and their inter-relationship and distinction

-identifying IECs

-regarding the solutions of negative impacts on a water resource at its tolerance

-Impact Assessment Evaluation

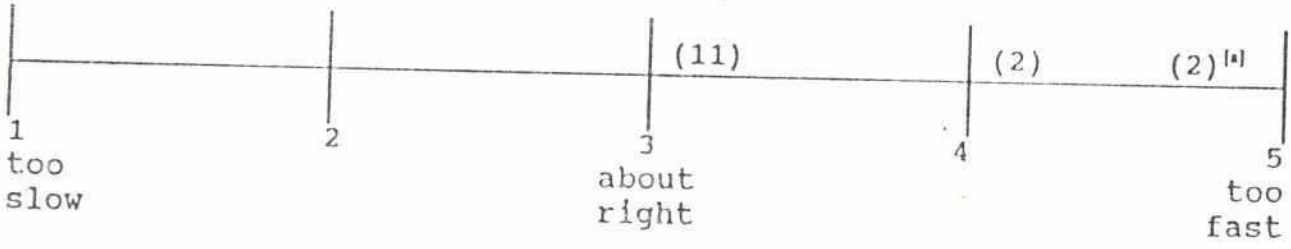
-GIS (2)

--methodology

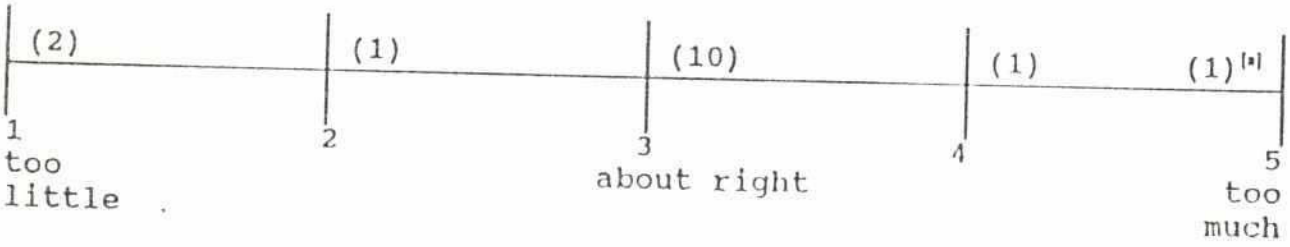
--Scoping

-Environmental Management Plan [b]

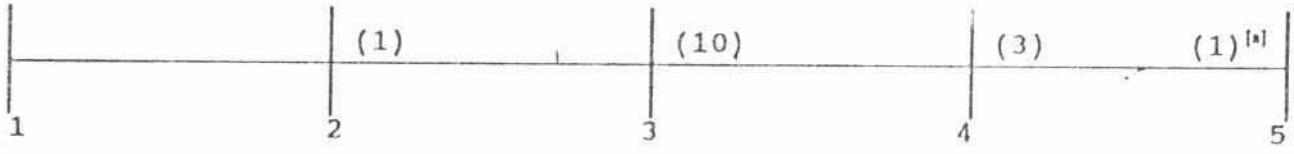
6. I think the pace of the work is:



7. I think the amount of information covered is:

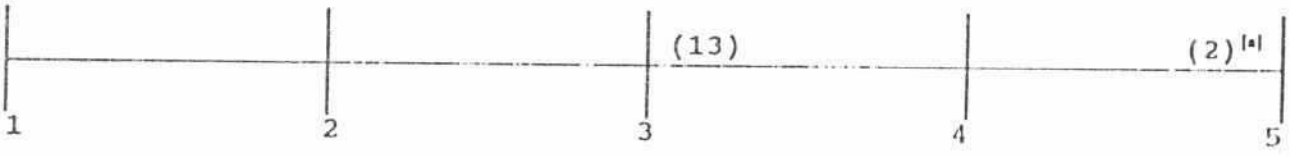


8. I think the exercises are:



not useful — useful — very useful

9. I think the handouts are:



not helpful — helpful — very helpful

10. I think the trainers could:

-Demonstrate in practical ways with movies, slides, etc.
-They are well skilled and good in almost all respects.
-Achieve more from this course.
-Not applicable.
-Give more information about EIA.
-Give more hints on the subject/exercises covered.
-Discuss the results of exercises in detail.
-Speak in brief more about the subjects.
-Elaborate the exercise results.
-Help the participants more.
-Helpful and very intimate.
-Explain elaborately.
-Go a bit more slowly and explain the main theme elaborately with more practical examples.

11. I think the facilities are:

-Adequate.
-Not that much.
-Good.
-Can be made more adequate.
-OK (2).
-OK except for transportation.
-Not adequate (2).
-Telephone facility should be provided.
-Not good enough.
-Very helpful to prepare a new project.
-Inadequate as per the need of the trainees.
-Not so good.
-Not enough.

12. Other Comment:

-No comment (2).
-Results of exercises could be generalized.
-EIA is an important now-a-days all are ... worried. So training is a step to make conversion with professionals as well ... people. More care and planning is to be taken regarding the training approach.
-Lecture should be more general and in details.
-Over emphasis on exercises. They should be preceded by appropriate lecture contents.
-Incentives should be higher.
-Trainer should be picked up from all disciplines of EIA study team (required for EIA study of FCDI projects).
-More hand outs should be given on Peoples' Participation.
-This is a course on EIA. The failure of the course organizers in assessing the working environment of Bangladesh is a shame. The differences between theoretical knowledge and actual situation in applicability are distinct in the process of the course. The organizers should take more care about trainees likings and dislikings.
-All the participants should be treated equally. Some participants left the class with prior permission but no action has yet been taken against them.

EIA WORKSHOP II (August 15 - September 9)

FINAL TRAINING EVALUATION - 15 Participants

This is an evaluation of the performance of the ISPAN Team by the participants

In order to help us design future workshops that respond to your needs, we would like to ask you to share your thoughts and feelings about the workshop you have just completed.

Instructions: Please mark an X on the scale provided, or use the space provided for your comments.

1. Did the workshop achieve its objective of helping you to use the Guidelines to develop and review EIAs?

1	2	3	4	5
less		about right		more
Response		4 4	6	1

2. Did the workshop meet your expectations?

Less 4 4(a) More 7

Comment: (a) Moderate

Comment:

- The workshop i.e. EIA training is very helpful to us. It will be very much helpful for our future guide lines to develop EIA study.
- The course is too speedy. More demonstrations by video, field trips can help our expectations more.
- Now I can understand what EIA is.
- Largely successful in imparting the skills.
- Now I understand why EIA need for any project.
- In content with Bangladesh we learned less.
- I think more working days were required to achieve such a new subject in details. Moreover practical training both in home and abroad is required to cope with this new area.
- My expectations was to know about the measures to reduce conflicts between different group of people for fulfilling their own benefit of the project.

3. How do you think you will apply the lessons you have learned in the workshop?

- apply or help in EIA review of projects (5)
- sound project planning (2)
- participate in EIA team (1)
- improve engineering planning and practice (1)
- apply to desk work and examining projects (1)
- apply to water resources projects (1)
- helpful in my field in future activities (1)
- successfully accurately (1)
- planning and review.

4. What area did you:

a. learn the most about?
- Important Environmental Components (IEC's) (6)
- people's participation (5)
- methodology (study methods) (2)
- scoping and bounding (2)
- reviewing (2)
- impact assessment (2)
- hazard and risk (2)
- more or less all area
- reporting
- interviewing
- Environmental Management Plan
- sound project planning
- EIA study for new projects
- environmental issues
- definitions used in EIAs

b. learn the least about?
- Geographic Information Systems (4)
- Environment Management Plan (4)
- scoping and bounding (3)
- impact assessment (3)
- weighting (2)
- reporting and communicating (2)
- no response (2)
- more or less all areas
- quantification, scaling, magnitude, importance of impacts
- none
- decision making
- trend analysis

5. Module by module which topics would you add, delete, emphasize more, emphasize less. **Please note that for the sake of scoring this session, the modules have been listed in descending order starting with those receiving the largest number of requests for change.**

Module 9: Environmental Management Plan
- more (15)
- OK
- less (0)
- no response (0)

Module 7: Impact Assessment and Evaluation
- more (14)
- OK (1)
- less (0)
- no response (0)

Module 10: EIA Review
- more (13)
- OK (1)
- no response (1)
- less (0)

Module 8: Communicating and Reporting
- more (11)
- OK (2)
- less (1)
- no response (0)

Module 2: Project Development
- more (8)
- OK (5)
- no response (2)
- less (0)

Module 3: People's Participation
- more (10)
- OK (2)
- less (2)
- no response (1)

Module 4: Scoping and Bounding
- more (7)
- Ok (4)
- less (1)
- no response (2)
- might me more specific (1)

Module 5: Study Methods
- more (9)
- Ok (4)
- less (2)
- no response (0)

Module 6: Hazard and Risk
- more (7)
- OK (4)
- less (2)
- no response (0)

Module 1: Program Introduction
- more (4)
- OK (5)
- less (4)
- no response (2)

6. Which techniques of instruction (lecturers, practical exercises, group discussions, case study, field trips, journals) did you get:

a. The most from:
Practicals (11)
Group discussion (10)
Field trip (8)
Case study (5)
Lectures (4)

b. The least from:
Journals (10)
Lectures (6)
Field trip (4)
Case study (4)
Group discussion
None

7. I thought the pace of the work was:

1	2	3	4	5
too slow		about right		too fast
*2		1 6 1	3	2*2

*Two responses were "too slow" at beginning of workshop and "too fast" at end.

8. I thought the amount of information covered was:

1	2	3	4	5
too little		about right		too much
1		2 1 3 1	5	1

9. Were the handouts helpful? If no, why not?
   - yes (6)
   - yes and /or helpful (5)
   - no (1)
   - yes but inadequate (1)
   - should cover all types (1)
   - insufficient (1)

10. In what ways could the instructors improve their performance?
   - not sure
   - more video and field trips etc. can improve performance
   - after writing they can do more practicals
   - elaborate the lectures on the topics
   - field trips and discussion can improve performance
   - discuss their experiences
   - give brief on the subject then questions and practicals
   - give own conclusions
   - provide appropriate handouts
   - cover more detail for each module
   - give views and ask comments instead of trying to speak for the participants
   - performance OK
   - no response (1)

11. Would you recommend the workshop to others:

Yes (11) (73%)

No response from other 4 participants

12. Please add other comments you would like to make about any aspect of the workshop.

1. Course Content

- participants need to prepare a full scaled EIA
- advanced EIA course should be considered for trainees of this course
- more training needed, NGO people should be included, more examples of international EIA boundary conflicts; advanced training needed.
- follow-up course in EIA is needed
- continue course for other technical persons
- audio-visual aids could be used, more guest lectures
- more EIA case study review, more individual exercise for Environment Management Protection
- lectures helpful

2. Length

- extend course one more week
- increase length of workshop
- course reduced to ten days

3. Field work/Practicals

- more field trips
- practical field trip exercise in real method

4. Course Management

- instructor should assess the working environment of trainees before extending lecture in class so that trainees can better understand; avoid irrelevant discussion just to pass time in class
- some Bangladeshi national to be included
- course training and management OK
- mix English and Bangla lectures
- course management not bad
- participants be drawn from other agencies (e.g. DAE, DOF, etc.)
- arranged appreciation session for senior levels
- instructors should be more sympathetic to participant's problems

5. Course Facilities

- no telephone available
- per diem increased
- venue was alright, but toilets, need telephone, tea breaks should be changed
- logistics should be improved, per diem increased, telephone should be available for participants,
- no response (4)

WORKSHOP PARTICIPANTS

Workshop 1 Participants

1.	ABUS, Sabur	WARPO
2.	AHMED, MD. Masud	FPCO
3	ALAM, Ruhul Mollah	FPCO
4.	AMIN, MD. Rabiul	MOI
5.	BEGUM, Momtaz	DOF
6.	HOQUE KHAN, MD. Manjural	BCL
7.	HOSSAIN, MD. Amjad	BWDW
8.	KAMAL, MD. Mustapha	BCL
9.	KARIM, MD. Rezaul	IMED/MOP
10.	KAZI, Jahangir Alam	PLAN COMM.
11.	KHALEQUE, K.A.	MOIWD & FC
12.	NUR UN NABI, A.K.M.	UNIV. DHAKA
13.	RAHMAN, Saidur	FPCO
14.	SERNIABAT, Mustafizur Rahman	BWDW
15.	SHAFI, A.M.	FPCO
16.	YASMIN, Noveera	DDC
17.	ZAMAN, Shamsuz	CARE

Workshop 2 Participants

1.	Md. Salequzzaman	DOE
2.	Champa Nag	DOE
3.	Humaira Khan	Planning Commission
4.	Zinaida Irfat	Ministry of Irrigation
5.	Mahmood Hasan Khan	DOE
6.	A.K.M. Mukhlesur Rahman	FPCO
7.	Md. Abu Zahid	FPCO
8.	Mozadoad Faruque	BWDB
9.	Kamaluddin Ahmad	Planning Commission
10.	Abdur Noor	FPCO
11.	S.M. Shahabuddin Mahmood	FPCO
12.	Md. Abdus Salam	BWDB
13.	Quazi Abdul Quadir	IMED M/O Planning
14.	Md. Badiuz Zaman	M/Irrigation
15.	Md. Sazedul Karim Chowdhury	BWDB