

11.0 Preparing an Environmental Impact Assessment Report

This section outlines the structure of an Environmental Impact Assessment (EIA) report. It provides a framework for applying the methods and approaches detailed in previous chapters. With the guidance given in this chapter, the EIA practitioner can proceed in a step-by-step fashion to prepare an EIA report.

At a minimum, an EIA report should contain: 1) an introduction; 2) a project description; 3) a detailed description of the environment; 4) an assessment of environmental impacts and mitigation measures; 5) an environmental management plan; and 6) an environmental monitoring plan. In many jurisdictions, the EIA report also contains an evaluation of alternatives, environmental economic analyses including a cost-benefit analysis, and a description of the public participation program. For example, Box 11-1 provides the suggested format for an EIA report for the Asian Development Bank (Asian Development Bank, 1993).

Box 11-1: Suggested Format for an EIA Report for the Asian Development Bank.

Introduction Description of Project Description of Environment Anticipated Environmental Impacts and Mitigation Measures Alternatives Cost-Benefit Analyses Institutional Requirements and Environmental Monitoring Program Public Involvement Conclusions
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11.1 Terms of Reference

Requirements for the preparation of an EIA report should be clearly outlined in a terms of reference (TOR), which should be prepared for the specific project to be assessed. The EIA report should be prepared by the proponent to the requirements of the review authority that will examine the report. If the report is not suitable for review and evaluation, the review bodies will not be in a position to a) decide whether the project should be permitted to proceed, and b) if it does proceed, set appropriate terms and conditions to ensure an environmentally sound project.

Chapter 2 emphasized the importance of scoping to develop the appropriate TOR. The effectiveness of EIA is compromised whenever time and money is spent searching for sophisticated answers to unimportant questions. It is also compromised whenever important issues are neglected through failure to consider a broad range of interests in the early stages of the EIA. Scoping has the objective of identifying the right questions to ask during the conduct of an environmental assessment.

11.1.1 Scoping Defined

Scoping is a process of interaction between interested public, government agencies and proponents to determine the important issues and alternatives that should be examined in EIA (U.S. Council on Environmental Quality, 1981).

Scoping is the process of determining the issues to be addressed, the information to be collected, and the analysis required to assess the environmental impacts of a project. (ESSA Technologies Ltd., 1994).

Scoping is a process within which various methods are applied to:

- identify concerns of the public and scientists about a proposed project or action;
- evaluate these concerns to determine the key issues for the purposes of the EIA (and to eliminate those issues which are not significant); and
- organize and communicate these to assist in the *analysis of issues* and the ultimate making of decisions (Federal Environmental Assessment Review Office, 1987).

There are two key concepts in these definitions:

- consultation with stakeholders to identify issues and concerns; and
- evaluation and prioritization of issues.

The Asian Development Bank uses an initial environmental examination (IEE) to implement scoping for development projects. As defined in Chapter 2, the primary objectives of the IEE are to:

1. identify the nature and severity of specific, significant environmental issues associated with the project;
2. identify easily implementable mitigations for the significant environmental issues; and
3. produce a detailed terms of reference should further EIA studies be needed.

The TOR should provide those preparing the EIA report with explicit direction on preparing the EIA report. It should be specific about the information requirements and level of detail to be included in each major section of the report.

11.2 Contents of the EIA Report

This section outlines the basic components or sections that should be included in an EIA report. A recommended table of contents for an EIA report is presented in Box 11-2.

Box 11-2: Table of Contents for an EIA Report.

- Executive Summary
- 1. Introduction
- 2. Description of the Project
- 3. Description of the Environment
- 4. Anticipated Environmental Impacts and Mitigation Measures
- 5. Alternatives
- 6. Environmental Monitoring
- 7. Additional Studies
- 8. Environmental Management Plan and Environmental Management Office
- 9. Summary and Conclusions
- 10. Annexes

11.2.1 Executive Summary

An executive summary should be prepared. This critical document summarizes the significant findings of the EIA report. The executive summary must describe each significant environmental issue and its resolution in sufficient detail so that the reader can understand its importance and scope, as well as the appropriateness of the approach taken to resolve it. The executive summary should be a clear presentation of the critical facts that make up each issue, and the resolution of the issues. Whenever possible, the summary should make use of base maps, tables and figures. Information should be condensed into succinct, but meaningful presentations. It must be able to stand alone as a document.

11.2.2 Introduction

The introduction section of the EIA usually should include the following:

- i. Purpose of the report, including a) identification of the project and project proponent; b) a brief description of the nature, size, and location of the project and of its importance to the country; and c) any other pertinent background information.
- ii. Stage of project preparation.
- iii. Extent of the EIA study, including scope of study, magnitude of effort, and person or agency performing the study.
- iv. Brief outline of the contents of the report, including mention of any special techniques or methods used for identifying issues, assessing impacts, and designing environmental protection measures.
- v. Background references.
- vi. Acknowledgments.

A review of relevant studies and examples of environmental impacts of similar projects should also be presented.

11.2.3 Description of the Project

The project description should be based on the project feasibility study. Not all the detailed engineering information needs to be included as much of it is unnecessary for the environmental review. The project description should present a condensed description of those aspects of the project likely to cause environmental effects. The project should be described in terms of its basic activities, location, layout, and schedule (in terms of the project life cycle). This project description section of the report should furnish sufficient details to give a brief but clear picture of the following:

- i. Type of project.
- ii. Need for the project.
- iii. Location (use maps showing general location, specific location, project boundary and project site layout).
- iv. Size or magnitude of operation, including any associated activities required by or for the project.
- v. Proposed schedule for approval and implementation.
- vi. Description of the project, including drawings showing project layout, components of project, etc. Schematic representations of the feasibility drawings which give the information important for EIA purposes should be produced to provide reviewers a clear picture of the project and its operations.
- vii. Description of mitigation measures incorporated into the project to meet environmental standards, environmental operating conditions, or other EIA requirements.

Any new and untested technology should be highlighted and an assessment of the risk of technological failure included.

11.2.4 Description of the Environment

Study Area

A clear delineation of the study area is important to define the area within which impacts must be considered. The additional description of the study area that will be required for the EIA is dependent on the types of resources located in the area, and upon the magnitude of the anticipated impacts. The area to study must be large enough to include all valued environmental resources that might be significantly affected by the project.

Establish a Baseline

Once the study area is well defined, studies to gather the baseline conditions for valued environmental components must be developed. Many jurisdictions have developed standard checklists that allow for consistent terminology in organizing the data assembled for environmental components. The system used in Thailand is presented in Table 11-1. In general, it is necessary to provide sufficient information to give a brief but clear picture of the existing environmental components and values. These components and values include, to the extent applicable (but are not necessarily limited to):

- i. **Physical components:** topography, soils, climate, surface water, groundwater, geology/ seismology.
- ii. **Ecological components:** fisheries, aquatic biology, wildlife, forests, rare or endangered species, wilderness or protected areas.
- iii. **Human and economic development:** population and communities (numbers, locations, composition, employment, etc.), industries, infrastructural facilities (including water supply, sewerage, flood control/damage, etc.), institutions, transportation (roads, harbors, airports, navigation), land use

planning (including dedicated area uses), power sources and transmission, agricultural development, mineral development, and tourism components.

- iv. **Quality of life values:** socioeconomic values, public health, recreational components and development, aesthetic values, archaeological or historical treasures, and cultural values.

Table 11-1: Classification of environmental components used in EIAs in Thailand (*source:* adapted from the National Environment Board, 1979).

National Environment Board Parameters		
Physical Resources	Surface Water Hydrology	Air Quality
	Surface Water Quality	Soils
	Ground Water Hydrology	Land Quality
	Ground Water Quality	Mineral Resources
	Climate	Geology / Seismology
Ecological Resources	Forest, Vegetation Cover	Aquatic Biology
	Terrestrial Wildlife	Fisheries
	Endangered Species	
Human Use Values	Agriculture	Industries
	Land Use	Highways, Railways
	Flood Control	Navigation
	Water Supply	Housing
	Power	Sanitation
Quality of Life Values	Aesthetics	Public Safety
	Cultural	Socio-Economic
	Archaeological	Recreation
	Public Health	Dedicated Use Areas

It is not necessary to gather information on all the components listed in such environmental component checklists. The baseline studies should concentrate on identifying those environmental components that may be significantly impacted by the project.

Base Maps

Many environmental components can be best represented as spatial data through various types of maps. In addition to the basic physical features and infrastructure of the study area, it is valuable to have maps identifying vegetation types/communities, animal habitat, and major population centers.

11.2.5 Anticipated Environmental Impacts and Mitigation Measures

A thorough treatment of project issues, their impacts on valued components and recommended mitigation measures to minimize impacts are the core of a successful EIA. One approach is to present this information in terms of the various stages of the project: preliminary design, final design, construction and operation. This methodology ties the impacts on the components to the stage(s) of the project during which they are triggered. Addressing impacts through the associated project stage indicates clearly which aspects of the project will require

mitigative actions in the form of design changes, and matches the decisions regarding mitigation with the project implementation schedule.

Item-by-Item Review: This section of the report should evaluate the expected impact (quantified to the degree possible) of the project on each component or value and, in the case of applicable sectoral environmental guidelines, wherever any significant impact is expected (this would include environmental risk assessment, where appropriate). Environmental impacts to be investigated should include those due to project location; those caused by possible accidents; those related to design; and those resulting from construction, regular operations, final decommissioning or rehabilitation of a completed project. Where adverse effects are indicated, discuss measures for minimizing and/or offsetting them. Opportunities for enhancing natural environmental values should be explored. Both direct and indirect effects should be considered, and the region of influence indicated. As required, the impact on the global environment should be described.

This analysis is the key presentation in the report — if not sufficiently complete, it may be necessary to delay the project until the analysis can be completed. It is necessary to present a reasonably complete picture of both the human use and quality of life gains to result from the project due to the utilization, alteration, and impairment of the natural components affected by the project, so that fair evaluation of the net worth of the project can be made.

Irreversible and Irretrievable Commitments of Components: The EIA report should identify the extent to which the proposed project would irreversibly curtail potential uses of the environment. For example, highways that cut through stream corridors, wetlands, or a natural estuary can result in irreversible damage to these sensitive ecosystems. Other impacts that may be irreversible include alteration of historic sites, and expenditure of construction materials and fuels. Projects through sensitive areas like estuaries and marshes may permanently impair the natural ecology of the area, while elimination of recreation areas and parklands can precipitate drastic changes in an area's social and economic character.

Effects During Project Construction: The construction phase of the project usually involves environmental impacts that will cease at completion of construction. These impacts may be significant, particularly when construction occurs over a number of years. These impacts and the mitigation measures proposed to reduce or prevent them should be discussed separately in the report.

In Chapter 1, EIA analysis was defined as having three sequential phases — identification, prediction and assessment. Identification involves characterizing the existing baseline environment and components of a development project which are likely to impact the environment. Many of the methods discussed in Chapter 3 along with scoping techniques are well suited for impact identification. During the prediction phase, the project impacts are quantified using standards and by comparison with the findings of other projects. Basically, the predictive function of an EIA is to forecast the nature and extent of the identified environmental impacts, and to estimate the probability that the impacts will occur. The methods described in Chapter 4 are designed for the prediction phase of EIA. During the assessment phase, the importance or significance of impacts is evaluated. The assessment should include consideration of the proposed mitigation measures that have been incorporated into the project design. Overall assessment of significance is based on the net impact assuming the proposed mitigation measures will be effective in minimizing adverse effects.

Assessment of Significance

As part of the International Study on the Effectiveness of Environmental Assessment sponsored by the International Association of Impact Assessment, the Canadian Environmental Assessment Agency, and Australian Environmental Protection Agency, Hilden (1995) prepared a review of the practice of assessing the significance of environmental impacts. He found that significance criteria could be used throughout the different stages in the EIA process, and he concluded that an assessment of significance at different stages in the EIA process based on clear guidelines and criteria could be highly effective in assisting practitioners in assigning significance.

Canter (1996), in his description of the prediction and assessment of impacts on the environment, provides specific guidance on and examples of how to assess significance for: 1) air; 2) surface water; 3) soil and groundwater; 4) noise; 5) biological environment; 6) cultural (architectural, historical and archaeological) environment; 7) visual environment; and 8) socioeconomic environment.

Criteria for Determining Significance

Determination of the significance of the anticipated impacts of proposed projects is a key component of the EIA process. While considerable expert judgement is exercised in the assessment of significance, there are few guidelines that can be followed in performing such an assessment. Definitions of significance and/or significant impacts are now included in EIA guidelines or regulations of many countries and international organizations (Canter and Canty, 1993). Some criteria for determining adverse impacts include:

- loss of rare or endangered species;
- reductions in species diversity;
- loss of critical/productive habitat;
- transformation of natural landscapes;
- toxicity impacts on human health;
- reductions in the capacity of renewable resources to meet the needs of present and future generations;
- loss of current use of lands and resources for traditional purposes by aboriginal persons; and
- foreclosure of future resource use or production.

The significance of adverse impacts depends on magnitude, geographic extent, duration and frequency, irreversibility, ecological context, social context, and economic context. Likelihood is determined by probability of occurrence and scientific uncertainty.

Major questions that need to be asked and answered in assessing significance are (Asian Development Bank, 1994):

1. Will the project create unwarranted losses in precious or irreplaceable biodiversity or other resources?
2. Will the project induce an unwarranted acceleration in the use of scarce resources and favor short-term over long-term economic gains?
3. Will the project adversely affect national energy to an unwarranted degree?
4. Will the project result in unwarranted hazards to endangered species?
5. Will the project tend to intensify undesirable rural-to-urban migration to an unwarranted degree?
6. Will the project tend to increase the income gap between the poor and affluent sectors of the population?

Additional questions that might require consideration are:

7. Will the project contribute to global effects (for example, increasing carbon dioxide, ozone depletion, climate change)?
8. Will the project have effects on national financing (for example, domestic hydropower projects reducing dependence on imported oil)?

The criteria for evaluating a project's environmental issues are listed below. The application of these criteria is somewhat subjective and will require justification in the EIA report. These criteria must be evaluated simultaneously as they are interrelated.

1. **Importance:** The value that is attached to a specific environmental component in its current condition.
2. **Extent of Disturbance:** The area affected by the disturbance which is anticipated to occur from the project.
3. **Duration and Frequency:** The amount of continuous time the disturbance-causing activity will occur and the frequency of occurrence.
4. **Risk:** The probability of an unplanned incident caused by the project that would result in significant adverse impacts.
5. **Reversibility:** The ability of the environmental components to recover their value after a disturbance has occurred.

Assigning Significance

Most EIA reports assign a significance to potential impacts. H.A. Simons Ltd. Consulting Engineers (1992) used a five-fold classification for assessing the impacts of a pulp mill project in Thailand (see details of the classification system in section 3.5). The potential impacts of this project, that is, each combination of project activity and environmental parameter of the impact matrix, were classified into one of five possible categories:

1. No Impact;
2. Significant Impact;
3. Insignificant Impact;
4. Unknown Impact; or
5. Mitigated Impact.

Mitigation Measures

The EIA report should provide a detailed description of recommended mitigation measures. Where appropriate, alternative means of mitigating the impacts should be presented. Each mitigation measure should be described in terms of:

1. the impacts it is designed to mitigate;
2. an assessment of its likely effectiveness in terms of reducing or preventing impacts;
3. its next best alternative;
4. its cost; and
5. the implementation plan for putting the measure into practice.

11.2.6 Alternatives

If the proposed project is expected to cause serious losses of natural environmental components and/or serious health effects, the EIA report should include consideration of both alternative projects or approaches which could achieve the same or equivalent results and the advantages/disadvantages of the alternatives from the point of view of environmental protection. Consideration of multiple alternatives can greatly increase the cost of the EIA report and great care should be undertaken in developing the TOR for this part of the EIA. Ideally, the TOR should spell out the alternative to be evaluated and identify the environmental and social factors upon which it is to be evaluated. In some cases, the TOR may also identify project-related economic factors to take into consideration. A method to be used to evaluate alternatives may be detailed in the TOR. In general, the TOR requirements should include: 1) a summary of adverse impacts of each alternative; 2) the mitigation measures proposed for each alternative; and 3) a discussion with respect to whether the proposed project alternative minimizes the environmental impact and is within acceptable environmental impacts limits.

EIAs address at least two alternatives (with and without the project); they can include multiple alternatives (usually limited to three to five alternatives). A number of factors are usually considered in evaluating alternatives. For example, an assessment of a highway project may include consideration of different routes, different traffic capacities, or various ways of scheduling construction. Depending on the project need, available budget and the TOR, it may be necessary to consider alternate modes of transportation (for example, railroads). In general, alternatives for projects may involve: 1) site selection; 2) design alternatives for a given site; 3) construction, operation, and decommissioning alternatives for a design; 4) project scale; 5) phasing alternatives for large staged projects; and 6) timing alternatives for project construction, operation, and decommissioning (Canter, 1996). The factors considered and degree of scrutiny depends on the time and budget available. Few EIAs consider all alternatives to same degree.

11.2.7 Environmental Monitoring Program

The technical aspects of monitoring the effectiveness of mitigation measures must be described in the environmental monitoring section of the report (Asian Development Bank, 1994). The description of the monitoring program should include:

1. a technical plan which spells out in detail: 1) the methodologies for measurement, 2) the required frequency of measurements, 3) the planned location of measurements, 4) data storage and analysis, 5) reporting schedules, and 6) emergency procedures; and
2. detailed budgets and procurement schedules for the 1) necessary equipment and supplies, and 2) technical and administrative manpower.

11.2.8 Additional Studies

This section contains a description of other major studies undertaken in support of the preparation of the EIA. For example, in early chapters, we presented material on public participation, environmental economics, and environmental risk assessment. If formal studies on these subjects have been undertaken as part of the EIA, these need to be included.

Public Participation

Public participation in the EIA process is a practice that has been adopted by many national governments and is required by international assistance agencies including the multi-lateral development banks. For these governments and agencies, the completed EIA must include documentation on the affected people's responses to the project. The determination of public response to a project may include an initial educational campaign using

mass media or public forums to describe the project, followed by a structured poll or survey of people's attitudes. The extent of public education about the project, and the level of public participation required in the EIA, depend upon the magnitude of the impact, the size of the affected population and the requirements of the approving authority (government and/or lending agency). The TOR for an EIA requiring public participation must describe how the issue will be addressed, including the media to be used and the fraction of the population contacted by the educational program and survey.

This section of the EIA report should include:

- summary issues identified by stakeholders;
- the TOR for the EIA public meetings and participation;
- list of persons receiving this and previous draft reports;
- compliance with coordination and regulatory requirements;
- public hearings, press releases, notifications; and
- a summary of the principal community/interest group concerns.

Environmental Economics

Economic analysis of environmental impacts provides one means of quantifying the severity of the impacts. The net environmental benefit or loss provided by a project can be evaluated if monetary values may be assigned to environmental and social components. Project options may be compared by their net economic impact. Economic analysis may also be used to develop equitable impact mitigation measures. For example, if a project is anticipated to cause negative impacts to a component such as fisheries, resulting in quantifiable loss of income to local fishermen and subsequent losses of income to fish marketers or processors, an appropriate mitigation measure may be the development of aquaculture at a scale that would at least offset the economic losses from the original fishery.

Economic analysis of the projects should include the present value of all benefits and all costs compared in the form of internal rate return on investment, and net present value. Cost-effectiveness of mitigating measures may have to be presented separately.

The net of economic cost and benefit impacts may be totaled by component, by implementation phase of the project, and for the project as a whole. If there are several project alternatives being considered, the net economic cost or benefit may be an important deciding factor in choosing the appropriate alternative. If there are no means of quantifying the value of a component, the importance of the component must be described in such a way that the severity of impact may be evaluated.

If a cost-benefit analysis has been undertaken, the EIA report should spell out the factors taken into account and define the key assumptions. These assumptions include: 1) setting the discount rate if applicable; and 2) specifying any constraints on costs.

Environmental Risk Assessment

An environmental risk assessment may be a necessary part of the EIA if there is considerable uncertainty about the likelihood or the magnitude of environmental impacts. The data collected during basic EIA studies provides much of the information needed for explicitly dealing with the uncertainties relating to environment impacts. There are two major categories of risk: 1) those to human health, and 2) those to ecosystem integrity. The primary goal of environmental risk assessment is to evaluate risks, their monetary costs, the costs of emergency response and/or avoidance of risk.

Environmental risk assessment studies require a high degree of scientific and mathematical rigor and may be costly if not properly planned.

11.2.9 Environmental Management Plan and Environmental Management Office

The environmental management plan (EMP) is needed to ensure that the mitigation measures specified in the EIA will actually be complied with when the project is approved for implementation (Asian Development Bank, 1994). The administration of an EMP may require the establishment of an Environmental Management Office to house monitoring staff after the closure of the EIA office. Funding to cover the costs of establishing and operating an appropriate Environmental Management Office to administer the EMP should be guaranteed in the basic project budget.

The EIA report should include a description of the administrative aspects of ensuring that mitigative measures are implemented and their effectiveness monitored after approval of the EIA. These details are the subject of the environmental management plan. They include: 1) checking the final design documents to ensure they incorporate the management measures; 2) monitoring the construction and interacting with the contractor to ensure an understanding of compliance with the constraints involved with the environmental protection or mitigation measures during construction; and 3) following construction, continued monitoring during project operations to ensure that the project meets its environmental goals, and to initiate needed modifications to the project design or operations for this purpose.

11.2.10 Summary and Conclusion

The EIA report should present the conclusions of the study, including: a) the overall net gains which justify implementation of the project; b) explanation of how adverse effects have been mitigated; c) explanation of use or destruction of any irreplaceable components; and d) provisions for follow-up surveillance and monitoring. Simple visual presentations of the type and magnitude of the impacts may aid the decision-maker.

11.2.11 Annexes

A number of annexes are normally included as part of the EIA report. These annexes provide important detailed information that is not appropriate for presentation in the main body of the EIA report. These annexes may include:

- terms of reference for the EIA;
- abstracts or summaries of relevant background documents;
- tabular and graphical summaries of data;
- a list of contacts and meetings; and
- a list of data sources.

11.3 Managing the Preparation of the EIA

11.3.1 The EIA Work Plan

The EIA work plan is the management outline of the EIA. It breaks the significant environmental issues into tasks, assigns the tasks to EIA team members, describes the qualifications required of each team member, schedules the completion of tasks, and budgets each task according to its schedule. Each of the functions of the work plan is essential for the proper execution of the EIA process. The work plan is as important as the technical components for the completion of a successful EIA report (Asian Development Bank, 1994).

Typical work plan tasks are listed in Table 11-2. The tasks relate primarily to the performance of items contained in the project description, description of the environment, anticipated environmental impacts and mitigation measures, environmental monitoring plan and environmental management plan chapters of the suggested EIA format. The scheduling of the interim, draft final and final reports also is critical. The preparation of the executive summary must also be planned, ideally as a distinct plan item.

Table 11-2: Listing of typical work plan tasks (*source:* Asian Development Bank, 1994).

EIA Work Plan	
1	Work Plan Tasks to be Specified in Terms of Reference
1.1	Assemble, review, and evaluate background information
1.2	Confirm the proper delineation of the study area
1.3	Develop environmental base maps for the study area
1.4	Quantify baseline component data for each significant environmental issue
1.5	Quantify impacts for significant environmental issues
1.6	Develop feasible mitigation measures
1.7	Collaborate with the feasibility study team on mitigation measures
1.8	Carry out all related tasks described in the EIA format
1.9	Prepare project reports (interim, draft, and final)
1.10	Review report submittals with government regulators
2	Task Scheduling: Each task must be scheduled using a critical path defining interrelated or dependent action items.
3	Budget: Each task must be budgeted in time and monetary units
4	Staff Requirements: A list of staff and their qualifications required to complete the tasks must be included in the work plan.

EIA Team Personnel

Most EIA reports are prepared by a team of environmental specialists drawn from various disciplines. In general, each team should have at least one qualified environmental engineer, social scientist, biologist, and physical scientist. All teams should be directed by an EIA Team Leader who has a good understanding of the administrative, procedural, and technical requirements of the country's EIA process. Experience with the type of development and its associated environmental impacts is also required.

The EIA team must include personnel with the managerial and technical expertise required to perform the work required by the EIA. The management skills are provided by the Project Manager and Deputy Manager, with planning and technical assistance provided by the Project Planner or Technical Analyst. Ideally the management team will have an extensive background in EIA work, but if this expertise is lacking in the management staff it can be provided by hiring an EIA expert. Project delays due to incomplete EIAs can be expensive, and have the potential to jeopardize funding from an international assistance agency. Staffing decisions should be based on the need to provide the skills required to complete the report. Table 11-3 deals with the staffing requirements of the EIA team.

Selection of the environmental specialists is based on the natural and human resources in the study area which may be affected by the project. As an example, a dam and flood control project may require the skills of a

water resources engineer or hydrologist, an aquatic ecologist or fisheries specialist, an agricultural specialist, a socioeconomist, and an expert in resettlement. The personnel selection will be different for each project based on the components in the study area and the type and magnitude of project.

Task Schedule

EIA tasks must be scheduled so the subject items can be completed within the overall time frame of the EIA and feasibility study. The general concept of task scheduling represented in Figure 11-1 is complicated by the interlinking of tasks. For example, the models in Task 3 may require the data assembled during Task 2 as input prior to its inception. Often the work of one environmental specialist is dependent upon information from another specialist. For example, to evaluate fisheries impacts in a lake which is enlarged and deepened for water supply purposes, the fisheries specialist will need information regarding water quality impacts, provided by the water resource specialist or hydrologist. If the fisheries specialist cannot begin evaluations until the hydrologist has completed a task, this must be taken into account in overall planning. This interdependency of tasks is a result of the interconnected nature of components and requires careful task planning.

The EIA Budget

The EIA budget is a natural outgrowth of the task scheduling and staffing processes. The budget should be tied to the completion of tasks such as submittal and acceptance of interim, draft final, and final reports. For tasks which extend beyond the time frame of the EIA process (for example, the EMP), sufficient budget and payment scheduling must be provided.

Table 11-3: EIA team staff requirements (*source:* Asian Development Bank, 1994).

1. Project Manager
Qualifications
√ Extensive EIA project management experience
√ Experience on EIA projects of similar magnitude
√ Good communication and organization skills
√ History of completing projects on time and within budget
√ Prior EIA expert experience, if possible

2. Deputy Project Manager
Qualifications
√ Project management experience
√ Experience in the local or regional area
√ Familiarity with the local situation
√ Excellent written and oral communication skills
√ EIA experience or knowledge

3. Project Planner / Technical Analyst
Qualifications
√ Knowledge of the project type – design, planning, and operations
√ Understanding of EIA process and objectives
√ Extensive background in project planning

4. Environmental Specialists
May include
√ Physical scientists
√ Biological and ecological scientists
√ Social scientists
√ Economists
√ Engineers
√ Other Specialists

5. EIA Expert

Detailed Task Assignment	Month 1	Month 2	Month 3	Month 4	Month 5
1. Waterlogging and soil salinity	●				●
2. Field data: collate, fill gaps, organize	■	■			
3. Models: review, verify, reconcile		■		■	
4. Drainage: Develop final criteria, perform design			■	■	
5. Compile report			■	■	
6. Land acquisition and resettlement	●				●
7. Project proponent document: review and verify	■		■		
8. Environmental impact		■	■	■	
9. Social impact and equity			■	■	
10. Public participation		■		■	
11. Monitoring and evaluation				■	■

Figure 11-1: Work plan task schedule example (*source:* Asian Development Bank, 1994).

11.4 References and Further Reading

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