

# **Preparation of Plans and Cost Estimates and Tender Documents**

## **1. INTRODUCTION**

Engineering planning, design and construction of dams, barrages, pumping stations, etc., is normally carried out with a high degree of efficiency. Sometimes, however, the smaller structures, secondary channels, etc., used for aquaculture projects are badly made or omitted entirely from engineering plans. In developing countries engineers have frequently neglected these minor works, particularly those required at the farm level. To contractors they do not mean much profit and they are dispersed and difficult to supervise.

It has been increasingly recognized that one of the major difficulties encountered in the implementation of aquaculture development programmes in developing countries is proper project preparation. Inadequate and poor preparation of projects has often caused the final construction cost of the project to be much higher than estimated. The purpose of this lecture is to present in simple form the various steps required in preparation of plans, estimates and tender documents for projects and to describe some of the planning procedures that are used in these processes.

Project preparation is usually considered to include all those activities short of a final decision to implement. This process includes the following stages:

- (i) Identification of the project. At this stage, the production target based on a marketing study, the species to be cultured and the systems of culture to be adopted, the availability of a large enough drainable and accessible land area free from flooding and having adequate soil conditions as well as adequate water source, must all be investigated and determined.
- (ii) Preparation of outline or feasibility plan of the project.
- (iii) Preparation of detailed plan of the project.
- (iv) Preparation of estimates of the project.
- (v) Preparation of tender documents of the project.

During each stage, a number of activities and analyses must be carried out and the findings used to meet the requirements of the subsequent phase, until the project is finally completed.

## **2. OUTLINE OR FEASIBILITY PLAN**

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## [2.1 Purpose of Outline Plan](#)

## [2.2 Procedures for Preparation of Outline Plan](#)

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### **2.1 Purpose of Outline Plan**

The purpose of an outline plan is to confirm that the proposed project can be economically developed on the selected site, and to investigate and provide all data, calculations and outline plans based on the different investigations required for the project approval and detailed planning.

### **2.2 Procedures for Preparation of Outline Plan**

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#### [2.2.1 Site selection](#)

#### [2.2.2 Collection of maps and data](#)

#### [2.2.3 Outline plan](#)

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#### ***2.2.1 Site selection***

In aquaculture project operations, site selection is of paramount importance. Success of the project depends to a large extent on the proper selection of the site. There are both ecological and technological as well as economic and social considerations involved in site selection. Factors to be considered in site selection are described in more detail in Chapter 1 on considerations in the selection of sites for aquaculture (Pillay, 1977).

#### ***2.2.2 Collection of maps and data***

The following maps and data about the site should be gathered to facilitate the preliminary investigations and calculations:

##### **(a) Maps**

- contoured sheet of map at a scale of 1:25 000 to 1:50 000. This can be used for preparation of a project location map, to determine the water catchment area and to serve as a source of information on road connections, etc.;
- land map showing boundaries of properties with different ownerships according to the official register of owners;
- soil or geological map showing the topsoil or subsoil encountered at the site;

- water resources development map. This will help in determining the water source of the project by indicating the possibilities of water supply and drainage, as well as by showing the depth of the expected water tables and yield capacities of any aquifers; climatological map showing the meteorological stations nearest to the site and the monthly mean values of temperature and rainfall;

- other development map, if any, regarding the proposed site.

(b) Meteorological data

- mean monthly temperature;
- mean monthly rainfall;
- mean monthly evaporation;
- mean monthly humidity;
- mean monthly sunshine;
- mean monthly wind speed and direction.

(c) Hydrological data

- data for discharge, yield, floods and water elevations of existing water sources (rivers, irrigation channels, reservoirs, springs, etc.);
- restriction for water supply to the fish farm (for example, periods of the maintenance works in the irrigation channel).

### ***2.2.3 Outline plan***

An outline plan is generally used as a basis for approval and financing of a project. This should prove the technical feasibility of the project. The production calculations concerned as well as the design should be in sufficient detail so that a reliable cost estimate including both the annual operational and production cost can be established.

The principal parts of the outline plan consist of the following;

(i) Report

This should contain the most important information on the project proposal including a description of the site, soil characteristics determined by the reconnaissance soil survey, source of water and the results of the water analysis, meteorological features used for planning, operation plan with the necessary production calculations, planning considerations, arrangement of the layout plan for the ponds and the location of the hatchery and the other buildings with the approach road to the project, arrangement for water supply and drainage of the ponds and the hatchery, the pond facilities, abstract of costs for capital, operational and production costs, economic analysis for benefits, and the proposed construction

programme. Additionally, all the statements obtained and required for approval and implementation of the project must be presented usually in a list of annexures to the report.

(ii) General location map

This is generally an unsealed map showing the location of the project.

(iii) Plane table map

This has a scale of 1:2000 to 1:5000 depending the size of the project, showing the boundary lines and the proposed size of the project, the locations of the soil test pits with their elevations, the rough contour lines and water source and drainage possibilities.

(iv) Outline layout plan

This plan to a scale of 1:1000 to 1:5000 should include the arrangements of the ponds, the water supply and drainage systems as well as the location of the hatchery and other buildings including the proposed approach road and the power and telephone lines.

(v) Outline cross-sections of dikes and channels

All the typical cross-sections of the dikes and channels showing their measurements and slopes required for the cost estimate must be provided.

(vi) List of proposed buildings and equipment

A list of the proposed buildings with their plinth areas and the equipment needed for running the project should be given for the cost estimate.

(vii) Soil and water test results

Soil test laboratory results of the samples taken from the test pits for engineering and production purposes should be provided in tables which are used for planning dikes, etc. (Buring, 1979).

(viii) Cost estimate

Estimates of base (civil works) cost must be calculated using unit rates judged to be applicable for the region of the project site and major quantities of each item shall be calculated from the drawings in just sufficient detail to serve the needs of proper estimating. Building costs should be estimated on plinth area. Earthwork costs are based as far as possible on a balance between cutting and filling. Estimates of cost

are given for electricity supply, engineering (design of detailed plan and supervision of construction), equipment, land procurement and physical contingencies.

Lastly, the operational costs and the production cost are provided under separate heads.

(ix) Implementation schedule

Based on the results of the reconnaissance investigations and quantity calculations a bar-chart for the various activities required to complete the detailed plans and tender documents and procure the land for construction should be prepared.

### **3. DETAILED PLAN**

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#### [3.1 Reviewing Outline Plan](#)

#### [3.2 Detailed Planning](#)

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#### **3.1 Reviewing Outline Plan**

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After having approved the outline plan of the project, a review should be made of all data available and, if this is insufficient, action should be taken to rectify the deficiency. Any modifications of the proposed operating schedule and related water management and water requirement calculations for both the fish ponds and the hatchery have to be completed prior to commencing detailed planning.