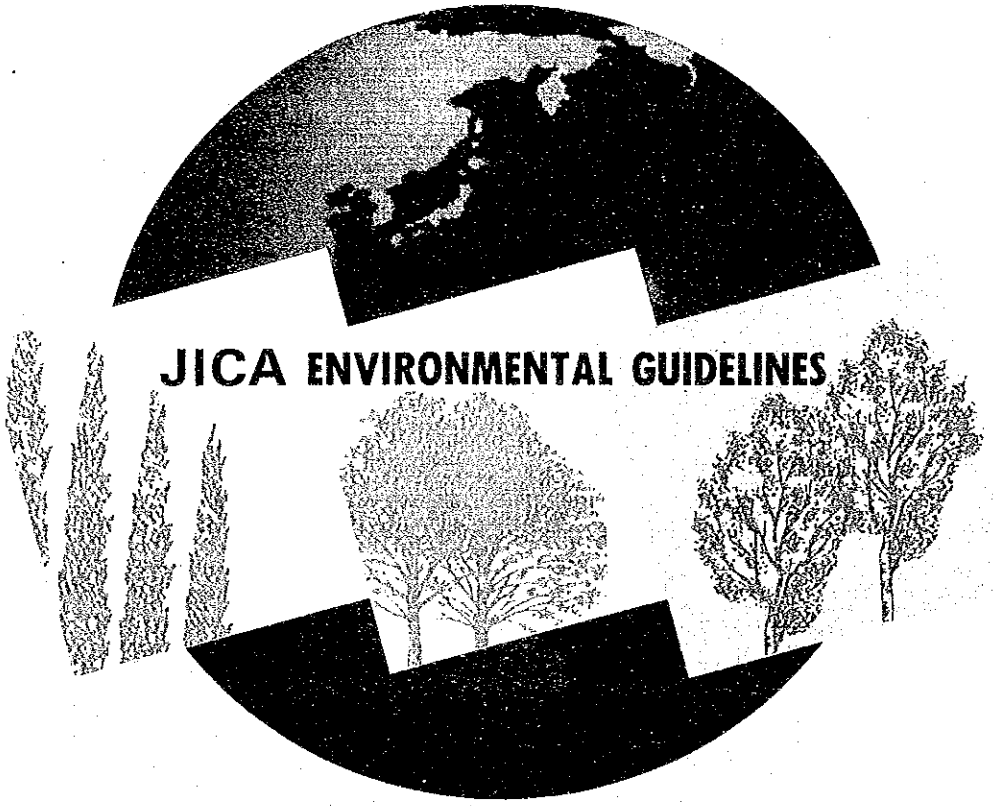
ENVIRONMENTAL GUIDELINES FOR INFRASTRUCTURE PROJECTS

IX WATER SUPPLY



SEPTEMBER 1992

JAPAN INTERNATIONAL COOPERATION AGENCY

ENVIRONMENTAL GUIDELINES FOR INFRASTRUCTURE PROJECTS

IX WATER SUPPLY

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JAPAN INTERNATIONAL COOPERATION AGENCY

Environmental Guidelines
for Infrastructure Projects

"Environmental Guidelines for Infrastructure Projects" was prepared to enable preparatory study members to conduct screening and scoping of environmental impact studies effectively and efficiently while maintaining a dialogue with their counterparts and officials concerned in the host countries for the purpose of predicting possible environmental problems caused by the infrastructure projects and to incorporate adequate environmental consideration into the projects.

The guidelines consist of the thirteen sectors listed below. This volume deals with environmental consideration for "Water Supply".

Sector I	Ports and Harbors
Sector II	Airports
Sector III	Roads
Sector IV	Railways
Sector V	River and Erosion Control
Sector VI	Solid Waste Management
Sector VII	Sewerage
Sector VIII	Groundwater Development
Sector IX	Water Supply
Sector X	Regional Development
Sector XI	Tourism Development
Sector XII	Transportation Development
Sector XIII	Urban Transportation Development

Note: The guidelines for dam construction were published in February 1990 as a separate volume.

PREFACE

In order to support sustainable development in developing countries, it is of great importance to give sufficient consideration to the environment in the implementation of development programs.

The Japan International Cooperation Agency (JICA) has continually placed special emphasis on environmental technical cooperation and has taken into account pertinent environmental consideration in development studies and implementation of projects.

Based on the recognition of the importance of environmental issues, JICA has prepared the guidelines concerning screening and scoping methods of environmental impact studies for the purpose of contributing to the planning of infrastructure development projects with sufficient environmental consideration.

The guidelines are to be used by JICA study team members when conducting preparatory studies of social and economic infrastructure development projects.

JICA committed the preparation of the guidelines to the International Engineering Consultants Association and organized an advisory group headed by Mr. Michio Hashimoto, president of the Overseas Environment Cooperation Center. Designated advisors of the group were from the Ministry of Health and Welfare, the Ministry of Transportation, the Ministry of Construction, and the Environment Agency. Also, the Ministry of Foreign Affairs provided sound and useful advice to the advisory group.

To all of these organizations and the personnel involved, I wish to acknowledge their much appreciated support.

September 1992

Akira Kasai
Managing Director
Institute for International Cooperation
Japan International Cooperation Agency

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TERMINOLOGY

Environmental Consideration

To study whether a development project will have serious environmental impacts on the project site and its surrounding areas, analyze the study results, and establish necessary measures for avoiding or alleviating any adverse environmental impacts.

Environmental Impact

The undesirable effect on the existing overall conditions of air, water, soil, and living things, assets, social information and circulation of goods, which are related to human life, or on their combined structures.

Preliminary Environmental Survey

The environmental survey conducted during the preparatory study stage of a development project. This includes screening and scoping of the environmental impacts of a particular project. This survey is regarded as a component of the initial environmental examination.

Initial Environmental Examination (IEE)

The examination undertaken at the outset of the development project planning stage to determine the environmental impacts that may be created by the particular project based on existing information and data, easily accessible information relating to the particular project, and comments and judgements of specialists who are familiar with the environmental impacts of past similar projects. This examination should be carried out in a short period at a low cost.

IEE has the following two objectives : 1) to evaluate whether EIA is necessary for the project and, if so, to define its contents; 2) to examine, from an environmental viewpoint, the measures for alleviating the effects of the project which requires environmental consideration but not a full-scale environmental impact assessment.

Environmental Impact Assessment (EIA)

To study, forecast, and evaluate the environmental impacts of a development project, which is judged a detailed environmental examination, and to propose the establishment of an environmental protection standard and measures for avoiding or alleviating environmental impacts.

Environmental Management Plan

To formulate an environmental monitoring system or methods based on the environmental protection standard to monitor the project's environmental impacts on surrounding areas, aiming at adequately protecting the environment both during and after project implementation.

Screening

To evaluate whether or not it will be necessary to include an environmental consideration in a development project. Screening conducted in Japan before the preparatory study is called preliminary screening.

Scoping

To identify the important environmental impacts among those which can be caused by the implementation of a development plan or development project, and to define the study items of the IEE or EIA based on the findings.

Project Description (PD)

The major contents and features of the project. It includes the background of the project (including its upper level plan), the objectives, the executing agency, the beneficiary population, and the project scale.

Site Description (SD)

The compact description of the project site which includes the natural and social environmental conditions in the areas that may be affected by the project.

Preparatory Study (PS)

To examine the contents of the full-scale study of a requested project and to discuss the scope of work (S/W) of the full-scale study with the host country. This study is conducted at the preparatory stage of the project prior to conducting the full-scale study including the master plan and the feasibility study.

Full-scale Study

The study generally conducted continuously after the preparatory study by carrying out field surveys to prepare the study report of a development project. The study report, with its conclusions and recommendations for project realization or project implementation, is submitted to the government of the host country. The full-scale study includes the master plan study, feasibility study, detailed design study, and map preparation.

Master Plan Study (M/P)

The study for preparing the basic plans for various development projects. In general, it is sectoral, or for each project.

Feasibility Study (F/S)

The study for evaluating the possibility, adequacy, and investment efficiency of a project. In general, it attempts to objectively verify the feasibility of a project from social, technical, economic, and financial viewpoints.

F/S is the core of JICA's development studies. The study report provides the government of the host country with the information needed to decide whether or not to implement the project. It is also used by international financial institutions to evaluate the appropriateness of financing the project once the government submits its loan request.

ABBREVIATIONS

TOR (T/R) :	Terms of Reference
S/W :	Scope of Work
M/M :	Minutes of Meeting
Q/N :	Questionnaire
IC/R :	Inception Report
DF/R :	Draft Final Report
F/R :	Final Report
OECD :	Organization for Economic Cooperation and Development
DAC :	Development Assistance Committee

Use of the Guidelines

The guidelines were prepared to provide personnel involved in JICA's preparatory study (including the preparatory work in Japan) with information that can be used to prepare the preparatory study report or compile project specifications while carrying out field surveys, hearings, and holding discussions with the officials of the host country during a short-time visit.

The use of the guidelines is shown in Figure i and explained herewith.

«Preparatory work in Japan»

1) Examination of the request

After examining the request, follow the procedure given below, unless it is judged a soft-type infrastructure project, which is supposed to have no serious environmental impacts, such as the preparation of topographical maps or a telecommunication project.

2) Preliminary screening

Based on the request, collect and analyze the data and information and prepare the PD and SD in Japan, and conduct the preliminary screening by using them.

If any serious environmental impacts are suspected, the preparatory study team should include an environmental specialist.

Prepare questionnaires to the recipient government concerned and the draft of S/W including environment related items.

«Work in the host country»

3) Examination of the country's guidelines

At first, investigate the country's IEE/EIA implementing structure, the laws, and any existing guidelines (hereinafter referred to as the country's EIA guidelines). Then, it should be confirmed whether or not the project is subjected to IEE/EIA.

Case 1: If the contents of the country's EIA guidelines are sufficient, follow their guidelines.

Case 2: If the contents of the country's EIA guidelines are insufficient, follow their guidelines and add JICA's screening and scoping items.

Case 3: If the country has no EIA guidelines, follow JICA's guidelines.

4) Screening

Reexamine the PD, SD, and the contents of screening prepared in Japan, based on the findings of the field surveys and data analysis. If it is evaluated that an IEE or EIA is required for the project, scoping should then be undertaken.

5) Scoping

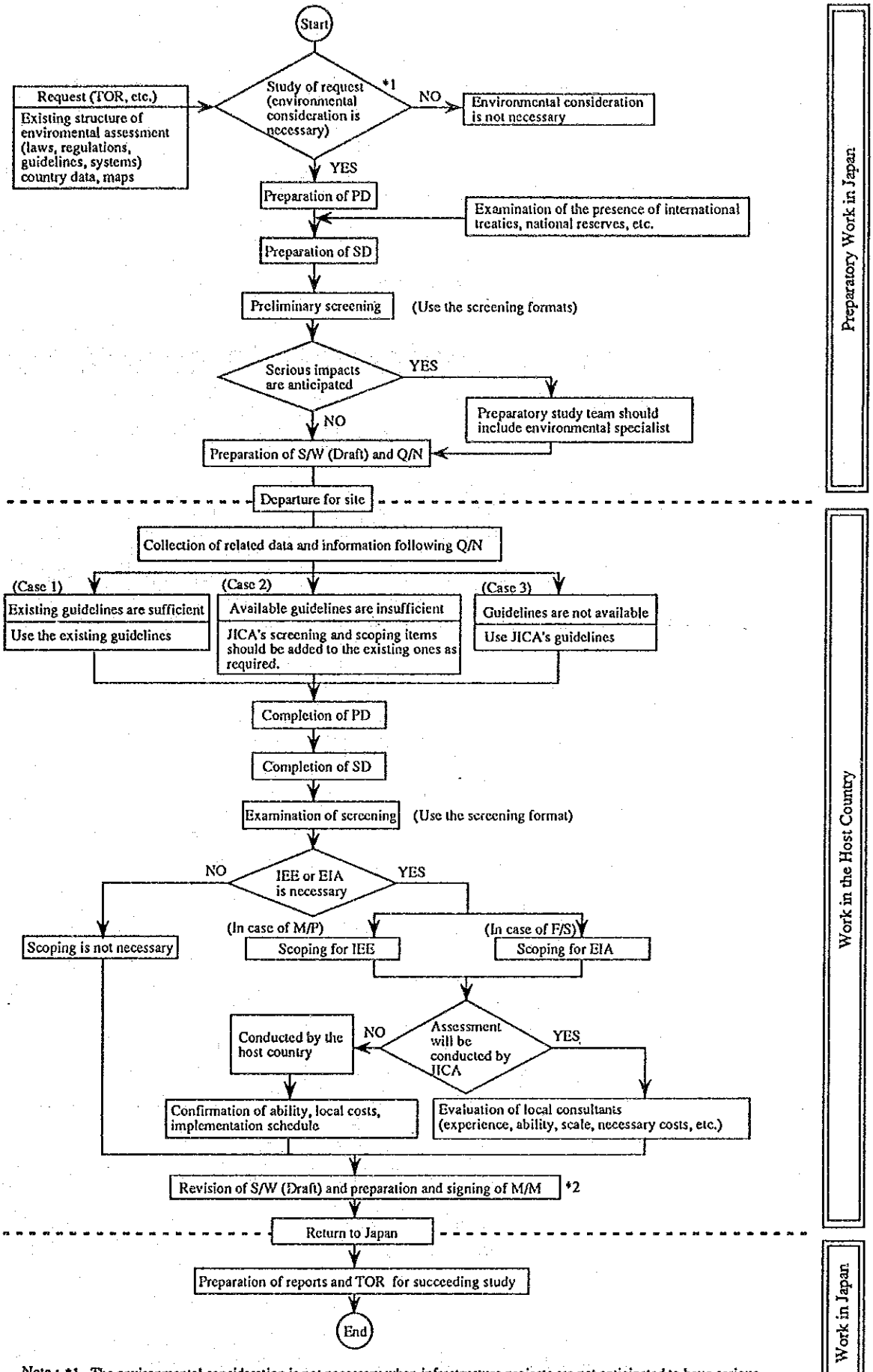
Evaluate the magnitude of impact on each environmental item, using the checklist method, to specify the items that are to be studied in IEE for M/P or EIA for F/S. In this process, making use of the explanation of items in the guidelines, try to grasp the features of possible environmental impacts. The results should be noted in the scope of work (S/W) and the minutes of meeting (M/M). When the environmental factors which may have serious impacts are not identified, it is necessary to mention in the M/M that such factors would be clarified through the full-scale study.

«Work in Japan»

6) Report preparation

Based on the above-mentioned results, compile a preparatory study report which makes it possible to carry out the appropriate IEE or EIA in the full-scale study. TOR for the succeeding study should reflect the contents of the report.

Figure i Procedure of Environmental Consideration



Note : *1. The environmental consideration is not necessary when infrastructure projects are not anticipated to have serious impacts, such as preparation of topographic maps and telecommunication projects, etc.

*2. When the environmental factors that may have serious impact are not identified, it is necesary to mention in the M/M that such items would be clarified in the full-scale study.

CHAPTER 1

OUTLINE OF ENVIRONMENTAL CONSIDERATION

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1.1 Basic Concept

JICA's aid study report "Sectoral Study for Development Assistance-Environment" published in 1988 defined that "Environmental Consideration" is to study whether a development project will have significant impacts on the environment or not, to assess the impacts and to incorporate measures to prevent or alleviate their effects, if necessary.

The premise of this definition is the understanding that development aid should not end with a one-time involvement but should be continuous and sustainable. Thus, it is believed that environmental consideration is prerequisite for securing the sustainability of the development.

For the implementation of development projects in developing countries with the cooperation of the Japanese government, a careful environmental consideration should be carried out from the early stages of project planning with a long-term perspective in order to accomplish a well-balanced development.

As such development projects are implemented in the host countries, based on the decision making process of these countries, it is necessary to conform to their laws, rules and regulations related to environmental consideration.

In some developing countries, however, such laws, rules and regulations do not exist, while in others they are not properly enforced. The policies and structures for environmental consideration vary from one country to another.

Therefore, when undertaking the environmental consideration, it is necessary to take into account of the developing country's policies and structures and to understand the country's awareness of environmental problems, while holding sufficient discussions with the people concerned in a flexible manner.

With regard to environmental consideration, JICA's basic principles are to promote sustainable development aimed at improving the living standard of the residents, and harmonize the development with a desirable environment based on the country's willingness.

If environmental consideration is not sufficiently undertaken for implementing a development project and, if careful attention is not paid to the management of the surrounding natural resources, the base of the development might be jeopardized and the development might be halted. The base of the people's livelihood or even their subsistence can be also threatened. It is necessary, therefore, to try to ensure the sustainable development by harmonizing the development project with natural resources and the base of livelihood and subsistence of the residents in the area.

The guidelines describe screening and scoping procedures at the preparatory study stage to deal with the negative impacts of a development project on the environment of the project site and its surrounding area.

The process of environmental consideration in a project cycle is shown in Figure 1-1.

A development project begins with its finding and formulation. At each stage of the cycle, a series of environmental considerations, such as a preliminary environmental survey, an initial environmental examination (IEE), environmental impact assessment (EIA), and the design of environmental protection measures take place. Environmental monitoring is then conducted with project implementation. Through this process, sustainable development can be attained.

Definition of the environmental management plan mentioned here is limited to the monitoring system which handles the environmental impacts caused by the project.

Tables 1-1 and 1-2 illustrate the time flows corresponding to the project implementation stages and the environmental consideration stages. The flows start with an environmental survey, followed by the EIA, proceed to the examination of environmental conservation measures, and then to the monitoring stage.

Figure 1-1. Flow of Environmental Considerations in Project Cycle

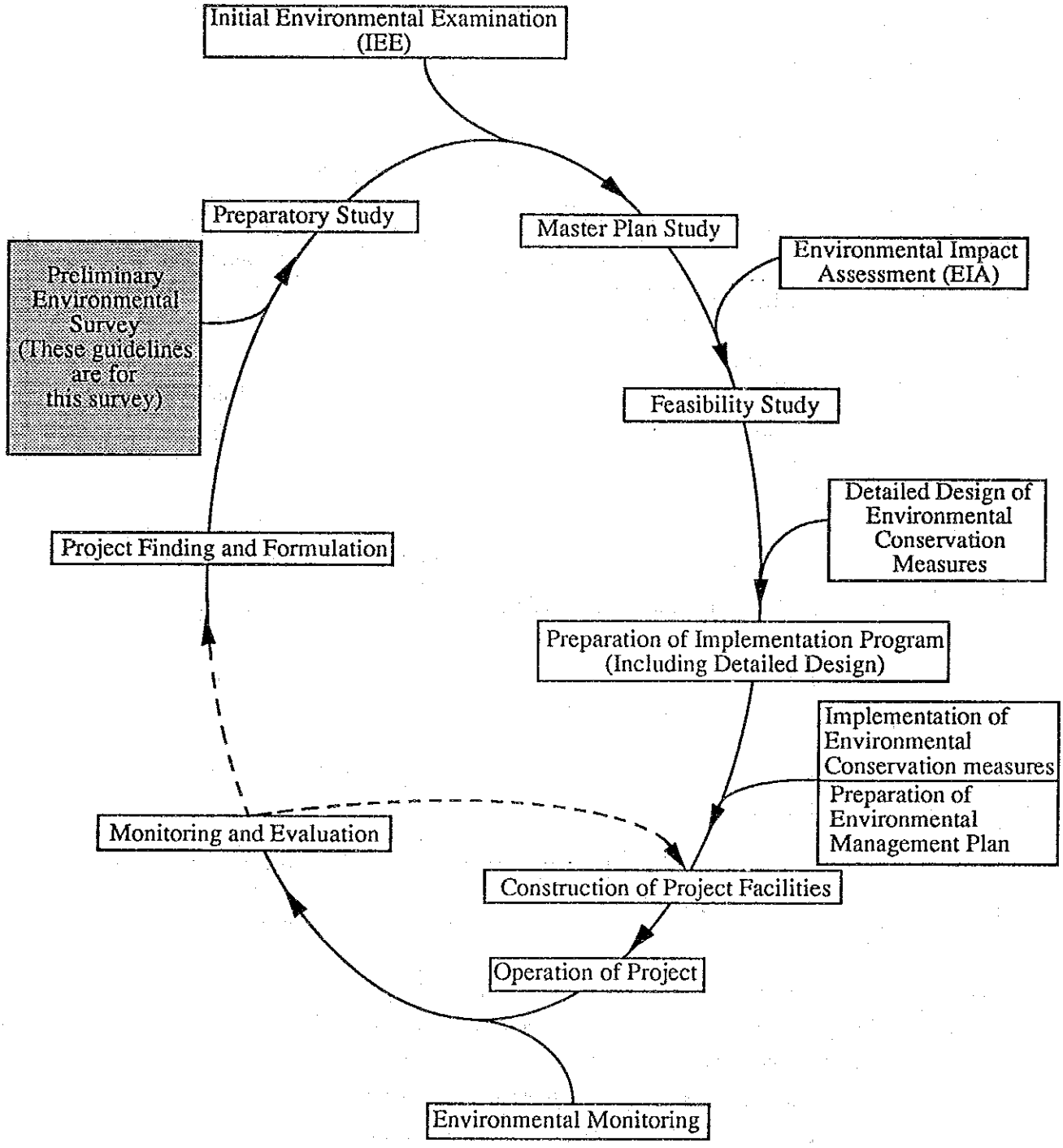


Table 1-1 Project Implementation Stages and Corresponding Environmental Consideration Stages

<table>
<tr><td colspan="4">Project Implementation Stages</td><td>Environmental Consideration Stages</td></tr>
<tr><td rowspan="3">Implementation by JICA</td><td colspan="3">Preparatory Study</td><td>Preliminary Environmental Survey</td></tr>
<tr><td rowspan="2">Full-scale Study</td><td>Master Plan Study</td><td rowspan="2">Feasibility Study</td><td>Initial Environmental Examination (IEE)</td></tr>
<tr><td>Feasibility Study</td><td>Environmental Impact Assessment (EIA)</td></tr>
<tr><td rowspan="3">Implementation by Executing Agency</td><td colspan="3">Preparation of Project Implementation Plan (Including Detailed Design)</td><td>Examination of Environmental Conservation Measures</td></tr>
<tr><td colspan="3">Project Construction</td><td>Implementation of Environmental Conservation Measures</td></tr>
<tr><td colspan="3">Project Facility Operation</td><td>Environmental Monitoring</td></tr>
</table>

Notes: 1. This table does not indicate strict correspondence.
2. Some projects do not require IEE or EIA.
3. Preparation of the project implementation plan includes the detailed design of the environmental conservation facilities and their construction.
4. The item enclosed in a separate box indicates the major boundary for the guidelines.

Table-1.2 Incorporation of Environmental Consideration into JICA's Development Studies

Study Flow		Contents and Timing Investigation	Examination Items
Project Finding	Request/Project Finding ↓ Acceptance of TOR ↓ Study on TOR	(Preliminary Screening) Judgment on necessity of IEE or EIA ↓ (Screening) Review of preliminary screening (Scoping) Decision of important items for IEE or EIA Decision of work boundaries	The project judged to cause serious environmental impact shall be rejected.
Preparatory Study	Preparatory Study ↓ Discussion and Agreement on S/W ↓ Preparation of Preparatory Study Report		(Preparation of M/M, S/W) Examine the description of agreed items on screening and scoping. (Reporting) Clarification of background and agreed items.
Selection of Consultants	Preparation of Project Specification ↓ Selection of Consultants		(Project Specification) Define the boundary and work volume of IEE or EIA to be conducted by consultants (Selection of consultants) Evaluate the appropriateness of the proposal for the project specification.
Full-scale Study	Preparation of and Discussion on IC/R ↓ Implementation of IEE or EIA ↓ Explanation of and Discussion on DF/R ↓ Preparation of F/R		(IEE or EIA) Discussion and decision on IEE/EIA items and methods based on the results of scoping. (Supervision of survey) Check whether IEE or EIA is conducted properly. (Final reporting) Clarification of IEE or EIA results and recommendations.

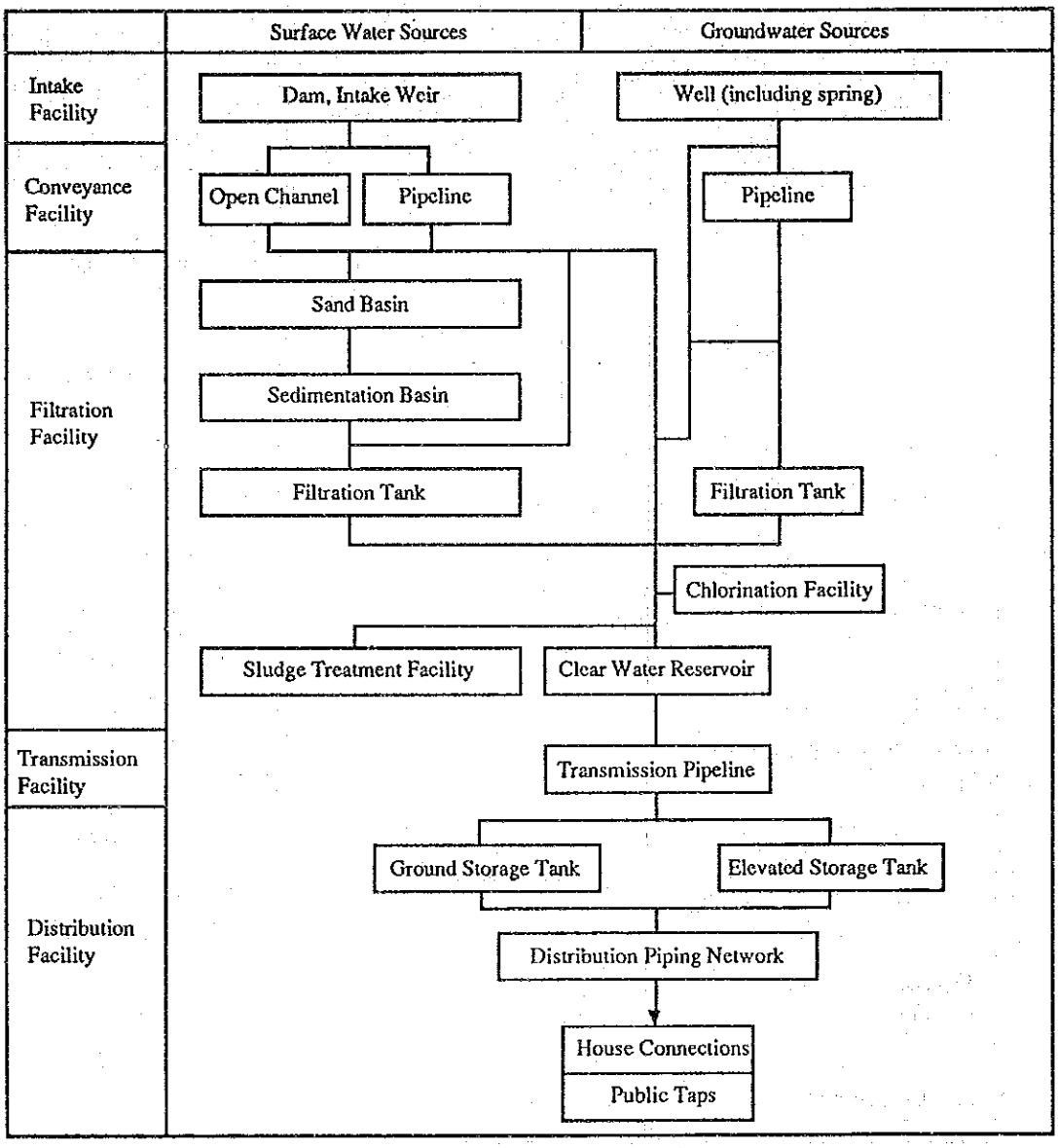
Source: JICA, "Sectoral Study for Development Assistance-Environment", 1988.
Note: The shaded part is mainly covered by the guidelines.

1.2 Environmental Consideration for Water Supply Projects

1.2.1 Definition of Water Supply Projects in the Guidelines

In the guidelines, a water supply project is a plan for constructing a series of facilities to intake, process and distribute water and to manage these facilities. The idea of the plan and it's constituent facilities are shown in Fig. 1.2.

Fig. 1-2 Outline of Water Supply Projects and Facility's Component



1.2.2 Typical Possible Impacts and the Points of Environmental Consideration

A water supply project aims at improving the public health and the living environment. It has strong positive impacts on the livelihoods of the people.

Even if a water supply project was inappropriate, the environmental impacts caused by the plan will be moderate, in general, compared with other infrastructure development projects.

Following are the typical environmental impacts that may be caused by a water supply project; they should be included in environmental consideration:

Water Rights and Fishing Rights:

Excessive water intake from rivers and lakes may change river flow conditions. In particular, the shortage of a maintenance flow will decrease the river functions. The lowering of lake water levels will cause difficulty in obtaining irrigation water, reduce the size of fish catch, discourage tourism, and also will affect the water supply, the fishery industry, and the lives of inhabitants.

In environmental consideration, attention should be paid to the livelihood of area residents and the water and fishing rights that are related to industries.

Hydrological Situation:

Excessive water intake from rivers and lakes will result in the decrease of the discharge and transportation rate and, as a result, the water quality will deteriorate. Lake water levels will also recede and the water quality will deteriorate.

As a result of providing a water supply system whereby the sewer is discharged into a lake, the level of the lake will rise and possibly cause flooding. Also, the water quality of the lake will deteriorate.

In an area where there is no sewerage system, sewage may flow into the rivers and lakes causing water pollution.

Water Pollution:

The environmental impacts that may be caused by water supply projects are not as serious as those caused by other development projects. However, as in the case of a large filtration plant, when its drainage and sludge flows into a river or lake, water pollution is highly possible.

In environmental consideration, attention should be paid to raw water qualities and the types of chemicals used for chemical purification.

The environmental impacts caused by a water supply project may propagate to the fisheries, water rights, the ecosystem, and the landscape. When undertaking environmental consideration, industries, livelihoods and the natural environment in the project area should be taken into consideration.

CHAPTER 2

PROJECT DESCRIPTION AND SITE DESCRIPTION

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PROJECT DESCRIPTION AND SITE DESCRIPTION

2.1 Basic Concept

To conduct screening and scoping of the potential environmental impacts that may be caused by a development plan or project, it is essential to fully understand the "project description" and "site description" at the earliest stage.

Project description includes the contents and features of the project, such as its background, objectives, location, executing agency, number of beneficiaries, scale, structure, construction method, operation and maintenance, etc..

Site description includes the present conditions of the natural and social environment and pollution in and around the project area.

In particular, if the project site includes such areas as follow, they should receive special attention:

a) Areas requiring soil conservation (high risk areas of erosion, salinization, etc.).
b) Arid and semiarid areas subject to desertification.
c) Tropical forests.
d) Water sources.
e) Habitats of value for the protection and conservation and/or sustainable use of fish and wildlife resources (wetlands, mangrove, swamps, coral reefs, etc.)
f) Areas of unique interest (historical, archaeological, cultural, aesthetic and scientific).
g) Areas of concentrations of population or industrial activities where further industrial development or urban expansion could create significant environmental problems.
h) Areas of particular social interest to specific vulnerable population groups (e.g., nomadic people or other people with traditional life styles).

It should be borne in mind that the above items must be thoroughly studied in each project step.

2.2 Project Description and Site Description of Sewerage Projects

The project description and the site description should be clarified in the formats shown in Tables 2-1 and 2-2 for screening and scoping.

However, at the project finding and preparatory study stages, sufficient information for the project description and site description may not be available. Thus, during the preparatory work prior to the preparatory study in the host country, the formats of Tables 2-1 and 2-2 should be filled in as complete as possible using all available information. The additional necessary information should be supplemented during the field surveys.

Table 2-1 Format for Project Description (Water Supply)

Item		Description
Project Name		
Background		
Objectives		
Location		
Executing Agency		
Beneficiaries		
Project Components		
	Type of Project	Construction / Improvement
	Major Property	Drinking, Agricultural, Industrial Water / Reservoir / Improvement of Working Condition for Women and Children
	Water Sources and Water Quality	Water Sources : Groundwater / Surface Water / Rainwater Water Quality :
	Conveyance Facilities	Length : km Open Channel / Pipe Line : (km)
	Purification plant	Treatment Process ··· Treatment Capacity ··· (m^3 / day)
	Reservoir Facilities	Number of Tanks··· , Capacity ··· m^3
	Appurtenant Facilities	Transmission Line Management Facilities
Others		

Note: The format should be filled in on the basis of the available existing data and information.

Table 2-2 Format for Site Description (Water Supply)

Item		Description
Project Name		
Social Environment	Inhabitants: (residents/indigenous people/their views on the project, etc.)	
	Public Facilities: (wells, reservoirs, water supply/electricity)	
	Public Health: (illness/infectious diseases, hospitals, sanitary habits)	
Natural Environment	Topography and Geology: (steep slopes, soft ground, wetlands/faults etc.)	
	Lakes, River System, Coast, Climate: (water quality and quantity, rainfall, etc.)	
	Valuable Fauna and Flora and Their Habitats: (national parks/habitats of rare species, etc.)	
Pollution	Complaints: (pollution of the upmost concern, etc.)	
	Measures Taken: (institutional measures/ compensation, etc.)	
Others		

Note: The format should be filled in on the basis of the available existing data and information.

CHAPTER 3

SCREENING

CHAPTER 3
SCREENING

3.1 Basic Concept

JICA's 1988 report, "Sectoral Study for Development Assistance-Environment," defines screening as "a process of judgement on whether a development project requires an environmental impact study or not." That is to say, screening is the first judgement in the process of environmental consideration and should commence at the initial stage of the project, such as project finding.

Screening in the guidelines is also based on the above definition. However, the evaluation of whether or not the IEE/EIA is required for a project should be based on appropriate ideas and views for harmonizing the sustainable development with the residents' livelihood and surrounding environment by taking into consideration the project features and its environment, but not on the quantitative standards.

3.2 Screening Methods

3.2.1 Outline

As for the procedures for screening in addition to the provisions detailed in the annex to the 1985 OECD council recommendations, JICA's report, "Sectoral Study for Development Assistance-Environment", describes the following cross-sectional viewpoints:

- Can the project adversely affect the sustainability of production which depends mainly on natural resources ?
- Will the project significantly affect people's health ?
- Will the project lead to a deterioration or loss of valuable living resources and their habitats ?
- Will the project have an unreasonable impact on the livelihoods and subsistence of the people concerned ?

Based on the above viewpoints, the screening method should be examined in detail.

If there are laws or regulations concerning the environmental impact assessment for the project in the host country, it is necessary to discuss with the officials concerned of the country to make better environment considerations in accordance with the laws and regulations by referring to the guidelines.

On the other hand, if there are no such laws or regulations in the host country, it may be possible to formulate a standard with respect to the project scale and the land-use conditions for evaluating whether the development project requires an environmental

impact assessment or not. However, setting up a quantitative standard for judgement is not only difficult but its effectiveness is also doubtful because Japanese development assistance is provided to various countries and their environmental characteristics are vastly different.

It is considered to be more effective, therefore, to formulate certain ideas and viewpoints with qualitative expressions for evaluating screening.

3.2.2 Screening of Water Supply Projects

Based on the above consideration, the following concepts are established in the preliminary environmental survey :

- The development project should be planned in such a way as to provide society with sufficient benefits while securing the areas' sustainable development and growth without being detrimental to the lives and existence of the residents.

- The development project should be planned in such a way as to maintain harmony with the natural environment, while avoiding significant damage to the existing environment, and preserve valuable natural environmental assets.

The examination of screening should be conducted from practical viewpoints for each environmental item based on the above concepts. The results of the examination should be clarified by using the screening format as shown in Table 3-1 and should be included in the preparatory study report.

The evaluation result of each environmental item should be noted on the format whether or not environmental impacts exist. As the overall evaluation, the conclusion and the reason for evaluating whether or not IEE/EIA is required should be described briefly on the format.

The guidelines should be applied for all environmental impacts that may be caused by the project implementation not only in the project area but also in any area that may be directly or indirectly affected during the construction and after the operation of project facilities.

Table-3.1 Format for Screening (Water Supply)

No.	Environmental Item	Description	Evaluation	Remarks (Reason)
Social Environment				
1.	Resettlement	Resettlement due to land occupancy (transfer of the rights of residence and land ownership)	[Y][N][?]	
2.	Economic Activities	Loss of production base and change of economic structure	[Y][N][?]	
3.	Traffic and Public Facilities	Impacts on schools, hospitals, and present traffic conditions, such as traffic jams and accidents	[Y][N][?]	
4.	Split of Communities	Separation of regional communities by hindrance of regional traffic	[Y][N][?]	
5.	Cultural Property	Loss or decrease of the value of cultural assets, such as temples, shrines and archaeological assets	[Y][N][?]	
6.	Water Rights and Rights of Common	Obstruction of fishing rights, water rights, and rights of common	[Y][N][?]	
7.	Public Health Condition	Worsening of health and sanitary condition due to the generation of garbage and pathogenic insects	[Y][N][?]	
8.	Waste	Generation of construction waste, surplus soils, sludge, and domestic waste	[Y][N][?]	
9.	Hazards (Risk)	Increase in risk of cave-ins, ground failure and accidents	[Y][N][?]	
Natural Environment				
10.	Topography and Geology	Change of valuable topography and geology due to excavation and earthfill	[Y][N][?]	
11.	Soil Erosion	Topsoil erosion by rainfall after land reclamation and deforestation	[Y][N][?]	
12.	Groundwater	Exhaustion of groundwater caused by overdraft, and water pollution by leachate	[Y][N][?]	
13.	Hydrological Situation	Changes of river discharge and riverbed condition due to filling work and drainage inflow	[Y][N][?]	
14.	Coastal Zone	Coastal erosion and change of coastal vegetation due to change of littoral drift and reclamation	[Y][N][?]	
15.	Fauna and Flora	Obstruction of breeding and extinction of species due to the changes of habitat conditions	[Y][N][?]	
16.	Meteorology	Change of micro-climate, such as temperature, wind, etc., due to large-scale reclamation and construction	[Y][N][?]	
17.	Landscape	Change of topography and vegetation due to reclamation. Deterioration of aesthetic harmony by structures	[Y][N][?]	
Pollution				
18.	Air Pollution	Pollution caused by exhaust gas or toxic gas from vehicles and factories	[Y][N][?]	
19.	Water Pollution	River and groundwater pollution caused by inflow of drainage and sludge from water treatment facilities	[Y][N][?]	
20.	Soil Contamination	Contamination caused by discharge or diffusion of waste water drainage or toxic materials	[Y][N][?]	
21.	Noise and Vibration	Noise and vibration generated by vehicles and operation of water treatment plants	[Y][N][?]	
22.	Land Subsidence	Land deformation and land subsidence caused by the lowering of water table	[Y][N][?]	
23.	Offensive Odor	Generation of offensive odor and exhausted gas	[Y][N][?]	
Overall Evaluation: Either IEE or EIA is necessary for the Project Implementation?			[Y][N]	

CHAPTER 4

SCOPING

CHAPTER 4
SCOPING

4.1 Basic Concept

In JICA's 1988 report, "Sectoral Study for Development Assistance-Environment," scoping is defined as "a process of identification of the critical environmental impacts out of the possible environmental impacts of a development project. Through the scoping process, the priority fields or items of an environmental impact assessment are also identified". Further, it recommends that scoping should be carried out through discussions with the government of the host country. These discussions are to be based on discussion items prepared in advance, and by taking into account the aforementioned cross-sectional judgement provisions.

With the above definition and the methods used by various agencies, the guidelines provide material for conducting adequate scoping. The guidelines would enable even those who are not IEE and EIA specialists to understand the overall picture of the development project to conduct the sufficient scoping work during the short-term preparatory study period.

4.2 Scoping Methods

4.2.1 Outline

There are several technical methods for environmental impact assessment and its scoping. Each of them is selected in accordance with the project type, the project planning level, the features of the environmental conditions, etc. The most common methods are the checklist method, the matrix method, the overlay method, and the network method. In particular, the checklist and the matrix methods are commonly used by most agencies.

For "identification of the critical environmental impacts out of the possible impacts of a development project," as required by the definition of scoping in the "Sectoral Study for Development Assistance-Environment," it is necessary to include all environmental items which can be predicted to arise along with implementation of the project. To accomplish this, the checklist method seems to be the easiest to understand and the most useful.

Based on the above consideration, the checklist method is proposed for scoping in the guidelines.

To clarify important fields and items among those listed on the checklist, it is necessary to understand the causal relationships between the environmental items and the project related activities during the construction and the operation periods. Thus, to make it easier to understand scoping, the guidelines show typical causal relationships between development activities and environmental items by using the matrix as well as the checklist.

For reference purposes, a comprehensive matrix covering 13 sectors of social and economic infrastructure development projects is shown in Table 4-1.

4.2.2 Scoping of Water Supply Projects

The checklist for scoping of water supply projects is shown in Table 4-2. The matrix for understanding the causal relationship between the development activities and the environmental items is shown in Table 4-3.

To use the checklist for scoping, the following conditions and procedures should be taken into account:

(1) Application conditions

1) Periods covered by scoping

Scoping should cover both the construction and operation periods.

2) Spatial extent of scoping

Scoping should cover the project site which includes water intake facilities, conveyance facilities, purification plants, appurtenant facilities and pipelines, but does not include dam construction and groundwater development.

3) Types of Environmental Impacts

Environmental impacts subject to scoping are those having negative impacts on the existing environment.

(2) Evaluation method of important fields and items

The evaluation of each item should be rated according to the following categories:

A (serious impact is expected);

B (some impact is expected);

C (extent of impact is unknown but further examination is required because it might become clear as the study progresses);

D (no impact is foreseeable and IEE/EIA is not required).

Important fields and items for IEE/EIA should be identified with reference to "possible environmental impacts," "useful factors for evaluation," "measures," and "related subjects for study" as listed in Table 4-5.

The opinions and views of the host country should also be taken into consideration for the evaluation.

(3) Overall Evaluation

The evaluation results of each environmental item and the reasons for the evaluation should be clearly described on the checklist. The items evaluated as A, B, or C should be examined based on the screening concept to determine whether or not IEE/EIA is required, and the policies for further study of those items should be outlined. If it is possible to alleviate or avoid some environmental impacts by taking adequate measures, the contents should be described.

If, as the result of the evaluation, there are items which are evaluated as "C" or higher, some studies should be conducted for these items.

For the overall evaluation, opinions and views of the host country should be taken into consideration.

The overall evaluation form is shown in Table 4-4.

Table 4-1 Comprehensive Matrix

		Project Type / Sectors / Environment Items	Sectoral Development									Comprehensive Development			
			1. Ports and Harbors	2. Airports	3. Roads	4. Railways	5. River and Erosion Control	6. Solid Waste Management	7. Sewerage	8. Groundwater Development	9. Water Supply	10. Regional Development	11. Tourism Development	12. Transportation Development	13. Urban Transportation Development
Social Environment	1	Resettlement	◎	◎	◎	◎	◎	○	○		○	○	○	○	○
	2	Economic Activities	○	○	○	○						○	○	○	○
	3	Traffic and Public Facilities	○	○	○	○	○	○				○	○	○	○
	4	Split of Communities		○	○	○	○					○	○	○	○
	5	Cultural Property	○	○	○	○	○					○	○	○	○
	6	Water Rights/Rights of Common	◎	○	○	○	◎			○	○	○	○	○	
	7	Public Health Condition				○		○				○	○	○	
	8	Waste	○	○	○	○	○	○	○			○	○	○	○
	9	Hazards (Risk)	○	○	○	○						○	○	○	○
Natural Environment	10	Topography and Soil Condition	○	○	○	○	○					○	○	○	
	11	Soil Erosion		○	○	○						○	○	○	
	12	Groundwater			○	○		○		◎		○			
	13	Hydrological Situation	○	○	○	○	◎	○			○	○	○	○	○
	14	Coastal Zone	◎	○	○	○	○	○				○	○	○	
	15	Fauna and Flora	◎	◎	◎	◎	◎	○	○		○	○	○	○	○
	16	Meteorology										○		○	
	17	Landscape	○	○	○	○	○	○	○		○	○	○	○	○
Pollution	18	Air Pollution	○	○	◎			◎	○			○		○	○
	19	Water Pollution	○	○	○	○	○	◎	○	○	○	○	○	○	
	20	Soil Contamination	○		○			○						○	○
	21	Noise and Vibration	○	◎	◎	◎	○	○	○	○	○	○	○	○	○
	22	Ground Subsidence								◎					
	23	Offensive Odor	○					◎	○			○		○	

Note:◎ : The environmental items to which special attention has to be paid
They might cause serious impacts that may affect the project formulation depending on the magnitude of the impacts and the possibility of the measures.

○ : The environmental items which may have a significant impact depending on the scale of project and site conditions

No mark : The environmental items requiring no impact assessment since the anticipated impacts are, in general, not significant.

In case of the comprehensive development projects, all the items are classified in ○, because their studies are usually at the master planning stage and the extent of impacts are not clear.

Table 4-2 Checklist for Scoping (Water Supply)

No.	Environmental Item	Evaluation	Reason
Social Environment			
1.	Resettlement		
2.	Economic Activities		
3.	Traffic/Public Facilities		
4.	Split of Communities		
5.	Cultural Property		
6.	Water Rights and Rights of Common		
7.	Public Health Condition		
8.	Waste		
9.	Hazards (Risk)		
Natural Environment			
10.	Topography and Geology		
11.	Soil Erosion		
12.	Groundwater		
13.	Hydrological Situation		
14.	Coastal Zone		
15.	Fauna and Flora		
16.	Meteorology		
17.	Landscape		
Pollution			
18.	Air Pollution		
19.	Water Pollution		
20.	Soil Contamination		
21.	Noise and Vibration		
22.	Land Subsidence		
23.	Offensive Odor		

Note 1: Evaluation categories :

A: Serious impact is expected.
B: Some impact is expected.
C: Extent of impact is unknown (Examination is needed. Impacts may become clear as study progresses.).
D: No impact is expected. IEE/EIA is not necessary.

Note 2: The evaluation should be made with reference to the "explanation of item" (Table 4-5)

Table 4-3 Matrix for Scoping (Water Supply)

		Major Facilities / Activities	Intake facilities / Conveyance facilities / Flotration facilities / Transmission facilities / Distribution facilities				
		Activities which may cause impacts / Environmental Items	Overall Evaluation	Before Operation		After Operation	
				Reclamation and Spatial Occupancy	Operation of Construction Equipment and Vehicles	Spatial Occupancy	Operation of Facilities
Social Environment	1	Resettlement	○	○			
	2	Economic Activity					
	3	Traffic and Public Facility					
	4	Split of Communities					
	5	Cultural Property					
	6	Water Rights/Rights of Common	○				○
	7	Public Health Condition					
	8	Waste					
	9	Hazards (Risk)					
Natural Environment	10	Topography and Geology					
	11	Soil Erosion					
	12	Groundwater					
	13	Hydrological Situation	○				○
	14	Coastal Zone					
	15	Fauna and Flora	○	○	○	○	
	16	Meteorology					
	17	Landscape	○	○		○	
Pollution	18	Air Pollution					
	19	Water Pollution	○				○
	20	Soil Contamination					
	21	Noise and Vibration	○		○		○
	22	Land Subsidence					
	23	Offensive Odor					

Note:◎ : The environmental items to which special attention has to be paid. They might cause serious impacts that may affect the project formulation depending on the magnitude of the impacts and the possibility of the measures.

○ : The environmental items which may have a significant impact depending on the scale of the project and site conditions

No mark : The environmental items requiring no impact assessment since the anticipated impacts are, in general, not significant.

Table 4-4 Overall Evaluation Form (Water Supply)

Environmental Item	Evaluation	Study Plan	Remarks

Note: Evaluation categories :

A: Serious impact is expected.

B: Some impact is expected.

C: Extent of impact is unknown (Examination is needed. Impacts may become clear as study progresses.).

D: No impact is expected. IEE/EIA is not necessary.

Table 4-5 Explanation of Item 1 (Water Supply)

Item	1. Resettlement
Description	Resettlement due to land occupancy (transfer of the rights of residence and land ownership)

Causes of Impacts

1. Inhabitants may be relocated for construction of open channel type of water conveyance systems, construction of intakes, and water treatment and distribution facilities.

Possible Environmental Impacts

1. Loss of living foundation of the inhabitants to be relocated. Social and cultural inadaptability to the new resettlement area may occur.
2. Friction between permanent residents and relocated people (new settlers) due to social and economic burden on the permanent residents
3. Deterioration of living standard after resettlement due to the poor compensation system in some countries or the status of illegal occupants

Useful Factors for Evaluation

1. Impacts may be larger in densely populated areas.
2. Resettlement may be difficult for those people whose living is dependent on the special environmental resources peculiar to the area.
3. Special attention should be paid to such villages or inhabitants who have a uniform sense of values, such as religious beliefs or racial consciousness.
4. The resettlement may be more difficult when there is no favorable resettlement area nearby.

Measures

1. Selection of resettlement areas by taking into account the wishes of the residents
2. Meetings with inhabitants and provision of necessary information
3. Improvement of the living and economic situations in the resettlement area
4. Sufficient compensation
5. Job training and guidance

Related Subjects for Studies

1. Number of inhabitants to be relocated and their economic situations
2. Conditions of the resettlement area
3. Past cases of resettlement

Table 4-5 Explanation of Item 6 (Water Supply)

Item	6. Water Rights and Rights of Common
Description	Obstruction of fishing rights, water rights, rights of common

Causes of Impacts

1. Excessive drawing of lake and river water

Possible Environmental Impacts

1. Effect on the people's livelihood due to the change of river flow condition, including deterioration of river functions due to the insufficient river maintenance flow, and the lowering of lake water levels. There is a possibility of a shortage of irrigation water, reduction in the fish catch, or damage to tourism.

Useful Factors for Evaluation

1. Special attention should be paid when it is reported that, due to the lack of rainfall, the river discharge has decreased or the lake water level has lowered.
2. Problems tend to arise when the rivers and lakes are widely utilized.
3. Water rights are often established through traditional practice and not by laws. Thus, the feelings of the area residents should also be taken into account when utilizing the water of rivers or lakes.

Measures

1. Preparation of water drawing plans which consider the river and lake maintenance flow and existing water rights
2. Development and provision of alternative water sources
3. Establishment of national level water use plans
4. Meeting with the inhabitants and provision of necessary information
5. Sufficient compensation

Related Subjects for Studies

1. Hydrological and meteorological study
2. Study of water use situation (e.g., women's labor to fetch water, wash clothes, etc.)

Table 4-5 Explanation of Item 13 (Water Supply)

Item	13. Hydrological Situation
Description	Changes of river discharge and riverbed condition due to reclamation work and drainage inflow

Causes of Impacts

1. Excessive drawing of lake and river water
2. Inflow of sewage originated from water supply

Possible Environmental Impacts

1. Increase of sedimentation in the rivers and deterioration of water quality due to the decrease of discharge and tractive force
2. Lowering of the lake water level would cause the deterioration of water quality.
3. When the sewage originated from a water supply is discharged into lakes, the lake water level may rise and inundate the lake shore areas or may cause the deterioration of water quality.
4. Environmental impacts could extend to the fishery, water rights, ecosystem and landscape.

Useful Factors for Evaluation

1. Impacts would be greater when a decrease in river discharge and lowering of the lake water level due to insufficient rainfall is reported.
2. Impacts would be larger for small lakes and rivers.
3. Special attention should be paid to such areas that have poor sewerage systems.

Measures

1. Preparation of water intake plans by taking into account the hydrological conditions of lakes and rivers
2. Establishment of comprehensive water use plans
3. Development of alternative water sources
4. Improvement of sewerage treatment facilities

Related Subjects for Studies

1. Hydrological and meteorological study
2. River and lake use conditions

Table 4-5 Explanation of Item 15 (Water Supply)

Item	15. Fauna and Flora
Description	Obstruction of breeding and extinction of species due to changes of habitat conditions

Causes of Impacts

1. Destruction of forests, greenery, and wetlands due to reclamation
2. Noise and vibration caused by construction work
3. Spatial occupancy by facilities

Possible Environmental Impacts

1. Change of natural conditions and vegetation due to topographical change would reduce the wildlife habitats and cause damage to the ecosystem.
2. In case it causes the extinction of some species, the biodiversity will be affected.
3. The impacts may jeopardize the livelihood of residents who live by hunting and collecting forest products, and spoil the recreational value of the area.

Useful Factors for Evaluation

Special consideration is required in the following conditions:

1. There is vulnerable ecosystem (e.g., virgin forests, wetlands and mangroves).
2. There are unique species in the project site.
3. There are endangered and/or rare species listed on the Red Data Books of the International Union for the Conservation of Nature and Natural Resources (IUCN).
4. The country has bilateral and/or multilateral conventions on wildlife.
5. There are inhabitants who depend upon hunting and use of plants for their livelihood.
6. The site is specified as preservation area of wildlife or national park.

Measures

1. Reexamination of project location and scale
2. Relocation of fauna and flora
3. Examination of alternative sites

Related Subjects for Studies

1. Ecological distribution of fauna and flora
2. Land use study
3. Related laws and regulations
4. Livelihood of inhabitants

Table 4-5 Explanation of Item 17 (Water Supply)

Item	17. Landscape
Description	Change of topography and vegetation due to reclamation. Deterioration of aesthetic harmony by the appearance of structures

Causes of Impacts

1. Spatial occupancy by the elongated structures of open channels or pipelines
2. Spatial occupancy by widely spread water treatment and distribution facilities
3. Spatial occupancy by elevated water storage tanks

Possible Environmental Impacts

1. Water conveyance facilities, such as channels or pipelines, would alter the landscape.
2. Spatial occupancy by widely spread water treatment and distribution facilities would deteriorate the landscape.
3. Tall structures, such as elevated water storage tanks, would often deteriorate the landscape.

Useful Factors for Evaluation

1. Impacts would be larger near residential areas or parks.
2. Landscape problems would often arise in natural parks, tourist attraction sites, or recreational areas.
3. Impacts would be larger in the vicinity of archaeological remains and cultural assets.

Measures

1. Reexamination of the contents of the project plan
2. Landscape architecture
3. Compensation for business

Related Subjects for Studies

1. Land use study
2. Situation of nature conservation areas
3. Location of archaeological remains and cultural assets
4. Study of tourism values

Table 4-5 Explanation of Item 19 (Water Supply)

Item	19. Water Pollution
Description	River and groundwater pollution caused by inflow of drainage and sludge from water treatment facilities

Causes of Impacts

1. Sludge generation at large-scale water treatment facilities
2. Excessive drawing of river or lake water

Possible Environmental Impacts

1. When the sludge is kept on the ground, rainwater would wash it into the rivers and thereby cause water pollution.
2. Lowering of river and lake water levels would deteriorate the water quality.
3. Water grass may grow due to the stagnation of water.

Useful Factors for Evaluation

1. Problems may arise when a large amount of water is treated and a large amount of sludge is generated.
2. Impacts would be serious in closed water areas such as lakes.

Measures

1. Examination of sludge disposal methods
2. Examination of chemicals for water treatment
3. Reexamination of water intake points and amount of intake

Related Subjects for Studies

1. Quality and quantity of raw water
2. Amount of sludge generation

Table 4-5 Explanation of Item 21 (Water Supply)

Item	21. Noise and Vibration
Description	Noise and vibration generated by vehicles and operation of water treatment plants

Causes of Impacts

1. Operation of construction equipment and large vehicles (during the construction period only)
2. Operation of water treatment facilities

Possible Environmental Impacts

1. Noise and vibration generated by the operation of construction equipment and heavy vehicles would disturb the inhabitants' living environment.
2. Impacts on the growth and breeding of cattle, and the dispersion of wild animals in suburbs.
3. Impacts of noise and vibration generated by project facility operation are generally less than those generated during the construction period.

Useful Factors for Evaluation

Serious impacts may occur under the following conditions:

1. Densely populated areas or facilities which require quiet atmosphere, such as hospitals and schools, are located nearby.
2. Cattle related industries and valuable wildlife habitants are located.
3. There are soft ground areas, such as landfill and clayey soil layer, etc..

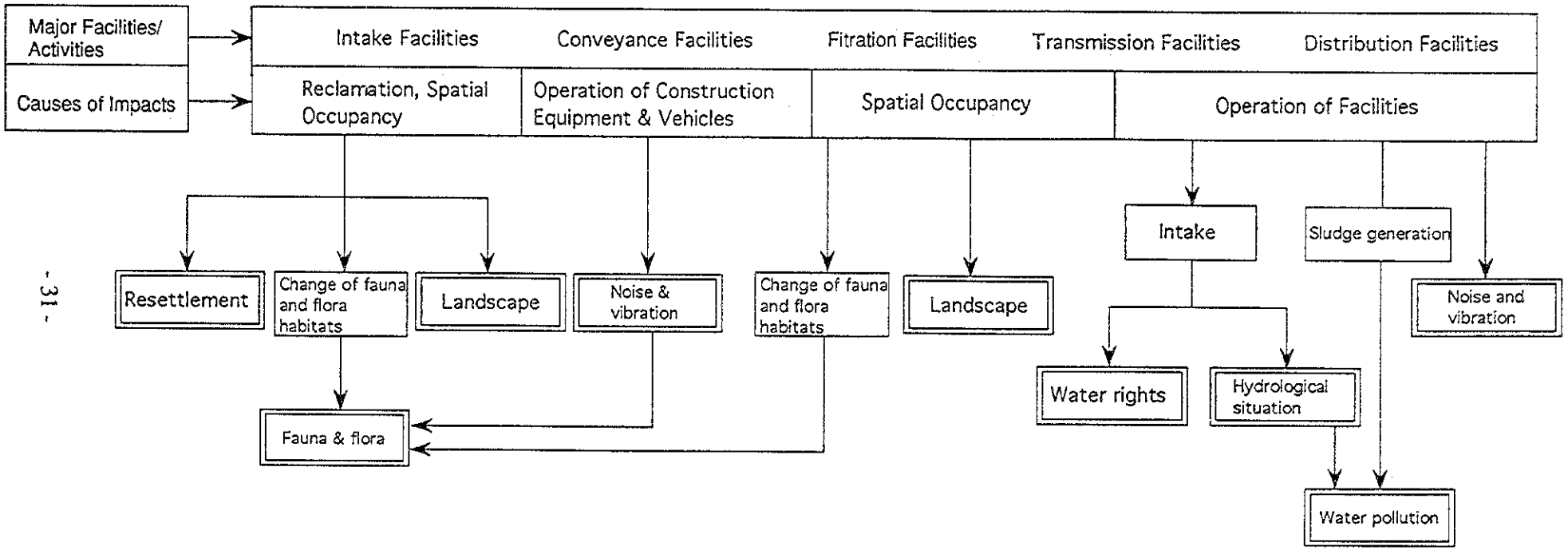
Measures

1. Installation of low noise and low vibration equipment
2. Examination of construction hours
3. Examination of project site
4. Installation of acoustic walls and buffer zones

Related Subjects for Studies

1. Land use
2. Geological survey
3. Living conditions of valuable wildlife

Appendix. Flow Chart of the Environmental Impacts of Water Supply Projects



Note : ▭ : indicates the environmental items shown in Table 4-3