

Appendix A Significant Environmental Impacts and Issues

Section 1. Significant Environmental Impacts for Assessment

This section outlines the possible significant environmental impacts to be assessed in the screening and scoping procedures under the Guidelines. The information and guidance presented include: 1) definition, 2) major potential adverse impacts, 3) typical development activities generating negative impacts, 4) special considerations for environmental assessment, 5) representative mitigation measures to be studied, and 6) related studies required for assessment.

1.1 Socio-economic Issues

(1) Social Issues

1) Planned Residential Settlement

Definition

A first type of planned residential settlement is new land settlement implemented in agricultural and rural development projects such as land clearing and leveling, sea/swamp reclamation and irrigation development.

A second type of planned residential settlement is exemplified by the estate project approach with settlement schemes for nomad, landless farmers or shifting cultivators.

Major Potential Adverse Impacts

Major potential adverse impacts due to planned residential settlement are as follows:

- (1) Significant socio-economic negative impacts both on new settlers and host population;
 - (2) Outbreak of conflict between new settlers and host population;
 - (3) Negative impacts on natural environment in and around the settlement areas;
- and
- (4) Negative impact on ecological balance with the natural environment.

(Refer to Appendix A, Section 2)

Typical Development Activities Generating Negative Impacts

Typical development activities generating negative impacts include:

- (1) Land acquisition;

- (2) New land settlement; and
- (3) Voluntary agricultural settlement.

Special Considerations for Environmental Assessment

Special factors that must be considered in environmental assessment are as follows:

- (1) Impact on local people;
- (2) Land allocation to each settler;
- (3) Titling and inheritance;
- (4) Settler selection;
- (5) Cropping system and land use;
- (6) Family planning; and
- (7) Consideration of the socially weak, such as ethnic minorities and the aged who adapt less easily to the new environment and changes in way of life; appropriate mitigation measures are prerequisite where ethnic or tribal frictions are anticipated.

Representative Mitigation Measures for Be Studied

Planning stage: Selection of settlement area based on the desires and aspirations of the affected people; adequate provisions for housing and social infrastructure; economic compensation including establishment of economic means and infrastructure; establishment of supporting systems for production and daily living activities of the people affected

Construction stage: Covering of expenses for resettlement; support of the livelihood of the affected population by providing employment opportunities in the construction related sector under the project.

Operation stage: Monitoring of environmental impact; study and execution of mitigation measures.

Related Studies Required for Assessment

Baseline data on present socio-economic conditions of settlers and host population, and natural and socio-economic environments in host areas; study on immigration policy and other related government policies; activities and capabilities of line agencies; opinions of related organizations including NGOs.

2) Involuntary Resettlement

Definition

Involuntary resettlement is defined as forced resettlement to move inhabitants

away from their original dwelling places in areas that will be inundated as part of development projects.

Major Potential Adverse Impacts

Major potential adverse impacts due to involuntary resettlement are as follows:

- (1) Significant socio-economic negative impact both on new settlers and host people;
- (2) Outbreak of conflict between new settlers and host people; and
- (3) Negative impact on the natural environment in and around the settlement areas. (Refer to Appendix A, Section 2)

Typical Development Activities Generating Negative Impacts

Typical development activities generating negative impacts are involuntary displacement of inhabitants by land acquisition, etc.

Special Considerations for Environmental Assessment

Special considerations for environmental assessment include the following:

- (1) Resettlement plan for natural, human-made, and social environments;
- (2) Host population, resource use patterns, and use of the area by non-residents;
- (3) Legal and customary use-rights;
- (4) Inventory of fauna and flora;
- (5) Social infrastructure and public health conditions; and
- (6) Consideration for the socially weak such as ethnic minorities and the aged who are less able to adapt to a new environment and changes in life. Appropriate mitigation measures are prerequisite where outbreaks of ethnic or tribal frictions are anticipated. Forced resettlement can cause great disruption to the lives of settlers who depend on the specific environment of their present dwelling place for their livelihood, and when the resettlement area is far from their present place of dwelling and environmental conditions there differ substantially.

Representative Mitigation Measures to Be Studied

Planning stage: Selection of a settlement area based on desires and aspirations of the affected people; adequate provisions for housing and social infrastructures; adequate compensation including establishment of economic means and infrastructures; establishment of supporting systems for production and daily living activities of the affected people.

Construction stage: Covering of expenses for resettlement; support of the livelihood of affected population by providing employment opportunities in construction projects related to the development projects.

Operation stage: Monitoring of environmental impact; study and execution of mitigation measures.

Related Studies Required for Assessment

Baseline data on the present socio-economic conditions of the settlers and the host population, and on the natural and socio-economic environments; study of immigration policy and other related government policies; activities and capabilities of line agencies; opinions of related organizations including NGOs.

3) Substantial Changes in Way of Life

Definition

Substantial change in way of life is defined as change in the way of life of the affected people, and in particular changes in the role of women in family and society brought about by agricultural and rural development.

Major Potential Adverse Impacts

Major potential adverse impacts are as follows:

- (1) Alteration and disruption of traditional ways of life and social dynamics; and
- (2) Substantial negative impact on women and the aged.

Typical Development Activities Generating Negative Impacts

Typical development activities generating negative impacts include:

- (1) Resettlement;
- (2) Changes in economic activities and occupations; and
- (3) Expansion or encroachment of negative impacts of development into surrounding areas.

Special Considerations for Environmental Assessment

Special considerations for environmental assessment include:

- (1) Age and gender;
- (2) Ethnic/tribal groups;
- (3) Socio-economic stratification;
- (4) Traditional system of affected people; and
- (5) Rapid changes in way of life that significantly affect the socially weak, such as ethnic minorities and the aged. Evaluation should be made of the traditional system which has evolved within the natural and socio-economic environment of a project area. Women's role and impact of a project on it should also be studied, with the aim of assessing: a) women's potential role in development, b)

impact on women's welfare and productivity, and c) social, legal or custom-related practices regarding women's role.

Representative Mitigation Measures to Be Studied

Planning stage: Project formulation, duly considering the way of life of affected people in order to avoid rapid changes in the traditional system.

Construction stage: Provision of equipment, materials, implements, etc., necessary for the altered way of life.

Operation stage: Monitoring of environmental impact; study and execution of mitigation measures.

Related Studies Required for Assessment

Baseline data on socio-economic conditions in a project area, including factors in the formation and values of traditional systems; interview survey of affected people, and of the weak in particular, to elicit their desires and aspirations; activities and capabilities of related agencies; opinions of related organizations including NGOs.

4) Conflict among Communities and Peoples

Definition

Conflict among communities and peoples refers to friction due to conflicting interests between beneficiaries and non-beneficiaries, people in favor of and those against development, new settlers and host people, people involved in development and outsiders, people in a project area and those affected in the surrounding area.

Major Potential Adverse Impacts

Major potential adverse impacts include:

- (1) Outbreaks of conflicts or disputes; and
- (2) Significant negative impact on socially or politically weak people such as indigenous peoples and ethnic minorities.

Typical Development Activities Generating Negative Impacts

Typical development activities generating negative impacts include:

- (1) Inter-settlement or close proximity of beneficiaries and non-beneficiaries;
- (2) Close proximity of those in support of and those against development;
- (3) Major income disparity; and
- (4) Migration or settlement of outsiders in a project area.

Special Considerations for Environmental Assessment

Special factors to be included in environmental assessment are as follows:

- (1) Potential presence of those who may be victimized by or otherwise oppose development; and
- (2) Identification of aspirations and concerns of related peoples, agencies and rural organizations.

Representative Mitigation Measures to Be Studied

Planning stage: Project formulation based on: sufficient consideration of the social environment of a project area; aspirations of related peoples; harmony with surrounding environment.

Construction stage: Monitoring of concerns or opinions of related peoples.

Operation stage: Monitoring of environmental impact; study on and execution of mitigation measures.

Related Studies Required for Assessment

Baseline data on socio-economy; interview survey of affected people to elicit their desires and aspirations; public hearings on development; activities and capabilities of related agencies; posture of related organizations including NGOs.

5) Impact on Native Peoples

Definition

Impact on native peoples refers to adverse effects of development on local communities composed partly or entirely of indigenous peoples (including tribal groups), low-caste groups, ethnic minorities, or nomads.

Major Potential Adverse Impacts

Major potential adverse impacts include:

- (1) Serious threats to the existence of native peoples (indigenous people, ethnic minorities, nomads, etc.); and
 - (2) *Impoverishment and environmental degradation with social, cultural and ecological conditions of native people.*
- (Refer to Appendix A, Section 2)

Typical Development Activities Generating Negative Impacts

Typical development activities generating negative impacts include:

- (1) Insufficient considerations on the interests and welfare of indigenous people,

ethnic minorities, nomads etc.;

- (2) Settlement or resettlement of affected groups;
- (3) Stationing of construction labor and personnel in a project area; and
- (4) Improvement of access to dwelling areas.

Special Considerations for Environmental Assessment

Special factors to be considered in environmental assessment include the following:

- (1) Indigenous people, including ethnic minorities, tribes and nomads, are in many cases in a socially and politically weak position, and their desires and aspirations tend to be neglected in development; and
- (2) In general indigenous people depend heavily for their livelihood on the natural environment of their dwelling areas.

Representative Mitigation Measures to Be Studied

Planning stage: Socio-economic provisions adequately reflecting indigenous peoples' desires and needs.

Construction stage: Monitoring of concerns or opinions of affected peoples.

Operation stage: Monitoring of environmental impact; study on and execution of mitigation measures.

Related Studies Required for Assessment

Baseline data on distribution, socio-economic conditions and living status of ethnic minorities, etc.; interview survey to elicit their aspirations and needs; study on government policies affecting indigenous people including tribes, low-caste groups, ethnic minorities, nomads, etc.; activities and capabilities of related agencies; posture of related organizations including NGOs.

(2) Demographic Issues

1) Population Increase

Definition

Population increase is defined as significant population increase in a project or surrounding area due to development.

Major Potential Adverse Impacts

Major potential adverse impacts are as follows:

- (1) Outbreak of conflict among local communities and people affected by development;
- (2) Adverse effects on social institutions and customs of affected people;
- (3) Deterioration of living environment of affected people; and
- (4) Environmental degradation of areas surrounding a development project.

Typical Development Activities Generating Negative Impacts

Typical development activities generating negative impacts are as follows:

- (1) Settlement or resettlement of affected group; and
- (2) Stationing of construction labor and personnel in a project or surrounding area.

Special Considerations for Environmental Assessment

Special considerations for environmental assessment are as follows:

- (1) Rapid increase and decrease of population caused by migration of construction labor can have a significant impact on the natural and socio-economic environments of a project area; and
- (2) Specific considerations are thus required on impacts induced by population increase.

Representative Mitigation Measures to Be Studied

Planning stage: Formulation of settlement plan with due consideration to aspirations of host populations; improvement or establishment of socio-economic infrastructures corresponding to an expected population increase.

Construction stage: Careful monitoring of possible deterioration of social fabric or value upheaval as a result of rapid population increase.

Operation stage: Monitoring of environmental impact; study and execution of mitigation measures.

Related Studies Required for Assessment

Baseline data on socio-economy in affected areas and natural environment in a project and surrounding area; identification of degree of reliance of affected people on the existing natural environment.

2) Drastic Change in Population Composition

Definition

This term is defined as drastic change in population composition in a project or surrounding area due to development.

Major Potential Adverse Impacts

Major potential adverse impacts are as follows:

- (1) Outbreaks of conflict among local communities and people affected by development;
- (2) Adverse effects on social institutions and customs of affected people;
- (3) Deterioration of living environment for affected groups; and
- (4) Decline in service levels of social infrastructure for affected people.

Typical Development Activities Generating Negative Impacts

Typical development activities generating negative impacts are follows:

- (1) Settlement or resettlement of affected people; and
- (2) Stationing of construction labor and personnel in a project or surrounding areas.

Special Considerations for Environmental Assessment

Rapid changes in population composition of a society may potentially result in insufficiency of social infrastructures or alteration of social institutions.

Representative Mitigation Measures to Be Studied

Planning stage: Formulation of settlement plan with due consideration of aspirations of host populations; improvement or establishment of socio-economic infrastructures corresponding to an expected population increase.

Construction stage: Careful monitoring of possible deterioration of social fabric or value upheaval as a result of rapid population increase.

Operation stage: Monitoring of environmental impacts; study and execution of mitigation measures.

Related Studies Required for Assessment

Baseline data on socio-economy, population composition and movement, and social infrastructures in a project area and its surrounding areas

(3) Economic Activities

1) Changes in Bases of Economic Activities

Definition

Changes in bases of economic activities refers to forced or involuntary relocation of economic bases or means such as farmland, fishing grounds, etc., under a project due to land acquisition, changes in land use regulation, and deterioration or depletion of bases or means for economic activities.

Major Potential Adverse Impacts

Major potential adverse impacts are as follows:

- (1) Disappearance of traditional production systems;
- (2) Emergence of those victimized by development; and
- (3) Degradation of natural environment in surrounding areas of development project.

Typical Development Activities Generating Negative Impacts

Typical development activities generating negative impacts are as follows:

- (1) Land acquisition by development project;
- (2) Destruction or disappearance of bases or grounds for fishing, gathering, and hunting; and
- (3) Increased competition for resources due to population increase.

Special Considerations for Environmental Assessment

Special considerations for environmental assessment are as follows:

- (1) Provisions formulated on the basis of due consideration on aspirations and abilities of affected people are essential; and
- (2) The possibility of emergence of refugees or those otherwise victimized by development must be considered.

Representative Mitigation Measures to Be Studied

Planning stage: Formulation of development plan based on due considerations of present economic environment in affected areas; introduction of sufficient compensation and support measures for the affected population.

Construction stage: Monitoring of concerns or aspirations of affected people.

Operation stage: Monitoring of environmental impacts; study and execution of mitigation measures.

Related Studies Required for Assessment

Baseline data on land use, productivity, living conditions in a project area and surrounding affected areas; study on aspirations and capabilities of affected people.

2) Occupational Change and Loss of Job Opportunity

Definition

This term is defined as forced or involuntary occupational change due to land acquisition and loss or deterioration of means or bases of economic activities; it includes loss of job opportunities due to farm mechanization.

Major Potential Adverse Impacts

Major potential adverse impacts are as follows:

- (1) Disappearance of traditional production systems;
- (2) Emergence of those victimized by development;
- (3) Degradation of natural environment in surrounding areas; and
- (4) Decrease in job opportunities in rural areas and drift of populations to urban areas.

Typical Development Activities Generating Negative Impacts

Typical development activities generating negative impacts are as follows:

- (1) Land acquisition;
- (2) Destruction or disappearance of bases or grounds for fishing, gathering, and hunting;
- (3) Increased competition for resources due to population increase; and
- (4) Decrease in job opportunities due to alteration of farming systems or farm mechanization.

Special Considerations for Environmental Assessment

Special considerations for environmental assessment are as follows:

- (1) Provisions formulated on the basis of due considerations of aspirations and abilities of affected people are essential;
- (2) The possibility of emergence of refugees or those otherwise victimized by development must be considered.

Representative Mitigation Measures to Be Studied

Planning stage: Formulation of development plan based on due consideration of present economic environment in affected areas; provision of sufficient

compensation and support measures for the affected population.

Construction stage: Monitoring of concerns or aspirations of related people.

Operation stage: Monitoring of environmental impacts; study and execution of mitigation measures.

Related Studies Required for Assessment

Baseline data on land use, productivity, living conditions in a project-affected area; study on aspirations and capabilities of affected people.

3) Increase in Income Disparities

Definition

This term is defined as the increase in income disparities among groups brought about by development; it implies relative impoverishment of the economically weak.

Major Potential Adverse Impacts

Major potential adverse impacts are as follows:

- (1) Emergence of economically weakened peoples; and
- (2) Increase in number of landless farmers.

Typical Development Activities Generating Negative Impacts

Typical development activities generating negative impacts are as follows:

- (1) Unequal distribution of development benefits; and
- (2) Lack of due considerations of those with weak economic status such as landless farmers.

Special Considerations for Environmental Assessment

Adequate distribution of development benefits to landless farmers, tenant farmers, and small-scale farmers is essential.

Representative Mitigation Measures to Be Studied

Planning stage: Formulation of a project with due attention to impartial distribution of benefits and provisions for those of weak economic status.

Construction stage: Monitoring of population changes after commencement of construction.

Operation stage: Monitoring of environmental impacts; study on and execution of mitigation measures.

Related Studies Required for Assessment

Baseline data on land tenure system, farm economy and size, farming system, labor force, etc.

(4) Institutional and Custom Related Issues

1) Adjustment and Regulation of Water or Fishing (Riparian) Rights

Definition

This term is defined as adverse development effects on water or fishing (riparian) rights and necessary adjustments or regulations to rectify the same.

Major Potential Adverse Impacts

Major potential adverse impacts are as follows:

- (1) Disturbance of existing water or fishing (riparian) rights;
- (2) Surrender or involuntary abandonment of fishing grounds;
- (3) Occurrence of water shortages; and
- (4) Outbreaks of conflict or disputes among local communities or affected people.

Typical Development Activities Generating Negative Impacts

Typical development activities generating negative impacts are as follows:

- (1) Irrigation or drainage development;
- (2) Water resources development;
- (3) Development of water areas; and
- (4) Water contamination due to development activities.

Special Considerations for Environmental Assessment

Special considerations are required because negative impacts of a project in many cases occur outside of a project area, and victims are not necessarily within the benefited area of a project.

Representative Mitigation Measures to Be Studied

Planning stage: Adjustments or provisions based on due consideration to the aspirations of the affected population; modification of development plan.

Construction stage: Formulating and implementing appropriate countermeasures.

Operation stage: Monitoring of environmental impacts; study on and execution of mitigation measures.

Related Studies Required for Assessment

Investigation of existing vested rights such as water and fishing rights and water use in and around a project area; study on the socio-economic value of such

vested rights; interview survey of people in order to elicit their desires and aspirations in areas likely to be negatively affected by a project; study on reconciliation capabilities of related agencies.

2) Changes in Social and Institutional Structures

Definition

This term is defined as changes in social and institutional structures as a result of establishment of new, or modification of existing, rural organizations caused by development.

Major Potential Adverse Impacts

Major potential adverse impacts are as follows:

- (1) Disintegration of traditional rural organizations;
- (2) Outbreaks of conflict among local communities or affected people;
- (3) Alienation of socially disadvantaged groups; and
- (4) Creation of poorly functioning organizations.

Typical Development Activities Generating Negative Impacts

Typical development activities generating negative impacts are as follows:

- (1) Insufficient consideration of traditional rural organizations and social institutions; and
- (2) Creation of organizations without due attention to aspirations of affected people.

Special Considerations for Environmental Assessment

Special considerations for environmental assessment are as follows:

- (1) Existing formal and informal rural organizations are assumed to have evolved naturally as a result of socio-economic conditions in a project area; and
- (2) Factors of formation, function, and value structure of existing organizations should be carefully reviewed in the establishment or modification of organizations.

Representative Mitigation Measures to Be Studied

Planning stage: Planning based on due consideration of the aspirations of affected people, existing institutions, and customs; establishment of adequate support measures; introduction of staged development.

Construction stage: Monitoring of outbreaks of conflict among people caused by induced reorganization of society.

Operation stage: Monitoring of environmental impacts; study on and execution of mitigation measures.

Related Studies Required for Assessment

Study of existing organizations in a project area; baseline data on socio-economy; interview survey to elicit the aspirations of affected people; study on functions and capabilities of related agencies.

3) Changes in Existing Institutions and Customs

Definition

This term is defined as changes in existing institutions and customs involved in or induced by development activities.

Major Potential Adverse Impacts

Major potential adverse impacts are as follows:

- (1) Undesirable alteration of existing institutions, systems and customs;
- (2) Vanishment of traditional practices; and
- (3) Undesirable establishment of new institutions or restructuring of existing institutions and customs.

Typical Development Activities Generating Negative Impacts

Typical development activities generating negative impacts are as follows:

- (1) Introduction of new institutions and systems or restructuring of the same;
- (2) Alteration of ways of life on local communities or affected people; and
- (3) Introduction of new systems or institutions which neglect traditional practices and aspirations of affected people.

Special Considerations for Environmental Assessment

Special considerations for environmental assessment are as follows:

- (1) Understanding is essential of the value of existing institutions, systems and customs within the context of the socio-economy of a project area; and
- (2) Rapid alteration of the same without paying due attention to traditional practices and aspirations of the population will result in socio-economic upheaval in a project area.

Representative Mitigation Measures to Be Studied

Planning stage: Planning based on due considerations on aspirations of affected peoples, existing institutions, and customs; establishment of adequate support

measures; introduction of staged development.

Operation stage: Monitoring of environmental impacts; study on and execution of mitigation measures.

Related Studies Required for Assessment

Study on existing organizations in a project area; baseline data on socio-economy; interview survey to explicit the aspirations of affected people; study on functions and capabilities of related agencies.

1.2 Health and Sanitary Issues

1) Increased Use of Agrochemicals

Definition

Increased use of agrochemicals refers to increased use of chemical pesticides due to intensification of agriculture; introduction of high-yielding varieties and new crops and irrigation development.

Major Potential Adverse Impacts

Major potential adverse impacts are as follows:

- (1) Decrease in numbers and species of insects and small animals;
- (2) Increased vulnerability of the ecosystem;
- (3) Vicious cycle consisting of outbreaks of agrochemical-resistant pests and increased application of agrochemicals; and
- (4) Physical harm to both humans and livestock.

Typical Development Activities Generating Negative Impacts

Typical development activities generating negative impacts are as follows:

- (1) Alteration of cropping patterns; and
- (2) Intensification of agriculture.

Special Considerations for Environmental Assessment

Special considerations for environmental assessment are as follows:

- (1) Large-scale monoculture and continuous cropping of a single crop are likely to cause outbreaks of pests and diseases; and
- (2) Traditional cropping patterns usually have ecological advantages to alleviate the infestation of pests and diseases.

Representative Mitigation Measures to be Studied

Planning stage: Formulation of a cropping pattern considering ecological effects to prevent infestation of pests and diseases; establishment and extension of pest and disease control measures.

Construction stage: Monitoring of changes in fauna and flora due to alteration of farming environment.

Operation stage: Monitoring of environmental impacts; study on and execution of mitigation measures.

Related Studies Required for Assessment

General agricultural survey; pest and disease survey; study on pest and disease forecasting and control system; study on system, technology, and capability of extension service on application methods of agrochemicals; survey of technical level of farmers.

2) Outbreak of Endemic Diseases

Definition

Outbreak of endemic diseases is defined as the spreading of endemic diseases as a result of the adverse effects of development.

Major Potential Adverse Impacts

Major potential adverse impacts are as follows:

Spreading of endemic diseases.

Typical Development Activities Generating Negative Impacts

Typical development activities generating negative impacts are as follows:

- (1) Creation of an environment conducive to the propagation of pathogenic agents (insects, bacteria, fungus, etc.);
- (2) Reduction in numbers and species of natural enemies of pests; and
- (3) Infestation from outside a project area.

Special Considerations for Environmental Assessment

Specific considerations are required regarding the increase in traffic of human beings and animals into a project area and the inadvertent creation of habitats of pathogenic insects due to irrigation development.

Representative Mitigation Measures to Be Studied

Planning stage: Study on the possibility of outbreak of endemic diseases and measures to control the same.

Construction stage: Monitoring of changes in fauna and flora due to alteration of the natural environment.

Operation stage: Monitoring of environmental impacts; study on and execution of mitigation measures.

Related Studies Required for Assessment

Study on infestation by pathogenic insects and other agents in surrounding or related areas; case study on similar projects.

3) Spreading of Epidemic Diseases

Definition

Spreading of epidemic diseases is defined as spreading of epidemic diseases attributable to the adverse effects of development.

Major Potential Adverse Impacts

Major potential adverse impact is outbreaks of epidemic diseases.

Typical Development Activities Generating Negative Impacts

Typical development activities generating negative impacts are as follows:

- (1) Creation of environment conducive to the propagation of pathogenic agents (insects, bacteria, fungus, etc.);
- (2) Import of pathogenic agents from outside a project area; and
- (3) Increase in traffic of human beings and animals.

Special Considerations for Environmental Assessment

Special considerations for environmental assessment are described as below:

Specific considerations are required regarding the increase in traffic of human beings and animals into a project area and the inadvertent creation of habitats for pathogenic insects due to irrigation development.

Representative Mitigation Measures to Be Studied

Planning stage: Study on the possibility of outbreak of epidemic diseases and control measures for the same; dissemination of information on health and sanitation.

Construction stage: Implementation of necessary provisions when an outbreak of epidemic disease is observed.

Operation stage: Monitoring of environmental impacts; study on and execution of mitigation measures.

Related Studies Required for Assessment

Study on outbreak of epidemic agents in surrounding or related areas; case study on similar projects.

4) Residual Toxicity of Agrochemicals

Definition

Residual toxicity of agrochemicals is defined as accumulation in the natural environment (soil, water, etc.) of agrochemicals or chemical substances with high residual toxicity such as organo-chloric insecticides, etc.

Major Potential Adverse Impacts

Major potential adverse impacts are as follows:

- (1) Harmful effects on human beings and animals through biological concentration; and
- (2) Adverse impacts on natural environments.

Typical Development Activities Generating Negative Impacts

Typical development activities generating negative impacts are as follows:

- (1) Use of agrochemicals with high residual toxicity;
- (2) Limited application or total lack of regulations to control toxic agrochemical use; and
- (3) Misuse of agrochemicals.

Special Considerations for Environmental Assessment

Special considerations for environmental assessment are as follows:

- (1) Elimination of factors attributable to the negative impacts; and
- (2) Employment of necessary agronomical measures under the planned cropping system.

Representative Mitigation Measures to Be Studied

Planning stage: Defining of criteria on agrochemicals with high residual toxicity and strict regulations on use and marketing of the defined ones.

Construction stage: Monitoring of application of the said regulations on agrochemical use and marketing.

Operation stage: Strict application of relevant regulations.

Related Studies Required for Assessment

Survey of agrochemicals on the market and regulations on agrochemical handling; survey of cultivation methods and extension technologies; study on marketing channels for agrochemicals.

5) Increase in Domestic and Other Human Wastes

Definition

This term is defined as the increase in domestic and other human wastes due to the consequences of development such as population increase.

Major Potential Adverse Impacts

Major potential adverse impacts are as follows:

- (1) Spreading of epidemic diseases;
- (2) Deterioration of sanitary conditions ; and
- (3) Water contamination and eutrophication in lower basin areas.

Typical Development Activities Generating Negative Impacts

Typical development activities generating negative impacts are as follows:

Development activities resulting in population increase such as settlement plans, increase in livestock population, and population influx due to employment opportunities generated under project construction works.

Special Considerations for Environmental Assessment

Increases in domestic and other human wastes will occur due to population increase and introduction or expansion of animal husbandry resulting from development activities.

Representative Mitigation Measures to Be Studied

Planning stage: Study on waste disposal facilities.

Construction stage: Provision of waste disposal facilities.

Operation stage: Monitoring of environmental impacts; study on and execution of mitigation measures.

Related Studies Required for Assessment

Study on existing measures and capacities for waste disposal; study on environmental conditions in affected areas.

1.3 Cultural Asset Issues

1) Impairment of Historic Remains and Cultural Assets

Definition

Impairment of historic remains and cultural assets is defined as direct or indirect impairment or destruction of sites, structures, and remains of archaeological, historical, religious, cultural, or aesthetic value as a result of development.

Major Potential Adverse Impacts

Major potential adverse impacts are as follows:

- (1) Impairment or destruction of historic remains etc.,; and
 - (2) Loss of tourist resources.
- (Refer to Appendix A, Section 2)

Typical Development Activities Generating Negative Impacts

Typical development activities generating negative impacts are as follows:

- (1) Direct impairment or destruction by development activities;
- (2) Inundation due to reservoir construction, etc.; and
- (3) Impairment due to increased traffic of vehicles and humans.

Special Considerations for Environmental Assessment

Comprehensive countermeasures are essential, based on identification of distribution, value, preservation policies, and existing conservation measures for historic remains and cultural assets.

Representative Mitigation Measures to Be Studied

Planning stage: Protection or relocation of affected remains, etc.; strengthening of preservation and management of the same.

Construction stage: Monitoring of environmental impacts; study on and execution of mitigation measures.

Operation stage: Monitoring of environmental impacts; study on and execution of mitigation measures.

Related Studies Required for Assessment

Survey of distribution, conditions, value, and distinctive features of remains, etc.; study on government conservation policies, and function and capabilities of related agencies for management and conservation.

2) Damage to Aesthetic Sites

Definition

Damage to aesthetic sites is defined as direct or indirect negative effects on aesthetic features as a result of development.

Major Potential Adverse Impacts

Major potential adverse impacts are as follows:

- (1) Degradation of aesthetic features;
- (2) Creation of inharmonious views;
- (3) Loss of tourist resources; and
- (4) Disappearance of sites with nostalgic value.

(Refer to Appendix A, Section 2)

Typical Development Activities Generating Negative Impacts

Typical development activities generating negative impacts are as follows:

- (1) Development activities involving disturbance or modification of earth surfaces; and
- (2) Construction of structures inharmonious to scenery at a site.

Special Considerations for Environmental Assessment

Comprehensive countermeasures are essential, based on identification of distribution, value, preservation policies, and existing conservation measures for aesthetic sites.

Representative Mitigation Measures to Be Studied

Planning stage: Selection of scenery or sites to be preserved; formulation of plan considering conservation of scenery.

Construction stage: Monitoring of environmental impacts; restoration of affected scenery.

Operation stage: Monitoring of environmental impacts; study on and execution of mitigation measures. (Refer to Appendix A, Section 2)

Related Studies Required for Assessment

Survey of distribution, value, and distinctive features of the subject scenery or site; study on government conservation policies and the function and capabilities of related agencies for management and conservation.

1.4 Biological and Ecological Issues

1) Changes in Vegetation

Definition

Changes in vegetation are defined as direct or indirect deterioration or degradation of vegetation due to development activities including removal of vegetation cover, alteration of land use, encroachment on forest, alteration of environmental conditions, etc.

Major Potential Adverse Impacts

Major potential adverse impacts are as follows:

- (1) Soil erosion;
- (2) Reduction of valuable or important fauna and flora;
- (3) Reduction of biological diversity; changes in micro climate;
- (4) Degradation of scenery; and
- (5) Reduction of green tracts and sources of fuel woods.

Typical Development Activities Generating Negative Impacts

Typical development activities generating negative impacts are as follows:

- (1) Removal or cutting of vegetation cover;
- (2) Alteration of land use;
- (3) Changes in micro climate;
- (4) Increased effects of human activities on forests, including encroachment;
- (5) Effects of grazing on surrounding areas; and
- (6) Increase in number of affected people.

Special Considerations for Environmental Assessment

Special considerations for environmental assessment include possible deterioration or degradation of vegetation in tropical forests, habitats of important or indigenous species, and wildlands should be carefully studied.

Representative Mitigation Measures to Be Studied

Planning stage: Appropriate land use planning; establishment of preserved areas or buffer zones; due consideration to local populations and those depending on gathering and hunting for livelihood; modification of a project.

Construction stage: Study of construction methods and period; monitoring and application of necessary restrictive measures.

Operation stage: Monitoring; and restrictions on land use.

Related Studies Required for Assessment

Soil and vegetation survey; survey on existing utilization of plant resources; socio-economic baseline data.

2) Negative Impacts on Important or Indigenous Fauna and Flora

Definition

Negative impacts on important or indigenous fauna and flora are defined as adverse effects on important or indigenous animal and plant species due to destruction of or changes in habitats.

Major Potential Adverse Impacts

Major potential adverse impacts include decimation or extinction of important or indigenous species.

Typical Development Activities Generating Negative Impacts

Typical development activities generating negative impacts are as follows:

- (1) Development activities in or around the habitats of subject species involving wide-scale or long-term modification or disturbance of earth surfaces such as land reclamation, land clearing, construction of roads, irrigation and drainage canals, and reservoirs;
- (2) Increased encroachment on habitats; and
- (3) Changes in hydrological regime.

Special Considerations for Environmental Assessment

As the reduction or extinction of important or indigenous species caused by development is a global environmental issue, conservation measures including modification of a project and establishment of protection areas and buffer zones are required when such a threat exists.

Representative Mitigation Measures to Be Studied

Planning stage: Identification of distribution of important fauna and flora; establishment and managing of conservation areas; introduction of conservation measures; modification of a project.

Construction stage: Monitoring of environmental impacts; implementation of necessary mitigation measures including relocation of subject species.

Operation stage: Monitoring of environmental impacts; study on and execution of mitigation measures.

Related Studies Required for Assessment

Survey and identification of distribution of important or indigenous species; study on government conservation policies and functions and capabilities of related agencies.

3) Degradation of Ecosystems with Biological Diversity

Definition

Degradation of ecosystems with biological diversity refers to the varieties of biological resources and living organisms. Biological diversity is the characteristic of wild species and natural ecosystems that allows them to withstand external stress. Conservation of ecosystems with biological diversity is, therefore, a form of natural resource management which has, as its primary goal, to maintain the long - term potential of biological resources to meet the needs and aspirations of future generations.

Major Potential Adverse Impacts

Major potential adverse impacts are as follows:

- (1) Reduction of useful, valuable or indigenous fauna and flora;
- (2) Reduction of biological diversity; and
- (3) Increase in vulnerability of ecosystem.

(Refer to Appendix A, Section 2)

Typical Development Activities Generating Negative Impacts

Typical development activities generating negative impacts are as follows:

- (1) Development activities in or around the habitats of subject species involving wide-scale or long-term modification or disturbance of earth surfaces; and
- (2) Increased encroachment on habitats due to development projects such as land reclamation, land clearing, construction of roads, irrigation and drainage canals, and reservoirs.

Special Considerations for Environmental Assessment

Wildlands such as tropical forests and wetlands are ecosystems with high biological diversity. Therefore, adequate protection measures are essential in these areas in order to conserve precious genetic resources.

Representative Mitigation Measures to Be Studied

Planning stage: Identification of distribution of important fauna and flora; establishment and management strengthening of conservation areas; introduction of conservation measures; due consideration to local population and those depending on gathering and hunting for livelihood; modification of a project.

Construction stage: Monitoring of environmental impacts; implementation of necessary mitigation measures including relocation of subject species.

Operation stage: Monitoring of environmental impacts; study on and execution of mitigation measures.

Related Studies Required for Assessment

Ecological survey; land or resource use survey; study on the distribution of similar ecosystems in a country or region; and study on government conservation policies, and functions and capabilities of related agencies.

4) Proliferation of Exotic and/or Hazardous Species

Definition

Proliferation of exotic and/or hazardous species is defined as introduction of pathogenic agents or spreading of hazardous species due to creation of an environment conducive to their propagation.
Condition

Major Potential Adverse Impacts

Major potential adverse impacts are as follows:

- (1) Outbreak or spread of pests and diseases affecting plants and animals; and
- (2) Spreading of endemic diseases.

Typical Development Activities Generating Negative Impacts

Typical development activities generating negative impacts are as follows:

- (1) Introduction of exotic crop or animal species; increased traffic of human beings and livestock;
- (2) Disturbance of the ecosystem caused by alteration of vegetation or cropping patterns; and
- (3) Creation of an environment conducive to habitation by hazardous species.

Special Considerations for Environmental Assessment

Special considerations for environmental assessment are as follows:

It should be remembered that irrigation development can create environments suitable for propagation of pathogenic agents or parasites.

The potential for introduction of diseases by imported construction labor is high.

Representative Mitigation Measures to Be Studied

Planning stage: Project formulation duly considering measures to avoid outbreak of pests and diseases, in particular measures to avoid outbreaks of endemic diseases.

Operation stage: Monitoring of environmental impacts; study on and execution of mitigation measures.

Related Studies Required for Assessment

Study on outbreak of epidemic pathogenic agents in surrounding or related areas; case study of similar projects.

5) Destruction of Wetlands and Peatlands

Definition

Destruction of wetlands and peatlands is defined as extinction of wetlands or peatlands due to direct destruction caused by development activities such as large-scale earth filling; or extinction due to indirect effects such as drying and decomposition due to changes in hydrological regime.

Major Potential Adverse Impacts

Major potential adverse impacts are as follows:

- (1) Decrease in wetlands or peatlands;
- (2) Reduction or extinction of useful, valuable, and indigenous species; and
- (3) Decrease in fishery resources.

Typical Development Activities Generating Negative Impacts

Typical development activities generating negative impacts are as follows:

- (1) Large-scale or long-term disturbance of earth surfaces such as land clearing, road construction, reclamation and irrigation, and drainage development;
- (2) Population increase resulting from settlement, etc.;
- (3) Improvement of access to a project area;
- (4) Alteration of hydrological regime; and
- (5) Burning of peat swamp due to fires used in shifting cultivation, field burning, or other human activity.

Special Considerations for Environmental Assessment

Wetlands in most cases comprise wildlands with valuable ecosystems. The most

important roles which wetlands perform are production of services (wetlands can contribute to local rainfall and can be an efficient, low-cost water purification system, a recreation area, buffer against floods, and protection from coastal erosion), preservation of biological diversity (for many species of shrimp, fish, and waterfowl, tidal and freshwater marshes, coastal lagoons, and estuaries are of vital importance as breeding grounds as well as staging areas), and production of goods (wetlands are among the most productive ecosystems on the earth).

Representative Mitigation Measures to Be Studied

Planning stage: Appropriate land use and drainage plan; establishment or strengthening of management of conservation areas and buffer zones; baseline survey of distribution of important fauna and flora; due consideration to those engaging in gathering or hunting in subject areas.

Construction stage: Study on construction method; monitoring and application of restrictive measures.

Operation stage: Monitoring of environmental impacts; restrictions on land use.

Related Studies Required for Assessment

Ecological survey; soil and land use survey; hydrological survey; study of government conservation policies and functions and capabilities of related agencies.

6) Encroachment into Tropical Rain Forests and Wildlands

Definition

Encroachment into tropical rain forests and wildlands is defined as decrease or disappearance of tropical rain forests due to direct or indirect effects of development.

Major Potential Adverse Impacts

Major potential adverse impacts are as follows:

- (1) Vanishment of tropical forests or wildlands;
- (2) Decrease or extinction of useful, valuable, or indigenous fauna and flora;
- (3) Reduction of biological diversity;
- (4) Increased vulnerability of the ecosystem;
- (5) Development of soil erosion; and
- (6) Increased stress on tropical forests in other areas.

(Refer to Appendix A, Section 2)

Typical Development Activities Generating Negative Impacts

Typical development activities generating negative impacts are as follows:

- (1) Large-scale or long-term disturbance of earth surfaces such as land clearing, road construction, and irrigation and drainage development;
- (2) Population increase resulting from settlement, etc.; and
- (3) Improved access to a project area.

Special Considerations for Environmental Assessment

Significant negative impacts of development which promote encroachment on tropical rain forests and wildlands should be carefully addressed.

Representative Mitigation Measures to Be Studied

Planning stage: Baseline survey of distribution of important fauna and flora; establishment or strengthening of management of conservation areas and buffer zones; due consideration to those engaging in gathering or hunting in subject areas; modification of a project.

Construction stage: Monitoring of environmental impacts; implementation of necessary mitigation measures including relocation of threatened plant and animal species.

Operation stage: Monitoring of environmental impacts; study on and execution of mitigation measures.

Related Studies Required for Assessment

Investigation of distribution and ecology of tropical forests or wildlands and resource use in tropical forests or wildlands by local people; study on government conservation policies and functions and capabilities of related agencies.

7) Destruction or Degradation of Mangrove Forests

Definition

Destruction or degradation of mangrove forests refers to disappearance of mangrove forests attributable to direct destruction, or deterioration of supporting environmental conditions.

Major Potential Adverse Impacts

Major potential adverse impacts are as follows:

- Disappearance of mangrove forests;
- Decrease or extinction of useful, valuable, or indigenous fauna and flora;
- Reduction of fishery resources.

(Refer to Appendix A, Section 2)

Development Activities Generating Negative Impacts

Development activities generating negative impacts are as follows:

Wide-scale or long-term disturbance of earth surfaces such as land clearing, road construction, and irrigation and drainage canal development;
Population increase resulting from settlement, etc.; and
Improved access to a project area.

Special Considerations for Environmental Assessment

Mangrove forests are ecosystems the extinction of which is a global concern; they are important breeding grounds and habitats for marine resources. Accordingly, their conservation must be given careful attention.

Mitigation Measures

Planning stage: Baseline survey of distribution of important fauna and flora; establishment or strengthening of management of conservation areas and buffer zones; due consideration to those engaging in gathering or hunting in subject areas; modification of a project.

Construction stage: Monitoring of environmental impacts; implementation of necessary mitigation measures including relocation of threatened plant and animal species.

Operation stage: Monitoring of environmental impacts; study and execution of mitigation measures.

Related Studies Required

Investigation of distribution and ecology of mangrove forests and resource use in mangrove forests by local peoples; study of government conservation policies and functions and capabilities of related agencies.

8) Degradation of Coral Reefs

Definition

Degradation of coral reefs is defined as encroachment due to direct destruction, or damage to and deterioration of the supporting environment caused by sedimentation, etc.

Major Potential Adverse Impacts

Major potential adverse impacts are as follows:

Vanishment of coral reef;
Reduction of fishery resources;
Loss of aesthetic features or recreational sites.
(Refer to Appendix A, Section 2)

Development Activities Generating Negative Impacts

Development activities generating negative impacts are as follows:

Large-scale or wide-scale disturbance of earth surfaces such as land reclamation and road construction;
Sedimentation of soils eroded in upper basin areas

Special Considerations for Environmental Assessment

Coral reef constitutes a precious ecosystem in which diversified marine fauna and flora reside, and protection of the area should be integrated into a project. Sedimentation due to soil erosion in upper basin areas as a result of development activities should be carefully addressed.

Mitigation Measures

Planning stage: Baseline survey of distribution of fishery resources; establishment or strengthening of management of conservation areas; due consideration to fishermen; modification of a project.

Construction stage: Monitoring of impacts; introduction of necessary restrictive measures.

Operation stage: Monitoring of environmental impacts; study and execution of mitigation measures.

Related Studies Required

Investigation of distribution and ecology of coral reefs; study of economic value of coral reefs and their inter-relationship with economic activities in the area; study of government conservation policies and functions and capabilities of related agencies.

1.5 Soil and Land Resources

(1) Soil Resources

1) Soil Erosion

Definition

Soil erosion is defined as the washing or blowing away of soil from the earth surface by the action of water or wind. Soil erosion is a smoothing or leveling process, with soil particles being carried, rolled, or washed down by the force of gravity. The main agents which loosen and break down the soil particles are wind and water (differentiated into water erosion or wind erosion according to the agent involved);

Soil erosion is aggravated by artificial impacts.

Major Potential Adverse Impacts

Major potential adverse impacts are as follows:

Degradation of land productivity;

Land deterioration and desertification;

Adverse impacts on lower basin areas (sedimentation and deterioration of water quality).

Development Activities Generating Negative Impacts

Development activities generating negative impacts are as follows:

Removal of vegetation cover;

Development of land on slopes;

Land use, land management, and cultivation practices conducive to erosion;

Inherent physical conditions such as topography, soil properties, and rainfall patterns sensitive to soil erosion.

Special Considerations for Environmental Assessment

Upland crop cultivation on sloping lands, light soils such as volcanic ash soil, and removal of vegetation during rainy or windy seasons are conducive to erosion. Characteristics of rainfall and wind and plant covers should be examined carefully.

Mitigation Measures

Planning stage: Formulation of physical and agronomical soil conservation

measures; appropriate land use planning; modification of a project.

Construction stage: Study of construction methods and period; monitoring of impacts; introduction of necessary restrictive measures.

Operation stage: Monitoring of impacts; restrictions on land use.

Related Studies Required

Survey and investigation of vegetation, topography, geology, soil, land use, characteristics of rainfall and wind, areas degraded by landslide and erosion.

2) Soil Salinization

Definition

Soil salinization is defined as phenomena in which soluble salts accumulate in the surface layer of soils and crop growth is consequently adversely affected. According to FAO guidelines, soils with EC (electric conductivity of saturated soil moisture) higher than 4 us are defined as saline soils.

Major Potential Adverse Impacts

Major potential adverse impacts are as follows:

Decrease of land productivity;

Deterioration and desertification of lands.

Development Activities Generating Negative Impacts

Development activities generating negative impacts are as follows:

Inadequate irrigation, drainage, and water management;

Poor water quality;

Physical conditions of an area such as topography and soil prone to salinization;

Rise in groundwater level in lower basin areas.

Special Considerations for Environmental Assessment

Salinization is liable to occur in areas where availability of irrigation water is limited and water with high salt content is used for irrigation, in arid or semi-arid regions with limited rainfall, and in coastal zones. Due attention should be given to the rise in groundwater level in lower basin areas or in lower parts of the irrigation command area.

Mitigation Measures

Planning stage: Attention to impacts to lower reaches in irrigation and drainage planning; formulation of cropping pattern including time required for

desalinization; introduction of salt tolerant crops; alteration of land use.

Construction stage: Monitoring of impact (salt accumulation).

Operation stage: Monitoring of environmental impacts; study and execution of mitigation measures.

Related Studies Required

Survey and investigation on soil, geology, water quality, groundwater and climatic conditions; study on water use in surrounding areas and potential effects on lower reaches.

3) Deterioration of Soil Fertility

Definition

Deterioration of soil fertility is defined as deterioration of soil productivity due to leaching and decomposition of nutrients, nutrient absorption by plants, surface soil erosion, salinization, failure in soil management, etc.;

Tropical forests maintain high bio-mass productivity based on a delicately balanced plan and soil nutrient cycle;

Removal of vegetation will result in rapid deterioration of soil fertility due to leaching of nutrients, decomposition of organic matter, and erosion of surface soil.

Major Potential Adverse Impacts

Major potential adverse impacts are as follows:

Deterioration of land productivity;

Frequent outbreaks of pests and diseases;

Increased vulnerability of soil ecosystem.

Development Activities Generating Negative Impacts

Development activities generating negative impacts include inadequate soil management (erosion, salinization, and inappropriate fertilizer use) and cropping patterns such as continuous cultivation of a certain crop.

Special Considerations for Environmental Assessment

Removal or burning of vegetation cover, soil erosion, cultivation of crops with high nutrient absorption capacity and continuous cropping of non-leguminous crops may result in deterioration of soil fertility.

Mitigation Measures

Planning stage: Introduction of appropriate cropping patterns and soil management practices.

Construction stage: Careful attention to alteration of soil environment due to construction work.

Operation stage: Monitoring of environmental impacts; establishment of research and extension systems.

Related Studies Required

Survey and investigation of soil, topography, land erodibility, and cultivation practices.

4) Soil Contamination by Agrochemicals and Others

Definition

Soil contamination by agrochemicals and others is defined as accumulation of agrochemicals in soil with high residual toxicity.

Major Potential Adverse Impacts

Major potential adverse impacts are as follows:

Agrochemical contamination of farm products;

Harmful impact on humans and animals through progressive biological concentration of toxic substances along the food chain; alteration of the ecosystem.

Development Activities Generating Negative Impacts

Development activities generating negative impacts include inappropriate or illegal use of agrochemicals and lack of guidelines or restrictions on use of agrochemicals.

Special Considerations for Environmental Assessment

Continuous application of agrochemicals with high residual toxicity or otherwise inappropriate use or excessive use of agrochemicals are major causes of soil contamination by agrochemicals.

Mitigation Measures

Planning stage: Use of agrochemicals having no or limited residual toxicity; extension of appropriate application methods of chemicals.

Construction stage: Monitoring of impacts.

Operation stage: Monitoring of environmental impacts; study and execution of

mitigation measures.

Related Studies Required

Study of agrochemical use, agrochemical registration, and restrictions on use.

(2) Land Resources

1) Devastation or Desertification of Land

Definition

Devastation or desertification of land is defined as deterioration of land productivity or desertification caused by artificial or natural impacts; Accelerated and irreversible devastation of lands constitutes an important global environmental issue.

Major Potential Adverse Impacts

Major potential adverse impacts are as follows:

Spread of effects of devastation or desertification of lands to surrounding areas;

Creation of refugees;

Destruction of the ecosystem.

Development Activities Generating Negative Impacts

Development activities generating negative impacts are as follows:

Removal of plant cover; cutting and harvesting of plant resources;

Inadequate use and management of land;

Irrational water management;

Over-grazing;

Soil erosion and salinization;

Population increase;

Changes in micro climate; and

Inherent natural conditions vulnerable to devastation such as climatic conditions in an area.

Special Considerations for Environmental Assessment

Lands under a sensitive ecosystem such as arid and semi-arid lands are prone to irreversible devastation or desertification. Special attention is therefore essential for development in areas around devastated or desertified lands.

Mitigation Measures

Planning stage: Formulation of an adequate land use plan; establishment of conservation areas and buffer zones; improvement of irrigation and farming systems; land conservation measures such as afforestation.

Construction stage: Study of construction methods and period; monitoring of

impacts; introduction of necessary restrictive measures.

Operation stage: Monitoring of impacts; land use restriction.

Related Studies Required

Investigation of topography and soil, vegetation, climate, land use, agriculture, socio-economic activities and population statistics; study of distribution, alteration, and factors in formation of devastated lands.

2) Devastation of Hinterland

Definition

Devastation of hinterland is defined as devastation of areas surrounding a project area as a result of secondary or indirect impacts of development.

Major Potential Adverse Impacts

Major potential adverse impacts are as follows:

Devastation of forests and grasslands in surrounding areas;

Aggravation of erosion;

Deterioration of socio-economic environment of peoples in surrounding areas.

Development Activities Generating Negative Impacts

Development activities generating negative impacts are as follows:

Development activities involving wide-scale or long-term disturbance of earth surfaces;

Population increase (such as settlement) and resultant pressure on surrounding areas;

Facilitated access to and increased population of livestock in the areas;

Increased negative stress to the areas due to reduction of resources in a project area.

Special Considerations for Environmental Assessment

Disappearance of forests used as fuel wood resources and population increase leads to intensified adverse effects on surrounding areas, resulting in destruction of the ecosystem and devastation of lands to a degree beyond natural regenerative capacity. This problem should be seriously addressed, particularly in areas under sensitive ecosystems.

Mitigation Measures

Planning stage: Planning for fuel wood afforestation and alternative grazing lands; due consideration to affected peoples and those engaged in gathering or hunting in affected areas; modification of a project.

Construction stage: Monitoring of aspirations and needs of affected peoples.

Operation stage: Monitoring of environmental impacts; study and execution of mitigation measures.

Related Studies Required

Investigation on present land use, ecosystem, and socio-economic activities of affected peoples.

3) Ground Subsidence

Definition

Ground subsidence is defined as settlement of ground caused by the dehydration or drying of wetlands, peat swamp, or reclaimed lands, or excessive exploitation of groundwater.

Major Potential Adverse Impacts

Major potential adverse impacts are as follows:

Subsidence of canals or structures;

Deterioration of land drainability.

Development Activities Generating Negative Impacts

Development activities generating negative impacts include reclamation and drainage of wetlands or peat swamp.

Special Considerations for Environmental Assessment

Special considerations for environmental assessments are as follows:

Design of structures with careful attention to potential subsidence;

Detailed investigation and study on the properties of peat and drainage conditions, as shrinkage and decomposition of the peat layer is largely influenced by the depth of groundwater level.

Mitigation Measures

Planning stage: Careful study of construction plan, period, and management.

Construction stage: Monitoring of environmental impacts; study and execution of mitigation measures.

Operation stage: Monitoring of environmental impacts; study and execution of

mitigation measures.

Related Studies Required

Investigation of geology, soil, hydrology, and groundwater.

1.6 Hydrology and Air and Water Quality

(1) Hydrology

1) Changes in Surface Water Hydrology

Definition

Changes in surface water hydrology is defined as alteration of river discharge or water level as the effects of reservoir construction, irrigation water intake, or drainage.

Major Potential Adverse Impacts

Major potential adverse impacts are as follows:

Flooding or water shortage in lower basin areas;

Inadequate maintenance flow and violation of the integrity of existing water rights in lower basin areas;

Adverse impacts on fishery.

Development Activities Generating Negative Impacts

Development activities generating negative impacts are as follows:

Construction of dams, headworks, and intake facilities;

Land reclamation and drainage works;

Construction of polders and flood dikes;

Deterioration of water recharging capacity due to land clearing.

Special Considerations for Environmental Assessment

Seasonal changes in river water level and discharge before and after implementation of a project should be carefully examined.

Mitigation Measures

Planning stage: Careful study on the physical environment of a project area and surrounding area, hydrology, and construction plan.

Construction stage: Monitoring of environmental impact; study and execution of mitigation measures.

Operation stage: Monitoring of environmental impact; study and execution of mitigation measures.

Related Studies Required

Study of existing water rights in lower basin areas, intake structures, inland navigation and waterways, and fishery; flood mark survey.

2) Changes in Groundwater Hydrology

Definition

Changes in groundwater hydrology is defined as changes in the groundwater recharge mechanism or groundwater table caused by infiltration of irrigation water and exploitation of groundwater.

Major Potential Adverse Impacts

Major potential adverse impacts are as follows:

Deterioration of drainability of land;

Soil salinization;

Adverse effects on existing groundwater use.

Development Activities Generating Negative Impacts

Development activities generating negative impacts include groundwater development and changes in groundwater table due to irrigation and drainage development.

Special Considerations for Environmental Assessment

Special consideration is required with regards to deep tubewell development and over-exploitation of groundwater. Irrigation development planning in areas of poor drainage or in arid areas should be given careful attention.

Mitigation Measures

Planning stage: Careful project planning; study on water-saving irrigation and pipe drainage.

Construction stage: Monitoring of environmental impact; study and execution of mitigation measures.

Operation stage: Monitoring of environmental impact; study and execution of mitigation measures.

Related Studies Required

Study of groundwater development with regard to hydrogeology and existing well inventory; study of irrigation and drainage with regards to crop water requirements and soil conditions.

3) Inundation and Flooding

Definition

Inundation and flooding are defined as the overflowing of a river onto the surrounding land or the surging of sea water onto the coastal land. Inundation or flooding are caused by increased river or run-off discharge or poor water management.

Major Potential Adverse Impacts

Major potential adverse impacts are as follows:

Harmful effects on humans and livestock;

Outbreaks of diseases;

Disturbance and degradation of the ecosystem.

Development Activities Generating Negative Impacts

Development activities generating negative impacts as follows:

Inadequate water control;

Inundation due to insufficient capacities or malfunctioning of drainage facilities;

Insufficient attention to negative impacts on lower basin areas.

Special Considerations for Environmental Assessment

Attention is necessary to changes in the run-off coefficient caused by development of new irrigation and drainage canals and conversion of forests to upland fields.

Mitigation Measures

Planning stage: Planning for adequate drainage facilities to drain excessive water, and flood control reservoirs.

Construction stage: Monitoring of environmental impacts; study and execution of mitigation measures.

Operation stage: Proper operation of reservoirs and canals.

Related Studies Required

Topographic survey; hydraulic and hydrological study.

4) Sedimentation

Definition

Sedimentation is defined as settlement of transported sediment in rivers, estuaries, and reservoirs.

Major Potential Adverse Impacts

Major potential adverse impacts are as follows:

Serious disturbance of water intake and drainage;

Inundation and flooding;

Destruction of habitats of important fauna and flora.

Development Activities Generating Negative Impacts

Development activities generating negative impacts are as follows:

Soil erosion due to land development and construction works;

Soil erosion attributable to degradation of plant cover;

Erosion in canals and river banks.

Special Considerations for Environmental Assessment

Development activities involving vegetation alteration and large-scale earth surface disturbance must be reviewed carefully.

Mitigation Measures

Planning stage: Careful estimation of volume of sediment transport and planning of mitigation measures to control the same; watershed management planning.

Construction stage: Restriction on land use, construction etc., monitoring of environmental impacts; study and execution of mitigation measures.

Operation stage: Monitoring of environmental impacts; study and execution of mitigation measures.

Related Studies Required

Investigation on soil erosion, hydrology, and river conditions.

5) Riverbed Degradation

Definition

Riverbed degradation is defined as degradation of riverbeds in lower basin areas due to insufficient sediment load to maintain riverbed level.

Major Potential Adverse Impacts

Major potential adverse impacts are as follows:

Serious disturbance of water intake due to draw-down of water level downstream;

Destruction of habitats of important fauna and flora.

Development Activities Generating Negative Impacts

Development activities generating negative impacts include stoppage of sediment supply to downstream areas due to weir construction.

Special Considerations for Environmental Assessment

Reservoir construction is a typical development component with potential to bring about riverbed degradation.

Mitigation Measures

Planning stage: Formulation of adequate mitigation measures such as ground sills.

Construction stage: Monitoring of environmental impacts; study and execution of mitigation measures.

Operation stage: Monitoring of environmental impacts; study and execution of mitigation measures.

Related Studies Required

Study on hydrology and river conditions.

6) Impediment of Inland Navigation

Definition

Impediment of inland navigation is defined as adverse impacts on navigation due to development activities.

Major Potential Adverse Impacts

Major potential adverse impacts include hindrance to inland waterway traffic and waterborne delivery of goods to market.

Development Activities Generating Negative Impacts

Development activities generating negative impacts are as follows:

Draw-down of water level downstream due to weir construction or water intake;
Soil sedimentation;
Land reclamation and polder dike construction.

Special Considerations for Environmental Assessment

Development activities such as construction of reservoir, intake facilities, and embankment and land clearing must be considered for environmental assessment.

Mitigation Measures

Planning stage: Study of existing inland navigation and water-ways; planning of alternatives and mitigation measures.

Construction stage: Monitoring of environmental impacts; study and execution of mitigation measures.

Operation stage: Monitoring of environmental impacts; study and execution of mitigation measures.

Related Studies Required

Study on draft depth, hydrology, river conditions, and erosion.

(2) Water Quality and Temperature

1) Water Contamination and Deterioration of Water Quality

Definition

Water contamination and deterioration of water quality is defined as deterioration of water quality due to development activities.

Major Potential Adverse Impacts

Major potential adverse impacts are as follows:

Adverse impacts on water utilization and fishery in downstream areas;

Eutrophication of water;

Deterioration of habitats for aquatic fauna and flora.

Development Activities Generating Negative Impacts

Development activities generating negative impacts are as follows:

Soil erosion;

Agrochemical and fertilizer run-off;

Discharge of waste in waterways from domestic, livestock, and agro- product processing.

Special Considerations for Environmental Assessment

Impacts on downstream areas of waste disposal into waterways (particularly closed water bodies) should be assessed carefully.

Mitigation Measures

Planning stage: Study on erosion control measures; extension of appropriate fertilizer and agrochemical application practices and waste disposal.

Construction stage: Monitoring of environmental impacts; study and execution of mitigation measures; survey of aquatic ecosystem.

Operation stage: Monitoring of environmental impacts; study and execution of mitigation measures.

Related Studies Required

Investigation of hydrology and water quality; case study on adverse impacts experienced in similar projects.

2) Water Eutrophication

Definition

Water eutrophication is defined as accumulation in water of nutritive soluble salts such as nitrate and phosphate.

Major Potential Adverse Impacts

Major potential adverse impacts are as follows:

Deterioration of function of irrigation and drainage canals due to dense growth of aquatic plants and algae;

Adverse impact on water use and fishery downstream.

Development Activities Generating Negative Impacts

Development activities generating negative impacts are as follows:

Negative impacts on aquatic ecosystem due to development;

Discharge or run-off of fertilizer and domestic and livestock waste into waterways.

Special Considerations for Environmental Assessment

Increased application of fertilizer, livestock development and settlement programs require careful review.

Mitigation Measures

Planning stage: Study of mitigation measures such as waste water disposal; careful study of negative impacts on a closed water body.

Construction stage: Appropriate disposal of waste water during construction.

Operation stage: Monitoring of environmental impacts; study and execution of mitigation measures.

Related Studies Required

Farming system survey, case study of similar projects.

3) Sea Water Intrusion

Definition

Sea water intrusion is defined as intrusion of a salt water wedge along a riverbed.

Major Potential Adverse Impacts

Major potential adverse impacts are as follows:

Deterioration of irrigation water quality;

Salt injury to crops ;

Adverse effects on habitats of fishes and shellfishes.

Development Activities Generating Negative Impacts

Development activities generating negative impacts include intrusion of salt water wedges due to development activities which reduce river discharge during low flow periods in the upstream of an estuary.

Special Considerations for Environmental Assessment

Reduction of river discharge during the dry season due to irrigation water intake and construction of reservoir and diversion weir should be carefully reviewed.

Mitigation Measures

Planning stage: Study of river conditions and mitigation measures.

Construction stage: Monitoring of environmental impacts.

Operation stage: Monitoring of environmental impacts; study and execution of mitigation measures.

Related Studies Required

Study of hydrology and river conditions.

4) Change in Temperature of Water

Definition

Change in temperature of water is defined as adverse impact of low irrigation water temperature on crops.

Major Potential Adverse Impacts

Major potential adverse impacts are as follows:

Reduction of crop yield due to low water temperature.

Development Activities Generating Negative Impacts

Development activities generating negative impacts include irrigation water intake from the deep portion of a reservoir (cold water).

Special Considerations for Environmental Assessment

Direct irrigation supply to the field of water of excessively low temperature must be considered carefully.

Mitigation Measures

Planning stage: Study of water intake from shallow depth and temperature increase in river or canal system.

Operation stage: Monitoring of environmental impact; study and execution of mitigation measures.

Related Studies Required

Survey of water temperature in existing reservoirs.

(3) Atmosphere

1) Air pollution

Definition

Air pollution is defined as diffusion of agrochemicals and sand dust and odoriferous particles such as exhaust from vehicles and machinery into the air.

Major Potential Adverse Impacts

Major potential adverse impacts include deterioration of living environment, harmful effects on humans and livestock.

Development Activities Generating Negative Impacts

Development activities generating negative impacts include odoriferous elements entering the atmosphere as a result of animal husbandry or exhaust from agro-product processing, diffusion of agrochemicals, dust caused by construction works and land clearing, and gas exhaust from vehicles and machinery.

Special Considerations for Environmental Assessment

Careful review of the impact of aerial spray of agrochemicals, large-scale land clearing, and establishment of livestock and agro-processing facilities around a residential area is necessary.

Mitigation Measures

Planning stage: Study on siting of livestock and agro- processing facilities and use of appropriate methods for application of agrochemicals.

Construction stage: Study on construction method and period; monitoring of impacts; employment of restrictive measures.

Operation stage: Monitoring of environmental impact; study and execution of mitigation measures.

Related Studies Required

Investigation of environmental conditions in a project area, including climatological conditions such as wind velocity and direction.

1.7 Landscape and Mining Resources

1) Damage to Landscape

Definition

Damage to landscape is defined as direct or indirect negative effects on features of landscape as a result of development.

Major Potential Adverse Impacts

Major potential adverse impacts are as follows:

- (1) Degradation of landscape features;
- (2) Creation of inharmonious views;
- (3) Loss of tourist resources; and
- (4) Disappearance of sites with nostalgic value.

Typical Development Activities Generating Negative Impacts

Typical development activities generating negative impacts are as follows:

- (1) Development activities involving disturbance or modification of earth surfaces; and
- (2) Construction of structures inharmonious to scenery at a site.

Special Considerations for Environmental Assessment

Comprehensive countermeasures are essential, based on identification of distribution, value, preservation policies, and existing conservation measures for landscape sites.

Representative Mitigation Measures to Be Studied

Planning stage: Selection of scenery or sites to be preserved; formulation of plan considering conservation of scenery.

Construction stage: Monitoring of environmental impacts; restoration of affected scenery.

Operation stage: Monitoring of environmental impacts; study on and execution of mitigation measures.

Related Studies Required for Assessment

Survey of distribution, value, and distinctive features of the subject scenery or site; study on government conservation policies and the function and capabilities of related agencies for management and conservation.

2) Impediment of Mining Resources Exploitation

Definition

This term is defined as impediment of exploitation of mining resources due to development activities.

Major Potential Adverse Impacts

The major potential adverse impact is impediment of mineral resources development.

Typical Development Activities Generating Negative Impacts

Typical development activities generating negative impacts are as follows:

- (1) Submergence of deposits due to construction of reservoir; and
- (2) Construction of large-scale structures blocking access to deposits.

Special Considerations for Environmental Assessment

Special considerations for environmental assessment include preliminary investigation on distribution of deposits and consultation with related agencies when deposits of mineral resources are predicted to be present.

Representative Mitigation Measures to Be Studied

Planning stage: Adequate investigation; alteration of project area.

Construction stage: Implementation of necessary provisions when unanticipated findings are made.

Operation stage: Study on socio-economic impacts.

Related Studies Required for Assessment

Investigation on mineral resource distribution; consultation with related agencies.

Section 2. Significant Natural and Social Environments

This section presents general guidance on the significant natural and social environments to be carefully reviewed in the environmental impact assessment procedures set out under the Guidelines. The environments discussed include the following:

- (1) Arid and Semi-Arid Lands**
- (2) Wetlands**
- (3) Wildlands**
- (4) Tropical Forests**
- (5) Coastal Zones**
- (6) Ecosystem with Biological Diversity**
- (7) Indigenous Peoples and Ethnic Minorities**
- (8) Cultural Assets**
- (9) Involuntary Resettlement**

2.1 Arid and Semi-Arid Lands

(1) Definitions

Arid and semi-arid lands are defined as drylands receiving a long-term annual average precipitation of 200-1000 mm. Arid and semi-arid lands are ecologically marginal areas with a natural low-productivity environment, where the major factor constraining biological productivity is normally water. When the limiting factors are overcome, economically and technically, arid and semi-arid lands can become moderately productive. Therefore the biological productivity in these areas can be expected to improve greatly when the major limiting factor is removed through irrigation schemes. However, past experience has demonstrated that intensive production systems under irrigated agricultural activities in arid and semi-arid lands are highly prone to serious negative environmental impacts such as soil salinization, alkalinization, soil erosion (wind and water erosion), and water-logging. They require careful management in order to avoid degradation of the socioeconomic environment of human communities and the outbreak of epidemic diseases. Careful study on the development approach is essential for projects proposed in arid and semi-arid lands.

(2) Development Activities Having Significant Negative Impacts

Because of the vulnerability to environmental stress of the ecosystem and socio-economic environment in arid and semi-arid areas, any sort of development activity has the potential to induce adverse effects on the natural and social environment. The agricultural development activities which potentially have significant negative environmental impacts requiring serious assessment are as follows:

- development activities that induce alteration of the production system in the project area and surroundings, including irrigation development; conversion of land use and cropping patterns; introduction of new crops; alteration of farming systems.

- development activities that involve wide-scale or long-term modification or disturbance of earth surfaces which have direct impact on the ecosystem of the project area and its surroundings: land clearing; construction of irrigation and drainage canals, farm roads, and reservoirs; soil conservation; rangeland management; settlement.

- development activities that bring about changes in land tenure and land use systems; alterations in land policy such as land taxation.

(3) Assessment of Environmental Impacts

Due to the vulnerability of ecosystems in arid and semi-arid areas and the fact that once an ecosystem is destroyed its recovery is extremely difficult, the following are essential in the planning of agricultural development projects in arid and semi-arid areas: 1) assessment of natural and social environmental impacts of projects, and 2) planning and design of projects based on adequate environmental consideration and review. The specific environmental impacts for assessment differ depending on the natural and social environment of the project area and its surroundings; however, the following environmental impacts generally require careful assessment.

Environmental Impacts to Be Reviewed

Climatic conditions (specifically micro-climate), fauna and flora, ecosystem, natural resources, soil and land characteristics, hydrology and water quality, population, daily living patterns, health and sanitary conditions, production and economic activities, social institution and customs, sources of fuel, and acceptability for introduction of envisioned technology for introduction.

Special Considerations

Questions requiring special consideration in environmental impact assessment are:

- Are the utilization and conservation of resources in the project area being planned based on a long-term perspective that considers the well-being of future generations ?
- Is the envisaged development or conservation plan based on and justified from the economic, technical, social, and scientific points of view ?
- Does the project ensure sustainable development of the area or resources without unnecessary degradation of natural resources ?
- Was the project formulated on the basis of sufficient identification of the socio-cultural status of affected people, and does it support the enhancement of the same ?
- Is the project consistent with national and regional policy on the management of natural resources ?
- Does the project avoid seriously interfering with the resilient capability of the natural ecosystem ?

(4) Mitigation Measures

Mitigation measures to be applied for ensuring the environmental soundness of a project should be formulated carefully in view of the environmental aspects requiring special consideration as indicated above. Although mitigation measures or other provisions to be introduced differ according to the site- specific environmental conditions in a project area and the development activities envisaged under a project, general environmental aspects to be studied in the formulation of mitigation measures in the agricultural development of arid and semi-arid areas are as follows:

- enhancement of rained agriculture and utilization of seasonal flood plains during the rainy season as alternatives for irrigation development ;
- introduction of water harvesting and/or water conservation farming systems;
- soil conservation and measures to improve soil productivity such as erosion control, salinization control and crop rotation ;
- rangeland management and agroforestry;
- development or introduction of alternative fuel sources, establishment of fuel wood forestry;
- provision of adequate safeguards for affected wild animals such as construction of wildlife passages, fish ladders, etc. ;
- revision or introduction of land tenure systems and price policies;
- compensation, education, and technical extension for affected people;
- establishment of protected areas and buffer zones;
- strengthening of related agencies.

2.2 Wetlands

(1) Definitions

Wetlands are defined as areas of marsh (fresh and tidal water marshes), fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water whose depth at low tide does not exceed six meters. Among the most important wetlands are tidal and fresh water marshes, bogs, fens, herbaceous and wooded freshwater and peat swamps, mangroves, coastal lagoons, floodplains, deltas, and estuaries which are perennially under the strong influence of water presence and behavior. Wetlands are wildlands of particular importance both economically and environmentally.

The most important roles which wetlands perform are:

< **Production of services** > Wetlands can contribute to local rainfall and can be an efficient, low-cost water purification system (herbaceous swamps), a recreation area (hunting, fishing, boating), a buffer against floods, and protection from coastal erosion by storms (mangroves).

< **Preservation of biological diversity** > For many species of shrimp, fish, and waterfowl, tidal and fresh-water marshes, coastal lagoons, and estuaries are of vital importance as breeding grounds as well as staging areas in their migration routes. All types of wetlands may harbor unique plants and animals.

< **Production of goods** > Wetlands are among the most productive ecosystems in the world. Estuaries and tidal wetlands, in particular mangroves, are important nursery areas for most species of fish and shrimp which are later caught offshore. Shallow water areas are, in general, rich fishing grounds. Floodplains are important grazing areas for cattle and wildlife and vital spawning grounds for many fish species. Swamp forest may yield valuable timber.

Despite their importance, wetlands everywhere are threatened.

These threats come from conversion to intensive agriculture and/or aquaculture through developments such as land clearing and irrigation, artificial alteration of hydrological environment, and degradation through over-exploitation. Destruction or degradation of wetlands is identified as one of the most serious global environmental issues. The Ramsar Convention (see Appendix B, Section 1) was established to protect worldwide wetlands from further degradation.

(2) Development Activities Having Significant Negative Impacts

Major agricultural development activities having significant negative impacts on the preservation of wetlands are:

- development activities such as land clearing and reclamation accompanied by wide-scale modification or disturbance of wetlands;
- development activities accompanied by long-term (e.g., canal and road) modification or disturbance of wetlands;
- development activities which affect wetland hydrology, including water resource development, irrigation and drainage development, and road construction ;
- development activities in the areas surrounding wetlands which involve wide-scale or long-term modification or disturbance of earth surfaces; development activities which improve access to wetlands;
- development activities which indirectly affect the ecosystem of wetlands, such as water pollution, introduction of exotic species, and population increase in the surrounding areas;
- watershed management projects in the upper basin of wetlands.

(3) Assessment of Environmental Impacts

When the existence of valuable wetlands is identified in a project area and in the areas affected by the project, the impact of the project on the wetlands should be duly considered as an important aspect of environmental impact assessment, and the anticipated negative impacts should be carefully assessed in the project evaluation. The major items to be assessed for projects with anticipated impact on wetland are as follows:

- whether or not the wetland is listed on the Ramsar Convention;
- the possibility and degree of influence on hydrology of wetland;
- the possibility and degree of water pollution and eutrophication of water resources flowing into the wetland;
- the areal extent and degree of physical disturbance to wetlands by encroachment and destruction;
- the areal extent of planned land clearing or reclamation and its proportion to the whole wetland;
- estimation of the socio-economic value of the wetland and replacement cost of this value;
- activities and capabilities of related agencies or institutions;
- adverse effects on people dependent on the wetland for their livelihood.

(4) Mitigation Measures

Negative impacts on wetlands should be minimized by modification of a project at the planning stage. In the event of unavoidable impact, the following mitigating or compensatory measures should be implemented:

- modification of a project or alteration of sites to minimize impact on the wetland;
- designing of structures to conserve hydrologic regimes critical to preservation of the wetland;
- protection of wetlands, restoration of the natural ecosystem, and construction of artificial wetlands in other areas to compensate for losses in a project area;
- compensation and support for people adversely affected by a project;
- construction of structures to safeguard affected wildlife;
- strengthening of institutions responsible for or related to wetland conservation;
- education and guidance to local people and communities;
- strengthening and promotion of national and regional wetland management and protection systems.

2.3 Wildlands

(1) Definitions

Wildlands are lands that have either never or have only very slightly been disturbed by human activities and possess ecosystems with preserved natural environments including forests, grasslands, inland water areas, inland and coastal wetlands, and coastal water areas such as coral reefs. Special consideration for wildlands in environmental impact assessments is essential, because they perform a number of environmental functions.

- Wildlands are habitats for a vast variety of indigenous plant and animal species and are therefore natural environments of particular importance for the conservation of biological diversity.
- Wildlands serve as a valuable surrounding environment for society.
- Wildlands provide essential ecosystems and resources for indigenous peoples.

Wildlands are environments sensitive to the negative impacts of population increase and economic development activities; a number of cases have been reported in developing countries where these factors have resulted in the destruction or depletion of wildlands.

(2) Development Activities Having Significant Negative Impacts

Among the wide range of development activities which adversely affect the ecosystems of wildlands, agricultural development directly or indirectly has a number of significant environmental impacts:

- Wide-scale or long-term development activities such as land clearing, construction of roads, irrigation and drainage canals, and reservoirs in wildlands themselves or the areas surrounding them which encroach on or destroy wildlands.
- Development activities such as settlement which induce population increase in or around wildlands.
- Development activities which improve access to wildlands.

(3) Assessment of Environmental Impacts

Environmental impact assessment makes it possible, on the basis of cost-benefit comparison, to evaluate whether wildlands should be preserved or developed. In addition, the assessment is an essential study for identifying development alternatives and for implementation of mitigation measures which minimize avoidable negative impacts on the

environment. For wildlands which exhibit a range of diversified environmental conditions, the assessment process must correspond to the specific environmental conditions of the targeted areas. However, generally essential items to be identified in an assessment include the following:

- the location, scale, and characteristics of wildlands;
- area of wildlands lost or degraded due to development as a proportion of the total wildland area in the subject region or country;
- effects of development on environmental factors critical to the formation of wildlands, such as water quality, water flow, and nutrient cycles;
- areal extent and duration of adverse effects;
- extent of loss or degradation of habitats and effects on diversity of animal and plant species;
- effects on animal and plant productivity;
- economic value of environmental services performed by wildlands such as soil and water conservation function (estimation of replacement cost for such services);
- number of people adversely affected and extent of the effects;
- extent of effects on social value of affected wildlands (sites for recreation, nature education, etc.);
- indirect effects of loss (increase of adverse impact on other wildlands).

(4) Mitigation Measures

Anticipated negative effects of a project should be minimized through modifications at the planning stage or the application of mitigation measures by incorporating wildland management as a project component. However, in cases where a project still has unavoidable significant negative impact, study and recommendations for measures and provisions to compensate for unavoidable losses are the subject of environmental impact assessment. Although mitigation measures to be implemented differ according to the natural and social environments of the targeted areas and the capability of the agencies concerned, principal mitigation measures to be examined are as follows:

- modification of a project -- for example, alteration of project site or routing;
- establishment of a protected area in the project area or in other wildlands of similar nature to compensate for loss due to a project;
- compensation and support for affected people;
- incorporation into project design of environmental safeguard structures such as fish ladders and wild animal crossings;
- establishment of buffer zones surrounding wildlands;

- creation or rehabilitation of ecosystems to counterbalance losses
- strengthening of research and technology development on wildland conservation and management;
- dissemination of information to the local population through, for example, education programs in environmental conservation.

2.4 Tropical Forests

(1) Definitions

Tropical forests are ecosystems with the highest level of biological diversity and productivity; despite their limited extent in proportion to the entire earth's surface, they are estimated to provide a habitat for 40 to 50 % of the total biological species on earth. A considerable human population also relies on these diversified plant and animal resources for their livelihood. On the other hand, however, tropical forests are ecosystems very vulnerable to external stresses. Many of the biological species found in the areas can survive only under the specific environmental conditions within tropical forests; therefore, the alteration or degradation of that specific environment may potentially result in the extinction of species and the reduction of resources.

(2) Development Activities Having Significant Negative Impacts

In the case of development activities involving wide-scale or long-scale disturbance of earth surfaces accompanied by direct clearance or destruction of tropical forests such as land clearing, road construction, and irrigation and drainage canal development, the need for environmental impact assessment is readily apparent. However, development activities such as those as listed below which have indirect or induced negative impacts on tropical forests should also be reviewed from the environmental point of view:

- development activities involving drastic population increase, such as settlement programs in surrounding areas;
- development activities which bring about changes in or destruction of vegetation in the surrounding areas (destruction of buffer zones);
- development activities inducing encroachment on shifting cultivators, such as road construction in or around tropical forests which improve access to the forests.

In addition, it should be borne in mind that environmental deterioration in tropical forests tends to spread rapidly due to the particular vulnerability of the ecosystem, and that negative impacts of development activities in a specific location rapidly expand to the surrounding areas, resulting in widespread environmental degradation.

(3) Assessment of Environmental Impacts

The environmental impact assessment is a prerequisite study for the identification of alternatives with limited or acceptable negative impacts, or integration of appropriate

mitigation measures into project design. It should evolve basic criteria for evaluating whether to develop or to conserve tropical forests in a project area. Environmental aspects requiring specific consideration in impact assessment are as follows:

- location, areal extent, and economic value of affected tropical forests;
- baseline data on a directly affected natural environment or ecosystem, adverse impacts and their extent (in particular, affects on rare species, biological diversity, and soil erosion);
- economic resources affected, number of people adversely affected, and degree of the effects;
- economic value of environmental services performed by the subject tropical forests, such as soil and water conservation functions;
- identification of indirect effects of a project on surrounding tropical forests -- for example, the increased pressure of human activities.

(4) Mitigation Measures

Predicted negative impacts of a project are to be minimized through project modification and/or incorporation of mitigation measures into the project. In such a case, however, it is essential that the concerns and aspirations of the affected population group be duly considered in the formulation of environmental provisions or measures. Major mitigation measures are as follows:

- alternative project siting or routing; modification of project components including project scale-down;
- establishment of preserved areas and buffer zones;
- strengthening of tropical forest conservation in other regions;
- strengthening restrictions and management structure for utilization of tropical forests;
- compensation and support for affected people;
- construction of environmental safeguard structures such as wild animal crossings;
- strengthening of capability of related agencies;
- dissemination of information on the value of tropical forest resources to the local population through education programs, etc.

2.5 Coastal Zones

(1) Definitions

Coastal zones are herein defined as coastal waters, land areas along coasts, estuaries, and inland coastal areas where human activities and natural processes affect the environments of adjacent water areas and are influenced by them. Accordingly, the coastal zones include natural features important for environmental impact assessment such as beaches, wetlands, estuaries, lagoons, coral reefs, and sand dunes. In addition, port facilities, fishing grounds, aquaculture grounds, industrial areas, tourist facilities, recreation facilities, and densely populated areas are located in the zones. Coastal zones are hence both economically and ecologically highly valuable environments. Unfortunately, development activities in these zones have the potential of seriously affecting existing facilities and natural environments. In addition, competition among diversified users for the development and utilization of resources in these zones can be expected to be fierce. Therefore, an environmental impact review alone will be insufficient for the environmental management of such coastal zones; a regional development approach instead will generally be required.

(2) Development Activities Having Significant Negative Impacts

Major agricultural development activities having significant negative impacts on the environments of coastal zones are as follows:

- development activities which involve wide-scale modification or disturbance of earth surfaces, such as land reclamation, land clearing, aquaculture development by conversion of wetlands, and reservoir construction;
- development activities which involve long-term modification or disturbance of earth surfaces along routes, such as canals, roads, etc.;
- development activities which influence hydrological regimes in coastal zones such as large-scale water resources development, drainage works, and large-scale alteration of land use in the upper reaches of basins feeding into the coastal area;
- mariculture and coastal capture fisheries;
- clearing of mangrove forests.

(3) Assessment of Environmental Impacts and Mitigation Measures

In assessing the environmental impact of development on coastal zones, predicted affects of envisaged development on the ecosystem and environment of a project area as well as effects on present and future utilization of the area by other sectors should be carefully reviewed, as coastal zones usually have extremely high socioeconomic and ecological value and hence strong competition for utilization of resources among sectors is anticipated. Furthermore, it should be borne in mind that the management of coastal zones is in many cases under the jurisdiction of several agencies with sometimes conflicting interests regarding resource use.

Information and guidance on environmental assessment and mitigation measures for environments of specific significance found in coastal zones such as wetlands and wildlands are presented in the corresponding subsections of this appendix.

2.6 Ecosystem with Biological Diversity

(1) Definitions

Biologically diverse ecosystems are areas inhabited by diversified biological species, the most representative of which are tropical forests and wetlands. Biological diversity is an important index for evaluating the tolerance of species or natural ecosystems to external stresses, and the genetic diversity of an ecosystem with biological diversity is considered to be a precious natural resource essential to human existence. The conservation of such biological diversity is a prerequisite for the preservation and utilization of the earth's biological resources and is identified as an important environmental issue for impact assessment in development planning. The conservation of endangered species is the primary objective of the CITES (see Appendix B, Section 1). The principal approach to the preservation of biological diversity includes 1) conservation of endangered species and preservation of their habitats and 2) strengthening of conservation and management of wildlands.

(2) Development Activities Having Significant Negative Impacts

Major agricultural development activities having significant negative impacts on the biological diversity of a project area are as follows:

- development activities involving wide-scale modification or disturbance of earth surfaces which directly induce negative affects on the ecosystem -- for example, land clearing, wetland development, irrigation and drainage development, reservoir construction, reclamation, and farm road construction;
- development activities which influence hydrology, such as irrigation and drainage development;
- alteration of farming systems by introduction of new livestock, increased use of agrochemicals, simplification of cropping pattern (monoculture), and introduction of exotic crops;
- development activities such as settlement which directly encroach on or accelerate encroachment on an area.

(3) Assessment of Environmental Impacts

The development components which have potential to induce significant negative impacts on biological diversity should be carefully identified in the initial stage of the project cycle

and duly reviewed in project planning or in the scoping process for an environmental impact assessment. The identification of potential significant negative impacts can take the following forms:

- identification of ecosystems of specific importance in a project area or in areas affected by a project such as tropical forests and wetlands; examination and confirmation of the regional, national, and international importance of the ecosystems;
- identification of biological diversity, and indigenous species and their habitats in the ecosystem;
- identification of development activities having significant negative impacts on the ecosystem;
- preliminary study and assessment of the extent and significance of potential negative impacts (areal and proportional extent of impacts; importance of affected ecosystem to the overall ecosystem of the country, the region, or the entire world).

(4) Mitigation Measures

Principal mitigation measures required for the conservation of biological diversity include the following:

- establishment of protected ecosystems within the area influenced by a project or the same elsewhere to offset unavoidable losses due to a project; establishment of buffer zones surrounding the subject ecosystems;
- provisions to safeguard wildlife from negative impacts of a project, such as construction of wild animal passages;
- restoration or regeneration of damaged or degraded habitats;
- creation of artificial habitats such as artificial wetlands, artificial reefs, and bird nesting sites;
- conservation and preservation of rare and endangered species.

Institutional provisions essential for mitigation of negative impacts are:

- strengthening of agencies responsible for the conservation of natural and biological resources;
- establishment and introduction of new institutions, regulations, and procedures necessary for promoting biodiversity conservation;
- education and guidance for development institutions on the conservation and management of biodiversity;

- compensation and support for people adversely affected by the implementation of conservation measures;
- support and promotion of participation of rural people and communities in conservation activities.

(5) Information on Threatened Animal Species

The Red Data Book has been published as a series by the Species Survival Commission of the IUCN (International Unions for Conservation of Nature and Natural Resources, established in 1948); it presents data on world wildlife threatened by extinction. The title of the book derives from colors used for distinguishing the status of species. In the book, endangered, vulnerable, and rare species are listed respectively on red, yellow, and white data sheets. Red Data Books on Mammalia, Aves, Reptilia, Amphibia, Pisces, Invertebrata, and flora have been published by IUCN.

Threats to wildlife, however, have recently accelerated, and revision of Red Data Books has become virtually impossible due to time requirements that render the data in a revised Book out of date by the time it is published. Therefore, IUCN has been publishing Red Lists of Threatened Animals, which set out species of vulnerable animals, categories of vulnerability, and distributions of species, aiming at ensuring periodic publication of data on species whose existence is threatened.

These Red Lists provide more recent data on endangered animal species identified by the IUCN, and supplement the Red Data Books. This sort of information on biological species is expected to be utilized as basic data for species conservation and also for prudent decisions regarding investment priority for limited financial resources. Further, the lists are utilized as principal information sources by those concerned with research and education and also by the mass-media and general public. The data supply basic information of particular importance for the promotion of international treaties on conservation of wildlife such as the CITES and Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals).

The Red Lists present the widest range of information available on endangered animal species; a summary of the Lists is indicated in the following table. A total of 3,733 animal species (including both vertebrate and invertebrate animals) are named in the Lists; among them 170 species, accounting for about 5 % of the total, are reported to be extinct. The largest number, 62, belong to the Insecta followed by Invertebrata species other than Insecta (36 species) and Mammalia (35 species). Concerning habitats of the extinct Mammalia, 17 species had inhabited Australia, 10 species were principally in island

habitats of the Pacific such as the Philippines, and 7 species were on other continents. In the case of the extinct Aves, 6 species had island habitats such as Madagascar Island, and 5 species were found in Central and South America. The extinct Pisces and Invertebrata are mostly of North American origin: 23 species of 24 extinct Pisces species, 23 of 36 Invertebrata species, and 23 of 62 Insecta species are North American. However, this may be due to the fact that the investigation of biological species in North America is particularly advanced. As for Insecta, however, the most important habitats of the extinct species were the Hawaiian Islands, which was home to 30 of such species.

No. of Threatened Animal Species in IUCN Red Lists

Unit: Nos. & %

Species	Category 1/					Total No.
	Ex No./ %	E No./ %	V No./ %	R No./ %	O No./ %	
Mammalia	35/6.4	166/30.3	143/26.1	40/7.3	163/29.8	547/100
Aves	11/1.0	111/10.3	69/6.4	122/11.4	761/70.9	1074/100
Reptilia	1/0.5	36/19.4	39/21.0	41/22.0	69/37.1	186/100
Amphibia	1/1.9	8/14.8	9/16.7	20/37.0	16/29.6	54/100
Pisces	24/7.0	79/22.9	135/39.1	83/24.1	24/7.0	345/100
Invertebrata	36/6.8	76/14.3	96/18.1	35/6.6	288/54.2	531/100
Insecta	62/6.2	117/11.7	186/18.7	120/12.0	511/51.3	996/100
Total	170	593	677	461	1832	3733

Source: 1988 IUCN Red List of Threatened Animals

Note: Invertebrata not including Insecta

1/ Category: Ex - extinct species E - endangered species

V - vulnerable species R - rare species

O - other species not precisely classified

In the Lists, the number of endangered species (E) is 593, including 166 Mammalia followed by Insecta, Aves, Pisces, and Invertebrata. In addition, the number of species classified into the vulnerable and rare categories is 1,138, accounting for about 30 % of all the species listed. The number of species which could not be classified into the four categories precisely due to limited information totals 1,832; this fact indicates the insufficiency of study and research on endangered species in the world.

2.7 Indigenous Peoples and Ethnic Minorities

(1) Definitions

Specific consideration is required when projects adversely affect indigenous peoples, low caste groups or ethnic minority groups. Especially when these groups' interests and aspirations are not duly protected or assessed because of the weakness of their social status, careful study of impacts to prevent destruction of the lands or natural resources on which their livelihood depends should be made at the planning stage of a project. In project planning it is essential that special consideration aim at formulation of development plans appropriate and acceptable to the sociocultural and economic status of these groups, because there is a high possibility that they may be unable to keep pace with rapid socioeconomic change and are thus vulnerable to dislocation and impoverishment. Groups targeted for specific consideration are as follows:

Indigenous Peoples

Indigenous peoples refer to peoples who lead a life culturally and economically closely rooted in an ancestral land or in a land in which they have been forced to dwell. These indigenous peoples strongly aspire to protect their lands and the rights to self-determination against the encroachment of other peoples.

Tribes

Tribes are groups of families descended from a common ancestor. Decisive authority on use of natural resources, including land, is generally entrusted to the elders of the clan.

Castes

Castes are exclusive social and occupational classes based on religious belief. Groups of peoples belonging to lower castes generally depend for their livelihood on farming, animal husbandry, hunting, and gathering, and form the groups most sensitive to negative impacts of a project.

Ethnic Minorities

Ethnic minorities are groups of limited population delineated by differences in dialect, race, religion, or historical background, and which are often subjected to discrimination. They usually live in a specific territory.

(2) Major Negative Impacts of Project

Negative impacts of a project on indigenous peoples and ethnic minorities include direct and indirect impacts. Direct impacts include encroachment on and degradation of lands and ecosystems utilized or occupied by these peoples, and direct influences on their lives, culture, and society due to exploitation of their resources. Indirect impacts are induced by the secondary effects of development implemented in areas proximate to their settlement. Negative impacts necessitating special attention in EIA are as follows:

- destruction of lands utilized or occupied by these peoples, depletion of the ecosystem, reduction of resources and degradation of living environment;
- exploitation of resources in lands used or occupied by these peoples and intensification of competition for resources with other dwellers;
- damage to and destruction of valuable buildings and sites for indigenous peoples or ethnic minorities;
- infestation and spread of diseases;
- adverse impacts on traditional culture and customs.

(3) Assessment of Environmental Impacts

Explicit identification at the initial stage of a project of the negative impacts listed in the previous section is essential, and the needs and aspirations of indigenous peoples and ethnic minorities should be duly incorporated into the planning of a project. Further, the adaptability of these peoples to alteration in environmental conditions should be studied and confirmed as an essential element under the EIA. In the EIA, the following aspects are to be carefully reviewed:

- land use rights: present status and impact under the project;
- resource use rights: present arrangements and impact under the project;
- economic activities such as gathering, hunting, and logging by outsiders in lands used by indigenous peoples and ethnic minorities: present status and impact under the project ;
- interests of affected peoples regarding a project: acceptable impact of a project, aspirations for development;
- assessment of capabilities of concerned local organizations to mediate boundary disputes and to examine the need and location of new boundaries or buffer zones;
- distribution of indigenous and rare species and impact of the project on the same;
- impact on social infrastructure;

- present health and sanitary conditions and effects of a project on them;
- capabilities and activities of related agencies;
- ability of affected populations to participate in development;
- capacity of lands presently utilized to maintain sustainable resource supply to support future population growth (expansion or encroachment of negative impacts into the surrounding areas);
- potential for project implementation to generate competition for existing resources.

(4) Mitigation Measures

Project impact on indigenous and ethnic minorities with weak social status should be carefully reviewed from the initial stage of a project. Modification of a project, employment of mitigation measures including special provisions for affected populations, and integration of supporting plans for the affected should be considered if any threat of negative impacts is identified. Mitigation measures to be carefully studied in a project with potential negative impacts are as follows:

- modification of development plans such as alteration of project site and route, or introduction of support mechanisms;
- formulation of a development plan which incorporates the affected population as beneficiaries;
- minimizing resettlement of inhabitants; provisions to support the affected population such as sufficient compensation, construction of socioeconomic infrastructures, and technical guidance and extension; participation of the affected populations in the formulation of supporting mechanisms;
- establishment of systems ensuring environmental impact monitoring and evaluation, and implementation of mitigation measures;
- legal protection of land use rights and rights to occupy territories;
- establishment of preserved areas;
- participation of the affected populations in formulation of development plans, management, operation and evaluation of a project and in environmental management;
- strengthening of related agencies;
- dissemination of information to local communities and peoples.

2.8 Cultural Assets

(1) Definitions

Cultural assets imply remains and structures with archaeological, historical, cultural, or religious value; the definition also includes sites with aesthetic importance. Tangible and intangible properties of this nature should be preserved and maintained as precious cultural resources. Therefore, the conservation or enhancement of cultural assets should be carefully reviewed in the EIA of a project. Consideration of potential impacts on these assets at the initial stage of a project is essential because the lack of such consideration may result in unnecessary construction delays and cost increases.

(2) Assessment of Environmental Impacts and Mitigation Measures

Development activities having potential direct impacts on cultural assets include land clearing, construction of irrigation and drainage canals, and reservoirs which involve either wide-scale or long-scale modification or disturbance of earth surfaces. Construction of large-scale structures in the vicinity of the assets is also a development activity responsible for direct negative impacts. In the environmental impact assessment, not only direct impacts but also indirect impacts such as rises in groundwater level and improved access should be carefully reviewed. Impact assessments and studies on mitigation measures should be made based on close consultation with such experts as archaeologists.

Major steps to be taken under the EIA are as follows:

- investigation of distribution of cultural assets in a project area and in areas affected by a project (when buried properties are identified, these should be excavated);
- consultation with related agencies and experts;
- assessment of direct impacts of a project at the construction stage and operation stage;
- assessment of indirect impacts of a project at the construction stage and operation stage;
- study and planning of conservation and mitigation measures.

Mitigation measures to be investigated are:

- project alternatives, including modification of project scale and components, and relocation of project site and routes;
- excavation of assets prior to project implementation;
- relocation of cultural assets;
- establishment of protected areas and access control areas;
- execution of protection and impact mitigation works;
- environmental impact monitoring;
- dissemination of information to local peoples and communities;
- strengthening and support of related agencies.

2.9 Involuntary Resettlement

(1) Definitions

Involuntary resettlement caused by land acquisition under a project is defined as the forced relocation or replacement of sites or bases on which lives and economic activities of affected peoples depend. The subject entails specific considerations such as sufficient compensation for affected populations and support for socioeconomic activities in the resettlement area. Involuntary resettlement should be avoided insofar as possible as the adverse socioeconomic effects on the people forced to move are usually great. However, when forced resettlement is thought to be unavoidable because of the importance of a project, provisions for the affected peoples should reflect their interests and aspirations.

(2) Assessment of Environmental Impacts

Essential elements in the assessment of negative impacts under involuntary resettlement are: 1) identification of impact on displaced peoples and sufficient measures supporting them, 2) confirmation of socioeconomic capability of host or affected areas to accept settlers, 3) assessment of negative impacts on the environment of host areas, and 4) measures mitigating impact on natural and socioeconomic environments of affected area. Involuntary resettlements in the past have often resulted in impoverishment and degradation of natural and social environments in host areas, and it is thus assumed that the risk of the same is considerably large. Accordingly, in a project involving unavoidable involuntary resettlement, the impact assessment and integration of mitigation measures into project planning are essential, regardless of the scale of resettlement. It is also essential that impacts on peoples and environment in host areas and on displaced peoples as well should be assessed.

Major impacts on host areas to be reviewed in the assessment are as follows:

- social environment in the host area: impact on population, society, and social organization (special attention required when the host area is a settlement of indigenous peoples or ethnic minorities);
- effects on resource use in the host area: impact on land utilization and land use rights, water, forest and biological resources, and competition for the same (including use by peoples residing outside of the subject area);
- effects on legal or customary rights on land use or occupation and on resource use;
- effects on biological resources: particularly on indigenous and rare species;

- effects on social infrastructures such as medical, education, water supply, drainage and waste disposal facilities, and the capability of these mechanism to support new population under the project;
- effects on health and sanitary conditions in the host area (disease infection);
- management capabilities of related local or regional agencies.

Collection and analysis of socioeconomic baseline data with regard to the settlers or displaced peoples is a prerequisite, and measures to provide more promising living standards than the present level should be introduced based on the baseline data.

(3) Mitigation Measures

In the case of involuntary resettlement, careful and prudent consideration of settlers as well as the natural and social environment of the host area is essential, and mitigation measures to be studied are as follows:

- detailed dissemination of information on project components and impacts on settlers and host peoples; ensured participation of the affected peoples in project formulation, monitoring, and evaluation;
- formulation of a resettlement plan on the basis of the absorption capabilities of the natural and social environments in a host area, demarcation of environmental conservation areas, introduction of control measures for environmental conservation;
- betterment of socioeconomic infrastructures in a host area over the present level;
- sufficient compensation for settlers;
- extension and support for settlers in introduction of economic activities and establishment of a base for such economic activities, which are appropriate to the capability level of settlers;
- technical extension and support for economic activities of host peoples (due care is necessary not to create income disparity between the host and resettled groups);
- employment of affected peoples in project construction work;
- monitoring and evaluation of project impacts on natural and social environments in a host area and establishment of an executing structure for required measures;
- strengthening of management capabilities of related agencies.

Appendix B International Treaties and Declarations

Section 1. Key International Treaties for Agriculture and Environment

1.1 General

Selected Multilateral Treaties in the Field of the Environment, published by UNEP in 1983, contains 76 principal treaties in total. Of these, the treaties most closely related to the agricultural sector in developing countries are the Ramsar Convention pertinent to wetland development, the Convention for the Protection of Birds, and CITES for conservation of wild fauna and flora. Outlines of these key treaties and the signatories to the same are presented in this section.

1.2 Key Treaties

(1) Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar Convention)

Date of adoption: 2 February 1971

Place of adoption: Ramsar, Iran

Objectives: To stem the progressive encroachment on and loss of wetlands now and in the future, recognizing the fundamental ecological functions of wetlands and their economic, cultural, scientific and recreational value.

Provisions:

- (a) Parties to designate at least one national wetland for inclusion in a List of Wetlands of International Importance (art. 2);
- (b) Parties to consider their international responsibilities for conservation, management and wise use of migratory stocks of wildfowl (art. 2);
- (c) Parties to establish wetland nature reserves, cooperate in exchange of information, train personnel for wetland management;
- (d) Conferences on the Conservation of Wetlands and Waterfowl to be convened as the need arises.

Signatories:(52 parties)

Algeria,	Australia,	Austria,	Bulgaria,
Canada,	Chile,	CIS,	Denmark,

Finland,	Germany,	Greece,	Hungary,
Iceland,	India,	Iran,	Italy,
Japan,	Jordan,	Mauritania,	Morocco,
Netherlands,	New Zealand,	Norway,	Pakistan,
Poland,	Portugal,	Senegal,	South Africa,
Spain,	Sweden,	Switzerland,	Tunisia,
United Kingdom of Great Britain and Northern Ireland,			
Uruguay,	Yugoslavia, etc.		

(2) International Convention for the Protection of Birds

Date of adoption: 18 October 1950

Place of adoption: Paris, France

Objectives: To protect birds in the wild state, considering that in the interests of science, the protection of nature, and the economy of each nation, all birds should as a matter of principle be protected.

Provisions:

- (a) Protection is to be given to all birds during the breeding season and migration (art. 2)
- (b) The taking of eggs and young birds is to be prohibited (art. 4)
- (c) Certain methods of hunting birds is to be prohibited or restricted, e.g. snares, nets, poisoned bait, blinded decoy birds, and capture by motor boat and motor vehicle (art. 5)
- (d) A pest species may be excepted from protection
- (e) Exceptions may also be made in the interests of science and education.

Signatories:

Belgium	China,	CIS,	Iceland,
Italy,	Japan,	Luxembourg,	Netherlands,
Spain,	Sweden,	Switzerland,	Turkey,
United States of America,	Yugoslavia, etc.		

(3) Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)

Date of adoption: 3 March 1973

Place of adoption: Washington, U.S.A.

Objectives: To protect certain endangered species from over-exploitation via a system of import/export permits.

Provisions:

(a) Includes animals and plants whether dead or alive, and any recognizable parts or derivatives thereof (art. 1)

(b) Four appendices are deposited.

Appendix I covers endangered species, trade in which is to be tightly controlled, Appendix II covers species that may become endangered unless trade is regulated,

Appendix III covers species that any party wishes to regulate and requires international co-operation to control trade.

(c) Species listed in appendices I and II must have a permit stating that export/import will not be detrimental to the survival of that species (arts. 3 and 4).

Parties of entry into force:

Algeria,	Argentina,	Australia,	Austria,
Bahamas,	Bangladesh,	Belgium,	Benin,
Bolivia,	Botswana,	Brazil,	Cameroon,
Canada,	Central African Republic,	CIS,	
Chile,	China,	Colombia,	Congo,
Costa Rica,	Cyprus,	Denmark,	Ecuador,
Egypt,	Finland,	France,	Gambia,
Germany,	Ghana,	Guatemala,	Guinea,
Guyana,	India,	Indonesia,	Iran,
Israel,	Italy,	Japan,	Jordan,
Kenya,	Liberia,	Liechtenstein,	Luxembourg,
Madagascar,	Malawi,	Malaysia,	Mauritius,
Monaco,	Morocco,	Mozambique,	Nepal,
Netherlands,	Nicaragua,	Niger,	Nigeria,
Norway,	Pakistan,	Panama,	Papua New Guinea,

Paraguay, Peru, Philippines, Portugal,
Rwanda, Saint Lucia, Senegal, Seychelles,
South Africa, Sri Lanka, Sudan, Suriname,
Sweden, Switzerland, Thailand, Togo,
Trinidad and Tobago, Tunisia, United Arab Emirates
United Kingdom of Great Britain and Northern Ireland,
United Republic of Tanzania United States of America,
Uruguay, Venezuela, Zaire, Zambia,
Zimbabwe, etc.

Section 2. International Declarations for Agriculture and Environment

2.1 General

Action on global environmental issues was initiated by the United Nations under the Stockholm Declaration on the Human Environment in June 1972. Since the beginning of the 1980's, international organizations have intensified their serious concern for the environment, and various declarations, resolutions, and recommendations have been subsequently adopted in this regard by the United Nations, OECD, etc.; for actions to be taken by industrialized countries in assisting projects in developing countries.

Some of these, which relate to or serve as references for the preparation of the Guidelines for agricultural development, are extracted and introduced herein. In particular, the recommendation by OECD is practical in its content and facilitates understanding of the background of the Guidelines.

The above-mentioned important declarations, resolutions, and recommendations are enumerated below:

(1) Declaration, etc. by United Nations

- | | |
|----------|--|
| 6. 1972 | Stockholm Declaration
The UN Conference on the Human Environment |
| 5. 1982 | Nairobi Declaration
The Governing Council of UNEP |
| 2. 1987 | Tokyo Declaration
The World Commission on Environment and Development |
| 4. 1987 | Our Common Future (WCED Report) |
| 12. 1987 | General Assembly Resolution on the WCED Report |
| 12. 1988 | General Assembly Resolution in UN Conference on Environment and Development |
| 5. 1989 | UNEP Governing Council Resolution in UN Conference on Environment and Development |
| 9. 1989 | Summary of Chairman in Tokyo Conference on Global Environment and Human Response Towards Sustainable Development |
| 12. 1989 | General Assembly Resolution in UN Conference on Environment and Development |

10. 1990 Ministerial Declaration on Environmentally Sound and Sustainable Development in Asia and the Pacific

(2) Declarations by Economic Summits (incorporating environmentally relevant provisions)

6. 1987 Economic summit in Venice
6. 1988 Economic summit in Toronto
7. 1989 Economic Summit in Arche
7. 1990 Economic summit in Houston

(3) Recommendations by OECD

6. 1985 Recommendation of the Council on Environmental Assessment of Development Assistance Projects and Programmes
10. 1986 Recommendation of the Council on Measures Required to Facilitate the Environmental Assessment of Development Assistance Projects and Programmes
2. 1989 Recommendation of the Council Concerning an Environmental Checklist for Possible Use by High-Level Decision-Makers in Bilateral and Multilateral Development Assistance Institutions
2. 1991 Joint Ministerial Meeting on Environment
12. 1991 Joint Ministerial Meeting on Environment and Development

2.2 Declarations by the United Nations and Economic Summits

Environmental declarations by the United Nations and Economic Summits which were referred to in the preparation of the Guidelines are summarized hereunder.

(1) Stockholm Declaration by the United Nations in June 1972

Of the seven proclamations under this declaration, the fourth is particularly concerned with the basic concept of environmental concerns in developing countries, as follows:

"In the developing countries most of the environmental problems are caused by under-development. Millions continue to live far below the minimum levels required for a decent human existence, deprived of adequate food and clothing, shelter and education, health and sanitation. Therefore, the developing countries must direct their efforts to development, bearing in mind their priorities and the need to safeguard and improve the

environment. For the same purpose, the industrialized countries should make efforts to reduce the gap between themselves and the developing countries. In the industrialized countries, environmental problems are generally related to industrialization and technological development."

Following the seven proclamations in the declaration, 26 principles of common conviction are stated; these include: the right to adequate conditions of life and responsibility to protect and improve the environment; safeguarding of the natural resources of the earth; maintenance and improvement of renewable resources; management of wildlife and its habitat; employment of non-renewable resources; discharge control of toxic substances; financial and technical assistance to accelerated development; education; multilateral and bilateral cooperation; etc.

Of these, assistance for protection of the environment is described as follows:

Principle 12

"Resources should be made available to preserve and improve the environment, taking into account the circumstances and particular requirements of developing countries and any costs which may emanate from their incorporating environmental safeguards into their development planning and the need for making available to them, upon their request, additional international technical and financial assistance for this purpose."

In May 1982, a tenth-year anniversary conference recalling the Stockholm Declaration was held in Nairobi and adopted the Nairobi Declaration. This declaration requests all governments and nationals to take responsibility for the protection of transfrontier pollution, assist developing countries, assist in strengthening UNEP, and developing potential resources to pass on to future generations.

(2) WCED Report , "Our Common Future"

This report was completed in 1987 by the World Commission on Environment and Development, and is summarized below:

Contents: Focus on issues of sustainable development; role of international economy; population and human resources; species and ecosystem; energy; industry; urban challenges; management of common resources; peace, security, development and the environment; and recommendation for common action.