ENVIRONMENT SAFEGUARDS

A GOOD PRACTICE SOURCEBOOK
DRAFT WORKING DOCUMENT

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Asian Development Bank

GLOSSARY

Anthropogenic Greenhouse Gases (GHGs). Greenhouse gases emitted into the atmosphere as a result of human activities and listed in the Kyoto Protocol to the United Nations Framework Convention on Climate Change. These include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydro fluorocarbons (HFCs), perfluorocarbons (PFCs), and Sulphur hexafluoride (SF_6).

Associated Facilities. Facilities that are not funded as part of a project but whose viability and existence depend exclusively on the project, or whose goods or services are essential for successful operation of the project.

Biodiversity (biological diversity). The variability among living organisms from all sources, including terrestrial, marine and other aquatic ecosystems, and the ecological complexes of which they are part. This includes diversity within species, between species, and of ecosystems.

Carbon dioxide equivalent (CO_2e). A universal standard of measurement against which the impacts of releasing (or avoiding the release of) different greenhouse gases can be evaluated over a time horizon. It is often measured in metric tons.

Chance Find Procedure. A project-specific procedure that outlines what will happen if previously unknown physical resources are encountered during project construction or operation. The procedure includes record-keeping and expert verification procedures, chain of custody instructions for movable finds, and clear criteria for potential temporary work stoppages that could be required for rapid disposition of issues related to the finds.

Cleaner Production. The concept of integrating pollution reduction into the production process and design of a product. This involves continuous application of an integrated preventive environmental strategy to processes, products, and services in order to increase overall efficiency and reduce the risks to humans and the environment through the conservation of raw materials, water and energy, and the reduction or elimination of the use of toxic and hazardous raw materials. It also includes taking advantage of renewable energy sources such as solar and geothermal.

Critical Habitat. A subset of both natural and modified habitat that deserves particular attention. Critical habitat includes: areas with high biodiversity value, including habitat required for the survival of critically endangered or endangered species; areas having special significance for endemic or restricted-range species; sites that are critical for the survival of migratory species; areas supporting globally significant concentrations or numbers of individuals of congregatory species; areas with unique assemblages of species or that are associated with key evolutionary processes or provide key ecosystem services; and areas having biodiversity of significant social, economic, or cultural importance to local communities.

Cumulative Impacts. The combination of multiple impacts from existing projects, the proposed project, and anticipated future projects that may result in significant adverse and/or beneficial impacts that cannot be expected in the case of a stand-alone project.

Emergency Response Plans. Plan to address contingencies associated with process upset and accidental circumstances. They include clearly assigned responsibilities for the assessment of the degree of risk to life and property with procedures on whom to communicate different types of emergencies and how.

Environmental Assessment. A generic term used to describe a process of environmental analysis and planning to address the environmental impacts and risks associated with a project. The assessment may take the form of an EIA, IEE, environmental audit, or Matrix of Environmental Impacts.

Environmental Audit. An instrument to determine the nature and extent of all environmental areas of concern at an existing facility or a facility under construction. The audit identifies and justifies appropriate measures to mitigate the areas of concern, estimates the cost of the measures, and recommends a schedule of implementation. For certain projects, the environmental assessment report may consist of an environmental audit alone; in other cases, the audit is part of the environmental assessment documentation.

Environmental Management Plan (EMP). A plan that guides the implementation of environmental management and mitigation measures. It contains the following key elements: mitigation measures, implementation and monitoring program, cost estimates, resource requirements, budget, and institutional arrangements.

Environmental Monitoring Plan. A plan that details environmental monitoring and reporting requirements, including parameters to be measured, methods, sampling locations, frequency of measurements, detection limits, and definition of thresholds that will signal the need for corrective actions; typically a part of an EMP.

Hazardous Waste. Substances classified as hazardous waste possess at least one of four characteristics - ignitability, corrosivity, reactivity, or toxicity - or appear on special lists.

Indirect Impacts. Adverse and/or beneficial environmental impacts that cannot be immediately traced to a project activity but can be causally linked. For example, a project's pollution may directly impact water quality in the river. This direct impact may lead to an indirect impact on fish in the river. In turn, the impact on the fish population may lead to reduced fish harvests with corresponding reductions in fishing incomes.

Induced Impacts. Adverse and/or beneficial impacts on areas and communities from unintended but predictable developments caused by a project, which may occur later or at a different location.

Integrated Pest Management. A mix of farmer-driven, ecologically based pest control practices that seek to reduce reliance on synthetic pesticides. It involves: (i) managing pests (i.e., keeping them below economically damaging levels) rather than seeking to eradicate them; (ii) relying, to the extent possible, on nonchemical measures to keep pest populations low; and (iii) selecting and applying pesticides, when they have to be used, in a way that minimizes adverse effects on beneficial organisms, humans, and the environment.

Invasive Alien Species. Non-native species of flora and fauna that are a significant threat to biodiversity due to their ability to spread rapidly and out-compete native species.

Legally Protected Areas. Areas legally designated to protect or conserve biodiversity, including areas proposed by governments for such designation.

Modified Habitat. Natural habitat that has been altered as a result of human activities such as agricultural, forestry or urban development, or through the introduction of alien species.

Natural Habitat. Land and water areas where the biological communities are formed largely by native plant and animal species, and where human activity has not essentially modified the area's primary ecological functions.

Persistent Organic Pollutants (POPs). A group of compounds that possess toxic properties, resist degradation, bioaccumulate, and are transported through air, water and migratory species across international boundaries and deposited far from their place of release where they accumulate in terrestrial and aquatic ecosystems. The 12 compounds covered under the Stockholm Convention on Persistent Organic Pollutants are Aldrin, Chlordane, Dieldrin, Endrin, Heptachlor, Hexachlorobenzene, Mirex, Toxaphene, Polychlorinated Biphenyls, DDT, PCDD (dioxin) and PCDF (furans).

Pesticides. Any substance or mixture of substances intended to prevent, destroy, repel, or mitigate any pest. Pests can be insects, mice and other animals, unwanted plants (weeds), fungi, or microorganisms like bacteria and viruses. Though often misunderstood to refer only to *insecticides*, the term pesticide also applies to herbicides, fungicides, and various other substances used to control pests.

Physical Cultural Resources. Movable or immovable objects, sites, structures, groups of structures, and natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance. Physical cultural resources may be located in urban or rural settings and may be above or below ground or under water. Their cultural interest may be at the local, provincial, national, or international level.

Polluter Pays Principle. An environmental policy principle that requires the costs of pollution or other environmental damage to be borne by those who cause it.

Pollution. The presence in the environment of both hazardous and nonhazardous pollutants in solid, liquid, or gaseous forms, as well as in other forms such as nuisance odors, noise, vibration, radiation, electromagnetic energy, and the creation of potential visual impacts including light.

Precautionary Approach. An approach to implement the principle that where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

Residual Impacts. Adverse impacts on the environment that remain after all mitigations have been applied.

Significant Conversion or Degradation. (i) the elimination or severe diminution of the integrity of a habitat caused by a major, long-term change in land or water use; or (ii) the modification of a habitat that substantially reduces the habitat's ability to maintain viable populations of its native species.

Strategic Environmental Assessment (SEA). An assessment of environmental impacts and risks associated with policies, programs and plans. An SEA may assess multiple policies, programs and plans within one study area such as a river basin.

Transboundary Impacts. Impacts that extend to multiple countries, beyond the host country of the project, but are not global in nature.

ABBREVIATIONS

ADB	–	Asian Development Bank
BAP	–	biodiversity action plan
CO_{2e}	–	carbon dioxide equivalent
DMCs	–	developing member countries
EARF	–	Environmental Assessment and Review Framework
EHS	–	environment, health, and safety (guidelines)
EIA	–	environmental impact assessment
EMP	–	environmental management plan
ESMS	–	environmental and social management system
FAO	–	Food and Agriculture Organization
FI	–	financial intermediary
GHG	–	greenhouse gas
GIIP	–	good international industry practice
GRM	–	grievance redress mechanism
GWP	–	global warming potential
IEE	–	initial environmental examination
IFC	–	International Finance Corporation
IPM	–	integrated pest management
IUCN	–	International Union for the Conservation of Nature
IVM	–	integrated vector management
MFF	–	multi-tranche financing facility
NGO	–	non-government organization
OECD	–	Organisation for Economic Co-operation and Development
POPs	–	persistent organic pollutants
SEA	–	strategic environmental assessment
SPS	–	safeguard policy statement
UNEP	–	United Nations Environment Programme
UNIDO	–	United Nations Industrial Development Organization
UNESCO	–	United Nations Education, Scientific and Cultural Organization
WHO	–	World Health Organization

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I. INTRODUCTION

A. Safeguard Policy Statement

1. In July 2009, ADB's Board of Directors approved the Safeguard Policy Statement (SPS)[1] governing the environment and social safeguards of ADB's operations. The SPS builds upon and enhances the relevance and effectiveness of the three previous ADB safeguard policies[2] on the environment, involuntary resettlement and indigenous peoples by bringing them together into one consolidated safeguard policy framework. The SPS became effective in January 2010.

2. The goal of the SPS is to promote the environmental and social sustainability of ADB-supported projects by protecting people and their environment from potential adverse impacts and enhancing the benefits provided. This goal is integral to achieving environmentally sustainable and socially inclusive growth and poverty reduction in Asia and the Pacific, a defining element of ADB's Long-Term Strategic Framework, Strategy 2020.[3] In this context, the SPS is one of ADB's key policy instruments for achieving its corporate vision and mission under Strategy 2020.[4]

3. The SPS sets out the policy objectives, scope, triggers, principles and requirements for three key safeguard areas:

- environmental safeguards
- involuntary resettlement safeguards
- Indigenous Peoples safeguards

4. In transforming the SPS commitment into results on the ground, ADB and its borrowers/clients take shared but differentiated responsibilities and actions. ADB has responsibility for explaining the policy requirements to borrowers/clients, and helping borrowers/clients meet these requirements during project processing and implementation through due diligence, review, supervision, and capacity-building programs. Borrowers/clients are required to undertake environmental and social assessments, engage affected people and communities through information disclosure and consultations, prepare and implement safeguard plans, monitor the implementation of these plans, and prepare and submit monitoring reports.

5. The SPS applies to all ADB-financed sovereign and non-sovereign projects, and project components that are associated with ADB-supported projects, regardless of whether these components are financed by ADB, the borrower/client, or co-financiers.[5] ADB will not finance projects that do not comply with the requirements laid out in the SPS. Nor will it finance projects that do not comply with the host country's laws and regulations, including those for which the implementing host country has obligations under international law.

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[1] ADB. 2009. *Safeguard Policy Statement*. Manila.
[2] ADB. *Environment Policy* (2002), *Involuntary Resettlement Policy* (1995), *Indigenous Peoples Policy* (1998).
[3] ADB. 2008. *Strategy 2020: Working for an Asia Pacific Free of Poverty.* Manila.
[4] See http://www.adb.org/sites/default/files/Strategy2020-print.pdf for more details.
[5] The term "project components" does not include facilities that are not funded as part of the project and therefore are not under the control or influence of the borrower/client and ADB. ADB due diligence will be conducted to determine the level of risk to the environment and affected persons and to ADB by association.

B. Overview of the Sourcebook

1. Purpose and Scope

6. This Sourcebook focuses on the SPS requirements for environmental safeguards. It does not establish or change policy. Instead, it aims to increase the likelihood that each ADB-supported project will achieve the objectives of the environment safeguards set out in the SPS, by adding clarity, providing further technical guidance, and recommending good practices in the implementation of the SPS. This Sourcebook is based on ADB's experience in environmental assessment and management, and international good practices adopted by other multilateral development banks. It updates ADB's previous *Environmental Assessment Guidelines.*[6]

7. The Sourcebook does not seek to be a definitive and exhaustive reference. Similar materials from multilateral development banks such as the World Bank Group's Environmental, Health and Safety Guidelines[7] and other environmental assessment references provide useful additional information.[8] The Sourcebook is for the use of ADB staff, borrowers/clients and executing agencies, and consultants and other environmental practitioners, including non-government organizations and civil society. It is a working document that will be updated periodically in light of lessons learned from the application of the SPS.

2. Outlook: Environmental Safeguards Integrated into Project Design and Implementation

8. The SPS requirements for environmental safeguards support the integration of environmental considerations into the project decision-making process. They are triggered if a proposed project is likely to have environmental impacts and risks to the physical, biological, socioeconomic, and/or physical cultural resources in the project's area of influence. Socioeconomic factors informing SPS environmental safeguard requirements include potential impacts on livelihood through environmental media, health and safety, vulnerable groups, and gender issues.

9. In complying with the SPS requirements, it is crucial for ADB's borrowers/clients to take note that: (i) environmentally sustainable projects are primarily achieved through a good project design during project preparation and effective environmental management during project implementation; ii) integrating environmental considerations into the project feasibility study and design calls for the incorporation of environmental assessment and management into the economic, financial, institutional, social, and technical analysis of a project; and (iii) good environmental assessment and management enables the continued improvement of environmental performance throughout the life of a project, and can lead to enhanced economic, financial, and social outcomes. By making it easier for ADB's borrowers/clients to understand and comply with the SPS safeguards requirements, this Sourcebook hopes to contribute in fulfilling ADB's commitment to ensure the environmental soundness and sustainability of ADB-supported projects by integrating the environmental assessment and management process into all stages of the project cycle, from project feasibility study and design, onto construction and operation management, and decommissioning.

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[6] ADB, 2003. *Environmental Assessment Guidelines*. Manila.
[7] http://www.ifc.org/ifcext/sustainability.nsf/Content/EHSGuidelines
[8] See a list of references at the end of each chapter.

3. Organization

10. The Sourcebook has seven chapters. Following this introduction, Chapter II describes the standard environmental assessment process, and provides practical advice on each step of the process. These steps include project screening, scoping, analysis of alternatives, assessing impacts and recommending mitigation measures, engaging communities through information disclosure and meaningful consultation, and preparing an environmental management plan. Chapter III summarizes the environmental assessment instruments required by ADB for its different financing modalities. Chapters IV–VIII provide technical guidance on each of the four core environmental issues for environmental assessment and management: health and safety (Chapter IV); biodiversity conservation and sustainable natural resource management (Chapter V); pollution prevention and abatement (Chapter VI); and physical cultural resources (Chapter VII).

II. THE ENVIRONMENTAL ASSESSMENT PROCESS

A. Environmental Assessment throughout the Project Cycle

11. An environmental assessment is a generic term describing a process of environmental analysis and planning to address the environmental impacts and risks associated with a project. For a proposed project likely to have environmental impacts and risks, ADB requires the borrower/client to undertake environmental assessment to identify and assess the potential environmental impacts, and design and implement appropriate mitigation, management, and monitoring measures to address such impacts and risks.

12. The environmental assessment and planning process is most effective when initiated early during project preparation as it allows the borrower/client to:

- Assess relevant potential impacts and risks associated with the proposed project.
- Assess the compliance of the proposed project against applicable ADB requirements and environmental laws and regulations of the jurisdictions in which the project operates.
- Incorporate impact avoidance and mitigation measures early into the project design process so that they can be easily accommodated.

13. Delays in the implementation of a project because environmental issues were not considered during the design phase can be significantly more costly than conducting a focused and comprehensive environmental assessment at the outset. In some cases, the environmental assessment may identify problems that are so serious that the project does not proceed.

14. The environmental assessment should analyze and document potential impacts and risks for every key stage of the project cycle, covering design and planning, construction, operation, and decommissioning/closure. , Environmental assessment is therefore not a one-time report prepared at the project feasibility stage but in accordance with international good practice should take place until project-end. Effective environmental assessment and management contain all the elements deemed necessary and appropriate to “plan, do, check, act,” and address problems as they arise, regardless of the project phase.

15. The activities and outputs of the environmental assessment process will vary with the nature of each project and the host country context. The level of detail and comprehensiveness of an environmental assessment report should be commensurate with the impacts and risks of the project. Nevertheless, environmental assessment and management for ADB-supported projects typically includes the following:

- **Screening and Categorization:** determines the requirement for, and type of environmental assessment that has to be undertaken.
- **Scoping:** identifies significant potential project impacts (environmental and social), providing a clear focus for the environmental assessment, and outlines the content of the assessment report and important studies usually in the form of terms of reference (ToR).
- **Analysis of Alternatives:** considers all feasible alternatives for improving project implementation and outcomes, taking account of economic, financial, technical, environmental and social factors.

- **Project Description:** summarizes the project site, design, and operation details to provide an understanding of the project, its activities, and environmental impacts.
- **Policy, Legal and Administrative Framework:** describes relevant national and local laws, and regulations and policies that the project is subject to, as well as the standards and guidelines that apply, including ADB requirements.
- **Baseline Environment:** describes current environmental and social conditions, focusing on features that relate to potential project impacts. This description is quantitative, where possible, providing the data required for detailed impact analysis.
- **Impact and Risk Assessment:** analyzes in an integrated manner all potential project impacts on physical, biological, socioeconomic and physical cultural resources, and identifies and addresses risks in terms of institutional capacity and commitment to managing environmental impacts.
- **Environmental Management Plan (EMP):** sets out the proposed impact mitigation measures, management responsibilities, institutional arrangements, monitoring and reporting requirements, emergency response procedures, capacity development and training measures, implementation schedule, cost estimates, and performance indicators.
- **Information Disclosure:** delivers information about the project to the general public, affected communities and other stakeholders, starting early during project development and continuing throughout the life of the project.
- **Consultation and Participation:** involves carrying out meaningful consultation with affected people and other relevant stakeholders including civil society, and facilitating their informed participation.
- **Grievance Redress Mechanism Development:** establishes a systematic process for receiving, evaluating and addressing affected people's project-related concerns, complaints, and grievances.
- **EMP Implementation:** involves implementation of the management actions set out in the EMP.
- **Monitoring and Reporting:** monitors EMP implementation and its effectiveness, and documents and reports monitoring results, including the development and implementation of a corrective action plan where required.

16. Most environmental assessment preparation tasks (apart from project screening and categorization) are undertaken concurrently, allowing new information to contribute to each part of the process. The following sections provide guidance and recommend good practices for each of the main tasks.

B. Project Screening and Categorization

17. Project screening and categorization are undertaken in accordance with ADB requirements and any applicable national conditions. They should:

- Provide an initial indication of the significance of the project's potential environmental impacts and risks.

- Identify the type and extent of environmental assessment[9] and institutional resources required for environmental assessment and planning, commensurate with the impacts and risks of the project to be financed.

18. At the earliest possible stage in the project cycle (typically at project identification), ADB, in consultation with the borrower/client, will screen and categorize the project based on the significance of the potential environmental impacts and risks. This involves consideration of the sensitivity and magnitude of the potential environmental impacts as a result of the project type, location, and scale (during construction and operation). The environment category of a proposed project is determined on the basis of the project's most environmentally sensitive component.

19. ADB's sector-based rapid environmental assessment (REA) checklists are used to assist with screening and categorization. These checklists identify potential site sensitivity issues and the main potential impacts of each project type. At the minimum, basic information on project design and operation, the proposed project site/s, and general site features is required to complete categorization.

20. ADB assigns one of the following environmental categories to the proposed project:

- **Category A**. The project is likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented. Impacts may affect an area larger than the sites or facilities subject to physical works. A full-scale environmental impact assessment (EIA), including an environmental management plan (EMP), has to be prepared by the borrower/client.
- **Category B**. The project's potential environmental impacts are less adverse and fewer in number than those in category A. Impacts are site-specific, few of which, if any, are irreversible. Impacts can be readily addressed through mitigation measures. An initial environmental examination (IEE), including an EMP, has to be prepared by the borrower/client.
- **Category C**. The project is likely to have minimal or no adverse environmental impacts. An EIA or IEE is not required, but ADB will conduct a desk review of the project's environmental implications.
- **Category FI**. The project involves the investment of ADB funds to or through a financial intermediary.

21. Project categorization is not a simple matter of assigning a category based on a mechanical list of project type and size. Although project type and size are major determinants of environmental category, the project site, design and operating processes also have to be considered to identify the most significant adverse impacts. For this reason, professional judgment is important in weighing the variables to categorize a project. For example, while a wind farm is likely to be categorized as B for most sites, if it is proposed in an ecologically sensitive area or in the viewshed of a significant historic site, it could fall under category A.

[9] "Type" refers to strategic environmental assessment (SEA), project environmental assessment, or compliance audit. "Extent" refers to a full environmental impact assessment for Category A projects, and an initial environmental examination for Category B projects.

22. Project categorization required by ADB member countries to satisfy the host country project planning requirements may or may not align with ADB's criteria. ADB adheres to its own criteria in order to ensure uniformity and consistency in the categorization process.

C. Scoping for Environmental Assessment

23. The primary functions of scoping are to identify and focus the environmental assessment on significant environmental issues, and to establish a logical roadmap for the assessment process. By identifying the project's key environmental and social issues at the start of the assessment process, significant impacts are far less likely to be missed or inadequately assessed, reducing the likelihood of time and cost overruns, and a loss of assessment credibility. Scoping done well is the first step in building stakeholder confidence in the environmental assessment.

24. **Method**. Scoping is undertaken very early in the environmental assessment process, usually once the initial project outline and preliminary environmental information are available, so as to enable a reasonable initial assessment of the issues. The scoping process may range from a comprehensive analysis for complex category A projects to a relatively simple process for low impact category B projects.

25. Scoping usually commences with the identification of the mandatory national and local environmental scoping requirements, if these exist, followed by actions to meet additional ADB requirements for scoping, as necessary. For complex projects, scoping may involve the following tasks, many of which may be undertaken but in far less detail for simpler projects:

- assembling an initial project description and basic site environmental and social information (primarily sourced from project feasibility reports, site inspections, and secondary data such as reference texts, surveys, maps, satellite imagery, etc.)
- identification and review of national/local project planning requirements, including preliminary discussions with national/local approving authorities on the assessment requirements, process, and important issues
- initial identification of the major environmental and social impact issues
- dissemination of project summary information to interested parties
- informal discussions with local people, community representatives and NGOs to get feedback on issues of importance
- convening scoping meeting/s of interested parties to more fully introduce the proposal, identify the range of issues, and establish the focus issues
- drafting the terms of reference for the environmental assessment

26. **Identification of issues**. Initial issue identification involves consideration of the initial design and operating regime of the project, and the typical environmental and social impacts likely to be caused by the type of project being proposed. This should generate a reasonable picture of the likely project impacts. The World Bank Group's Environment, Health and Safety (EHS) guidelines provide useful summaries of sector-specific impacts and management measures that may be undertaken for a broad range of projects.

27. Assessing the relative significance of issues is often based on public concern and specialist opinion, grounded in previous experience with the project type, project area and similar sites. Different project types often have similar major issues such as types of emissions

or effluent. However, it has to be stressed that issues are always project-specific, hence, the need for identifying them for each proposed project.

28. Consultation during scoping commonly results in a long list of environmental and social issues being identified due to the range of stakeholder interests. It is therefore important to discern which issues are significant. Identifying the key issues is ideally done as the final task of a scoping meeting or overall issue identification among key stakeholders. This ensures that the environmental assessment team understands where their concerns fit relative to those of the others, ideally reaching consensus on the assessment's focus. Issues may change in importance as additional information is obtained during assessment preparation. But if scoping is done well, there are far fewer surprises.

29. **Level of detail and comprehensiveness**. The level of detail and comprehensiveness of an environmental assessment should be commensurate with the project complexity and significance of the potential impacts and risks. Projects with limited potential impacts and risks can focus the assessment on the key ones identified during scoping. Projects with a broad range of potential significant impacts and risks should conduct a broader assessment of direct, indirect, cumulative and induced impacts, as appropriate.

30. **Terms of reference**. The output of scoping is usually a ToR for the environmental assessment, tailored to the project. The ToR may be formally required by the host government in accordance with national environmental assessment procedures. It is encouraged that the ToR for each environmental specialist under a project preparatory technical assistance be prepared based on the scoping results. The ToR is an indispensable plan, particularly for category A projects, because it establishes the scope of the environmental assessment and a clear plan of action to prepare it.

31. The ToR usually provides:

- a summary description of the main project features (with a location map and project layout diagram)
- a list of applicable national, local and ADB environmental assessment requirements
- summary discussions of significant issues (environmental and social)
- a list of feasible project alternatives that will be considered
- an outline of the main impact assessment studies to be undertaken
- a budget and program for the environmental assessment

32. The ToR should also include the detailed terms of reference for each of the main environmental and social impact assessment studies. If information is inadequate or not immediately available to determine the details of these studies, the ToR should be flexible enough to accommodate these studies as further information is obtained and new issues may emerge during the assessment preparation.

D. Analysis of Alternatives

33. The SPS requires an analysis of project alternatives for all category A projects to determine the best method of achieving project objectives while minimizing environmental and social impacts. This analysis is an important element of the environmental assessment process as it brings environmental and social considerations into early decision making (at the stage of

feasibility study), providing the main opportunity to avoid and, if avoidance is not possible, minimize adverse environmental impacts and risks. A serious analysis of alternatives can also reduce the project cost, assist in gaining greater public support for the project, and improve the likelihood of project approval. If this opportunity is foregone, the best that can be achieved in most instances is damage limitation by applying impact mitigation measures during project implementation.

34. The analysis of alternatives has to commence early in the design process when project managers and designers/engineers are open to change, and improvements can be made without disrupting or backpedaling on project planning and design.

35. The unbiased consideration of alternatives to achieve design optimization requires a balance between economic, technical, environmental, and social factors, trading off the relative merits and disadvantages of each factor to arrive at the optimum outcome. For this reason, the consideration of alternatives should be conducted in collaboration with the project design/engineering team so that all reasonably feasible alternatives are identified and analyzed. The analysis should consider capital and recurrent costs, suitability of the design/technology to local conditions, and potential environmental and social impacts, including the feasibility of mitigating unavoidable adverse impacts.

36. The analysis of project alternatives can occur at two levels:

- alternative methods of delivering the required service (e.g. additional energy can be supplied by different forms of generation, urban waste management can be achieved by waste incineration or landfill disposal)

(i) alternative project design – location, technology, design, and processes

37. **Method of delivering the service**. A realistic consideration of alternative methods to deliver the required service is unlikely to occur, once a project is already being proposed (e.g. when a wind power project is proposed to provide additional power, the realistic consideration of other forms of energy generation is unlikely to occur). The reasons why the proposed method or project type was selected over others should be documented in the environmental assessment. Project selection rationale is usually described in the project feasibility reports or other early project planning documents, and is often supported by related government policies and plans.

38. **Location**. Careful project siting is one of the most effective ways of avoiding or reducing adverse impacts. This is particularly important for the alignment of linear infrastructure such as roads, transmission lines and pipelines where small deviations can avoid significant features (e.g. avoidance of critical habitat, minimization of resettlement). The siting of non-linear projects also benefits from careful consideration. For example, the most environmentally benign hydroelectric dam sites are commonly located on upper tributaries, while the most problematic ones are on the lower reaches of rivers. Alternative locations may be considered for the entire project (e.g. a port facility) or components (e.g. the location of a bridge as part of a road project).

39. **Technology**. The use of different technologies can produce large differences in environmental impact (e.g. subcritical versus supercritical boilers in thermal power plants).

40. **Design**. This may include alternative approaches to any aspect of project design (e.g. height of and span between transmission towers; a road tunnel versus a longer road diversion around a hill; bridges versus embankment in wetlands for road development).

41. **Processes**. Different operating processes or methods influence project impacts (e.g. varying the timing and volume of hydropower generation releases can provide an appropriate downstream flow or allow the river to dry out).

42. The analysis of alternatives must also address the "no project" alternative. This will generally indicate the (i) beneficial outcome and net contribution to development that would be foregone without the project, and (ii) the main adverse impacts that would be avoided without the project.

43. In most instances, it is ideal for the analysis of alternatives to be conducted by a multidisciplinary team that combines environmental, social, technical and economic/financial expertise so that these different factors are adequately considered to a similar level and weighed against each other/traded off to select the best option.

44. A staged approach to alternative analysis may be appropriate. This can commence with the identification of a first cut of alternatives based on economic, technical, environmental and social factors, followed by the determination of the selection criteria, and then the conduct of a detailed analysis/comparison of alternatives. The selection criteria should consist of important differentiating features, ideally quantifiable to allow a direct objective comparison. Single (e.g. cost) or multiple (e.g. cost, savings) criteria may be used under each main factor.

45. The analysis of alternatives may be undertaken prior to the consultation. Nevertheless, it is important to consider the views of interested parties when choosing both the selection criteria and alternatives to be assessed, as support for or opposition to an alternative may be a key determinant of whether it is feasible or not. In addition, local knowledge can provide valuable insights on local conditions that can assist in site selection (e.g. record of local flood levels). Conversely, not presenting the proposed alternative and the criteria used in the selection process can create community resistance.

46. An overriding "no go" block may also be incorporated in the selection process if a significant and unacceptable environmental or social impact is identified to warrant curtailing further consideration of the alternative (e.g. significant conversion or degradation of a critical habitat on a project site). This prevents an unacceptable alternative from being preferred based on the net sum of its merits against all selection criteria.

E. Project Description

47. A clear project description is required to understand project facilities, sites, activities, and processes. The project description, as part of an environmental assessment report, should provide a clear picture of the proposed project facilities and activities. The type of information and level of detail to be provided should be directly related to the likely environmental and social adverse impacts and benefits. Relevant material should be selectively summarized from project feasibility/design reports, avoiding the inclusion of extensive design information that adds little to understanding the likely environmental and social impacts. The summary project description should ideally include:

(i) project type and size/magnitude – industry sector, capacity/dimensions, new/existing facilities, associated facilities and activities[10]
- project proponent
- need for the project in the context of national or local development program and plan

(ii) location – state/province, district/s, nearby town/s and notable features
- site layout and general site description: area, alignment, current land use and built features, etc.

(iii) project structure/facility design and total cost – capacity, length, height, etc.
- operating processes and activities

(iv) development program, schedule and main construction activities – approval, construction and operation

48. Figures, diagrams, maps, aerial photos and/or satellite images should be provided to clearly illustrate the site location, project layout, main project features and features in proximity to the project. Topographic maps and satellite imagery are particularly useful to show site location and adjacent features for linear facilities, and may be freely available from the web (e.g. Google Earth).

F. Applicable Policy, Legal and Administrative Framework and Standards

49. A summary discussion of the policies, laws, regulations, standards and guidelines that directly apply or relate to the project's environmental and social issues at the national and local level and with regard to ADB requirements, should be presented. This serves to explain the context of the project or constraints on factors such as project siting and design, approval requirements, mitigation measures, emission/discharge or ambient standards, public consultation, monitoring, and reporting. The summary also assists in ensuring that all relevant planning approvals are identified.

50. This discussion includes a description of the specific performance standards or guidelines that will be applied. ADB expects project performance to meet national and local standards as well as the World Bank Group's Environmental, Health, and Safety (EHS) Guidelines. The EHS Guidelines contain general and industry-specific examples of good international industry practice. The guideline performance levels and measures are normally acceptable to ADB, and are generally considered to be achievable in new facilities at reasonable cost using existing technology. The EHS guidelines consist of two parts:

- **General EHS Guidelines**: provide information on cross-cutting environmental, health, and safety issues potentially applicable to all industry sectors. It is designed and should be used together with the relevant industry sector guideline/s, as below.
- **Industry guidelines**: contain industry-specific impact and management guidelines, performance indicators and monitoring for over 60 different industry sectors.

51. For ADB-financed projects, application of the EHS Guidelines to existing facilities may involve the establishment of site-specific targets and a timetable for achieving these targets.

[10] Associated facilities are facilities that are not funded as part of a project but whose viability and existence depend exclusively on the project, and whose goods or services are essential for successful operation of the project (SPS Appendix 1, paragraph 6).

The environmental assessment process may recommend alternative (higher or lower) levels or measures, which, if acceptable to ADB, become project-specific or site-specific requirements.

52. When national regulations differ from the performance levels and measures presented in the EHS Guidelines, projects are expected to achieve whichever is more stringent. On occasions, if less stringent levels or measures are appropriate in view of specific project circumstances, full and detailed justification of the applied standard or guideline should be presented in the environmental assessment. This justification should demonstrate that the chosen alternative's performance level is protective of human health and the environment.

53. It is important that this section of the environmental assessment report only covers directly relevant material rather than (i) citing applicable policies, laws, regulations, standards, and guidelines without identifying and explaining the specific parts that apply to the project, or (ii) providing a long list that contains many references of little relevance.

G. Baseline Environment

54. A description of baseline environmental and social conditions (current conditions without the project) is required to provide an understanding of current conditions forming the benchmark against which project effects are predicted in the environmental assessment and measured during project implementation.

55. **Scope**. The type of baseline environment and social information and level of detail presented in the environmental assessment report have to be relevant to the likely project environmental impacts. The information gathered and provided should help to explain the project's potential impacts, covering the range of physical, biological, socioeconomic and physical cultural features that will be affected on site and in the project's area of influence. It has to provide a comprehensive picture of the conditions that may be affected by the project or influence the impacts. For example, long-term river flow data is required to establish the existing hydrological conditions that will be affected by a hydropower project, whereas relatively limited air quality information is needed for this project as it will have a minor and short-term effect on the airshed.

56. Information is usually presented for different spatial levels, depending on the area of influence of different impact issues [e.g. project sites, immediately adjoining area (e.g. within 1 km), broader affected area or spatial feature (e.g. watershed, airshed), a biological feature or resource (e.g. forest, protected area, reef system), an administrative area (regional, national, trans-boundary)]. Information on the site, adjoining area and broader affected areas is normally the most critical, with larger scale information usually of less relevance.

57. Baseline information should be provided in quantitative terms to the extent possible. For example, where applicable national or international benchmarks or standards in quantitative terms exist (e.g. standards on ambient air and water quality, noise, and vibration), quantitative data reflecting baseline environment should be collected and comparison with the benchmarks/standards should be conducted and documented. Another example is the need to quantify existing biodiversity status, to assess potential biodiversity loss and design an offset program, in a project with likely significant residual adverse impacts on biodiversity.

58. **Data sources**. Baseline data sources can be primary or secondary. There is a distinct need for primary data in certain cases. For example, a project involving large-scale vegetation removal would require primary data on the existing vegetation types and species in order to

enable accurate impact analysis. The district or regional level description of vegetation types, often provided in impact assessments and usually based on secondary data, is of relatively little importance here. Primary data, collected through project site inspections and surveys, and interviews and monitoring, is usually required to accurately describe project site conditions and adjoining features. Primary data collection normally requires specialist input to ensure that standard data collection practices are correctly followed, and data quality is high. Where standard national or international survey and analysis methods exist, these methods should be used (e.g. water quality field sampling, water quality parameters testing, and laboratory analysis).

59. Some data may have to be collected over an extended period of time, particularly for features that are seasonally variable (e.g. river flows) or difficult to identify during some periods of the year (e.g. deciduous vegetation species). When the ideal data collection period exceeds the environmental assessment period, data collection should continue over the minimum period required to obtain reliable data. This allows comparison of the conditions prior to and during project implementation, and management measures to be refined. Data showing trends in conditions over time is useful where conditions are changing (e.g. local population increase, district forest decrease).

60. Secondary data (e.g. statistical records, government reports, NGO publications, academic studies and texts)[11] is usually the starting point in establishing baseline conditions as it is readily available, and cost- and time-effective to obtain. Secondary data is particularly useful in describing the context or broader environment in which the project sits (i.e. district, regional and national conditions) and showing historical trends in conditions over time. But it usually does not provide the level of detail necessary to assess site impacts, and therefore should not be overly relied upon. As secondary data is obtained, gaps can be identified, particularly the need for up-to-date data and site-specific research. Secondary data commonly available in most developing member countries (DMCs) includes topographic maps, aerial photos, meteorological records, agricultural statistics, census information, and district statistics. Global satellite images are available from a range of commercial and open sources. But secondary data is often lacking on subjects such as local vegetation and fauna, aquatic ecology, air quality (apart from major urban airsheds), noise levels, water quality (apart from major rivers), and local resource use, particularly at the site level. In these instances, the collection of primary data is the only means of filling the gaps.

61. It is good practice to summarize baseline and impact analysis from the social studies conducted to meet ADB's social analysis and safeguard requirements for involuntary resettlement (SR2) or Indigenous Peoples (SR3), and present them in the relevant sections of the environmental assessment. This will avoid additional data collection and studies, and ensure consistency across all project reports.

62. For an EIA, the baseline description is usually extensive and may be conveniently arranged under the sub-headings "physical", "biological", "socioeconomic", and "physical cultural resources." Voluminous material that does not enhance the reader's understanding of the key environmental and social issues should not be included. Where a detailed study is done on a specific issue such as a vegetation survey, it is standard practice for summaries to be provided in the baseline and impact analysis sections and the entire study to be presented in an appendix or annex volume of the environmental assessment.

[11] Secondary data are data obtained from existing internal or external sources; primary data are collected directly by or for the borrower (e.g. surveys, sampling, monitoring, or other primary data collection techniques).

63. Limitations of the baseline data such as coverage (time period and area) and quality of available data, assumptions and key data gaps, and uncertainties associated with predictions should be clearly discussed in environmental assessment reports. For example, a survey of aquatic ecology may have been undertaken during a single season whereas different conditions are known to occur at other times of the year.

H. Impact and Risk Analysis

64. The analysis of project impacts and risks is the technical heart of the environmental assessment process, providing a comprehensive net appraisal of the project's effects on the environment and socioeconomic conditions. Potential impacts and risks have to be evaluated against the applicable laws and regulations of the host country and ADB's requirements as set out in the SPS.[12]

1. Type and Scope of Impacts and Risks

65. Impact analysis needs to consider all potential environmental impacts and risks of the project, while focusing on the major ones identified through scoping or subsequently as additional information is obtained. The analysis should cover both adverse and beneficial effects over time to fully describe the net project effect. Adverse environmental impacts are negative impacts on physical, biological, socioeconomic (including impacts on livelihood through environmental media, health and safety, vulnerable groups, and gender issues), and physical cultural resources. Notable benefits could be environmental (e.g. a wind power project indirectly reduces emissions of pollutants and greenhouse gases; a new reservoir forms a migratory bird resting area), social (e.g. the project provides jobs and improves community facilities for health and safety), or economic (e.g. substantial royalties and taxes are paid by the project to the government).

66. Impact analysis should consider the following features when they are potentially affected by the project:

- **physical** – surface and ground water, air, soil, land use, landform/topography, noise, vibration, geology, seismicity and other natural hazards, resource use, waste, greenhouse gases, etc.
- **biological** – terrestrial and aquatic flora and fauna, habitat and ecosystems, endangered or critically endangered species, protected areas, etc.
- **socioeconomic** – occupational health and safety, community health and safety, impacts on vulnerable groups and gender issues, impacts on livelihoods through environmental media (e.g. project river pollution or river flow reduction decreases downstream fishing yields),[13] visual impact, etc.
- **physical cultural resources** – movable or immovable objects, sites, structures, groups of structures, and natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance[14]

[12] Appendix 1 of the SPS identifies specific environmental safeguard requirements pertaining to biodiversity conservation and sustainable management of natural resources, pollution prevention and abatement, occupational and community health and safety, and conservation of physical cultural resources.
[13] See ADB's Safeguard Policy Statement Appendix 2 paragraph 6 for more information.
[14] See ADB's Safeguard Policy Statement footnote 13.

67. Risk analysis should consider the project developer's capacity to manage the project's environmental and social impacts, as well as the potential for issues to arise due to project activities.

68. Project impacts and risks should be analyzed in the context of the project's area of influence. The area of influence may span:

- Primary project site/s and ancillary facility sites that will be owned, developed, operated or managed by the borrower/client or its contractors. Examples of ancillary facilities include access roads, borrow pits, spoil disposal areas, pipelines, canals, tunnels, depots and construction camps.
- Associated facilities not funded by the project but whose existence and viability are entirely dependent on the project and whose services are essential to project operation. Examples of associated facilities are a transmission line constructed by government for the sole purpose of connecting an ADB-supported hydropower project to the existing electricity grid, and a gas pipeline installed by the gas supplier to supply an ADB-supported thermal power plant. Even though the impacts and mitigation measures from the development of associated facilities do not have to be analyzed in detail in the EIA/IEE of the project financed by ADB, basic information about the main design features, their location, the significance of potential impacts, the required approval process, and institutional arrangements should be described in the EIA/IEE. ADB reviews these facilities as part of its due diligence to determine if the associated level of impacts and risks to the environment and people is acceptable, recognizing that the borrower/client should address these impacts and risks in a manner that is commensurate to the borrower/client's control and influence over the associated facilities.
- Areas and communities potentially affected by cumulative impacts from further planned development of the project, other sources of similar impacts in the geographical area, any exiting project or condition, and other project-related developments that are realistically defined at the time the assessment is undertaken. The combination of multiple impacts from existing, the proposed, and anticipated future projects may result in significant cumulative impacts (positive or negative), which cannot not be expected in the case of stand-alone projects. Examples are incremental contribution of pollution emission by a new thermal power plant in an airshed, reduction of water flow in a watershed due to multiple withdrawals, and increased pressure on the survival of wildlife species in a given ecosystem. [15]
- Area and communities potentially affected by induced impacts from unplanned but predictable developments or activities caused by the project, which may occur later or at a different location. For example, a new road constructed through an intact forest provides access to a gas field. The road improves access to previously difficult to reach forest resources, resulting in illegal logging, local settlement and agricultural activities.

69. Project impacts may include transboundary and global effects. Transboundary impacts extend beyond the country where the project is located but are not global in nature (e.g. large scale water abstraction from an international river, air pollution adjacent to an international

[15] See Section C of Chapter III for details on the assessment of cumulative impacts.

border). In such cases, the significance of potential impacts should be assessed in light of commitments contained in applicable international agreements. The borrower/client may be required to notify the affected country or countries about the proposed project.

70. **Vulnerable groups and gender.** The potential for particular individuals and groups to be differentially or disproportionately affected by the project's potential adverse environmental impacts because of their disadvantaged or vulnerable status has to be analyzed. Such groups include the poor, women, and Indigenous Peoples. For example, a project may have different impacts on women and men due to their different socioeconomic roles and varying degrees of access and control over assets, productive resources and employment opportunities. Where it is anticipated that the project will have impacts on different groups and communities, vulnerable individuals or groups should be identified and disaggregated data should be collected, if possible. Specific or targeted measures for consultations and mitigation of the impacts have to be proposed, as necessary.

2. Impact Assessment Methods

71. Project impacts are analyzed using a range of methods, from simple qualitative analysis to detailed quantitative survey or modeling. The types of impact analysis methods and tools used and the breadth and depth of analysis must be commensurate with the type, scale, location and significance of each impact posed by the project, in line with good international industry practice.

72. Detailed analysis usually requires specialist input to cover the specific disciplines and techniques involved, with local knowledge preferred on such topics as ecology, air quality, noise and cultural heritage. The baseline assessment and impact analysis of an issue are directly related, and hence, are usually prepared by the same specialist. However, specialist impact modeling may be undertaken separately by experts (e.g. three dimensional reservoir water quality modeling based on data collected by the project hydrologist).

73. In practice, a phased approach to impact prediction occurs during environmental assessment preparation. As more detailed information is progressively obtained, impacts are better understood and information gaps are identified. Initial impact analysis commences during scoping and preliminary baseline data collection. This involves qualitative techniques such as analysis of secondary regional or district level information, preliminary site information, and discussions with local people and other stakeholders. When specialist field surveys and sampling are required, more complex predictive techniques may be applied such as experimental methods, detailed surveys or mathematical models. The following examples are provided to present appropriate impact analysis methods for different situations:

- ***Example A***: a new link road is proposed to improve access to a regional tollway. The proposed alignment passes through agricultural land and small areas of woodland. The local natural ecosystem has been significantly altered by human activities and appears to have low conservation significance, with scattered woodland trees remaining. A walk-through survey by an ecologist to confirm that there are no species or habitats of importance within the study area is likely to be sufficient.
- ***Example B***: a waste incinerator is proposed on the outskirts of a town. Significant community concern about air pollution from the facility was noted during initial consultation. The standards set out in the World Bank Group's EHS guidelines for air quality apply to this development, therefore, detailed dispersion

modeling of incinerator stack emissions is required based on existing air quality data at nearby receptors, local meteorological data (wind speed and direction, atmospheric stability classes and temperature), and incinerator operation (including likely feedstock, emission rate of each pollutant, temperature, water content and height of the stack). An industry-recognized computer model should be used to calculate dispersion patterns and ground level concentrations of pollutants.

74. Impact analysis has to be based on the most recent environmental and social baseline data available at an appropriate level of detail and, as with the presentation of baseline data, impacts should be analyzed and predicted using quantitative data to the extent possible. The assessment should clearly indicate the net change in baseline conditions and the magnitude of the impact against applicable standards over time, providing an accurate indication of overall impact significance.

75. In some instances, the only analysis method available will be a qualitative (subjective) assessment such as visual impact assessment. In these cases, consultations with affected persons and communities are often a critical part of the assessment. For example, the assessment of changes to the visual amenity of a landscape will be subjective, but this can be analyzed by developing a set of value indices and indicators supported by maps, cross-section plans and photomontages.

76. Predictive modeling[16] is conducted for those impacts that can be quantifiably measured, and have recognized national and international standards and modeling methods. Industry or activity specific guidelines[17] provide environmental standards that aim to protect human health and prevent unacceptable environmental degradation.

3. Impact Description

77. The magnitude of each environmental and social impact should be described quantitatively wherever possible, and should include the following particulars when applicable: impact type, extent (area of influence), duration (short-, medium-, long-term), irreversibility (reversible or permanent), performance against a recognized standard, and the value of the affected/lost resource. Each impact should be indicated against the applicable industry performance standard or guideline if this exists.

78. Qualitative statements with no accompanying analysis of data are generally unacceptable for significant impacts. Examples of acceptable and unacceptable impact descriptions are provided in Table 1.

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[16] If predictive modeling is used, the suitability of the model should be justified, including: (i) underlying principles and assumptions, objective/s of the study, the situation being modeled, and expected outputs; (ii) justification on the choice of the model including citing earlier applications to similar circumstances; (iii) data, variables, constants and assumptions used; (iv) development of the model and its conversion into a software package and limitations, if any; (v) details of the experience and training of the consultants using the model; (vi) calibration of the model; (vii) validation of the model; (viii) summary of numerical output; (ix)margin of errors, and their implications for the objectives of the study; and (x) conclusions.

[17] The borrower/client is encouraged to make use of international recognized guidance on environmental assessment such as the World Bank Group's Environmental, Health and Safety Guidelines (the EHS Guidelines) providing guidance on over 60 industry and project activities in 8 sectors.
See: http://www.ifc.org/ifcext/sustainability.nsf/Content/EnvironmentalGuidelines.

Table 1. Examples of Quantitative and Qualitative Impact Descriptions

Quantitative (acceptable)	Qualitative (unacceptable)
Daytime road traffic noise will increase by 4dB(A) at the X Street residences, with a predicted maximum noise level of 58dB $_{LAeq15hr}$ at the front of buildings.	As traffic volumes increase, noise levels are also likely to increase along X Street.
12.7 ha of secondary, semi-degraded forest will be removed from the transmission line right-of-way.	Some trees will be removed from the right-of-way, but this will be minor and localized.
Flood modeling indicates that the proposal will result in flood level increases of less than 5 mm for the 20 year and 100 year average return interval flood events.	Very minor changes in peak flood levels will occur during major floods.
Levels of benzene in the reservoir for options A and B are predicted to be 10,000+ times lower than the drinking water guideline of 1µg/l.	While benzene could potentially be deposited on the surface of the reservoir, it is unlikely to be in high concentrations.

79. **Assessing Significance**. Once the impacts have been analyzed and their size or magnitude predicted, the significance of each impact should be determined. Prediction of a large impact may not mean that it is significant, either because there are no sensitive receptors or the change is still within acceptable environmental limits. Likewise, a small size impact may be considered significant if the change results in new conditions above acceptable levels. The size of the change needs to be compared against a standard or criterion.

4. Mitigation Measures and Residual Impacts

80. If potential impacts and risks are identified, mitigation measures should be developed for each impact and risk, and documented in the EIA/IEE report. As a general rule, a mitigation hierarchy is followed, starting with avoiding adverse impacts, followed by impact minimization, then mitigation, and lastly, compensatory measures to offset significant residual impacts. The avoidance of adverse impacts is usually the most effective and least-cost approach. It is recognized at the same time that social impacts, technical availability, and financial feasibility have to be considered whenever measures need to be drawn from options.

81. Impact minimization and mitigation measures for each impact are usually summarized in the impact assessment section of the environmental assessment report, together with a description of the net residual impact that is likely to occur once mitigation measures have been implemented. This provides a complete picture for each impact and risk, including likely impact without mitigation, mitigation measures to be implemented, and residual impact following mitigation. Full details of the measures summarized in the environmental assessment report have to be provided in the EMP. Mitigation measures have to be specifically designed for each adverse environmental impact that can be managed. Measures should aim to meet (and ideally exceed) applicable national laws, regulations and standards, ADB's requirements as specified in the SPS, and international good practice standards.[18] Measures have to be technically and financially feasible. Other design considerations include: mitigating to a level where "no significant harm to third parties" will occur; the polluter pays principle (the cost of mitigation is borne by the polluter); the precautionary approach (cost-effective measures shall be

[18] International good practice for mitigation measures is provided by various internationally recognized sources, including the World Bank Groups EHS Guidelines, and technical reference documents that contain the performance levels and measures normally acceptable to ADB.

implemented to prevent or mitigate potentially serious or irreversible environmental degradation even when there is a lack of full scientific certainty); and adaptive management (lessons are learned from past management actions to improve future management as the project progresses).

I. Environmental Management Plan

82. The environmental management plan (EMP) is crucial in translating proposed mitigation measures into practice. The EMP defines desired outcomes and actions to address the identified impacts and risks, and meet applicable requirements as measurable events to the extent possible. The EMP also discusses the measures for information disclosure, the grievance redress mechanism, and the process for continued consultation with and participation of affected people during project implementation.

83. Effective environmental management begins with the design of appropriate and practical mitigation measures, the development of a workable monitoring program, and firm management commitments for implementation and monitoring. Experience has shown that while procedural compliance has improved over time, the substantive aspects of compliance (i.e., the integration of environmental considerations into project design, borrower/client ownership of the EMP, and effective EMP implementation) remain challenging. EMPs that address these substantive issues are more likely to achieve their compliance objectives.

84. An EMP sets out: (i) actions to implement mitigation measures; (ii) a monitoring and reporting program; (iii) emergency response procedures; (iv) institutional/organizational arrangements; (v) capacity development and training; (vi) implementation schedule; and (vii) cost estimates. It is an action plan agreed to by the borrower/client and ADB, in effect committing the borrower/client to implement the proposed management measures. Implementation of the EMP is normally: (i) a condition of project approval issued by the approving authority; (ii) a condition incorporated into the bidding documents, project construction contracts, and operation and maintenance contracts; and (iii) a covenant in the ADB loan agreement.

85. The level of detail and comprehensiveness of an EMP should be commensurate with the anticipated impacts and risks of the project. The contents of an EMP can be arranged in different ways, but the following information is normally covered:

- introduction
- summary of project approvals, permits, conditions, etc.
- summary of significant adverse environmental and social impacts and risks, and mitigation measures
- actions to be taken to implement each mitigation measure
- monitoring program – monitoring, audits, corrective actions, reporting
- emergency response procedures (when required)
- continued community engagement
- institutional/organizational arrangements for implementing the EMP
- capacity development and training
- implementation schedule
- cost estimates and funding sources

1. Actions To be Taken to Implement the Mitigation Measures

86. To ensure sound implementation of each recommended mitigation measure, the EMP has to provide sufficient information about the action/s to be taken so that it is unambiguous in terms of what is required, when it is required, and who will implement it. Accordingly, action/s on each mitigation measure should be described in terms of the impact it will mitigate, the conditions when it is required (e.g. continuously during a construction activity, or after a specific event), its general design, equipment required, and operating procedures, as appropriate. Related additional environmental plans that will be prepared (e.g. site or issue specific plans) as well as other relevant plans already prepared (e.g. for health and safety, involuntary resettlement, or emergency response) should also be described.

2. Monitoring and Reporting

87. An environmental monitoring program is developed as part of the EMP. Environmental monitoring during project implementation is required to assess performance against agreed standards and criteria, identify any environmental harm and non-compliance issues, provide data to support compliance, and meet government approval and permit conditions and ADB requirements.

88. As with mitigation measures, the monitoring program to be designed for the project should be commensurate with the project's impacts and risks and focus on the indicators of compliance for significant issues. The design of the monitoring program may start with the obligations stated in government approval and permit conditions but with additions made to ensure comprehensiveness. Depending on the project, the monitoring program specifies the parameters to be measured, monitoring/measurement methods, sampling locations, frequency of measurements, performance indicators or targets, detection limits, and thresholds limits that signal the need for corrective action. Where external laboratories or other analytical services are required, certified agencies at least under nationally recognized schemes should be contracted to ensure that measurements and data provided are accurate, reliable, and defensible.

89. **Verification of monitoring information**. When projects are likely to have significant adverse environmental impacts (category A projects), the borrower/client should retain qualified and experienced external experts or qualified NGOs to verify its monitoring findings. External experts or NGOs are expected to have extensive experience in the design, delivery and quality assurance aspects of monitoring relevant to the monitoring program. External experts or NGOs may need to conduct site inspections to review and verify the monitoring reports produced by the borrower/client.

90. **Corrective action**. If monitoring identifies a non-conformance against project approval, permit or EMP conditions, the borrower/client or its contractor may need to develop a corrective action plan to bring this into compliance. Corrective actions could range from improving the technical aspects of mitigation measures (e.g. increasing the bunded capacity around fuel storage tanks) to enhancing the environmental management capacity of implementing agencies. A corrective action plan generally:

- describes and prioritizes corrective actions to address each non-conformance
- identifies implementation responsibilities for each corrective action
- identifies a time-line for the implementation of each action
- presents a schedule for communicating the results of plan implementation to affected communities, government authorities and/or ADB

91. Each corrective action should be implemented within the specified time frame. The borrower/client is encouraged to follow up systematically until the required actions are implemented effectively.

92. **Reporting requirements.** The reporting of monitoring results to internal (project management) and external (authorities, local people, ADB) audiences is required to verify compliance. ADB requires the borrower/client to prepare periodic monitoring reports commensurate with the project's potential risks and impacts. For projects likely to have significant adverse environmental impacts (category A projects), semiannual reporting to ADB is required as a minimum during construction, and annually during operation. For category B projects, periodic reporting to ADB is required (normally annual or semiannual, depending on the project). For projects designated as highly complex and sensitive, quarterly reporting to ADB is required.

3. Institutional Arrangements

93. The responsibilities of all key parties involved in EMP implementation and project environmental management have to be clearly stated. The key parties are likely to be the borrower/client (executing agency or the project owner), contractors, consultants, and government oversight authorities.

94. The successful implementation of the EMP depends on the capacity and commitment of the borrower/client. Accordingly, the borrower/client should have an experienced environment specialist, and define clear lines of responsibility and authority for environmental and social management. The borrower/client may use in-house staff and/or external consultants or experts to supervise EMP implementation and conduct monitoring activities. Programs for staff/consultant recruitment and training should be developed based on the project needs.

95. ADB's due diligence includes assessment of the project implementation capacity of the borrower/client. ADB may provide technical assistance to help strengthen institutional capacity and develop staff skills in environmental management. To assess the adequacy of the borrower/client's capacity and commitment for environmental management, the following questions can be useful:

- How does the Project identify and allocate human, technical and financial resources, including the use of external experts, for environmental management?
- How has environmental management been integrated into the overall project management process?
- Are there any processes for balancing and resolving conflicts between environmental, social and other project priorities?
- What are the responsibilities and accountability of personnel who manage work affecting social and environmental issues, and are these well-defined and documented?
- Do staff responsible for environmental management have adequate knowledge about national and ADB requirements, and experience with similar projects, including managing consultants and contractors, community engagement and grievance resolution?
- Is there a process for the periodic review, monitoring and reporting of environmental, health and safety management?

4. EMP Implementation Schedule and Cost Estimates

96. The implementation schedule and phasing of the project, and the major works or activities under each phase should be presented. The implementation schedule may need to be updated from time to time based on the detailed design and operational progress.

97. Cost estimates for environmental management should be documented in the EMP to indicate the proposed expenditure on these measures, and ensure that these items have been adequately budgeted.

J. Information Disclosure, Consultation and Participation

98. Information disclosure, consultation and participation are key elements of stakeholder engagement and essential for the successful management of a project's environmental and social impacts. Depending on the nature, risks and impacts of a project and the presence of affected people, the frequency and level of effort of stakeholder engagement may vary considerably.

99. ADB's requirements for community engagement are focused on the engagement of affected people. Engagement should begin early, and be carried out on an ongoing basis based on the timely effective disclosure of relevant project information and through consultation and participation.

1. Information Disclosure

100. Disclosure of relevant information about the proposed project and its potential impacts will help stakeholders to understand the impacts, risks and opportunities of the project. Relevant information, including those documented in environmental assessment reports, should be provided in a place, language and form that are accessible and understandable to affected people and other stakeholders. This process commences early in the project cycle and continues throughout the life of the project.

101. To make key documents widely available to the general public, ADB requires that the borrower/client submit the following documents for disclosure on ADB's website:

Category A projects:

- draft EIA - at least 120 days prior to ADB Board consideration, and/or environmental assessment and review framework before project appraisal, where applicable[19]
- final EIA upon receipt
- supplementary reports, if required during project implementation
- corrective action plan/s (for major noncompliance, if any) prepared during project implementation
- environmental monitoring reports

Category B projects:

- final IEE (upon receipt or Board approval, whichever is earlier)
- a new or updated IEE, if required during project implementation
- corrective action plan/s (for major noncompliance, if any) prepared during project

[19] An environmental assessment and review framework applies to sector lending and multi-tranche financing facilities.

implementation
- environmental monitoring reports

102. Lengthy and highly technical EIA or IEE reports may not meet the information needs of the affected people. Key findings of the environmental assessment (including the proposed project facilities and activities and their locations and duration, any impacts or risks to affected people and relevant mitigation measures, consultation process, and grievance mechanisms) may best be communicated in summary form through printed materials such as brochures, leaflets, or booklets, written in plain language understandable to the affected communities. In areas where some affected persons and stakeholders may be illiterate, non-written communication methods such as verbal presentations in community meetings, radio spots, and pamphlets and signs with pictorial depictions/illustrations may be utilized. Where appropriate, the full documents may be made available to interested stakeholders in the local language.

2. Meaningful Consultation and Participation

103. Meaningful consultation goes well beyond information disclosure. It involves two-way communication between the borrower/client and the affected communities and stakeholders, and active participation of affected communities and stakeholders at various stages in the project design and implementation. Meaningful consultation provides opportunities for the borrower/client to learn from the knowledge, experience and concerns of the affected communities.

104. Meaningful consultation:

- Begins early and is carried out on an ongoing basis throughout the project cycle. Methods for consultation and participation, and response to comments received during project preparation should be documented in the EIA/IEE. Throughout the life of the project, the borrower/client is encouraged to build upon established channels of communication and engagement with affected communities to disclose information and receive feedback on the effectiveness of mitigation measures, and affected communities' ongoing interests and concerns about the project.
- Provides timely disclosure of relevant information. Affected people and stakeholders should have access to relevant project information prior to any decision-making that will affect them. Relevant information includes key aspects of the assessment such as project activities and locations, identified impacts, mitigation measures, compensatory methods and amounts, and consultation and grievance mechanisms. Information should be provided in a form and language that are understandable and readily accessible to affected people.
- Is free of intimidation or coercion. Consultation occurs freely and voluntarily, without any external manipulation, interference, or threat of retribution, and is conducted in an atmosphere of transparency.
- Is gender-inclusive and responsive, and tailored to the needs of disadvantaged and vulnerable groups. Consultation should be inclusive of various segments of the affected community, including both women and men, and accessible to the disadvantaged and vulnerable groups within the community. In highly stratified communities or societies, lower ranking socioeconomic groups, ethnic groups, or castes may normally have little voice in public forums, community consultations, and formal meetings with project and/or borrower/client officials. Similarly, women in some communities are censored or shamed into silence in such

forums and may be spoken for by their husbands or other male relatives. These barriers to participation need to be positively addressed in a culturally sensitive manner. Ensuring consultation with and participation of women may require a separate women's consultation process, and hiring female professionals to engage female stakeholders. For other excluded low ranking groups, separate consultations without the presence of higher ranked groups are usually needed to obtain a full picture of the needs of the poor and vulnerable, and specialists in the participation of the poor and vulnerable may be required.

- Requires the incorporation of relevant views of affected people and other stakeholders into project design and decision-making, including the development of mitigation and compensation measures. It also involves communicating to affected people and other stakeholders the measures taken to address their concerns. It facilitates the sharing of development benefits and opportunities.

105. The types and level of consultation need to be commensurate with the impacts on affected communities. The borrower/client can seek ADB's input to assist in developing an appropriately scaled consultation process. The borrower/client may also wish to consult ADB's *Staff Guide to Consultation and Participation* for further guidance on consultation and participation.[20]

4. Reporting on Consultation

106. The consultation process and its results should be documented in the environmental assessment reports. Key information that should be reported includes:

- relevant host country laws and regulations
- methodologies/means used to inform and involve the affected people and other stakeholders in the environmental assessment process
- discussion of issues raised by various stakeholders
- response to affected people on how the project will address concerns raised during consultation
- continuous consultation measures to be and/or already established for the environmental management program
- documentation of public meetings and interviews, including dates, names, topics, summary details of discussion, and important outcomes

K. Grievance Redress

107. A grievance redress mechanism (GRM) is an arrangement for receiving, evaluating and facilitating the resolution of affected people's concerns, complaints, and grievances about the borrower/client's social and environmental performance on a project. A GRM is important for development projects where adverse impacts or risks are ongoing or anticipated. Affected people need a trusted way to voice and resolve project-related concerns, and the project needs an effective way to address affected people's concerns.

108. A well-functioning project GRM:

- provides a predictable, transparent and credible process to all parties, resulting

[20] Available at: http://www.adb.org/participation/toolkit-staff-guide.asp.

in outcomes that are seen as fair, effective and lasting
- builds trust as an integral component of broader community relations activities
- enables a more systematic identification of emerging issues and trends, facilitating corrective action and pre-emptive engagement

109. ADB requires the borrower/client to establish and maintain a GRM for each project that has environmental, involuntary resettlement and/or Indigenous Peoples impacts. A single GRM can be used to cover these three safeguard requirements. The GRM has to be scaled to the impacts and risks of the project. It is not a substitute for a project's information disclosure and consultation process, or vice-versa. The two are complementary and should be mutually reinforcing.

1. Grievance Redress Principles

110. A good GRM is not necessarily a whole new system, but can be built upon traditional or existing local methods that are functioning effectively. The following principles are important to guide the establishment and maintenance of a project GRM:

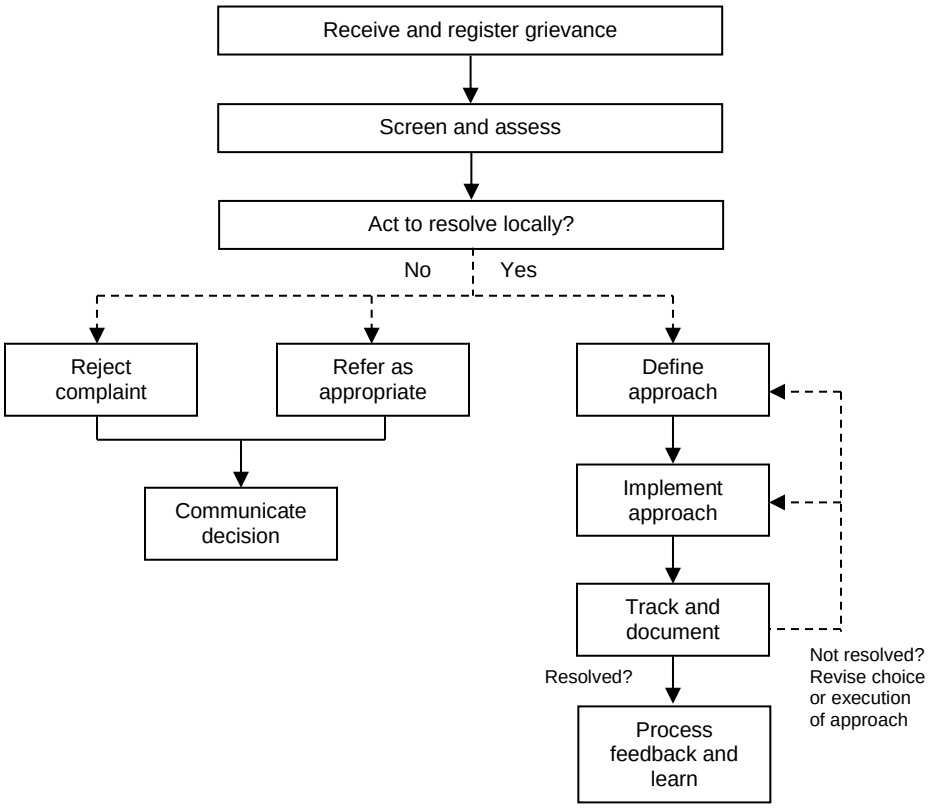
- **Proportionality.** The scope, timing, and form of a GRM should fit the context and needs of the project. For large projects with potentially complex issues, a GRM should ideally be established during the environmental planning phase and continue for the life of the project, and to the extent practical, the function of investigation and response should be separate from the personnel in charge of project management. For smaller projects with relatively straightforward issues, the project may consider designating a point of contact such as a liaison officer to whom the concerns and complaints of affected people can be addressed.
- **Involvement.** The most successful grievance redress mechanisms involve representatives from the affected community in the design of the GRM. The borrower/client and contractors are strongly advised to engage community representatives in identifying the key factors that will make the GRM successful (e.g. the kinds of disputes that could arise, how affected people want to raise concerns, the effectiveness of existing procedures for resolving complaints, and the availability of local resources to resolve conflicts), as well as in designing and improving the GRM based on community feedback. In addition, suggestion boxes, periodic community meetings and other communication methods to receive advice may be helpful.
- **Accessibility.** A GRM includes procedures for receiving, recording, and responding to grievances in a reasonable period of time. The procedures should be easily accessible and understandable, and should be communicated to all stakeholders, including vulnerable groups such as the poor and women.
- **Cultural appropriateness.** A good GRM is designed to take into account specific cultural attributes and traditional mechanisms for raising and resolving issues. If the project affects community groups with significant cultural differences, tailored approaches may be needed to ensure that each group (especially women and indigenous peoples) is able to raise concerns. For example, members of indigenous communities often do not use formal grievance procedures even when they have project complaints or grievances. Thus, the project should consider all practical ways to capture community sentiments, including verbal reporting stations (where community liaison officers could

transfer oral to written complaints) and other informal methods such as phone texting.

- **Responsiveness.** Grievances received and responses provided should be documented and reported back to the affected communities. Response times and a mechanism for the complainant to seek reconsideration by a higher authority of a response that is unsatisfactory should be included in the GRM. A good GRM provides regular feedback to local communities to clarify expectations about what it does and does not do, communicate how grievances were resolved, and gather feedback to improve the mechanism.
- **Accountability.** A good GRM has an organizational structure with clear authority and responsibilities for community liaison and grievance resolution. Individuals assigned as access points are most effective if they are trustworthy, trained, knowledgeable, and approachable, regardless of the ethnicity, gender, or religion of the complainant.
- **Appropriate protection.** It is important that the borrower/client is aware of the judicial and administrative mechanisms available in the country for the resolution of disputes so that the project GRM does not inadvertently impede access to these mechanisms. The mechanism should also set up protection for complainants so that they do not suffer retribution.

An example of a basic grievance mechanism structure is illustrated in Figure 1.

Figure 1. Basic Grievance Redress Mechanism Structure and Process



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III. ENVIRONMENTAL ASSESSMENT REQUIREMENTS FOR VARIOUS FINANCING MODALITIES

111. Over the years, ADB has adopted various finance modalities, other than standard loan projects, to promote inclusive growth and sustainable development in DMCs. These modalities include:

- policy-based lending
- sector lending
- multi-tranche financing facilities (MFFs)
- emergency assistance loans
- loans for projects in conflict-affected areas
- projects involving financial intermediaries (FIs)
- and general corporate finance

112. This chapter discusses the various environmental assessment and planning instruments that are used for the various financing modalities.

A. Environmental Assessment and Review Framework

113. An environmental assessment and review framework (EARF) is required before Board approval of projects delivered through the following financing modalities:

- sector lending
- MFFs
- emergency assistance loans
- loans for projects in conflict areas

114. EARFs are also required in other finance modalities where subprojects or project components will only be identified after Board approval of the project.

115. An EARF guides the screening and categorization, level of impact assessment, required institutional arrangements, and processes to be followed for components or sub-projects that will be selected during project implementation.[21]

116. Reviewing the technical capacity of the borrower/client to implement ADB safeguard requirements, coupled with ADB due diligence reviews, is crucial in projects where an EARF applies. This is because the successful implementation of environmental safeguards relies heavily on the borrower/client's capacity, commitment, and good understanding of ADB safeguards requirements. For these projects, ADB will assess the borrower/client's capacity to manage environmental impacts and risks, and implement national laws. The EARF should include the details of the training needs of the borrower/client to ensure that the environmental safeguard requirements are implemented effectively.

117. For sector lending, in addition to an EARF, an environmental impact assessment (EIA) or initial environmental examination (IEE) will be prepared for one or more sample subprojects to establish good practice examples for the environmental assessment of succeeding subprojects. EIAs and IEEs for such sample subprojects are required before Board approval of

[21] See Annex to Appendix 1 of the ADB Safeguards Policy Statement, 2009 for the EARF outline.

the sector loan. For all subsequent subprojects classified as category A or B, assessment documents should be prepared, taking into account the requirements agreed with the borrower/client in the EARF.

118. For MFFs, an EARF is required for the entire MFF before approval. In addition, each tranche of an MFF is screened and categorized according to its environmental impacts, and the categorization of the tranche is based on its most sensitive component. For example, if one of three subprojects in a tranche is considered category A then all the subprojects are categorized as category A. There is no overall categorization for the entire MFF.

119. For emergency assistance loans, ADB's Disaster and Emergency Policy, 2004 allows procedural flexibility in the application of the safeguard requirements. In these cases, an EARF that identifies the types of project for which the assistance will be used, and the EIAs or IEEs are prepared after Board approval but before physical works begin. This ensures rapid disbursement of funds at a time of need. The Report and Recommendation of the President (RRP) needs to justify why a deviation from the general procedures is being sought.

120. For projects in conflict areas, it is often not possible to prepare EIAs or IEEs before Board approval. In these instances, an EARF is prepared and submitted to support project approval instead of an EIA or IEE. The RRP justifies why a deviation from standard procedures is needed, and the EIA or IEE is prepared and approved before any construction begins.

121. Where subprojects or components are prepared after Board approval and have limited anticipated environment impacts, an EARF may be submitted in lieu of safeguard plans for such subprojects or components. Justification for any deviation from the general procedure has to be included in the RRP. The environment and social assessments are prepared and approved before any physical activities start.

B. Strategic Environmental Assessment

122. A strategic environmental assessment (SEA) is required when the project involves the development of or changes to policies, plans, or programs with likely significant regional or sectoral impacts (e.g. Category A policy-based lending). An SEA is a tool for evaluating the effect of policy changes on a broad, cross-sectoral basis encompassing the natural environment, the economic situation, as well as social and cultural conditions. Its primary aim is to help make development more sustainable. SEA requires a much more qualitative view than an EIA, and looks at wider sustainability issues than would normally be found in a project-level assessment. Ideally, the information and strategic direction determined in an SEA will cascade down through the tiers of decision-making, and can be used for the assessment of individual projects. As the SEA is working at a cross-sectoral level, there is also a need to consider tradeoffs and how to achieve a balance between different objectives. It is also important to see the SEA as an opportunity to add value to a decision-making process.

123. There are many different approaches and techniques for SEA. It is important to select an approach and method that is most appropriate for the type of assessment being undertaken.[22]

[22] The list of references at the end of the chapter provides guidance on where to find information on methods, approaches, and examples of SEAs.

124. Despite the multitude of SEA approaches, there are some common criteria that are essential for a successful SEA. The list below is based on a widely recognized set of basic criteria established by the International Association for Impact Assessment.[23]

- It is fit for the purpose. The SEA methodology is appropriate for the circumstances, and not the other way around (i.e., attempts are not made to fit the circumstances to an SEA methodology).
- It is objectives-led. The change in policy, plan or program has a specific set of objectives that it will attempt to achieve, and the SEA is helping achieve these objectives.
- It is sustainability-driven. The SEA has a long-term outlook. It is not just looking to influence the immediate outcomes of the process but will provide inputs to guide the overall process to something that will be more sustainable in the long-term.
- It is comprehensive in scope. The SEA addresses all the key factors that are important. However, being comprehensive does not mean the inclusion of irrelevant information.
- It has to be decision-relevant. The SEA is not a piece of analysis for its own sake. It is essential to know what decision the SEA is trying to effect, or the policy or plan that could be improved by applying the SEA approaches.
- It is integrative. The SEA process ensures an appropriate environmental assessment of all strategic decisions relevant for attaining sustainable development, and addresses the interrelationships of the biophysical, social, and economic aspects.
- It is participative. The SEA, like the standard EIA, takes the opinions and perspectives of key stakeholders and allows multi-stakeholder discussion of the issues. It is not undertaken solely by a group of experts seeking answers to questions that are also the concern of those who will be affected.

C. Environmental and Social Management System (ESMS)

125. While standard loan projects are direct investments, loans to financial intermediaries (FIs) are indirect investments. ADB provides funds to eligible FIs for on-lending to final borrowers for eligible subprojects, at the FIs credit risk.[24] As ADB has no direct supervision over these subprojects,[25] it holds the FI accountable for managing the environmental risks of its subprojects.

126. An FI is required to have in place an appropriate environmental and social management system (ESMS) commensurate with the nature and risks of its likely future portfolio, to be maintained as part of its overall management system. ADB and the FI agree on the arrangement for the ESMS and the procedure for subproject review by ADB before Board approval of the investment. An ESMS satisfactory to ADB is adopted by the FI before ADB's first disbursement.

127. If the FI funds any category A subprojects, an EIA should be prepared. Category B subprojects require an environmental assessment report in accordance with government

[23] http://www.iaia.org/publicdocuments/special-publications/sp1.pdf
[24] OM Section D6/BP Financial Intermediation
[25] In the case of financial intermediaries, "subproject" means business activities financed by the financial intermediary (OM Section F1/BP).

requirements. The EIA and/or environmental assessment report are required before subproject approval.

128. General corporate finance, by its name, covers corporate investments.[26] General corporate finance requires a corporate ESMS audit. If the audit finds any issue, a corrective action plan that specifies time-bound measures to achieve and maintain compliance with the objectives, principles and requirements of the SPS within a reasonable time, has to be prepared. This action plan will be incorporated into the client's corporate ESMS. The audit, and if necessary, the corrective action plan are required before Board approval of the investment.

D. Environmental Audit

129. ADB sometimes enters into a project with facilities that already exist or are under construction. These facilities may have been constructed or started to be built without adequate safeguard measures. Projects that will use existing facilities or where construction has commenced require an environment compliance audit to determine whether the facilities are in accordance with ADB safeguard principles and requirements for borrowers/clients. Where noncompliance is identified, a corrective action plan will be prepared by the borrower/client and concurred by ADB. The plan will define remedial actions, the budget for these actions, and timeframe for achieving compliance. ADB understands that some existing facilities are difficult to dismantle for the sake of compliance. In such situations, compliance with national standards, even if less stringent than ADB's environment safeguards, is acceptable. Deviations from the general procedure are documented in the plan. The environmental audit and, if necessary, the corrective action plan are required prior to Board approval of the project.

130. If a project involves an upgrade or expansion of existing facilities that have the potential to generate environmental impacts, ADB's environmental assessment and planning requirements will apply in addition to the compliance audit.

E. Matrix of Environmental Impacts

131. ADB requires a matrix of environmental impacts to be prepared for policy-based loan projects. The matrix should discuss the major environmental implications associated with the proposed policy actions, and the mitigation measures to be undertaken. It is the product of an assessment of the potential impacts of each policy action and the identification of appropriate mitigation measures, as required by the SPS. Unlike standard loan projects, policy-based lending is not linked to a range of activities, but focuses on the implementation of policy reforms. Funding is relatively quickly disbursed to support policy reforms that have sector-wide and economy-wide impacts.

132. The matrix of environmental impacts should also include a qualitative indication of the likely magnitude of each potential impact, and the brief reasons for the judgment. Appropriate mitigation measures agreed upon by the borrower and ADB will be incorporated into the loan covenants. The matrix of policy actions is required before Board approval of the policy-based loan project.

[26] Under corporate finance, the "primary source of repayment for investors and creditors is the sponsoring company, backed by its entire balance sheet, not by the project alone" ("Project Finance in Developing Countries," International Finance Corporation, 1999).

Table 2. Finance Modalities and Environmental Safeguard Requirements

Instrument	Safeguard Requirement	Trigger	Timing
Policy-based lending	Matrix of environmental impacts	All Category A or B policy-based lending projects	Before project approval
	SEA (where applicable)	Development of or changes to policies, plans, or programs likely to have significant environmental regional or sectoral impacts (Category A)	Before project approval
Sector lending	EARF for entire project	Potential environmental impacts	Before project approval
	EIA/IEE for sample subprojects	Category A/B subprojects.	
	EIA/IEE for succeeding subprojects	Category A/B subprojects.	Before project approval After project approval
MFF	EARF for entire MFF	Tranches prepared after Board approval of the MFF	Before MFF approval
	SEA for entire project (if required)		
	EIA/IEE for first tranche	MFF with anticipated significant sector or regional impacts	Before MFF approval
	EIA/IEE for succeeding tranches		Before MFF approval
		Tranche with potential environmental impacts (category A or B)	After MFF approval but before approval of each tranche
		Succeeding tranches with potential environmental impacts (category A or B)	
Emergency assistance loans and projects in conflict areas	EARF	Category A or B projects	Before project approval
	EIA/IEE for subprojects	Category A / B subprojects/components.	After Board approval
Financial intermediary investments	ESMS	Anticipated adverse environmental impacts	ESMS arrangement agreed upon before project approval, and adopted before first disbursement
	EIA	Potential significant environmental impacts of subprojects (category A)	After ADB's approval of the FI project, but before subproject approval
	Environmental assessment report as	Category B subprojects	After ADB's approval of the FI project, but before

	required by the government		subproject approval
General corporate finance	Corporate ESMS Audit Corrective action plan	All Category A or B general corporate finance, working capital or equity finance Audit identifies noncompliance with ADB safeguards	Before project approval Before project approval
Existing facilities	Environmental audit Corrective action plan	Under construction or existing Category A or B project facilities and/or business activities. Audit identifies noncompliance with ADB safeguards.	Before project approval Before Board approval

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IV. OCCUPATIONAL AND COMMUNITY HEALTH AND SAFETY

133. Occupational health and safety refers to protecting workers, including contracted workers and any others who work at project sites or provide project-related services (e.g. cooks, cleaners), from accident, injury or illness associated with exposure to hazards encountered in the workplace.[27] Hazards can arise from materials (including chemical, physical and biological substances and agents), environmental or working conditions (e.g. oxygen-deficient environments, excessive temperatures, improper ventilation, poor lighting, faulty electrical systems or unshored trenches), or work processes (including tools, machinery and equipment).

134. Community health and safety refers to protecting local communities from project-related hazards (including flooding, landslides or other natural hazards) exacerbated by project activities, disease, and the accidental collapse or failure of project structural elements such as dams. Project related activities may directly, indirectly or cumulatively change community exposure to hazards. A significant concern with major development projects is the spread of communicable diseases from the workforce to the surrounding communities. The transmission of sexually transmitted diseases such as HIV/AIDS is an important issue, and waterborne diseases arising from poor sanitation and vector-borne diseases such as malaria are a significant concern. For example, abandoned borrow pits filled with stagnant water may promote the growth of malaria-carrying mosquitoes. An influx of workers during the construction stage may overwhelm local sanitation and waste management systems, and also result in increased traffic and traffic accident fatalities. These types of impacts may cause project delays and damage relationships with communities. Proper management of health and safety impacts can reduce unnecessary costs, and help create positive community perceptions of the project.

A. Application

135. If relevant, the environmental assessment should include an analysis of the project's potential impacts and risks on occupational and community health and safety, and develop preventive and protective measures. The assessment should consider all stages of the project cycle (design, construction, operation, and decommissioning). The depth and breadth of analysis and the preventive measures should be commensurate with the identified risks and impacts.

B. Occupational Health and Safety

136. Key aspects in providing workers with a safe and healthy working environment are summarized below.

- **Identify and eliminate or minimize the causes of potential hazards** to workers, as far as reasonably practicable. It is preferable to eliminate sources of hazard to workers' health and safety rather than allowing the hazards to continue and providing personal protective equipment.

[27] Occupational health and safety is not the same as core labor standards, and safeguard requirements 1 (SR1) of the SPS do not encompass core labor standards such as: (i) freedom of association and the effective recognition of the right to collective bargaining, (ii) the abolition of all forms of forced or compulsory labor, (iii) the elimination of discrimination in respect of employment and occupation, and (iv) the elimination of child labor. Core labor standards are addressed through ADB's *Social Protection Strategy*, and through routine inclusion of relevant covenants in loan agreements, and tender and bidding documents. Further, all Asian and Pacific DMCs, by virtue of being members of the International Labour Organization, are held to respect, promote, and realize fundamental core labor standards.

- **Establish preventive and protective measures**. When an occupational hazard is inherent to a project activity or it is not feasible to eliminate or minimize the hazard, appropriate protective measures (such as barriers or machine guards) should be installed, and adequate personal protective equipment (PPE) should be provided at no cost to the workers. PPE may be required by laboratory, maintenance, and construction workers, pesticide applicators, painters, firefighters, and many other workers who may be exposed to chemical, physical, biological or radiological agents on the job. PPE includes respirators, eyewear, gloves, clothing, hearing protection, and steel-toed shoes. Preventive and protective measures should be consistent with international good practice, as reflected in internationally recognized standards such as the EHS Guidelines.
- **Train workers** on the aspects of occupational health and safety associated with their work including emergency arrangements, and provide them with appropriate incentives to use protective equipment and comply with health and safety procedures.
- **Document and report** occupational accidents, diseases, and incidents to relevant local authorities and to ADB. It is good practice to retain related monitoring data such as exposure levels and health testing. Workers should not face any disciplinary measures or negative consequences for reporting or raising concerns about occupational health and safety conditions.
- **Have emergency prevention, preparedness, and response plans** in place. Effective emergency preparedness and response plans are tailored to the risks faced by the project, and include an integrated approach to address emergency needs and protect the health and safety of workers, the local affected communities and the environment inside and outside the project physical boundary. Emergency preparedness and response plans encompass all persons normally working on or visiting the project site, are prepared in cooperation with external emergency services and agencies such as local fire departments and emergency response teams, and include adequate procedures for communication with workers, local communities and relevant authorities during emergency events. Facilities that face fire risk need to have evacuation plans that are well understood and have been rehearsed by all workers.
- **Comply with host country laws**. Most countries have laws regulating occupational health and safety and workplace conditions and the borrower/client is expected to comply with such laws.

C. Community Health and Safety Principles

137. Key aspects in protecting local communities from project-related hazards are summarized below.

- **Identify and assess risks** to, and potential impacts on, the safety of affected communities during all stages of the project.
- **Establish preventive and protective measures** in a manner commensurate with the identified risks and impacts. These measures should favor the prevention or avoidance of risks and impacts over their minimization and reduction. An example is properly managing borrow pits so they do not become sources of disease vectors. However, when potential impacts and risks are inherent to the project activity or it is not feasible to completely eliminate them, the borrower/client should implement appropriate minimization and mitigation measures. Many community health issues can be resolved with the application of well-established, simple and cost-effective public health interventions such as

information and education programs, while safety concerns may be addressed by, for example, fencing and posting warning signs so as to avoid accidental community intrusion onto hazardous project sites, or implementing traffic control and calming measures such as enforcement of traffic safety regulations, establishment of controlled intersections and/or roundabouts, and pedestrian safety measures such as pedestrian crossings, tunnels or bridges.[28]

- **Conduct contractors and subcontractors due diligence**. The borrower/client should use reasonable means to investigate its capacity to address safety issues, communicate its expectations of safety performance, and influence the safety behavior of contractors especially those involved in the transportation of hazardous materials to and from the project site.
- **Manage natural hazards**. Measures should avoid or minimize the exacerbation of impacts caused by natural hazards such as landslides or floods that could result from significant changes to vegetation cover, topography, and hydrologic regimes. For example, clearing forest cover on a slope may result in increased erosion and the risk of landslides and/or flooding, especially during high rainfall events, as well as a subsequent reduction in the quality of water in local streams or rivers. These types of physical environment changes may occur in projects involving (but not limited to) the establishment or expansion of mines, industrial parks, roads, airports, pipelines, and agricultural areas. In such cases, relevant precautions include preventing geological instability, safely managing storm water flow, preventing a reduction in the availability of surface water and groundwater for human and agricultural use (depending on the sources of water traditionally relied on by the community), and preventing degradation in the quality of these resources.
- **Have community emergency prevention, preparedness, and response arrangements** in place if the consequences of emergency events are likely to extend beyond the project site or originate outside of the project site (e.g. a hazardous material spill during transportation on public roadways). Emergency response plans should be designed based on the risks to community health and safety identified during the environmental assessment, developed in close collaboration and consultation with potentially affected communities and local authorities, and address the following aspects of emergency response and preparedness:

    - specific emergency response procedures
    - trained emergency response teams
    - emergency contacts and communication systems/protocols
    - procedures for interaction with local and regional emergency and health authorities
    - permanently stationed emergency equipment and facilities (e.g. first aid stations, fire extinguishers/hoses, sprinkler systems)
    - protocols for fire truck, ambulance and other emergency vehicle services
    - evacuation routes and meeting points
    - drills (annual or more frequently as necessary)

    The following additional emergency response guidance is provided in the general and sector-specific EHS Guidelines.

[28] Research indicates that up to 75% of all road fatalities in developing countries involve pedestrians.

- **Inform affected communities, local authorities and emergency services** on the nature and extent of environmental and human health effects that may result from routine operations or unplanned emergencies at the project facility. Information campaigns should describe appropriate behavior and safety measures in the event of an accident involving project facilities, and actively seek community views concerning risk management and associated community preparedness. For example, an urban road rehabilitation project may create increased traffic, noise, dust, and movement of heavy machinery during construction phase. In addition to eliciting their views on both impacts and responses, affected communities should be informed in advance of construction schedules, alternate travel routes, and measures they can take to safeguard their families near construction sites (e.g. following construction signage, taking extra precautions especially during dark/rainy weather). Disclosure may be by way of newspaper articles, temporary signs, community meetings, etc. Information should be disclosed in a culturally appropriate manner in language/s utilized by the affected people. The process should reflect communities' capacities to understand and act on health and safety information. For example, since women generally make most health decisions at the household level, their role in future health education and intervention programs should be considered.
- **Conduct an independent review of high-risk structural elements or components**. High risk structural elements are most commonly encountered in larger projects and include those that could threaten human life in the event of failure such as dams located upstream of communities. In these cases, in addition to local engineering certification requirements, a risk assessment should be undertaken by qualified and experienced external experts. In the case of dams and impoundments,[29] the experts can base their evaluation of safety on specific risk criteria. Experts can initially refer to national regulations and methodologies. Should such regulations not be available in the country, existing well-developed methodologies promulgated by authorities in countries with mature dam safety programs can be referred to and adapted as necessary to local conditions.

138. Community health and safety measures should be incorporated into the project environmental management plan (EMP). Additional guidance on community health and safety is provided in the general and sector-specific EHS Guidelines, and in the IFC *Introduction to Health Impact Assessment* which provides good practice guidance for conducting a health impact assessment of a project.

[29] Including hydroelectric power dams, mine tailings dams, dams for ash ponds, fluid overburden and spoils, water and other liquid storage, and dams for wastewater and storm water management.

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GENERAL EHS GUIDELINES: OCCUPATIONAL HEALTH AND SAFETY
http://www1.ifc.org/wps/wcm/connect/Topics_Ext_Content/IFC_External_Corporate_Site/IFC+Sustainability/Sustainability+Framework/Environmental,+Health,+and+Safety+Guidelines/

V. BIODIVERSITY CONSERVATION AND SUSTAINABLE NATURAL RESOURCE MANAGEMENT

139. Biodiversity is "the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems."[30] Biodiversity occurs in genes, species and ecosystems, underpinning the functioning of ecosystems that sustain life and provide society with food, medicines, natural resources, ecological services and spiritual and aesthetic benefits. Conservation of biodiversity and the sustainable use of its components are the central objectives of the Convention on Biological Diversity to which over 30 ADB DMCs[31] are party.

140. The borrower/client has to assess the significance of project impacts and risks on biodiversity and natural resources as an integral part of the environmental assessment process. The assessment has to focus on the major threats to biodiversity that include destruction of habitat and introduction of invasive alien species, and the use of natural resources in an unsustainable manner. The borrower/client needs to identify measures to avoid, minimize, or mitigate potentially adverse impacts and risks and, as a last resort, propose compensatory measures such as biodiversity offsets to achieve no net loss or a net gain where the affected habitat is natural or modified.

141. Renewable natural resource management and use involves the management of land, water, soil, vegetation and animals for production purposes and other uses while maintaining the health and function of these resources over time (sustainability). It includes protecting, conserving and maintaining the capacity of ecosystems and resources to sustain life and development.

A. Biodiversity Conservation and Protection

142. ADB's environmental safeguards contain specific requirements for different habitat types that relate to their likely conservation value. Habitats can be classified as either natural or modified; ranging from pristine, undisturbed natural habitat at one end of the scale, through different degrees of modification or disturbance, up to highly modified or degraded areas that support an artificial assemblage of plants and animals. Despite a habitat being modified, it may support valuable biodiversity, including endemic or threatened species. Subsets of these habitat types are critical habitats and legally protected areas, both of which more commonly consist of natural or slightly modified habitat.

143. An area of habitat rarely has uniform biodiversity value due to natural variability (e.g. terrestrial habitat varies according to soils, drainage, slope and aspect) as well as the degree of human-induced modification (e.g. harvesting, access) that has occurred in different areas. Habitat commonly contains a mosaic of areas with different degrees of modification, which can make the identification of habitat as either natural or modified a complex task. This determination is best done by suitably qualified professionals that can classify habitats based on a range of indicators.

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[30] Formal definition by the Convention on Biological Diversity (CBD), 1992. The CBD is an international legally-binding treaty with three main goals: (i) conservation of biodiversity; (ii) sustainable use of biodiversity; and (iii) fair and equitable sharing of the benefits arising from the use of genetic resources.

[31] Armenia, Azerbaijan, Bangladesh, Bhutan, Cambodia, People's Republic of China, Cook Islands, Fiji, Georgia, India, Indonesia, Kyrgyzstan, Laos, Malaysia, Maldives, Marshall Islands, Federated States of Micronesia, Mongolia, Nauru, Nepal, Pakistan, Palau, Papua New Guinea, Philippines, Samoa, Solomon Islands, Sri Lanka, Tajikistan, Thailand, Timor-Leste, Tonga Turkmenistan, Tuvalu, Uzbekistan, Vanuatu ,Vietnam.

144. **Natural habitat**. Natural habitat is an area of land and/or water where biological communities are formed largely by native plant and animal species, and where human activity has not essentially modified the area's primary ecological functions. Examples of natural habitats are more common in remote and difficult to access areas such as mountains, or areas that have been protected over an extended period such as established national parks. However, natural habitats are not only those that are untouched or pristine. Both natural and modified habitats may contain high biodiversity values, and can also be considered as critical habitat. The extent of human disturbance is therefore not always an indicator of its biodiversity values or the presence of critical habitat.

145. Projects should not significantly convert or degrade natural habitat unless: (i) there are no technically and financially feasible alternatives; (ii) a comprehensive analysis demonstrates that the overall benefits from the project will substantially outweigh the project costs, including environmental costs; and (iii) any conversion or degradation is appropriately reduced or mitigated.

146. Projects should seek to avoid significant conversion or degradation of natural habitat, primarily through project or facility relocation. Significant conversion or degradation can occur from (i) the elimination or severe diminution of the integrity of a habitat caused by a major, long-term change in land or water use or (ii) the modification of habitat that substantially reduces its ability to maintain viable populations of native species. Significant conversion or degradation, usually during project construction, may result from land clearing and mining, replacement of natural vegetation (e.g. by crops or tree plantations), permanent flooding (e.g. by a reservoir), or drainage/dredging/filling/channelization of wetlands.

147. Mitigation measures should be designed to achieve at least no net loss of biodiversity. They may include a combination of the following actions:

- onsite mitigation measures such as minimizing habitat loss
- identification of 'set asides'[32] to avoid impacts on biodiversity such as the preservation of a certain percentage of habitat within the project, or adjacent to it
- post-project restoration of impacted areas with appropriate local native species
- offsetting biodiversity losses through the creation of effective long-term conservation of ecologically comparable area/s elsewhere (comparable in size, quality and function), while respecting any ongoing use rights of Indigenous Peoples or traditional communities
- compensating the direct users of the affected biodiversity, commensurate with the loss caused by the project (e.g. people who have lost production benefits derived from forest access caused by a project may be provided direct financial compensation or access to another forest area.

148. **Modified habitat**. Modified habitat is altered natural habitat, often formed by the removal of native species during resource harvesting, land use conversion and/or the introduction of alien species of plants and animals. Agricultural land, plantations and urban areas are common examples of modified habitat. Modified habitats usually have a lower biodiversity value than natural habitat, but can still harbor endangered species, contain areas of rare remnant vegetation or provide unique ecosystems. In addition, biodiversity values can be high in the transition zone between modified habitat and undeveloped natural habitat, as many species are

[32] Set asides are land areas within the project site, or areas over which the project has control, which are excluded from development and are managed for conservation purposes. Set asides will likely contain significant biodiversity values and/or provide ecosystem services of significance at the local, national and/or regional level.

able to find suitable ecological niches and these areas can serve as breeding grounds for adaptive variations. The SPS requirements on biodiversity apply to areas of modified habitat that have significant biodiversity values, as determined in the environmental assessment.

149. The borrower/client should minimize any further conversion or degradation of modified habitat that contains significant biodiversity values where this is technically and financially feasible and cost-effective, and depending on the nature and scale of the project, will identify opportunities to enhance habitat and protect and conserve biodiversity as part of the project activities.

150. Examples of opportunities to protect and enhance modified habitat include:

- assisting traditional forest users to protect and enhance areas of forest adjacent to the project by funding forest patrols to prevent illegal harvesting or fence installation to exclude livestock
- funding the replanting of degraded land or forest within a protected area or community forest
- funding the relocation of an endangered wildlife species to a protected area where it previously existed

151. **Critical habitat**. Critical habitat is an area that has high biodiversity value and may include sites that are legally protected or officially proposed for protection (e.g. areas that meet the International Union for Conservation of Nature (IUCN) classification criteria, the Ramsar List of Wetlands of International Importance, and United Nations Educational, Scientific, and Cultural Organization (UNESCO) world natural heritage sites. Critical habitat includes:

- habitat required for the survival of critically endangered or endangered species
- areas with special significance for endemic or restricted-range species
- sites that are critical for the survival of migratory species
- areas supporting globally significant concentrations or numbers of individuals of congregatory species
- areas with unique assemblages of species that are associated with key evolutionary processes or provide key ecosystem services
- areas with biodiversity that has significant social, cultural or economic importance to local communities

152. In accordance with the SPS, no project activity is permitted in areas of critical habitat unless: (i) there are no measurable adverse impacts, or likelihood of such, on the critical habitat that could impair its high biodiversity value or ability to function; (ii) the project is not anticipated to lead to a reduction in the population of any recognized endangered or critically endangered species, or a loss in the area of the habitat concerned such that the persistence of a viable and representative host ecosystem will be compromised; and (iii) any lesser impacts are mitigated to achieve at least no net loss of biodiversity.

153. When project activities are proposed in a critical habitat, the borrower/client is required to retain qualified and experienced external experts to assist in conducting the assessment. This is also advisable when the project's area of influence may extend into critical habitat.

154. Endangered and Critically Endangered species are species classified as under threat of extinction. The IUCN Red List of Threatened Species (the Red List)[33] is generally considered to be the most comprehensive international reference on the conservation status of plant and animal species. The IUCN also provides useful information on protected areas and other biodiversity and natural resources issues, and has guidelines on protected areas including their categorization. In addition, host countries usually have their own listings of threatened plant and animal species.

155. The probability of measurable adverse impacts on critical habitat, populations of endangered or critically endangered species, ecosystems and overall levels of biodiversity can be determined through a detailed biodiversity assessment. A biodiversity assessment involves surveying or measuring what exists in the area and what is known about it, judging its value and identifying the most important features, and assessing expected reductions in population numbers, habitat carrying capacity or other relevant parameters. It typically involves field-based surveys supported by reviews of relevant scientific literature and protected area management plans, and consultations with relevant national conservation authorities and local communities, including Indigenous Peoples. It may also utilize aerial photography or satellite imagery interpretation.

156. **Legally protected areas**. Where some project activities are proposed within a legally protected area,[34] the borrower/client should meet the requirements for critical habitat and: (i) act in a manner consistent with defined protected area management plans; (ii) consult protected area sponsors and managers, local communities, and other key stakeholders on the proposed project; and (iii) implement additional programs, as appropriate, to promote and enhance the conservation aims of the protected area. The project should also demonstrate that the proposed activity in such areas is legally permitted.

157. The borrower/client should first consider if the project activities and facilities proposed within the protected area are permissible by law and generally in accordance with the provisions of the area management plans. National land and resource use plans such as a National Biodiversity Action Plan should also be considered. In many countries, project site investigation and environmental impact assessment activities can only be undertaken within protected areas with the prior consent of the relevant authority.

158. Obtaining approval for proposed project activities permitted within a protected area will often rest on the approval authority's understanding of the activities and facilities, and likely impacts on protected area values. Accordingly, early and clear consultation with authorities is critical, usually commencing during the development of the project concept. Where a project will impact on the protected area, it may be possible to create a net positive impact by supporting enhancement activities and programs that have been identified by the area management authority (e.g. supporting an animal breeding and relocation program, funding additional staff, supplying equipment for area patrols, or supporting research on key conservation issues).

159. The boundaries of some protected areas may be ill-defined on maps or in the field. In these instances, the borrower/client should consult with theprotected area management authority to accurately identify the boundaries in relation to proposed project activities. Buffer zones may be legally demarcated around protected areas or be informally recognized. If project

[33] www.iucnredlist.org

[34] An area may be designated as legally protected for different purposes. Legally protected here refers to areas legally designated for the protection or conservation of biodiversity, including areas proposed by governments for such designation.

activities are proposed within buffer zones, it is advisable to identify the area and undertake consultation and related activities as described above.

160. Areas with recognized high biodiversity values that are not legally protected should also be identified, working on the principle that the biodiversity value of the area is the critical factor as compared to its current legal conservation status. Such areas include natural and modified ecosystems that have been voluntarily conserved by indigenous peoples and local communities through customary laws or other effective means.[35] In the event that a project is proposed inside or in proximity to a community conserved area, the borrower/client is encouraged to ensure that relevant Indigenous Peoples and local communities are appropriately consulted as part of the assessment process.

B. Biodiversity Assessment

161. Biodiversity assessment is required as a component of the environmental assessment when habitat is likely to be affected by the project. Project activities that have potentially adverse impacts on biodiversity include: habitat conversion, fragmentation, and isolation through changes to land use or land cover, and land disturbance; unsustainable extraction or harvesting (overexploitation) of species, or unsustainable utilization of other natural resources such as water and forest resources; significant pollution; and introduction of invasive alien species.

162. The objectives of biodiversity assessment are to: (i) identify and quantify the potential project impacts; (ii) design measures to avoid, minimize, or mitigate potentially adverse impacts and, as a last resort, propose compensatory measures to achieve no net loss, or preferably a net gain, of biodiversity; and (iii) identify the project's likely residual impacts. The principle of no net loss of biodiversity involves achieving measurable conservation outcomes that can reasonably be expected to result in no net loss of biodiversity.

163. **Screening** determines whether biodiversity will be a major project issue, and identifies what features require studying. This evaluation can be complex and therefore often requires the judgment of qualified and experienced experts. Key factors that need to be considered are: (i) the location and scale of project activities and facilities and their area of influence, including those of associated facilities; (ii) the types of technology that will be used; and (iii) the project's proximity to areas containing important biodiversity. Examples of red flags that indicate potential major biodiversity issues are: project sites within, partly within, adjoining or upstream of protected areas; medium- to large-scale land use conversion; the conversion of natural habitat; and activities that have a high risk of introducing alien species into the project area.

164. Figure 2 provides a sample decision framework for project siting, indicating different 'no-go' circumstances (i.e., when the requirements of the SPS are not met, the project is unlikely to be eligible for ADB financing) for projects working in various types of habitat and legally protected areas.

[35] Community conservation areas are characterized by:

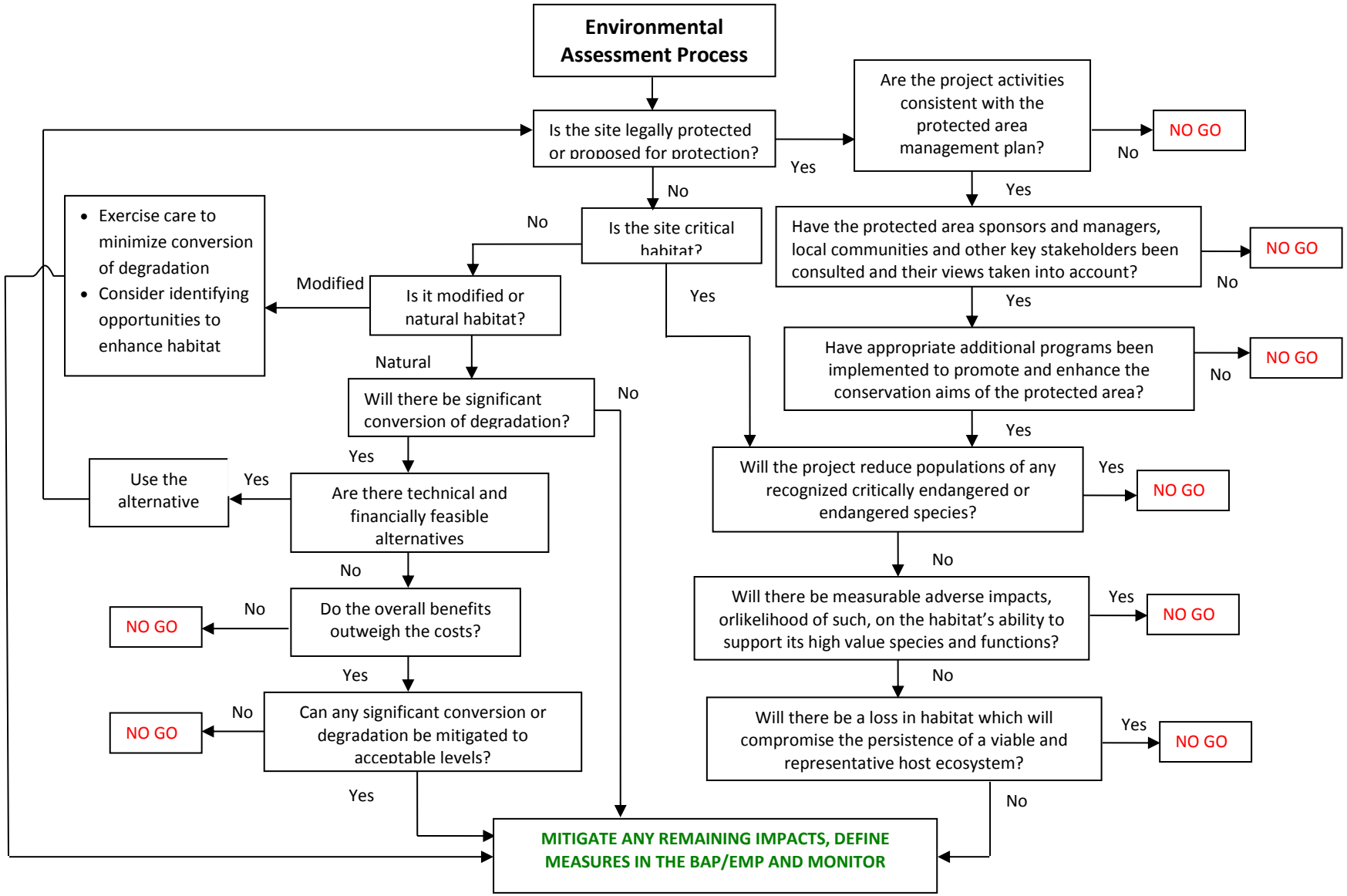
(i) one or more communities closely related to the ecosystems and/or species because of cultural, livelihood, economic or other ties
(ii) community management decisions and efforts lead to the conservation of habitats, species, ecological benefits and associated cultural values, although the conscious objective of management may not be conservation *per se*
(iii) communities are the major players in decision-making and are implementing actions related to ecosystem management, implying that some form of community authority exists and is capable of enforcing regulations

165. **Scoping** determines which direct and indirect biological impacts are likely to be significant, and thereby determines the focus issues of the impact assessment. Scoping also determines the appropriate spatial and temporal scope of the assessment, identifies data gaps, and indicates suitable survey and research methods. Consulting with government officials, conservation organizations and local communities is important at this stage to help identify key biodiversity impacts, including those linked to social issues and local livelihoods.

166. **Baseline studies** define the values of habitats that will be affected (on project sites and in the area of influence), describing the distribution, range and status of the species and biological communities present, and the location, status and main biodiversity values of nearby protected areas or other important areas for biodiversity. Biological baseline surveys can be time-consuming because detailed ground sampling is usually required and surveys may need to be conducted during a number of seasons to account for varying conditions. Industry recognized survey methods should be applied to ensure the integrity of the collected data, and avoid project delays due to problems/inadequacies in data collection. Habitat adjoining the project site may have to be surveyed to determine the connectivity with habitat on the project site and to assess the likely edge effect of the project on this adjoining area.

167. **Impact analysis** assesses impacts identified during scoping and baseline studies to determine their nature, scale, reversibility, magnitude, likelihood, extent, and effect. Determining the significance of impacts involves considering: the importance of resources at local, regional, national or international levels; whether the area is subject to formal or informal protection; the ecological values of potentially affected species and habitats; and the value of the ecosystems as sources of food or livelihood for local communities.

Figure 2. Biodiversity Decision Framework for Project Siting



Source: International Finance Corporation, World Bank Group.

168. **Mitigation measures** aim to avoid or reduce adverse biodiversity impacts. Priority is given to avoiding impacts on features with significant biodiversity value by using: alternative project sites (site, alignment); alternative facility/structure design, processes and construction methods; varying the layout of the project; and different project operating regimes (e.g. the timing and volume of hydropower generation releases). For adverse impacts that cannot be avoided, mitigation measures are designed and compensatory measures proposed to achieve no net loss of biodiversity. National regulations that stipulate mandatory mitigation measures have to be incorporated such as compensatory tree planting to offset the loss of vegetation. These measures are presented in the project EMP that also sets out the institutional arrangements (i.e., roles and responsibilities) and resources required to manage biodiversity impacts, and the implementation and monitoring programs. The EMP may include a communication plan indicating how implementation progress will be disclosed.

169. For projects with potentially significant biodiversity impacts and risks (e.g. involving critical habitats), the development of a Biodiversity Action Plan (BAP) or its equivalent may be appropriate. Regardless of whether proposed biodiversity management measures are presented in a separate plan, mitigation measures and associated timelines for addressing biodiversity issues should be incorporated into the environmental assessment, and implemented through the borrower/client's EMP.

170. **Biodiversity offsets** are conservation actions intended to compensate for unavoidable residual harm caused to biodiversity by project activities (i.e., after impact avoidance, minimization and mitigation measures have been exhausted). Offsetting usually aims to create ecologically comparable areas (comparable in size, quality and function), close to the affected project site if possible, in which biodiversity is managed and protected.

171. The principle of "no net loss" or "a net gain" of biodiversity requires that the pre-project net area and quality of biodiversity be maintained, or preferably enhanced in terms of key biodiversity components such as species diversity (numbers and/or composition), habitat extent and/or structure, and ecosystem function. In other words, biodiversity should be, at the minimum, the same but preferably better as a result of the project.

172. The design of a biodiversity offset is undertaken as part of the environmental assessment process, and is incorporated into the relevant project assessment documentation. Biodiversity offsets should be designed to comply with all relevant national and international law, and planned and implemented in accordance with the Convention on Biological Diversity and its ecosystem approach, as articulated in National Biodiversity Strategies and Action Plans. The use of experts with relevant academic qualifications in biology, ecology or ecological restoration, and experience in offset implementation in the host country or a similar developing country is highly recommended.

173. Offsetting may include management actions such as improving the conservation status of an area by reintroducing target native species, installing erosion control works to stabilize land and promote re-vegetation, or establishing ecosystems where they did not previously exist such as new wetlands. Alternatively, it could involve actively protecting an area to prevent degradation and allow regeneration, or reducing or removing biodiversity threats or pressures. For example, pressure may be removed by entering into contract or covenant agreements with individuals or communities in which they give up the right to convert habitat in the future in return for payment or other benefits now. Alternatively, it could involve patrolling an area to prevent harvesting or fencing it to prevent grazing.

174. International experience with biodiversity offsets indicates the need for the following elements to be addressed in the design of offsets:

- **Measurable conservation outcomes**: a flexible approach is required to design and implement biodiversity offsets to achieve clear, long-term and cost-effective conservation outcomes.
- **Balancing ecological equivalence and conservation priorities:** biodiversity offsets have to be commensurate to the magnitude of the impact of the development and ideally deliver outcomes that are "like for like." Given the difficulties in measuring biodiversity, establishing equivalence between the affected and offset sites is considered a good basis for achieving no net loss. However, this bias towards equivalence should not prevent offsets from being focused on agreed conservation priorities.
- **Location:** biodiversity offsets should be located within the same general area as the development activity, and have connectivity with areas of continuous vegetation/habitat.
- **Additionality:** biodiversity benefits from offsets have to directly result from the additional actions, and would not have occurred otherwise. An action that protects an area that is not being degraded is not an offset.
- **Timing and duration:** biodiversity offsets have to be delivered in a timely manner and be long-term. Offset implementation should commence as early as possible, ideally prior to or when the project impact commences.
- **Stakeholders' involvement:** dialogue and consultation with all key stakeholders and the involvement of experts is vital for biodiversity offset design. For offset implementation, it is good practice to engage an organization with appropriate experience and qualifications to work closely with the executing agencies/project proponents and, where relevant, staff from protected areas, local NGOs and other community partners.
- **Monitoring and enforcement**: biodiversity offsets have to be enforceable and regularly monitored and audited. This would often require that the area of offset is secured for conservation use in perpetuity to prevent further fragmentation or development.

175. A precautionary approach is recommended for the design of biodiversity offsets to increase the likelihood of successful outcomes. For example, a 1:1 ratio of habitat area replacement may be insufficient to ensure no net loss due to edge effects (e.g., drying, fire, blow-down, etc.) and partial failure of rehabilitation or protection methods. There is no generally accepted standard for an offset ratio, but ratios of 3:1, 10:1, and greater are considered best practice. Consultation with relevant national and local authorities, affected communities and biodiversity experts is encouraged when developing mitigation and compensatory measures. The borrower/client is encouraged to provide evidence of the effectiveness of the proposed offset, including results from similar projects to illustrate the likely outcomes.

C. Invasive Alien Species

176. An alien plant or animal species is one that is introduced beyond its original range of distribution (not naturally occurring in the project area, region or country). Invasive alien species invade or spread rapidly by out-competing native plants and animals when they are introduced into a new habitat that lacks their traditional controlling factors. Introductions can occur deliberately or accidentally (e.g. by seed or animal movement along road corridors, or from the

discharge of ballast water from ships). Invasive alien species are a major threat to global biodiversity.[36] While most modern agricultural and forestry species and cultivars are alien species, primarily bred for yield increases and hardiness, very few of these species are invasive.

177. Invasive alien species are a major cause of biodiversity loss, displacing native species by out-competing them. They also add to the cost of agriculture, forestry, fisheries, and other human enterprises, competing with or consuming production species, thereby reducing yields and increasing production costs. They can act as disease vectors, and can physically impede the operation of facilities (e.g. obstructing irrigation canals and hydroelectric dam intakes) thus reducing the lifespan of development investments. These impacts in turn put added stress on poverty alleviation, food security and biodiversity conservation. Examples of invasive species in the Asia Pacific region are: water hyacinth (*Eichhornia crassipe*s), indigenous to the Amazon Basin but now choking many of Asia's waterbodies; and the giant African snail (*Achatina fulica)*, native to East Africa but now widely distributed across southern and eastern Asia where it destroys crops and is a disease vector.

178. The borrower/client should not intentionally introduce any new alien species into the project area, region or country unless it is undertaken in accordance with the existing regulatory framework for such introduction, or unless the introduction is subject to a risk assessment (as part of the environmental assessment) to determine the potential for invasive behavior. Under no circumstances must species known to be invasive be introduced into new environments. The borrower/client should assess the possibility of the accidental or unintended introduction of such invasive alien species, and identify measures to minimize the potential for release.

179. Project activities that are more likely to introduce invasive alien species are shipping and other forms of transportation, and large-scale construction (particularly when earthmoving equipment and gear is imported from distant locations). For example, seed can arrive in containers from other countries or on mud attached to heavy machinery that has been used in other areas. Even something as innocuous as *Phytophthora cinnamomi*, a soil fungus that causes plant root rot, can be introduced into areas on vehicles and equipment, resulting in severe forest dieback. Introduction often occurs unintentionally and is not recognized until the species is well-established. In many instances, the initial establishment of an invasive alien species can be controlled if identified early, but the opportunity is lost when regular monitoring is not undertaken by trained personnel.

180. Preventing the introduction of invasive alien species is a critical management aim, as it avoids the often substantial costs involved in eradication and reduced production. Once prevention has failed, eradication is required. When the borrower/client proposes to introduce an alien species as a component of a project, this should be assessed for compliance with relevant national regulations. If a regulatory framework does not exist, its introduction should be assessed in light of the species behavior in similar conditions (e.g. climate, soils). Additionally, where the potential for the accidental introduction of invasive alien species exists, it is recommended that the borrower/client prepare a plan of management to monitor accidental introduction and rapidly manage such a situation.

[36] According to IUCN (2009), invasive species are the fifth most severe threat to amphibians, following habitat loss, pollution, disease and fires; the third most severe threat to bird species after agriculture and logging; the third most severe threat to mammals after habitat loss and utilization (mostly for food and medicine); and the fourth most severe threat to reptiles after pollution, persecution and natural disasters.

181. Good indicators of a species' invasive characteristics are: its current distribution outside its natural range, particularly in the project country and in similar climatic and soil conditions; and its preferred habitat conditions. As a general principle, great care is required when considering introducing an alien species into an area. In rare instances where this is proposed (e.g. for agriculture or forestry), the species should have a proven record of not becoming invasive in similar growing conditions.

D. Sustainable Natural Resource Management

182. Sustainable natural resource management involves the use, development and protection of natural resources in a way or at a rate that enables people and communities to provide for their current social, economic, and cultural well-being while sustaining the potential of these resources to meet the reasonably foreseeable needs of future generations. This includes safeguarding the life-supporting capacity of the atmospheric, hydrological and soil systems.

183. Experience has shown that sustainable use of natural resources can be achieved by balancing conservation and development priorities without compromising critical ecosystem services over the long-term, recognizing that this often requires trade-offs. When projects are proposed to utilize renewable natural resources such as forests, surface water or soils, the environmental assessment should consider if the resources will be managed sustainably over the project life and identify any residual impacts following the project. This requires an understanding of the assimilative capacity of the resource and its ability to function in a healthy manner, when harvested or used in the proposed manner and at the proposed rate.

184. Examples of the types of projects that need to manage natural resources in a sustainable manner include: (i) primary production derived from living natural resources (e.g. natural and plantation forestry, agriculture, livestock, aquaculture and fisheries); and (ii) water resource projects (e.g. domestic, industrial and irrigation water supply, sanitation, and hydropower).

185. Options available for sustainable management include minimizing the use of the resource through process efficiency, and regenerating the resource to provide ongoing raw materials. Planning techniques such as energy and water budgets are useful tools to determine management options and select viable processes.

186. Where possible, the borrower/client is required to demonstrate the sustainable management of resources through an appropriate system of independent certification. An appropriate certification system is one that is independent, cost-effective, based on objective and measurable performance standards, and developed through consultation with relevant stakeholders such as local people and communities, indigenous peoples, and civil society organizations representing consumer, producer, and conservation interests. Such a system has fair, transparent, and independent decision-making procedures that avoid conflicts of interest. For some resources such as forests, it may be possible to demonstrate sustainable management using an existing certification scheme. In the absence of an appropriate certification system, the borrower/client may choose to demonstrate sustainable natural resource management through an independent evaluation of management practices and/or the status of the resource.

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VI. POLLUTION PREVENTION AND ABATEMENT

187. ADB safeguards require the borrower/client to apply pollution[37] prevention and control technologies and practices consistent with international good practice. This should occur during project design, construction, and operation to ensure that the project meets the relevant standards and guidelines. Pollution prevention and abatement is required if the project has the potential to generate pollution or emit greenhouse gases, or if it proposes to undertake pest and/or vector management controls. Pollution prevention and abatement also extends to the management of the waste generated by a project, which is in itself a potential source of pollution.

188. This section addresses pollution prevention and abatement issues in four interrelated technical areas:

- pollution prevention, resource use efficiency and conservation
- waste and hazardous materials management
- pesticide use and management
- greenhouse gas emissions

189. **Standards, guidelines and good practice**. Pollution prevention and abatement has to address project impacts and risks in accordance with international good practice, as reflected in internationally recognized standards and guidelines. The primary standards to be applied are national regulations and the World Bank Group's *Environment, Health and Safety* (EHS) *Guidelines*. National regulations take precedence; but when they differ from the EHS Guidelines, the more stringent levels or measures apply. In some circumstances, less stringent levels or measures may be appropriate due to specific project conditions (e.g. existing facilities). In these cases, the borrower/client is required to prepare alternatives that are consistent with SPS requirements for the protection of human health and the environment. Full and detailed justification of the proposed alternatives should also be provided.

190. The World Bank Group's guidelines consist of: (i) General EHS Guidelines, covering environmental, occupational health and safety, community health and safety, and construction and decommissioning; and (ii) industry sector EHS guidelines, which provide specific guidance for over 60 different industries and project activities.[38] The guidelines are good technical reference documents with general and industry-specific examples of good international industry practice (GIIP). They contain performance levels and measures that are generally considered to be achievable in new facilities at reasonable cost and with the use of existing technology.

191. The application of the EHS Guidelines should be tailored to the hazards and risks of each project, where site-specific variables such as national context, assimilative capacity of the environment, and other project factors are taken into account. The applicability of specific technical recommendations should be based on the professional opinion of qualified and experienced persons.

192. **Cleaner production.** This concept of integrating pollution mitigation into the design of a product and production processes to eliminate the cause of the hazard at its source is ADB's

[37] The term "pollution" refers to the presence of both hazardous and nonhazardous pollutants in solid, liquid, or gaseous forms, as well as in other forms such as nuisance odors, noise, vibration, radiation, electromagnetic energy, and the creation of visual impacts including light.

[38] www.ifc.org/ifcext/sustainability.nsf/Content/EHSGuidelines

emerging overall approach to pollution prevention and abatement. But besides addressing pollution, the concept also involves the continuous application of an integrated strategy to processes, products, and services to reduce the risks posed by production activities to humans and the environment, including those that arise from unsustainable resource utilization. It therefore encompasses resource conservation and resource use efficiency, in addition to waste management, regulating the use of toxic and hazardous materials, and greenhouse gas emissions reduction.

193. Seven elements or steps can be applied to a project to achieve cleaner production[39]:

- Reduce material intensity.
- Reduce energy intensity.
- Reduce dispersion of toxic substances.
- Enhance the ability to recycle.
- Maximize the use of renewable resources.
- Extend product durability.
- Increase service intensity.

194. Cleaner production is achieved by improving processes and/or using alternative processes. The borrower/client is encouraged to apply cleaner production technology and methods to the design and operation of greenfield projects when technically and financially feasible and cost-effective (e.g. consideration of cleaner production at the design stage can include allocating plant space for environmental improvements at a later date, for example, providing space for flue gas desulphurization units). The borrower/client is strongly encouraged to keep up with industry developments in clean production as it can improve production and reduce costs over time, given that it is considerably easier to incorporate proven technology into a new project design than to retrofit the facility later. While increasing returns, cleaner production can also improve the project or corporate image, and create a market edge through product differentiation.

A. Pollution Prevention, Resource Use Efficiency and Conservation

1. Pollution Prevention

195. The borrower/client is required to apply the following pollution prevention and minimization principles to a project:

- Avoid, or where avoidance is impossible, minimize or control the intensity or load of pollutant emission and discharge.
- When the project has the potential to create a significant source of emissions in an already degraded area, introduce strategies to help improve ambient conditions (e.g. emissions offsets).

196. Project pollution prevention should aim to achieve cost-effective pollution prevention and minimization, using commercially available skills and resources. This approach recognizes that the diminishing benefits of some measures may not justify their implementation. Pollution prevention should be achieved in compliance with statutory and guideline limits for end-of-pipe (discharge) pollutant loads, taking into account the conditions of the receiving environment and

[39] ADB, 2005. Making Profits, *Protecting Our Planet – Corporate Responsibility for Environmental Performance in Asia and the Pacific*. Asian Environment Outlook. Manila.

project features of significance such as project sites, components, technologies, and processes. The assimilative capacity of the environment and potential cumulative impacts of pollution should also be considered in the development of suitable control measures.

197. For projects with potentially significant emissions, detailed baseline data on ambient conditions and continued monitoring during project operation are usually required, and an industry-recognized model may have to be applied to predict project-induced conditions. For projects with limited emissions, pollution prevention or minimization may be achieved by the application of simple control measures to meet the applicable emissions limits and ambient standards.

198. In areas where the receiving environment is already degraded, international good practice requires an evaluation of the existing background ambient levels to determine whether these are in compliance with the relevant regulations and guidelines, and to identify the required performance criteria for the project. For example, the guideline for a degraded airshed may stipulate 'no net increase in ambient levels of suspended particulate matter,' whereas a small increase in ambient levels in a non-degraded airshed may be permissible as it can cause limited harm. The EHS Guidelines provide clear limits for project emissions and ambient air and water quality.

199. If the project has the potential to contribute significant emissions in an already degraded environment, and maximum technically and financially feasible reductions in pollution discharge intensity and/or loading have already been integrated into the project design, additional strategies may be required to avoid further impacts. These strategies may include evaluating alternative project locations where ambient conditions are less degraded, and/or introducing emission offsets. Emission offsetting involves compensating for a project's emissions by obtaining emission reductions elsewhere. For example, the establishment of a central heating boiler house in eastern Asia may allow the closure of a number of less efficient and more polluting small boilers, resulting in a net reduction in emissions and an improvement in ambient air quality.

2. Resource Use Efficiency and Conservation

200. The borrower/client is required to examine and incorporate resource use efficiency and conservation measures into project operations consistent with the principles of cleaner production. While conserving raw materials, these measures usually also result in cost savings and waste reduction.

201. Resource use efficiency and conservation are best achieved by including the most appropriate technology and processes in project design. The decision to include such measures will be partly based on the costs and returns of different options. This is especially true in the energy sector where the shift to clean technologies and clean energy supplies may mean substantial initial investments.. However, shifting to renewable energy must also take into account its likely impacts on other sectors (e.g. additional strain on scarce water resources in the case of hydropower, effects on food production and food security of greater biomass energy production). The borrower/client can also make use of opportunities for demand-side energy efficiency with financial benefits, which are commonly found in all industry sectors.

202. Where benchmarking data is available, the borrower/client is advised to utilize this data to establish project energy efficiency and plan improvements. Examples of energy efficiency opportunities in different sectors are: [40]

- commercial and services – improvements in lighting and heating, ventilation and air conditioning systems
- metals and minerals manufacturing – equipment upgrades, automated process control, installation of variable speed drives, reduced process variability, and waste heat recovery
- oil and gas extraction – reducing and eliminating unnecessary energy use, and improving the efficiency of electric motors used to operate equipment such as pumps and compressors
- water and waste – pump optimization, greater control of aeration processes, and biogas re-use facilities
- transportation – fuel optimization, lubricants and electricity use at depots.

More efficient electricity generation (i.e., greater output per unit of fuel) also offers substantial gains.

B. Wastes and Hazardous Materials

1. Wastes

203. Wastes (solid, liquid, gaseous or radioactive) are defined as unwanted or unusable materials that can pose a hazard to human health and the environment. Wastes can be generated during all phases of a project's lifecycle, from construction through to decommissioning. But the main source of wastes is usually project operation. As waste management and disposal costs and associated liabilities continue to increase so do the commercial gains that can be achieved from improvements in waste avoidance and management.

204. The borrower/client is required to avoid, or where avoidance is not possible, minimize or control waste generation from project activities. Where waste cannot be recovered or reused, it should be treated, destroyed, and disposed of in an environmentally sound manner. If the generated waste is considered hazardous, the client should explore reasonable alternatives for its environmentally sound disposal, considering the limitations applicable to its transboundary movement. When waste disposal is conducted by third parties, the borrower/client should endeavor to use contractors that are licensed by the relevant regulatory agencies.

205. The borrower/client should apply the internationally accepted waste management hierarchy to prioritize project waste management practices and so optimize environmental outcomes. From the most to the least preferred, the order of these management practices is: avoid, reduce, reuse, recycle, recover, treat, dispose. This should be applied to both hazardous and nonhazardous wastes during all project stages in compliance with applicable national environmental and industrial regulations. Wastes from commercial or industrial sources that are potentially hazardous to humans or the environment require a higher level of control.

206. **Avoid.** Avoiding the generation of waste is the best option to prevent the release of hazardous materials. It is also the most cost-effective measure as it results in the avoidance of

[40] www.ret.gov.au

the associated waste management costs. Waste can be eliminated in the production process by modifying or changing the process, adopting new technology or substituting another material to prevent waste generation.

207. Reduce. Actions that minimize waste production include implementing new processes and technology, looking into using materials more efficiently (e.g. by redesigning packaging or cutting out unnecessary packaging), and replacing disposable products with reusable and durable ones.

208. **Reuse**. Reusing the product more than once in its original form or for a different purpose avoids the consumption of additional resources and waste generation. Reuse and recycling involves systematic segregation, collection and reprocessing. Examples include reusing shipping pallets.

209. **Recycle**. When reuse can no longer be carried out, the materials should be recycled back into similar products or to be used as secondary raw materials for the production of new products wherever possible. Producing new products from recycled materials usually consumes less energy and reduces the extraction of raw materials from the environment. The use of agricultural processing waste for stockfeed is an example of recycling.

210. **Recover.** The recovery of energy from waste can be a viable option after the previous actions have been applied. It is the final step in the recovery of benefits from waste, and can involve incineration, the recovery of latent heat energy from materials, and conversion into power for commercial or domestic use. The release of hazardous emissions to the air of these waste recovery measures has to be considered. An alternative method of energy recovery from waste is the capture of methane emissions from landfills for electricity generation electricity.

211. **Treat and dispose**. If waste cannot be reused or recovered, it has to be treated, destroyed and/or disposed of in an environmentally acceptable manner in accordance with international good practice relevant national regulations. This usually involves disposing of the waste in a properly engineered sanitary landfill.

212. Third party waste disposal should be undertaken by legitimate, qualified enterprises that have all the necessary regulatory approvals and/or licenses. It is prudent to inquire about the location of the final disposal of the waste by the third party, and to ensure that the final disposal facility is licensed by the relevant regulatory agencies. If no suitable disposal method is available through commercial or other means, the borrower/client may consider developing its own recovery or disposal facilities. An alternative is to work with waste management associations or similar entities to identify viable approaches consistent with international good practice.

213. If the waste is considered hazardous, the borrower/client may explore reasonable alternatives for environmentally sound disposal, in accordance with the *Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal*. The *Basel Convention* is the most comprehensive global environmental treaty on hazardous wastes. It has 170 party states, including over 30 countries from the Asia Pacific region. The Convention aims to protect human health and the environment against the adverse effects resulting from the generation, management, trans-boundary movement and disposal of hazardous and other wastes. International good practice is to comply with all relevant requirements of the *Basel Convention* with respect to the trans-boundary movements of hazardous and other wastes,

including applying the “Prior Informed Consent” procedure (shipments made without consent are illegal).

2. Hazardous Materials

214. Hazardous materials are sometimes used as raw materials or produced by projects. The borrower/client is required to avoid the manufacture, trade, and use of hazardous substances and materials subject to international bans or phase-outs because of their high toxicity to living organisms, environmental persistence, potential for bioaccumulation, or potential for depletion of the ozone layer. The borrower/client should consider the use of less hazardous substitutes for such chemicals and materials. Relevant conventions include the *Stockholm Convention on Persistent Organic Pollutants*; the *Rotterdam Convention of Prior Informed Consent for Certain Hazardous Chemicals and Pesticides in International Trade*; and, the *Montreal Protocol on Substances that Deplete the Ozone Layer*.

215. The release of hazardous materials is best prevented by avoiding the use of such materials in project activities in line with the principles of cleaner production. The borrower/client is strongly encouraged to explore opportunities throughout the project life to use non-hazardous materials in place of hazardous materials, especially where the hazards of the materials cannot be easily prevented under normal use and disposal at the end of their life cycle. Substitutions have been found, for example, for the use of asbestos in building materials, polychlorinated biphenyls (PCBs) in electrical equipment, persistent organic pollutants in pesticides formulations, and ozone depleting substances in refrigeration systems.

216. Where a project has the potential to release toxic or hazardous material, or project activities are to cause injury to project staff or the public, the borrower/client is advised to conduct a hazard analysis of its operations. Substances classified as hazardous wastes possess at least one of four characteristics - ignitability, corrosivity, reactivity, or toxicity - or appear on special lists such as Annex I of the *Basel Convention on the Control of Transboundary Movements of Hazardous Wastes*, or a comparable list under national laws. Information on the environmentally sound handling and disposal of wastes can be found in the World Bank Group’s EHS Guidelines, in numerous publications in support of the *Basel Convention,* and in the *Stockholm Convention on Persistent Organic Pollutants*.

C. Pesticide Use and Management

217. The indiscriminate use or misuse of pesticides can cause severe illness or death, contaminate soil and water, harm crops, livestock and wildlife, and reduce or eliminate the natural enemies of targeted pests. For these reasons, the selection and use of pesticides has to take into account potential impacts on human health and the environment.

218. Pest and vector management activities are required to be based on an integrated pest management (IPM) or an integrated vector management (IVM) approach that targets economically significant pest infestations and disease vectors of public health significance. IPM and IVM are environmentally sensitive approaches that use current, comprehensive information on the life cycles of pests and their interaction with the environment, in combination with available pest control methods, to manage pest damage at an acceptable level through the most economical means and with the least possible hazard to people, property, and the environment. The borrower/client’s IPM and IVM program will entail coordinated use of pest and environmental information along with available pest/vector control methods, including cultural practices, biological, genetic and, as a last resort, chemical means to prevent unacceptable

levels of pest damage. The use of synthetic chemical pesticides in agricultural and public health projects should be minimized and utilized only, if and when, and to the extent that other environmentally sound pest management practices have failed or proved inefficient. Capacity development to enhance the application of integrated pest management, and measures to help regulate and monitor the distribution and use of pesticides should also be part of the borrower/client's IPM/IVM program.

219. The *WHO Recommended Classification of Pesticides by Hazard* (2005) sets out a classification system to distinguish between more and less hazardous forms of pesticides based on acute risk to human health (e.g. the risk of single or multiple exposures over a relatively short period of time). This classification takes into consideration the toxicity of the technical compound and its common formulations. The document lists common technical grade pesticides and recommended classifications, together with a listing of active ingredients believed to be obsolete or discontinued for use as pesticides, pesticides subject to the prior informed consent procedure, limitations to trade because of international conventions, and gaseous or volatile fumigants not classified under these recommendations.

220. Products classified by WHO as Hazard Class Ia (extremely hazardous), Class Ib (highly hazardous) and Class II (moderately hazardous) may only be used if the borrower/client can demonstrate that there is a national pesticide regulatory framework that places restrictions on the distribution and use of these chemicals, and they will not be accessible to personnel without proper training, equipment and facilities to handle, store, apply and dispose of these products properly.

221. If pesticides are to be used, international good practice involves exercising a high degree of diligence, selecting those that are:

- low in human toxicity (see below)
- known to be effective against the target species
- have minimal effects on non-target species and the environment
- are packaged in safe containers and clearly labeled for safe and proper use
- have been manufactured by an entity currently licensed by relevant regulatory agencies

222. Good practice on handling, storing, applying and disposing of pesticides is set out in the Food and Agricultural Organization's (FAO) *International Code of Conduct on the Distribution and Use of Pesticides.* The Code establishes voluntary standards of conduct for all public and private entities engaged in or associated with the distribution and use of pesticides, and serves as the globally accepted standard for pesticide management. The borrower/client will handle, store, apply and dispose of pesticides in accordance with international good practice such as the FAO Code. If required, a program for capacity building may be provided in the regulation and monitoring of pesticide distribution and use, and in the development and application of IPM/IVM approaches.

D. Greenhouse Gas Emissions

223. The SPS requires the borrower/client to promote the reduction of project-related greenhouse gas (GHG) emissions in a manner appropriate to the nature and scale of project operations and impacts. During the development or operation of projects that are expected to or currently emit significant quantities of greenhouse gases, defined as amounting to 100,000

tCO_2e per annum or more aggregate direct and indirect emissions,[41] the borrower/client should quantify (i) direct emissions from the facilities within the physical project boundary, and (ii) indirect emissions associated with the off-site production of power used by the project. The borrower/client should also evaluate technically and financially feasible and cost-effective options to reduce or offset project-related GHG emissions during project design and operation.

224. GHGs in the atmosphere absorb and emit infrared radiation thereby warming the atmosphere through the "greenhouse effect". The six main anthropogenic GHGs emitted into the atmosphere and targeted in the Kyoto Protocol to the *United Nations Framework Convention on Climate Change* are:

- carbon dioxide (CO_2)
- methane (CH_4)
- nitrous oxide (N_2O)
- hydrofluorocarbons (HFCs)
- perfluorocarbons (PFCs)
- sulphur hexafluoride (SF_6)

225. Each of these gases has a different global warming potential (GWP) due to their different radiative properties and lifetimes in the atmosphere. For example, Table 4 shows that: over a 100-year time horizon, methane, a gas commonly produced in agriculture, has 25 times the warming effect of carbon dioxide; while sulfur hexafluoride, a gas commonly used for electricity transmission circuit breakers and switchgear, has a GWP 22,800 times the warming effect of carbon dioxide. The GWP of a GHG is calculated in carbon dioxide equivalent (CO_2e), providing a common unit to express the GWP of a volume of gas (e.g. 1 ton of methane equals 25 tons CO_2e).

Table 4. Global Warming Potential Values and Lifetimes

Compound	GWP (100 year time horizon)	Lifetime (years)
Methane	25	12
Nitrous oxide	298	114
HFC-23 (hydrofluorocarbon)	14,800	270
HFC-134a (hydrofluorocarbon)	1,430	14
Sulfur hexafluoride	22,800	3,200

Source: 4th Assessment Report, Intergovernmental Panel on Climate Change (IPCC), 2007.

226. The environmental assessment screening process should determine if the project falls in a sector that has the potential to emit one or more of the six GHGs listed in the Kyoto Protocol at the rate of 100,000 tCO_2e per year. Sectors that generate significant GHG emissions include energy, transport, heavy industry, agriculture, forestry and waste management. Tables 5 and 6 provide illustrative examples of projects that may exceed the GHG emission significance threshold of 100,000 tCO_2e per year. Projects with annual emissions equal to or above the threshold level should estimate: (i) the net GHG direct emissions from the facilities within the physical project boundary (i.e., emissions after all reduction measures are adopted); and (ii) the indirect emissions associated with the off-site production of power used by the project.

[41] This is based on good international practice presented in IFC Performance Standard 3: Pollution Prevention and Abatement, in *Performance Standards on Social and Environmental Sustainability, 2006*.

Table 5. Examples of Projects that Emit 100,000 tCO_2e per Year

Sector/Project	Projects with 100,000 tonne CO_2e per year	Assumptions
A: Direct Emissions		
(i) Energy (Fossil Fuel Combustion)		
Coal-fired combustion facility	Coal consumption - 45,000 ton/yr (or 1,100 TJ/yr)	Emission factor – 25.8 tC/TJ, Fraction of carbon oxidized – 0.98, Net calorific value – 24.05 TJ/1,000ton
Oil-fired combustion facility	Oil consumption - 32,000 ton/yr (or 1,300 TJ/yr)	Emission factor – 21.1 tC/TJ, Fraction of carbon oxidized – 0.99, Net calorific value – 40.19 TJ/1,000ton
Gas-fired combustion facility	Gas consumption - 36,000 ton/yr (or 1,800 TJ/yr)	Emission factor – 15.3 tC/TJ, Fraction of carbon oxidized – 0.995, Net calorific value – 50.03 TJ/1,000ton
(ii) Energy (Electricity Generation)		
Coal-fired power generation	Generating capacity – 18 MW	World average emission factor in 2001-2003 – 893 gCO_2/kWh, Annual capacity factor – 70%
Oil-fired power generation	Generating capacity – 25 MW	World average emission factor in 2001-2003 – 659 gCO_2/kWh, Annual capacity factor – 70%
Gas-fired power generation	Generating capacity – 41 MW	World average emission factor in 2001-2003 – 395 gCO_2/kWh, Annual capacity factor – 70%
(iii) Energy (Coal Mining)		
Underground coal mining	Coal production - 370,000 ton coal/yr	Emission factor – 17.5m^3 CH_4/ton of coal, 0.67 $GgCH_4$/million m^3
Surface coal mining	Coal production - 2,600,000 ton coal/yr	Emission factor – 2.45m^3 CH_4/ton of coal, 0.67 $GgCH_4$/million m^3
(iv) Heavy Industry		
Cement production	Cement production - 201,000 ton cement/yr	Emission factor – 0.4985 tCO_2/t cement
Iron and steel production	Iron / steel production - 63,000 ton iron or steel/yr	Emission factor – 1.6 tCO_2/t iron or steel
(v) Agriculture		
Domestic livestock (dairy cattle, Latin America)	Livestock - 74,000 cattle	Emission factor – 59 $kgCH_4$/head/yr
Domestic livestock (dairy cattle, Africa)	Livestock- 118,000 cattle	Emission factor – 37 $kgCH_4$/head/yr
(vi) Forestry / Land Use Change		
Conversion of fast growing hardwood tropical forest	Conversion area: 4,400 ha	Annual average accumulation of dry matter as biomass – 12.5 ton dm/ha/yr, carbon fraction of dry matter – 0.5
Conversion of Douglas fir temperate forest	Conversion area: 9,100 ha	Annual average accumulation of dry matter as biomass – 6.0 ton dm/ha/yr, carbon fraction of dry matter – 0.5
(vii) Oil and Gas Production (Flaring only)		
Natural Gas Production	83,000 million m^3/yr	CO_2 emission factor of 1.2E-03 Gg per million m^3 gas production. Source: IPCC Guidelines for National Greenhouse Gas Inventories, Table 4.2.5 (2006)

Sector/Project	Projects with 100,000 tonne CO_2e per year	Assumptions
Oil Production	2.4 million m^3/yr	CO_2 emission factor of 4.1E-02 Gg per thousand m^3 oil production. Source: IPCC Guidelines for National Greenhouse Gas Inventories, Table 4.2.5 (2006)
Associated Gas Flaring	1,400 million standard cubic feet (SCF) gas flaring/yr	American Petroleum Institute (API) Combustions Emissions Estimation Methods, Exhibit 4.8 (2004)
B: Indirect Emissions (from Purchased Electricity)		
Average Generation Mixture	Electricity consumption - 200 GWh/yr	World average emission factor in 2001-2003 – 494 gCO_2/kWh
Coal-fired generation	Electricity consumption - 110 GWh/yr	World average emission factor in 2001-2003 – 893 gCO_2/kWh
Oil-fired generation	Electricity consumption - 150 GWh/yr	World average emission factor in 2001-2003 – 659 gCO_2/kWh
Gas-fired generation	Electricity consumption - 250 GWh/yr	World average emission factor in 2001-2003 – 395 gCO_2/kWh

Source: IFC Guidance Note 3: Pollution Prevention and Abatement, 2007.
Note: Assumptions are from (i) Revised 1996 and 2006 IPCC Guidelines for National Greenhouse Gas Inventories, (ii) IEA Statistics – CO_2 Emissions from Fuel Combustion 1971-2003, and (iii) IEA Energy Statistics Manual, 2004. These levels are for illustrative purposes only and not to be used as threshold to determine whether projects exceed 100,000 metric ton CO_2 equivalent per year.

227. A road project has to be assessed if it will emit above 100,000 CO_2e during operation. If the assessment finds that, for a given project with a specific "road length" in kilometer (km), the traffic expressed as Passenger Car Units per day (PCU/day) is below the numbers in Table 6 in a representative year, the emissions for that year are unlikely to exceed the 100,000 tons threshold.

228. If the project has several stretches with different traffic flows, then the weighted average of traffic for the entire road is calculated and compared against Table 6. For example, for a project with stretches of 25km, 30km, and 40 km having daily traffic of 8000, 12000 and 5000 PCU for the total length of 95 km the weighted traffic will be 8000 PCU (25*8000+30*12000+40*5000)/(25+30+40)= 8000). Table 6 indicates that for a 95 km long road, if the traffic is below 12000 PCU/day (interpolated number), the emissions will be below 100,000 tons/year.

Table 6. Maximum Number of Passenger Car Units per Kilometer to Trigger 100,000tonne CO2e per Year

Road Length	Passenger Car Units ('000s)
20	57
30	38
40	28
50	23
60	19
70	16
80	14
90	13
100	11

229. If the threshold is exceeded for a road project, the project team can use the guidance provided in the Transport Emissions Evaluation Models for Projects (TEEMP).[42] The suite of models under the TEEMP was developed by ADB, and has been adopted by the Global Environmental Fund as a guide for financing transport sector projects.

230. There are many internationally recognized methodologies that can be used to estimate and monitor a project's direct GHG emissions. The most authoritative methodologies are found in the 2006 IPCC *Guidelines for National Greenhouse Gas Inventories.*[43] These guidelines provide estimation methodologies for a number of activities and sectors, consisting of Volume 1 (General Guidance and Reporting), Volume 2 (Energy), Volume 3 (Industrial Processes and Product Use), Volume 4 (Agriculture, Forestry and Other Land Use), and Volume 5 (Waste).

231. Indirect emissions from the off-site generation of power used by the project can be estimated by using the national average GHG emissions performance for electricity generation (i.e., national average of carbon dioxide emissions per unit of electricity generated in the country). However, project-specific GHG emissions performance for electricity generation is preferred if available (i.e., average of carbon dioxide emissions per unit of electricity generated by the utility from which the project purchases electricity), particularly if renewable forms of energy are used.

232. Indirect emissions from the use of a new or upgraded project facility by outside entities or people, such as vehicles travelling on a new road, are not reportable emissions as they are outside the project's direct control. Despite this, it is advisable to estimate any such indirect emission savings that are likely to be delivered by the project to indicate the net effect of the project on GHG emissions (e.g. from reduced fuel consumption due to greater average travel speeds, better road surface and shorter travel distances, which in turn can be attributed to the more efficient road transport provided by the project).

233. The main project GHG reduction options available to the borrower/client include:

- enhancement of energy efficiency in equipment, buildings, vehicles, and energy generation
- development and increased use of renewable energy
- recovery of energy from wastes

234. Carbon offsetting, involving the reduction of GHG emissions elsewhere to offset or compensate for project emissions, may be undertaken through: (i) the establishment, enhancement or protection of carbon sinks (e.g. forests); (ii) the promotion of sustainable forms of agriculture and forestry; or (iii) other activities that sequester carbon. Carbon finance through emissions trading under the Clean Development Mechanism or similar carbon markets may provide additional funding sources for GHG reduction and control.

235. Annual monitoring and quantification of GHG emissions using internationally recognized methodologies can: (i) help establish CO_2 emission volumes and trends in ADB-supported projects; (ii) test and improve the methodology for CO_2 quantification and monitoring; and (iii) enhance borrower/client awareness and promote emission reduction. By comparing the project's GHG emissions performance with good international practice performance for that activity or sector and analyzing the annual trend in project GHG emissions performance over

[42] TEEMP is available at www.cleanairinitiative.org/portal/projects/TEEMP
[43] Available at http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html

time, the borrower/client can accurately gauge project performance and determine the need for improvements.

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VII. PHYSICAL CULTURAL RESOURCES

236. ADB safeguard requirements on physical cultural resources (PCR) apply when a project has the potential to either directly or indirectly affect PCR, regardless of whether these resources are legally protected or not or previously disturbed. The primary objective of PCR management is to protect cultural heritage from adverse project impacts and support its preservation. Borrower/client obligations commence with siting and designing projects to avoid significant damage to PCR. When a likely impact is identified, the borrower/client should utilize qualified experts to undertake field surveys and related research and consultation to assess the potential impact on these resources. Consultation shall be conducted with the relevant national and local regulatory agencies and affected communities who use or have used these resources. If the project is likely to have an adverse impact on PCR, the borrower/client should identify appropriate measures to mitigate these impacts. In addition, when the location of a project is in an area where PCR is expected to be found, a chance find procedure should be included in the EMP.

A. What are PCR?

237. PCR are broadly defined as covering all types of tangible cultural heritage, including movable or immovable objects, sites, structures, groups of structures, and natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic or other cultural significance. PCR are human-made objects, natural features, or a mix of the twoboth. They may be located in urban or rural areas and may be above or below ground or underwater. They may be known and listed on official inventories, but often they are undiscovered.

238. PCR are sources of valuable scientific and historical information, assets for economic and social development, and integral parts of a people's cultural identity and practices. Their cultural interest may be at the local, provincial, national or international level. The value of PCR is partly indicated by the fact that once lost, it cannot be replaced.

239. Examples of PCR are: (i) human-made objects such as buildings of architectural or historical interest, religious buildings, and historic roads, bridges, and walls; (ii) natural sites and landscapes such as paleontological sites, natural landscapes of outstanding aesthetic quality, and wellsprings and wells of spiritual significance; (iii) combined human-made and natural features such as cave paintings, sites used for religious or social functions, and places of pilgrimage; and (iv) movable objects such as paintings, religious artefacts and antiquities such as coins and seals. More examples of PCR are listed in Table 6.

Table 6. Examples of Common Physical Cultural Resources

Human-made	**Natural**
• Religious buildings such as temples, mosques, churches • Exemplary indigenous or vernacular architecture • Buildings, or remains of buildings, of architectural or historic interest • Historic or architecturally important townscapes • Historic roads, bridges, walls, fortifications, dams, aquaducts and viaducts • Archeological sites • commemorative monuments	• Springs and wells • Sacred waterfalls • Sacred groves and individual sacred trees • Historic trees • Sacred mountains and volcanoes • Caves currently or previously used for human habitation • Paleontological sites (i.e. deposits of early human, animal or fossilized remains) • Natural landscapes of outstanding aesthetic

• Historic sunken ships	quality
Combined human-made and natural • Sites used for religious or social functions such as weddings, funerals or other traditional community activities • Places of pilgrimage • Burial grounds • Family graves in the homestead • Historic gardens • Cultural landscapes • Natural stones bearing historic inscriptions • Historic battlegrounds • Combined human and natural landscapes of aesthetic quality • Cave paintings	**Movable** • Historic or rare books and manuscripts • Paintings, drawings, icons, jewelry • Religious artifacts • Historic costumes and fabrics • Memorabilia relating to the lives of prominent individuals or to events such as historic battles • Statues, statuettes and carvings • Pieces broken off monuments or historic buildings • Unregistered archaeological artifacts • Antiquities such as coins and seals • Historic engravings, prints and lithographs • Natural history collections such as shells, flora, minerals

Source: World Bank, 2009.

240. Protecting PCR from deterioration or loss is recognized in the 1972 *Convention Concerning the Protection of the World Cultural and Natural Heritage (*commonly known as the *World Heritage Convention)*, ratified by over 40 countries in the Asia Pacific region.

B. Project Activities and Possible Impacts on PCR

241. Features of projects likely to trigger ADB's PCR requirements are: (i) location is within, or in the vicinity of, recognized cultural heritage sites; (ii) project design focuses on supporting the management or conservation of PCR; and (iii) the project involves significant excavation and earthmoving, demolition, flooding, or other environmental changes where previously unknown PCR are likely to be encountered. The more common types of direct project impacts on PCR are: direct physical disturbance through construction activities such as vegetation removal and earthmoving, or building renovation; site inundation (from reservoirs, etc.); indirect construction disturbance by blasting or vibration; increased human access; blocking of traditional access; and operational impacts that include altering the amenity of a site or area by factors such as noise, vibration and reduction in scenic quality. Table 7 provides a list of common project activities and features that can typically have adverse impacts on PCR.

Table 7. Common Project Activities and Features that Can Impact PCR

Activity	Potential Impact
Construction	
Work camps	• Vandalism, theft and illegal export of movable PCR, and of pieces of monumental PCR accessible directly or indirectly to migrant laborers • Desecration of sacred sites
Excavation, construction and soil compaction	• Direct physical damage to, or destruction of, human-made, natural, and buried PCR on site
Construction traffic	• Vibration, air, soil and water pollution, leading to damage to natural and human-made PCR in the vicinity
Use of heavy construction	• Vibration, damaging build PCR in the vicinity • Soil compaction, damaging buried PCR (archaeological and

equipment	paleontological) on site, and damaging pipelines and drains serving built PCR in the vicinity
Use of explosives	• Air pollution and vibration, leading to landslides and damage to buildings and natural PCR in the vicinity
Creation of large or linear construction sites	• Barrier effects causing difficulty or denial of access by community to living-culture PCR
Inundation	• Submergence or destruction of human-made, natural or buried PCR. Barrier to access of all types of PCR
Resettlement	• Denial of access to all types of PCR formerly used by community • Abandonment of all types of PCR, leading to neglect • Damage/destruction of man-made, natural or buried PCR in resettlement sites
Waste disposal or landfill	• Burial or damage to natural, buried or underwater PCR
Quarrying or mining	• Damage to aesthetics of townscapes or landscape • Damage or destruction of buried PCR on site
Operation	
New and upgraded roads	• Increased human traffic enjoying improved access to PCR of public interest leading to increased wear and damage, sacrilege of sacred sites, theft and vandalism of movable and breakable PCR • New highways cutting off access to living-culture PCR by residents of settlements on other side of highways • Increased air pollution and vibration from traffic causing damage to human-made PCR, particularly monuments and buildings • Increased noise pollution interfering with enjoyment of PCR such as tourist destinations, historic buildings, religious establishments and cemeteries • In scenic areas, obtrusive highways can have a negative visual impact on the landscape • Roads and bridges that may themselves constitute PCR are damaged by increased traffic
Reservoir operations or irrigation	• Shoreline erosion exposes archaeological PCR, leading to illegal digging and looting • Reduced sediment load speeding up river flows, eroding banks of estuary, and undermining human-made PCR such as monuments
Induced development	• Induced development can lead to increased wear and damage, sacrilege of sacred sites, theft and vandalism of movable and breakable PCR, and damage to the aesthetics of scenic landscapes and townscapes
Poor drainage	• Resultant erosion leading to exposure, damage and looting of archaeological PCR
Steep and unstable embankment cuts	• Collapse leading to exposure, damage and theft of built, natural and archaeological PCR
Factories and other facilities using heavy equipment	• Increased noise pollution interfering with enjoyment of PCR such as tourist destination, historic buildings, religious establishments and cemeteries • Damage to aesthetics of scenic landscapes and townscapes
Urban development	• Changes in demography or settlement patterns leading to decay of inner cities and abandonment and neglect of older residential areas containing built PCR such as vernacular architecture • Developments which are out-of-character with their surroundings diminishing the aesthetic value of the townscape, decline in property values and ultimately, neglect of built PCR in the area

	• Damage to aesthetics of scenic townscapes
Cultural heritage inventorying	• Inventorization, mapping and publishing of PCR encouraging theft and illegal trafficking of movable PCR • Introduction of excessively strict historic buildings code leading to difficulty in modernization, resulting in abandonment and neglect of historic buildings
Land or protected area management	• Change of status, ownership or use of land resulting indirectly in neglect, damage, destruction or change of use of all types of CPR
Increased pressure on land	• Increased pressure resulting in land-clearing and deforestation activities, causing damage to all types of PCR

Source: World Bank, 2009.

C. PCR Protection through Environmental Assessment and Management

242. When triggered, analysis of the project potential impact/s on PCR should be incorporated into the environmental assessment, with conservation and impact avoidance measures specified in the EMP, as appropriate. The assessment of PCR is an integral part of an environmental assessment because: (i) PCR have unique or distinct significance that may not be regained once lost; (ii) all the direct and indirect potential impacts on PCR are likely to be more fully appreciated through an environmental assessment that provides a sound and comprehensive context to the analysis of these impacts (i.e., in terms of project site/s, activities, processes, baseline conditions, and bio-physical and socio-economic impact); and (iii) research on living cultural PCR is usually best conducted as a component of demographic or socioeconomic surveys, saving time and reducing the inconvenience on local people of an additional survey. Additionally, by integrating PCR in the environmental assessment, it is more likely to be considered early in the project cycle and reporting is simplified by its inclusion in the environmental assessment and associated EMP.

1. Screening, Analysis and Survey

243. The assessment of PCR follows a procedure similar to an environmental assessment: screening to determine if an impact is possible; baseline survey; impact analysis; and formulating mitigation measures. PCR assessment should commence early in the environmental assessment process to ensure that it is adequately considered and agreement can be reached on its management while there is still opportunity to modify the project design. This will assist in avoiding or reducing the likelihood of controversy and project delays.

244. The project is screened to determine if PCR will be affected, considering the following features:

- type of project activities (e.g. whether they involve significant excavation, demolition, and movement of earth; or can lead to flooding and other environmental changes),
- location of the project (i.e., within or in the vicinity of a known PCR, determined through a review of global, national and local heritage lists such as the World Heritage List, the host country's World Heritage Tentative List,[44] and other

[44] A Tentative List is an inventory of properties considered by each State Party to the *World Heritage Convention* to have cultural and/or natural heritage of outstanding universal value suitable for inscription on the World Heritage List, and intended to be nominated to the List in later years.

national or local heritage lists and in consultation with competent national heritage authorities and local communities)

245. When screening indicates that the project has the potential to affect PCR, a more detailed analysis of the potential impacts and risks is undertaken, usually through a PCR field survey. The level of detail and comprehensiveness of the survey should be commensurate with the significance of the potential impacts and risks. The survey identifies and gathers information on, and potential risks to, PCR within the project's area of influence, and typically involves:

- a review of relevant available literature, maps, aerial photos and satellite imagery
- a field-based investigation to locate, photograph, map and assess PCR (where present and visible)
- consultation with local and international experts, government authorities, and members of local communities and Indigenous Peoples to utilize their local knowledge (knowledge of local communities is particularly important in identifying PCR tied to the natural environment that is often not evident to outsiders)

246. A PCR survey should be undertaken by a qualified expert/s with relevant field experience. The survey should not rely on published information on PCR in the local area, as sites and objects are often not documented. On-site investigations are critical and so is consultation with parties whose cultural values may be affected. The assessment should describe the values and significance of the identified PCR that will be affected. The results of the survey should be integrated into the project environmental assessment.

2. Consultation and Disclosure

247. When a project may affect PCR, consultations should be undertaken with the relevant national or local regulatory agencies that are entrusted with protecting PCR. Such consultations can assist with identifying PCR and determining the requirements of the regulatory agencies such as the ministries of archeology, culture or similar national or heritage institutions, national and local museums, and cultural institutes. Meaningful consultation should also be conducted with affected communities to identify PCR of importance and, where possible, to solicit their views on the resources to be considered during project design. Affected communities include communities currently using physical resources for long-standing cultural practices and/or have used those resources within living memory.[45] The consultation process should be documented in the environmental assessment, with agreed management actions incorporated in the EMP.

248. The PCR assessment findings should be disclosed in the environmental assessment report. Exceptions to full disclosure may be considered if the borrower/client, in consultation with PCR specialists, determines that disclosure would compromise or jeopardize the safety or integrity of the PCR (e.g. through theft, vandalism or uncontrolled tourism). In such cases, sensitive information relating to these resources may be omitted from the environmental assessment reports.

[45] There is no formal definition of "living memory." For the purposes of this Sourcebook, it is considered to be the period of time experienced and remembered by the oldest people who are now alive, or roughly 100 years.

3. Management Measures

249. When a PCR survey indicates that a project is likely to have adverse impacts on these resources, the project EMP should propose appropriate measures for avoiding or mitigating these impacts. The measures that may be applied, in order of preference, are:

- **Avoidance**: changes to project location, design, technology, and components to eliminate predicted impacts.
- **Minimization**: changes to project location, design, technology, and components to reduce predicted impacts to acceptable levels.
- **Mitigation**: project measures such as site protection, other actions, procedures and technologies to counteract negative impacts. PCR are best protected in situ (e.g. preservation) through local, national or international mechanisms, as removal may result in irreparable damage or destruction of the heritage resource. These measures may also include selective mitigation, including salvage and documentation in cases where a portion or all of the PCR may be lost.

4. Chance Find Procedure

250. When the proposed location of a project is in an area where PCR are expected to be found, a chance find procedure should be included in the EMP. A chance find procedure is a project-specific outline of what actions will be taken if previously unknown PCR are encountered during construction or operation. The procedure typically requires chance finds not to be disturbed until an assessment by a competent expert is made and avoidance, minimization or mitigating measures are developed. The type and level of detail of the assessment should be commensurate to the nature and scale of the project's potential adverse impact on the chance find. Consideration should be given, where feasible, to alternative siting or design of the project to avoid significant damage to the chance finds.

251. A chance find procedure should outline the roles, responsibilities and response times required by project staff and any relevant heritage authority; agreed consultation procedures; record-keeping and expert verification procedures; chain of custody instructions for movable finds; and clear criteria for temporary work stoppages. The procedure usually includes:

- definition of the PCR to which the procedure applies
- ownership of the found artifacts
- recognition procedure for identifying chance finds during project implementation
- procedure upon discovery, a rapid response procedure to protect chance finds while minimizing disruption to project activities (i.e., stipulates the procedures for consultation with the authorities legally responsible for PCR, demarcation of the discovery site, chance finds report, arrival and actions of cultural authority, and suspension/non-suspension/further suspension of work)

252. The recognition of chance finds can be difficult and may require an archaeologist on site during project activities that have the potential to uncover and damage PCR.

5. Removal

253. Most PCRs are best protected by preservation *in situ*, as removal is likely to result in irreparable damage or destruction. The borrower/client will ensure that the project does not remove any physical cultural resources unless the following conditions are met:

- No alternatives to removal are available.
- The overall project benefits substantially outweigh the anticipated cultural heritage loss from removal.
- Removal is conducted in accordance with the relevant provisions of national and/or local laws, regulations, and protected area management plans and national obligations under international laws, and employs the best available techniques.

254. Prior to removal of the PCR, the borrower/client should consult the historical or traditional owners and users of the PCR and take their views into account. Additionally, the removal technique proposed by the borrower/client or its expert may be peer-reviewed by other qualified experts.

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