



Environment and Social Impact Assessment

Climate Change (CE-12101)

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Environmental Impact Assessment



Introduction

- The environmental impact assessment (EIA) process is an **interdisciplinary and multi-step** procedure to ensure that **environmental considerations** are included in decisions regarding projects that may **impact the environment**.
- Simply defined, the EIA process helps **identify the possible environmental effects** of a **proposed activity** and how those impacts can be **mitigated**.
- The purpose of the EIA process is to **inform decision-makers** and the **public of the environmental consequences** of implementing a proposed project.
- The EIA document itself is a technical tool that **identifies, predicts, and analyzes** impacts on **the physical environment**, as well as **social, cultural, and health impacts**.
- If the EIA process is successful, it identifies **alternatives and mitigation measures** to **reduce the environmental impact** of a proposed project.

Introduction

- EIA process does not **guarantee** that a project will be **modified** or **rejected** if the process reveals that there will be **serious environmental impacts**.
- In some countries, a **decision-maker** may, in fact, choose the most **environmentally-harmful alternative**, as long as the **consequences are disclosed in the EIA**.
- In other words, the EIA process ensures an **informed decision**, but not necessarily an **environmentally-beneficial decision**.

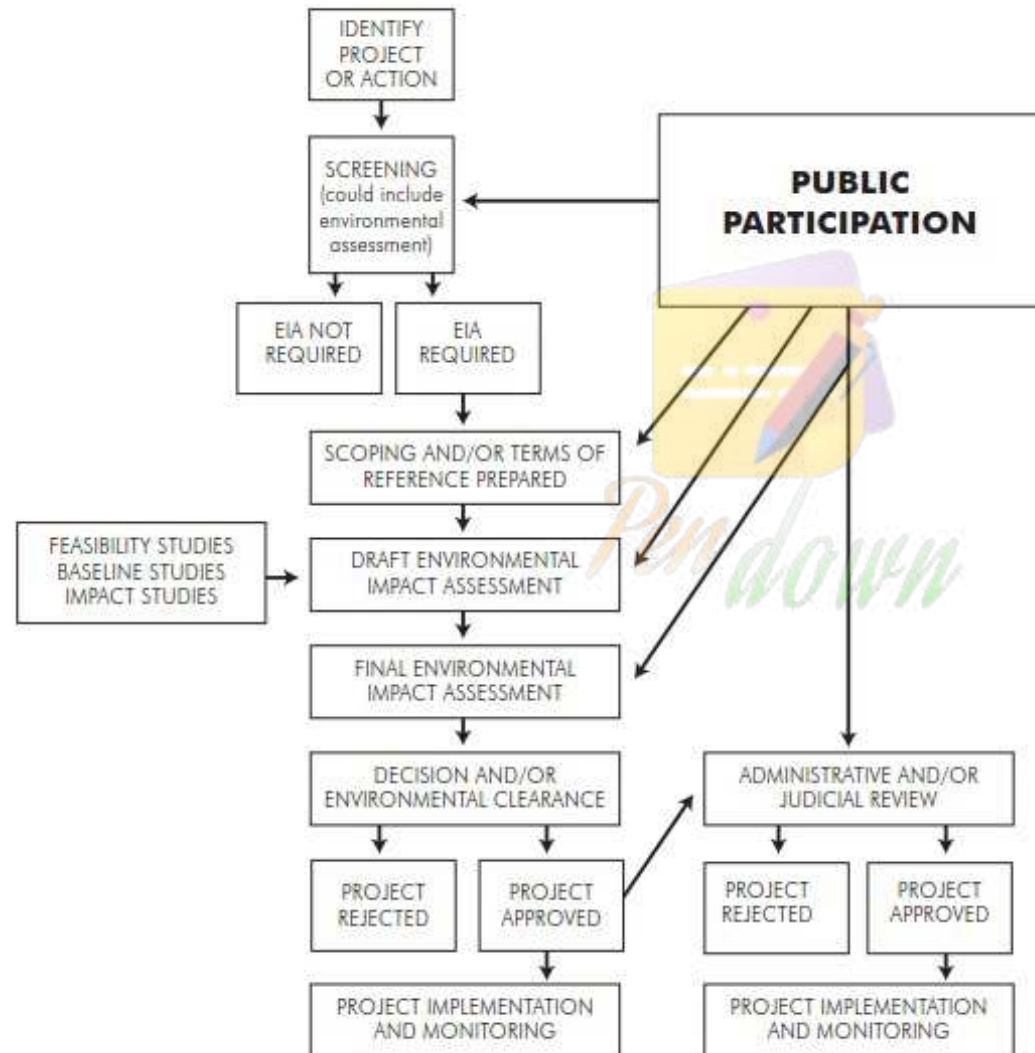
BENEFITS OF THE EIA PROCESS

- Potentially screens out environmentally-unsound projects
- Proposes modified designs to reduce environmental impacts
- Identifies feasible alternatives
- Predicts significant adverse impacts
- Identifies mitigation measures to reduce, offset, or eliminate major impacts
- Engages and informs potentially affected communities and individuals
- Influences decision-making and the development of terms and conditions

WHO PREPARES AN EIA?

- Depending on the EIA system, responsibility for producing an EIA will be assigned to one of two parties:
 - The **government agency** or **ministry**,
 - The **project proponent**.
- If EIA laws permit, either party may opt to **hire a consultant** to prepare the EIA or **handle specific portions of the EIA process**, such as **public participation or technical studies**.
- Using a **consultant** carries the risk that the **document will be biased** in favor of proceeding with the project. If a **consultant is hired by the mining company**, conflicts may arise if the consultant believes it will **receive future work if the project is approved**, or **even indirect benefits** from related activities (e.g., consulting work for a port where ore will be exported).
- Some laws require **consultants** to be registered with the government and/or **professionally accredited** in EIA preparation.

STAGES OF THE EIA PROCESS



Identifying and Defining the Project or Activity

- Defining a “project” for the purposes of an EIA can become complex and even controversial if a mining project is large, has several phases, or involves multiple sites.
- The goal of this step is to define the project with enough specificity to accurately determine the zone of possible impacts and to include activities that are closely connected with the proposal so that the entire scope of environmental impacts is evaluated.

Screening:

- The screening process determines whether a particular project **warrants preparation** of an EIA.
- The threshold requirements for an EIA vary from country to country – some laws provide **a list of the types of activities or projects** that will require an EIA, others require an EIA for any **project that may have a significant impact on the environment** or for **projects that exceed a certain monetary value**.
- In some cases, particularly if the **possible impacts of a project** are not known, a **preliminary environmental assessment** will be prepared to determine whether the project warrants an EIA.


Scoping:

- Scoping is a stage, usually involving the **public and other interested parties**, that **identifies the key environmental issues** that should be addressed in an EIA.
- This step provides one of the first opportunities for **members of the public or NGOs** to learn about a **proposed project** and to **voice their opinions**.

Preparing Terms of Reference

- The Terms of Reference serve as a **roadmap** for EIA preparation and should ideally **encompass the issues and impacts** that have been identified during the scoping process
1. A **description** of the project
 2. A list of the **agencies or ministries responsible for overseeing** the EIA process and making decisions
 3. The **geographic area to be studied** (also called the ‘**impact zone**’)
 4. EIA requirements in **applicable laws or regulations**
 5. **Impacts and issues** to be studied
 6. **Mitigation and/or monitoring** systems to be designed

Preparing Terms of Reference

7. Provisions for public involvement
 8. Key stakeholders
 9. Timeframe for completing the EIA process
 10. Expected work product and deliverables
 11. Budget for the EIA
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A draft Terms of Reference may be made available for public review and comment. Public review at this early stage of the process provides a key opportunity to ensure that the EIA is properly framed and will address issues of community concern.

Preparing Draft EIA

- A draft EIA is prepared in accordance with the **Terms of Reference** and or the **range of issues identified** during the scoping process.
- The draft EIA must also meet the content requirements of the overarching **EIA law or regulations**.
- This step will ideally engage a **wide range of technical specialists** to evaluate **baseline conditions**, predict the likely **impacts of the project**, and design mitigation measures.

Public Participation

- Best EIA practice involves and engages the public at numerous points throughout the process with a two-way exchange of information and views.
- Public participation may consist of informational meetings, public hearings, and opportunities to provide written comments about a proposed project.
- However, there are no consistent rules for public participation among current EIA systems. Even within a particular country, there can be variations in the quality and extent of public involvement in the EIA process, depending on the type of project being considered, the communities that may be affected, or government agencies that are overseeing the project.

Preparing Final EIA

- This step produces a **final impact assessment report** that addresses the **viewpoints and comments of the parties** that reviewed the draft EIA.
- These comments may **prompt revisions** or additions to the text of the draft EIA.
- In some cases, the final EIA will contain an **appendix summarizing** all of the **comments received from the public and other interested parties** and **provide responses to those comments**.

Decision

- A decision to **approve or reject a mining project** is generally based on the final EIA, but in some instances, an **environmental clearance** may be just one step in the mine permitting process.
- The decision may be accompanied by **certain conditions** that must be fulfilled, such as **posting a reclamation bond** or **filing an Environmental Management Plan**.

Administrative or Judicial Review:

- Depending on the jurisdiction, there may be opportunities for a party to **seek administrative and/or judicial review** of the final decision and the EIA process.
- An appeal may address **procedural flaws in the EIA process**, such as a **failure to hold any required public hearings**, or may point to **substantive issues that the decision-maker failed to consider**.
- A country's judicial review or administrative procedure act, or sometimes the EIA law itself, will usually identify the **kinds of issues that can be raised in an appeal and the type of relief** that may be granted.

Project Implementation:

- Provided all regulatory requirements are met and permits are obtained, mine development will proceed following the project decision and once opportunities for administrative and/or judicial review are exhausted.

Monitoring:

- Monitoring is an important part of project implementation. Monitoring serves three purposes:
 1. ensuring that **required mitigation measures** are being implemented;
 2. evaluating whether **mitigation measures** are working **effectively**; and
 3. validating the **accuracy of models or projections** that were used during the impact assessment process.

Socioeconomic Impact Assessment (SEIA)



INTRODUCTION:

- Socioeconomic impact assessment (SEIA) is the systematic analysis used during EIA to identify and evaluate the **potential socioeconomic and cultural impacts** of a proposed development on the **lives and circumstances of people, their families, and communities**.
- If such potential **impacts are significant** and adverse, SEIA can assist the **developer and other parties** to find ways to **reduce, remove, or prevent** these impacts from happening.
- Impacts are **potential changes** caused **directly or indirectly** in **whole or in part**, for better or **for worse** by industrial and development activities.
- In the past, **EIA focused on direct and indirect biophysical impacts** of proposed developments, that is, the impacts of development activities on **water, air, land, flora, and fauna**.
- In recent years, the impacts of industrial development on **society, culture, and different forms of economic activities** have gained equal importance in EIA.

INTRODUCTION:

- While SEIA tends to focus on the **avoidance of adverse impacts**, SEIA also provides a forum for **planning how to maximize the beneficial impacts of a proposed** development.
- Beneficial impacts can include
 1. A **better standard of living** due to increased access to **employment, business opportunities, training, and education**;
 2. **Greater access** to and from a community; and
 3. Increased funding to improve **social infrastructure and culture maintenance** programs.
- Specifying how **adverse impacts may interact with beneficial impacts** and identifying how to manage these impacts are important steps in SEIA.
- The SEIA recognizes the importance of relationships between **people, culture, economic activities, and the biophysical environment**.

Valued socioeconomic components

- Governmental or private programs, policies, and projects can cause potentially significant changes in many features of the socioeconomic environment.
- In some cases, the changes may be beneficial; in others, they may be detrimental.
- Accordingly, environmental impact studies must systematically identify, quantify, where possible, and appropriately interpret the significance of these anticipated changes.
- For example, large-scale relocations of people may be required for major water resource projects.
- Proposed projects involving the decommissioning and closure of major governmental installations or industrial sector developments can have significant socioeconomic consequences.

Valued socioeconomic components

- The consequences are in terms of **local and/or areawide decreases in jobs and revenue** to the economy, **declines in human population**, and **leftover societal debts** for local infrastructure and educational facilities.
- Major development projects can include significant requirements for associated infrastructure such as **townships, roads, highways, railroads, water supply, sanitary sewers, storm-water drainage, erosion control, sediment control and grading, electric systems, gas systems, educational services, and health services**. The provision of such needed infrastructures can also **generate environmental impacts**.

Issues for valued socioeconomic components

- Health and well-being
 - Individual and population health
 - Community and cultural group cohesion
 - Family cohesion
- Protecting heritage and cultural resources
 - The aesthetic, cultural, archeological, and/or spiritual value of places
 - Maintenance of traditional language, education, laws, and traditions
- Equitable business and employment opportunities
 - Local, regional, and territorial business competitiveness
 - Employment opportunities for local, regional, and territorial residents
 - Training and career development for local, regional, territorial residents



Issues for valued socioeconomic components

- Population sustainability
 - In- and out-migration effects
 - Change in social and cultural makeup of affected communities
- Adequate services and infrastructure
 - Pressure on social services such as health care, education, and justice
 - Housing pressure—affordability, availability, and appropriateness
 - Traffic and road safety—pressures on physical infrastructure
- Adequate sustainable income and lifestyle
 - Overall amount of money in the community
 - Local and regional cost of living
 - Adverse lifestyle changes—increased gambling, crime, and substance abuse

Considerations of SEIA

1. Matching the **scale and focus** of a SEIA with the characteristics of the **proposed development** and the **concerns of responsible authorities and potentially affected communities and individuals**.
2. **Minimizing adverse impacts while enhancing beneficial impacts.**
3. Using the **precautionary principle** and other **internationally recognized SEIA principles**.
4. Focusing **on impacts that are at least partially** attributable to the proposed development.
5. Involving **various potentially affected communities** in the SEIA early and extensively.
6. Conducting **long—range, forward—looking studies** that rely on the **insight of past** experiences.
7. Using **experts from the government, communities, and social sciences**.
8. Using **reliable, appropriate, and relevant information** from primary and secondary sources.
9. Balancing **traditional knowledge and scientific knowledge**.
10. Following up and monitoring **socioeconomic and cultural mitigation measures**.

The general SEIA process

- SEIA focuses on various questions. SEIA answers these questions using a series of steps for identifying, assessing, mitigating, and monitoring the potential impacts of a proposed development.
- The SEIA steps are similar to those used during the impact assessment of the biophysical environment.
- However, SEIA requires different data collection methods, information sources, expertise, and analytic tools.

SEIA questions

- Impact definition
 - What are the **potential socioeconomic and cultural impacts** of the proposed development?
- Direction of impacts
 - Is the direction of the potential impacts **adverse** or **beneficial**
 - Does impact direction shift between **different groups and subpopulations**? Do some benefit while others don't?
 - Are the **trade-offs between potential adverse impacts and potential beneficial impacts** acceptable?
- Impact causes
 - How could the proposed development cause **socioeconomic impacts**?



SEIA questions

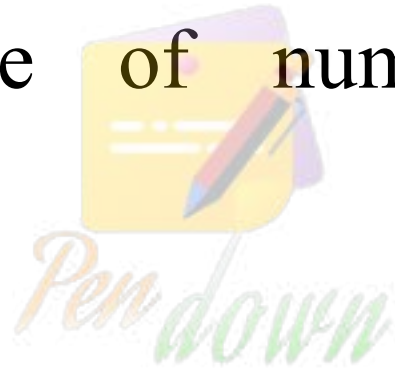
- Impact attribution
 - Will the proposed development create **new impacts** or **accelerate/exacerbate** existing impacts?
 - How responsible could the **proposed development be for causing an impact?**
- Impact scope and scale
 - **Which populations and communities** will the proposed development most likely impact?
 - How **far and wide, geographically**, could individuals and communities feel the impacts of the proposed development?
- Impact manageability
 - Will potential impacts **support or undermine the affected communities' aspirations and goals?**
 - How **resilient are the potentially affected communities? How vulnerable are they to adverse impacts?**
 - Will **the impacts cause unmanageable** change for a community?

SEIA questions

- Impact significance
 - Are the potential impacts likely **adverse and/or significant**?
 - Is mitigation available **to manage, reduce, or eliminate the potential impacts**?
- Impact mitigation and monitoring
 - Are there **existing mitigation measures** that have worked for these types of impacts? If so, how **can we use them**?
 - How do we track the **accuracy of our predictions** and use adaptive management to alter mitigation if required?

Socioeconomic factors

- Factors that describe the socioeconomic environment represent a composite of numerous interrelated and nonrelated items



Demographic concerns

- General **characteristics and trends in population for state**, substate region, country, and city
 - Increase or decrease in population
- **Migrational** trends in study area
 - Increase or **decrease in migrational trends**
- **Population characteristics** in study area, including distributions by **age, sex, ethnic group, educational level, and family size**
 - Increase or decrease in various population distributions; people relocations
- Distinct settlements or **ethnic groups or deprived economic or minority groups** in study area
 - Disruption of settlement patterns; people relocations

Economic and employment concerns.

- Economic history for state, substate region, country, and city
 - increase or decrease in **economic activities**;
 - **change in economic patterns**
- **Employment and unemployment patterns** in study area,
 - Increase or decrease in overall employment or unemployment levels;
 - Change in occupational distribution
- Income levels and trends for study area
 - Increase or decrease in income levels

Land use, values, and taxes

- **Land use patterns** and controls for study area
 - Change in land usage;
 - Project may or may not be in compliance with **existing land use plans**
- **Land values in study area**
 - Increase or decrease in land values
- **Tax levels and patterns** in study area, including land taxes, sales taxes, and income taxes
 - **Changes in tax levels and patterns** resulting from changes in **land usage** and income levels

Public service and social concerns.

- **Housing characteristics** in study area, including types of housing occupancy levels and age and conditions of housing
 - Change in types of housing and occupancy levels
- **Health and social services** in study area including health manpower, law enforcement, fire protection, water supply, wastewater treatment facilities, solid waste collection and disposal, and utilities
 - Changes in demand for health and social services
- **Transportation systems in study area, including** highway, rail, air, and waterway systems
 - Changes in demand for transportation systems; relocations of highways and railroads

Community attitudes and cohesion

- **Community attitudes and lifestyles**, including history of area voting patterns
 - Changes in attitudes and lifestyles
- **Community cohesion, including organized** community groups
 - Disruption of cohesion



Miscellaneous factors

- Tourism and recreational opportunities in study area
 - Increase or decrease in tourism and recreational potential
- Religious patterns and characteristics in study area
 - Disruption of religious patterns; change in characteristics
- Areas of unique significance, such as cemeteries or religious camps
 - Disruption of activities in or change to unique areas

Advantages of SEIA

1. SEIA is a systematic effort to **identify, analyze, and evaluate social** impacts of a proposed project or policy change on the **individuals and social groups** within a community or on an entire community in advance of the **decision—making process** in order that the information derived from the SIA can actually influence decisions.
2. SIA is a means for **developing alternatives** to the **proposed course of action** and determining the full range or consequences for each alternative.
3. SIA **increases knowledge on the part of the project proponent and the impacted** community.
4. SIA raises consciousness and the level of understanding of the community and puts the residents in a better **position to understand the broader implication of the proposed action**.
5. SIA includes within it a **process to mitigate or alleviate the social impacts** likely to occur, if that action is desired by the impacted community.

Model for SEIA

- Identification of potential impacts represents the initial step, followed by the preparation of a description of existing conditions for the selected factors.
- Relevant standards, criteria, or guidelines should then be procured and utilized to assess existing conditions.
- Impact predictions for both the future-without-project and future-with-project conditions have to be studied. This study involves the assessment of the predicted impacts in relation to existing conditions and through the use of relevant standards, criteria, or guidelines.
- The next step consists of the identification and incorporation of mitigation measures to minimize the negative consequence of the proposed project.

Social indicators

- Once negative effects are identified, efforts would be made to redesign the proposal to reduce such negative impacts.
- The basis for assessment is the social indicators that describe the characteristics of a particular social group and that are usually collected at different times to form a time series.

Community consultation

- The social assessment is described in terms of a **community consultation** process to consider and identified alternative locations:.
- **Views expressed and issues identified** were documented and fed into the study process
- **Environmental justice impact assessment** is intended to identify people at risk of injustice and to review ways of reducing this risk

Community consultation

The key elements for community consultation process are the following:

- Demographic assessment: This includes the **identification of minority and low income groups and other sensitive groups** depending on the proposal (if air emission was an issue, **then asthma sufferers would** need to be considered).
- Impact assessment: This stage includes consideration **of human health, environment, and socioeconomic effects**; disproportionately **high and adverse effects**; multiple and cumulative effects; normal operations and accident scenarios; **avoiding and reducing impacts through mitigation and alternatives**; and integrating impact and demographic data.

The six steps of SEIA

1. **Scoping and identification of impacts:** A preliminary analysis identifies and prioritizes SEIA considerations and required information. Early and effective scoping narrows the focus of SEIA onto the issues of potential significance.
2. **Baseline conditions:** Focuses on gathering information about the socioeconomic environment and context of the proposed development. This can include defining measurable indicators of valued socioeconomic components.
3. **Predicting impacts:** Based on the analysis of information gathered from issue scoping, baseline profiling, and past experiences to predict possible socioeconomic impacts.

The six steps of SEIA

4. **Identifying mitigation:** Predicted adverse impacts require **mitigation**. Mitigation includes **strategies, plans, and programs to reduce, avoid, or manage impacts**.
5. **Evaluating significance:** This involves determining whether a proposed development is likely to **cause significant adverse impacts** on valued socioeconomic components.
6. **Applying mitigation and monitoring:** Good mitigation for socioeconomic impacts requires **good monitoring programs** also known as follow-up to ensure the mitigation is working effectively, and when necessary, the mitigation is adapted as required.

Project-category-based approach

A project-category-based approach for the SIA procedure for projects in developing countries has been promulgated by the **Asian Development Bank**;

- **Category AP:** Those projects whose major objective is to **have a direct positive impact in the form of poverty alleviation**. Poverty projects almost always require the active **participation of beneficiaries**.
- **Category A:** Projects that are expected to have a **direct, positive social impact** and that, in order to be successfully executed and/or sustained, require the active participation of the intended beneficiaries. This category includes most projects in the **agriculture and social infrastructure** sectors.

Project-category-based approach

- **Category B:** Projects that rarely have an immediate, direct (positive or negative) social impact and/or projects that can be executed and sustained without beneficiary participation. This category includes most projects in the energy, transport, communications, and industrial sectors.
- **Category C:** Projects that have the potential for direct, negative impact on the lives of the significant number of people. Category C includes all projects that may require the relocation of significant numbers of people, for example, large dams, highways, airports, and so on. Also included in this category are a range of projects (e.g., mining, plantation crops, and highways) to be located in remote areas predominantly inhabited by tribal or ethnic communities or any other group having a significantly different sociocultural tradition from that of the ruling or dominant communities (Asian Development Bank, 1991a).

Identification of socioeconomic impacts

- Potential socioeconomic impacts can be identified through the use of **interaction matrices, networks, simple checklists, and/or descriptive checklists**. Case studies of similar project types can also be helpful
- The **basic impact area associated** with predicting and assessing impacts on the socioeconomic environment is called the **region of influence (ROI)**. This represents the **geographic area or region** wherein the project induced changes to the socioeconomic environment will occur.
- In an analogous sense, the ROI for addressing socioeconomic impacts would be comparable with (1) **an air-quality control region** for addressing air-quality impacts, (2) **a watershed for addressing surface**—water quantity and quality impacts, or (3) **an ecoregion or habitat type** for addressing biological impacts.

Identification of socioeconomic impacts

- There are no fixed rules or criteria for determining the geographic location of the ROI. The most frequent practice is to define the ROI in accordance with the administrative/political boundaries, since the majority of socioeconomic information and data is available on such boundary basis.
- A reasonable beginning approach for defining the ROI is to consider the project location and the contiguous counties.
- If a project is located in two or more regions, then each of those should be considered in the ROI and all the contiguous areas. For projects involving large-scale construction efforts, temporary construction workers may commute from long distances. Therefore, for some large-scale projects, the ROI should be expanded to include areas beyond the project counties and their contiguous counties, as appropriate.

Baseline socioeconomic conditions

- The key approach in describing existing conditions is to focus on selected **socioeconomic factors** expected to **be changed by the proposed** project.
- Sources of **socioeconomic information can provide primary** data that are data from specific field studies on selected factors or secondary data like data from published reports.
- For example, **secondary data can be obtained from Bureau of statistics Department**, Government of India, local **planning departments, panchayat offices, and mandal** offices.
- The data related to **transportation planning, water supply, water quality, wastewater treatment** strategies, and solid waste management strategies can be obtained from **various concerned organizations**.
- Socioeconomic indexes could be used as a basis for describing baseline conditions and could serve as point of reference for delineating project activity impacts.
- For example, for projects in developing countries, **a human development index (HDI)** could provide a relatively simple means of monitoring the overall level of socioeconomic development. The HDI combines the **three factors considered to best represent the human condition, that is, life expectancy, literacy, and income** (Asian Development Bank, 1991b).

Prediction of socioeconomic impacts

Four approaches can be used for predicting impacts:

1. Qualitative description

- Qualitative description refers to the approach used by individual professional or interdisciplinary teams to describe the effects of alternatives based on general knowledge of generic types of impacts and case studies. No quantitative presentations are made.

2. Quantitative description

- The approach using “quantitative description” involves use of a numerical technique by either an individual professional or an interdisciplinary team to project impacts based on an understanding of the existing situation and unit impact information. This approach requires knowledge of effects that have occurred in similar situations and the use of quantitative impact factors.

Prediction of socioeconomic impacts

3. Use of application-specific prediction techniques, and
 - Methodologies have been formulated that can be used to address the social, economic, employment, housing and property values, fiscal ,demographic, and public service impacts of land development projects.
 - Demographic-impact prediction involves the use of techniques for determining the number, distribution, and characteristics of the people moving into or away from the impact area and is needed to assess public services demands, fiscal impacts, and social impacts. Specific models have also been developed for predicting particular impacts.
4. Use of relative comparisons of the effects of alternatives.

Traffic and transportation impacts

- The issue of transportation and the environment is paradoxical in nature since **transportation conveys substantial socioeconomic benefits**, but at the same time, **transportation is impacting environmental systems**.
- From one side, transportation activities support **increasing mobility demands for passengers and freight**, while on the other, transport activities are associated with the growing levels of **environmental externalities**.
- This has reached a point where transportation is a **dominant source of emission** of most pollutants and their **multiple impacts** on the environment.

Traffic and transportation impacts

- The transportation sector is often subsidized by the public sector, especially through the construction and maintenance of road infrastructures that tend to be free of access.
- If the owner and the regulator are the same (different branches of the government), then there is a risk that regulations will not be effectively complied to.

Traffic and transportation impacts

- Total costs incurred **by transportation activities**, notably **environmental damage**, are generally not fully assumed by the users.
- The lack of consideration of the **real costs of transportation** could explain several environmental problems.
- For instance, external costs account on average for more than **30% of the estimated automobile costs**. If environment costs are not included in this appraisal, the usage of the car is consequently **subsidized by the society, and** costs accumulate as **environmental pollution**. This requires due consideration as the number of vehicles, especially automobiles, is steadily increasing.
- The relationship between transport and **the environment is multidimensional**. Some aspects are unknown, and some new findings may lead to drastic changes in environmental policies, as it did in **regard of acid rain and chlorofluorocarbons** in the 1970s and 1980s.

Traffic and transportation impacts

- Transportation also became an **important dimension** of the concept of sustainability, which is expected to become the prime focus of transport activities in the coming decades, ranging from vehicle emission to green supply chain management practices.
- These impending developments require a **deep understanding of the reciprocal influence between the physical environment and transport infrastructures**, and yet, this understanding is often lacking. The main factors considered in the physical environment are **geographic location, topography, geologic structure, climate, hydrology, soil, natural vegetation, and animal life.**

Traffic and transportation impacts

- The main environmental dimensions of transportation are related to the **causes, the activities, the outputs, and the results of transport systems**.
- Establishing linkages between environmental dimensions is a difficult undertaking.
- For instance, to what **extent carbon monoxide emissions are linked to land use patterns?** Furthermore, **transportation is imbedded in environmental cycles, notably over the carbon cycle**.
- The relationships between transport and the environment are also complicated by two observations:
 1. **Transport activities contribute among other anthropogenic and natural causes, directly, indirectly, and cumulatively to environmental problems**. In some cases, they may be a dominant factor, while in others, their role is marginal and difficult to establish.
 2. **Transport activities contribute at different geographic scales to environmental problems**, ranging from local (noise and CO emissions) **to global (climate change)**, not forgetting continental/national/regional problems (smog and acid rain).

Traffic and transportation impacts

- Establishing environmental **policies for transportation** thus have to take account of the level **of contribution and the geographic scale**; otherwise, some policies may just move the **problems elsewhere and have unintended consequences**.
- A noted example are local/regional policies that have forced the construction of higher **chimneys for coal-burning facilities** (power plants) and induced the continental **diffusion of acid rain**.
- Thus, even if an **administrative division (municipality, country, and state/province)** has adequate environmental enforcement policies, the geographic scale of **pollutant diffusion** (notably air pollutants) obviously goes beyond established jurisdictions.

Traffic and transportation impacts

- In addition to the environmental impacts of the network, traffic, and modes, **economic/industrial processes sustaining the transport system** must be considered. These include the **production of fuels, vehicles, and construction materials**, some of which are very **energy-intensive (e.g., aluminum)**, and the disposal of vehicles, parts, and the provision of infrastructure.
- They all have **a life cycle timing their production, utilization, and disposal**. Thus, the evaluation of the transport-environment link without the consideration of cycles **in the environment and in the product life alike** is likely to convey a limited overview of the situation and may even lead to **incorrect appraisal and policies**.

Traffic and transportation impacts

- Air pollution is the most important source of environmental externalities for transportation. Although the nature of air pollutants is clearly identified, the scale and scope on how they influence the biosphere are subject to much controversy.
- On the positive side, the emissions of the most harmful air pollutants, such as carbon monoxide and volatile organic compounds, have declined in spite of a substantial growth in the number of vehicles an indication of growing levels of environmental compliance of vehicles.
- Carbon dioxide emissions have increased proportionally with the growth of transportation usage.

Traffic and transportation impacts

- Air pollution costs are probably the most extensive of all environmental externalities of transportation, mainly because the atmosphere enables a fast and widespread diffusion of pollutants. As all externalities, costs are very difficult to evaluate because several consequences are not understood; the problems could be at another scale or highly correlated with others and/or a value cannot be effectively attributed.
- Two major groups of factors are contributing to air pollution, notably in urban areas. Structural factors are essentially linked to the size and level of consumption of an economy. Factors such as income and education tend to be proportional with emissions. Behavioral factors are linked to individualism, consumerism, and transportation preferences. Because of convenience and its symbolism, the car is systematically the preferred mode of transportation, even when other modes are available.

Traffic and transportation impacts

- Noise is an inherent characteristic of transportation. Noise emissions can be represented as point (a vehicle), line (a highway), and surface (ambient noise generated by a set of streets) sources.
- Noise pollution is very different from the two categories of pollutant previously discussed as it is only present as vibrations. The internal combustion engine involves combustion, moving parts, and friction on the surface over which a transport mode moves. The impacts of noise are strictly local, as vibrations are quickly attenuated by the distance and the nature of the landscape.

Traffic and transportation impacts

- A **hazardous material is a substance capable of** posing an unreasonable risk to health, safety, and property when transported in commerce.
- Considering **large amounts of freight being** shipped through transport systems, hazardous materials have become a concern.
- Several **hazardous material (hazmat) releases** are spectacular events.
- Thus, transportation **has a wide array of environmental externalities**, some of which can be reasonably assessed while others are mostly speculation.
- The bottom line is that **better transport practices, such a fuel-efficient vehicles**, that reduce environmental externalities are likely to **have positive economic, social, and environmental** consequences.

Health impacts assessment (HIA)

- It is recognized that the very development that intends to improve the quality of life of the people, if **not managed properly, often leads to conditions hazardous to health of the people and their environment.**
- Poor **environmental conditions are the cause of most waterborne, airborne, and vector-borne diseases** and contribute to poor health and a poor quality of life.
- Economically poor **communities, children, women, most people in least developed or developing countries,** and the migrant workforce generally constitute the most vulnerable groups.
- Rio de Janeiro Earth Summit in 1992 stressed that development was about meeting the **needs of people, their health, well-being and lives, and a safe environment.**

Health impacts assessment (HIA)

- Broadly, the health impact assessment (HIA) is a **change in health risk reasonably attributable** to a **project, program, or policy** where a health risk is the likelihood of health hazard affecting a particular community at a particular time.
- The problem of **vector-borne diseases associated with water resource projects** has received a considerable attention for many years. During the pre-DDT era, most major projects in India were being **prospectively assessed for adverse health impacts**.
- By providing proper **subsoil drainage**, the Sharda canal barrage in Uttar Pradesh did not create **malariogenic conditions**.
- Other noteworthy examples of the assessment of impact on malaria of the water resource development projects **include Upper Krishna Irrigation Project, Irwin Canal (Karnataka), Thermal Power Plant in Delhi, and Vizag Steel Plant, Visakhapatnam**.

Health impacts assessment (HIA)

- HIA is a practical approach used to judge the potential health effects of a policy, program, or project **on a population, particularly on vulnerable or disadvantaged** groups.
- Recommendations are produced for **decision-makers and stakeholders**, with the aim of **maximizing the proposal's positive health** effects and minimizing its **negative health effects**.
- HIA can be **a valuable tool for helping to develop policy** and assisting decision-makers. Economic sectors such as **transport, agriculture, and housing** have profound impacts on health.
- For instance, transport is a major factor in traffic injuries, air pollution, and noise. But **“healthy transport policies” can help reduce these risks and promote walking and cycling**.
- In **agriculture, fertilizers and pesticides** may boost crop yields. **But wise use is** important to protect farm **workers and consumers from excessive** chemical exposure.

Health impacts assessment (HIA)

The usefulness and need of HIA within policy and decision—making is clear; HIA

- is **used in projects, programs, and policies**;
- **assists policy development**;
- brings **policies and people together**;
- **involves the public**;
- provides **information for decision-makers**;
- addresses **many policy making requirements**;
- is a **proactive process that improves** positive outcomes **and decreases negative outcomes**;
- can provide what policy makers need.



Housing and health

- International guidance on “**healthy housing**” should be developed to help **prevent a wide range of diseases and unintentional injuries** that can be effectively addressed through better housing. This was a key message emerging from an international consultation of 40 experts from 18 **countries hosted by WHO in Geneva, 13-15 Oct. 2010.**

Aesthetics and livability

- Community aesthetics and livability have historically been given low priority during the development of transportation projects. Yet, potential impacts on aesthetics and community resistance to transportation projects.
- This is because aesthetic impacts are easily understood, emotional, and highly subjective. Civic pride is often associated with the aesthetic and visual qualities of a community—qualities that make a community unique among its neighbors and special to its residents.
- Attention to aesthetics and cultural resources during project development and design can adversely affect cherished community resources and greatly increases the likelihood of active opposition to a proposed transportation project.
- For these reasons, the Project Development and Environment (PD&E) requires consideration of aesthetic and visual impacts during the PD&E process. Any project where a genuine concern is expressed for the aesthetic character of a community and where members of the community are included in the development of solutions will have a greater chance of success.

Aesthetics and livability

- A community aesthetic and visual resource can be broadly defined as a **natural or cultural feature** of the environment that elicits positive sensory reactions and evaluations by the observer.
- Examples might include **street trees, scenic views, historic structures, local landmarks, and cultural resources like libraries, town halls, civic centers, and college campuses.**
- An **aesthetic and visual detractor** can be defined as a structure or feature that elicits a **pronounced negative sensory reaction and evaluation by the observer.** Possible detractors might be a **landfill, auto salvage yard, abandoned building, or a deteriorating industrial structure.**

Aesthetics and livability

- Aesthetic **resources and detractors** collectively define the aesthetic character of a community and contribute to its “**sense of place.**” Various user groups within the community often define these **qualities** differently.
- The **lasting image** a visitor has of a community or neighborhood, for example, is often based on the **view of that community from a transportation facility** (i.e., road, bus transfer center, airport, and train).
- Residents of the community or neighborhood may define its character **based upon local landmarks** or features that may not be apparent to the casual visitor.

Aesthetics and livability

- Clearly, the **placement and design of a transportation** facility can alter the aesthetic and visual character of the surrounding area. Therefore, transportation **facilities should be carefully woven** into the surrounding context so that the facility itself becomes assets and not a detractor.
- Both the view **of the transportation facility and the View from the transportation** facility should be considered in assessing potential aesthetic impacts of a transportation project.
- Questions to be answered in an assessment of potential aesthetic and visual impacts from a project include the following: -
 1. Will the proposed project in any way result in **the obstruction of a view, scenic amenity**, or landscapes?
 2. Are these **considerations taken into account by the proponents**?
 3. Will there be **any adverse impacts from new constructions on** the existing structures? What are the considerations taken into account?
 4. Whether there are **any local considerations of urban form and design influencing** the design criteria.
 5. Are there any **anthropological or archeological sites** or artifacts nearby?
 6. Are there any significant features in the vicinity of the **proposed developmental site**?

Assessment techniques

- Determining the **aesthetic impacts of project alternatives** is largely a **qualitative process** that emphasize simplicity and community involvement.
- Techniques that can be simply performed are **easily understood and incorporate the sentiments of the community at large**, which are the most effective and valuable to the project development process.
- In general, any assessment of aesthetic impacts involves the following:
 - **Identifying existing aesthetic and cultural resources and detractors** within the study area and determining their relative importance to the community
 - **Determining likely impacts, both good and bad**, from project alternatives to those identified aesthetic resources

Conceptual approach to visual impact assessment

- Consider **potential visual impacts** by project type.
- Identify and describe **existing aesthetic and cultural resources** in the study area and determine their relative importance.
- Establish **resources or areas of critical concern** to the community.
- Determine **visual impacts of each proposed alternative**.
- Assess the **significance of predicted impacts**.
- Identify and **incorporate measures to reduce** adverse visual impacts.

Conceptual approach to visual impact assessment

- The type of visual impacts will vary somewhat according to the nature of the project alternatives.
- An exercise to get started is to simply consider what type of general visual impacts each alternatives might have on the study area.
- Contrasts between natural landforms, landscapes, or features and engineering features of the roadways due to road alignments, cuts, fills, retaining walls, riveted embankments, clearing of vegetation, etc.
- Blocked views or reduced visual continuity due to embankments, bents, elevation of the roadway, etc.
- Roadway is out of scale with adjacent urban development, such as might occur with an elevated or above-grade roadway or an extensive road-widening project in a historic district.
- Construction materials or designs are not consistent with the character of historic bridges or transit structures.

Identifying aesthetic resources and detractors

- The most important step in assessing aesthetic impacts is to determine the **location of cultural or aesthetic resources and their relative importance to the community**.
- **Involving stakeholders and community leaders** is important on a variety of levels.
- First, it helps assure that **potential issues related to aesthetics** will be identified early in the process.
- Second, **aesthetic character is highly subjective** and needs to be determined by those affected by the project.
- Third, involving stakeholders facilitates **community acceptance of the project** and provides a **cooperative atmosphere** for working through aesthetic issues.
- At the very least, **a spirit of trust and cooperation will be developed** between the implementing agency and the community, thereby promoting a **less adversarial atmosphere** for problem solving.

Identifying aesthetic resources and detractors

- Describe the general character of the study area. This may require separating the study area into **subareas according to their visual and aesthetic characteristics**, for the purposes of assessment.
- Inventory **cultural and aesthetic resources in the study area**.
- Determine the **relative importance of each resource or detractor** and identify resources of critical aesthetic or cultural concern. This step involves **taking the master list of resources and detractors** and **applying a voting or ranking procedure to identify their relative importance**.
- Identify any **visual resources that are most highly valued by the community** and that are highly sensitive to change. These areas would **be categorized as resources of critical concern** and would be **considered more significant for the purposes of assessment**. They would receive more careful consideration in project development to **avoid or minimize potential adverse impacts**. This effort may benefit **from broader community participation** than occurred during in the inventory. Sample ranking techniques are the following.

Review of agency plans and policies

This technique involves identifying those goals and objectives pertaining to aesthetic and visual resources.

1. Preserving of the rural or historic character of an area
2. Preserving the character of a neighborhood or retail area
3. Preserving of a locally significant View shed, landmark, or resource

The key to determining if these goals and objectives are important to the community is to give study area stakeholders ample opportunity to comment on them. Allowing stakeholders to define which goals and objectives are most important will sensitize the project development process to these issues. Try to reach as many interested stakeholders as possible in this process. Because this technique does not require gathering people in a room, it can be accomplished with a large number of interested parties.

Review of agency plans and policies

- One of the main benefits of this approach is broad community involvement. It also allows interested parties to **self-select** so that those **who are really interested can review and respond** and those who are not interested can simply choose to not participate.
- In addition, interested parties can **contact others in the community** and have them participate as well. In this manner, the widest possible **variety of interests** can be accounted for in determining what aesthetic resources are important to consider and which ones have the potential of **being degraded or enhanced by the project alternatives**.

Stakeholder workshop

- This technique involves **gathering a group of stakeholders in** a workshop format to identify important community aesthetic and visual resources and detractors.
- The **number of stakeholders invited to participate** should be manageable and appropriate given the size and diversity of the study area.
- The best stakeholders to invite are those **with authority to represent many** other stakeholders. Examples might include the president of the local chamber of commerce, the **director of the local tourism association, a local elected official, the president of area home owners or neighborhood associations, the president of a local environmental group, the head of a local historic preservation society,** the local planning director, and so on.
- Always invite any member of the community who has expressed a strong interest in participating.

Stakeholder workshop

1. Separate **stakeholders into small groups** and provide each group with an aerial photograph of a section of the study area.
2. Ask each group to collectively identify the **important aesthetic and visual resources** of the study area and **any major detractors** and to **circle or otherwise** note the location of each important aesthetic community resource directly on the **aerial photograph** of the study area.
3. Next, ask them to identify **aesthetic detractors—structures** or features that substantially detract from the aesthetic quality of the community.
4. Have each group **prepare a brief written description** of their identified resources and detractors. These descriptions could **be attached to the aerial photograph** on post—it notes or with tape. Then, have the complete a more detailed description for each item.

Stakeholder workshop

5. **Reassemble the groups** and ask them to pick a spokesperson to share their results. Ask the broader group if they missed **any major resources or detractors** and add these to the map.
6. Establish the **relative priority or significance of the resource or detractor**. This could be determined through a ranking method. The written description could also be taken into account in determining importance.
7. The final step is to transfer all the resources and detractors onto a master list to accompany the aerial photos. The map and master list could be **disseminated to a broader** group if desired and will provide the basis for assessing aesthetic impacts of various project alternatives.

Sample ranking scale		
Resources		Detractors
+4	Critical	–1 Somewhat negative
+3	Very positive	–2 Negative
+2	Positive	–3 Very negative
+1	Somewhat positive	0 Not significant

Stakeholder photographic log

- This technique involves providing disposable cameras to a group of stakeholders and asking them to **photograph the aesthetic and cultural resources they individually find** important to the character of the study area and those features **that significantly detract from the aesthetic** appeal of the area. Stakeholders are asked to maintain a log of **their photographs** that describes the location of each photograph and what is important about that resource or detractor.
- The cameras and logs are then gathered and **sorted by stakeholder and resource**. A master list is then developed, describing each **resource and detractor identified** by the stakeholder group.
- The last step is **to call a meeting of the stakeholder group** to give them an opportunity to review and prioritize the completed master list of resources and detractors.
- This could be accomplished using the **workshop ranking procedure described** above.
- Send the master **list and ranking directions to the stakeholders well in advance** of the meeting to provide ample opportunity for them to review it. During the meeting, stakeholders should be asked to reach consensus on a final master list and to rank each item.

Local expert walking tour

- This technique employs a local **individual with substantial knowledge** of the area's history or architecture to assist in identifying important aesthetic and cultural resources and detractors.
- In this technique, a recognized expert **on local** cultural and aesthetic resources (such as a **community historian**) leads the analyst on a tour of the study area corridor.
- During that tour the expert identifies all the important cultural and **aesthetic resources and any major detractors**. The analyst takes notes during the tour, including the exact location, description, and all other relevant information.
- After the walking tour is complete, each feature identified by the expert should be located on a conceptual map of the study area along with a master list and description of the features. A community **meeting or workshop** may be called to present the map and list to area stakeholders, refine the list, and rank each item (see stakeholder workshop above). Forward this information to stakeholders well in advance of the meeting to provide ample opportunity for review.

Modified visual preference survey

- In this technique, a group of **local stakeholders evaluates a series of slides and scores the images according to their initial** reactions as to whether the image is appealing and would be appropriate for the subject community or study area.
- The slide images could represent **features** relevant to the particular project, such as **streetscapes, types of medians, bikeways, sidewalks, recreational areas, drainage structures, bridges, parking options, or transit station areas.**
- The **technique works best if the stakeholders cannot recognize** the exact location of the images so as not **to bias responses based** on experiences not relevant to the aesthetic character of the images presented.

Modified visual preference survey

- Stakeholders are allowed to View each image one at a time for approximately 10 s per image. They should rate the image on a scale between -10 and +10 based on their initial emotional response to the image.
- The total score for each image should be calculated, and the images should be ranked from most points to least. Higher scores indicate stakeholder preference for the perceived positive aesthetic characteristics of that image.
- Results are used to summarize what stakeholders have identified as the most preferred images related to planning and design in their community. The summary could then be applied to guide the development of project alternatives and conceptual designs.

Determining visual impacts

- Potential visual impacts associated with project alternatives can be determined after the **important aesthetic resources and detractors** have been identified.
- Checklists **provide a straightforward approach to assessing potential aesthetic impacts** related to transportation alternatives.
- Another **supporting technique is the map overlay**. These techniques are recommended as they are cost-effective and can be readily incorporated into the project development process.
- Other techniques, **such as computer simulation or bringing in special expertise**, are provided for more unique circumstances where aesthetics is a significant concern or for more extensive and complex projects.

Overlay maps

- Using the information on aesthetic and cultural resources and detractors from the methods above, **locate each cultural and aesthetic resource and detractor in the study area on an aerial photo or conceptual map of the study area.**
- Prepare **acetate overlays of each project alternative and lay them onto this map.**
- Summarize the **aesthetic impacts of each alternative**, indicating the number of **features potentially affected, the nature of the feature**, and the potential strategies for reducing adverse impacts of each alternative.
- Review **the results with stakeholders** in the study area and refine as needed.

Computer visual simulation

- This technique involves the use of special computer software to graphically simulate the visual landscape of a community with and without the completed **transportation project**.
- It can be used to **compare and contrast the potential** impacts of various design and alignment concepts in a manner that can be easily comprehended. In this technique, the same group of stakeholders used in previous assessment techniques is called **together to view the computer simulation of proposed project alternatives**.
- The computer simulation should include **all identified community aesthetic resources and detractors**. The **simulation should then display the project alternatives and potential impacts** created by each project alternative from the perspective of all possibly impacted user groups.

Computer visual simulation

- The feedback from the stakeholder group on potential impacts can be used to select the **project alternative that will create the most** acceptable set of impacts to the community.
- Additionally, **possible mitigation measures can be simulated**, and reaction to the effect of the **mitigation effort can be gauged with regard to community** acceptance.
- This technique also gives the stakeholder group an opportunity to ask “**what if**” **questions** that can be answered visually through the simulation procedure.
- It also offers **project designers an opportunity to clearly demonstrate** any problems that might be associated with Various stakeholder suggestions.
- This technique **requires a high level of expertise and experience**. A specialist will likely need to be employed to conduct the visual simulation exercise. For that reason, this **technique is more appropriate where potential impacts** to the aesthetic character of the community have been identified as a significant concern.

Bringing in outside expertise

- If potential **aesthetic impacts** of a project become the focus of local controversy or if the surrounding area is a **designated scenic or historic** landscape, then **consider employing a landscape architect or planner experienced in performing aesthetic and visual impact assessments.**
- The **skill and objectivity an experienced professional** can bring to this assessment can go far to reduce the adverse aesthetic impacts of a project, **enhance the qualities of** the area, and **increase sensitivity to community** aesthetic values in the design process.

Mitigation and problem solving

Attention to potential aesthetic impacts of a transportation project is an essential part of community impact assessment and can go far in increasing public support for a project.

Guiding Principles are:

1. Locate new facilities where they are most compatible with the surrounding visual environment.
2. Avoid exposing visual detractors (such as salvage yards, deteriorating structures, and waste disposal areas), especially near gateways to a community or adjacent to scenic vistas.
3. Preserve the visual privacy of residential sites wherever possible.
4. Provide or preserve access to public viewing points.
5. Promote coordination of utilities and transportation projects through shared corridors.

Mitigation and problem solving

6. Strive to enhance the gateways to communities.
7. Remove or replace abandoned facilities.
8. Remove or retain vegetation along transportation corridors to highlight the natural character of the area, create or enhance scenic views, and screen visual detractors.
9. Enhance views to water bodies.
10. Avoid the use of materials or colors that are incompatible with the surrounding landscape.
11. Design the facility at a scale that is compatible with the surrounding area.

Strategies for addressing adverse aesthetic impacts

- Avoidance—Alter the project to avoid a potential impact. Examples include the following:
 - a) Shifting a project to avoid the destruction of a stand of grandfather oaks
 - b) Shifting the project to eliminate an abandoned structure
 - c) Shifting a project to avoid a view from the transportation project onto an unattractive landscape or to open a view onto a water body
- Minimization—Modify the project to reduce the severity of the impact. Examples include the following:
 - a) Burying utilities associated with the transportation project so they are not visible to or from the project
 - b) Designing the signage on the facility to match the style and color of existing signage

Strategies for addressing adverse aesthetic impacts

- Mitigation—Undertake an action to alleviate or offset an impact or to replace an appropriated resource. Examples include the following:
 - a) Incorporating **existing aesthetic resources**, such as **old street lamps**, into the design of the transportation facility
 - b) **Constructing earthen berms to block views** onto the transportation facility from the surrounding community
 - c) Providing technical assistance to the **local agencies on access management strategies** for the improved roadway to reduce adverse impacts of curb cuts on community character
- Enhancement—Add a desirable or attractive feature to the project to make it fit more harmoniously into the community. Examples include the following:
 - a) Providing landscaped medians
 - b) **Incorporating public art into the design of the transportation facility**
 - c) **Constructing a linear park** within the right—of—way of a new transportation facility



**Thank
you**



Pen down