Climate Change Adaptation and EIA

What is climate change adaptation?

Climate change refers to shifts that can be attributed directly or indirectly to human activity that alter the composition of the global atmosphere, and which are in addition to natural climate variability observed over comparable time periods (Intergovernmental Panel on Climate Change [IPCC], 2001). Adaptation to climate change refers to adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities (IPCC, 2001). Adaptation needs and actions are sector- and climate change impacts-specific. For example, in infrastructure, examples include raising river or coastal dikes, promoting flood-resistant roads, or improving the effectiveness and backup capacity in energy, water and sewage system capacities. Such actions could be highly relevant for developments and projects for which EIAs are developed.

Types of adaptation measures to respond to climate change

Type of adaptation		Definition	Examples
Reacitve		Actions that can be taken by farmers and communities independently of policy, based on a set of technology and management options available under current climate	• Crop calendar shifts (planting, input schedules, harvesting) • Cultivar changes • Crop mix changes • Wetland migration
Planned (non-reactive)		Actions that require concerted action from local, regional and/or national policy Early-warning systems	• Land use incentives • Pollution control form inputs • Water costing • Building codes
Two types of planned adaptations:	Public	Led by public institutions such as national and provincial governments	• Subsidies/compensation payments • Changes in insurance payments • Changing standards, such as construction codes, limits per unit of production, or environmental standards to address changes in climate
	Private	Planned initiatives undertaken by companies and/or households to respond to climate change impacts	• Water-metering to support water conservation • Implementation of standards • Purchasing insurance • Small-scale water storage • New ways of construction to limit flooding • Expanding drainage infrastructure as a major way to accommodate heavy precipitation events

The key step in order to assess the potential adaptation needs and identify adaptation actions is to understand the potential climate change impacts on the planned project and the project area. This is critical, as the impacts of climate change are different for various locations; furthermore, not all impacts are important for the planned project. However, responding to climate change adaptation is not just a stand-alone activity presented in the form of specific climate change adaptation strategies and plans. Crucial to adaptation planning is ensuring that all necessary adaptation actions, policies and measures are effectively integrated into the mitigation actions, EMP and other plans and monitoring efforts within the EIA. Based on this, we can summarize the key steps in integrating climate change adaptation into the EIA process as follows:

- Based on the literature, develop an assessment of climate change impacts relevant for the project area and project activities; currently many countries and regions have developed climate change impact assessments, regional climate models and hazard maps—these can be used in the EIA process.
- Integrate the identified impacts into the impacts analyses.
- Assess the consequences of the impacts of the planned development and consider cumulative impacts (such as lower water levels due to droughts, which can put pressure on communities using the water for production and consumption; water needs to maintain biodiversity while the development also needs a certain amount of water).
- Identify mitigation measures to reduce impacts; in this context we consider mitigation measures as adaptation to climate change.
- During the development of the risk assessment and contingency plans, consider extreme weather impacts on planned development such as floods, heavy precipitation over short time, and droughts. Such extreme climate change impacts can provide additional risks compared to those usually considered, such as technological failures and natural disasters.
- When design the EMPs and monitoring plan, consider indicators on extreme weather events such as floods, droughts and their impacts on the environment, people and the development such as water levels, energy backups and others.

There is a great deal of information on adaptation measures in specific sectors such as agriculture, coastal development, mining and energy. Below, we discuss a case study on adaptation needs to protect biodiversity when planning projects and development. The case study is based on European Union (2013).

Case study: Integrating climate change adaptation and biodiversity protection into EIAs

Biodiversity loss is one of the largest environmental concerns of the 21st century. In light of this, a primary goal of all EIAs should be to take on a broader mandate to conserve and protect biodiversity. The connection between biodiversity and climate change is clear. As flora and fauna adapt differently and provide different services to the surrounding environment, a more robust number of species helps the environment adapt better to changes in weather. This diversity also helps to reduce the impact of natural disasters in an area by helping to increase storm water absorption, control erosion and help an area recover more quickly in the event a natural disaster does occur. Considering that climate change and biodiversity are interconnected in a cause and effect feedback loop, a negative effect in one factor creates a continual downward trend in both.

While this downward trend can happen naturally, the influence of development projects can increase the speed at which this occurs. While all projects, through their environmental impacts, have potential negative effects on the environment, if implemented properly they can slow or stop this downward trend from occurring, helping to maintain balance in the ecosystem in the face of global climate change. In the end, identifying and integrating the relevant climate change issues and biodiversity factors into an EIA will result in a more resilient project and save valuable financial, human and natural resources in the event of any extreme events caused by climate change.

Identify climate change and biodiversity issues early on in the EIA

Identifying climate change and biodiversity challenges during the screening and scoping phases of an EIA will help to better inform the EIA moving forward. Where information is available, historical data to help identify trends to compare to the most current baseline data collected will provide a better idea of the rate of biodiversity loss as well as any extreme changes in climate that may otherwise be regarded as normal. This data may be available from technical reports from earlier EIAs or from government or scientific databases. Where quantitative data is unavailable, interviews and field observations with knowledgeable locals can help to provide a general idea of such trends.

Use trends instead of data at one point in time

As the nature of climate change is just that, change, using static data that provides a baseline for a single point in time leaves way for too much uncertainty in the future. Using trends will help to reduce uncertainty and provide a more informed EIA report. When indicators are chosen, thresholds or a maximum/minimum level should also be set to identify at what point a significant change in the ecosystem could occur.

Key indicators to follow as drivers of climate change

Indicator	Measurement
Greenhouse Gas Emissions (GHG)	Quantity CO_2, NOS, CH_4, O_3- in the atmosphere
Extreme weather events	Frequency and severity of the events
Disaster risk	Factors contributing to environment vulnerability: risk of soil erosion/landslides, susceptibility to drought/floods, forest health in the face of invasive species and forest fires
Species at risk habitat	State of the habitat/health and population size of species

Collection and assessment of baseline survey data as climate changes

As the climate changes, so too will the baseline survey carried out during the screening section of the EIA. This means that baseline data must be continually updated—and potential impacts reassessed—based on the new information. This will require an evolution in how EIAs are used. Traditionally, EIAs have been undertaken with the intention of obtaining an environmental licence and ensuring impact mitigation. This has meant that once the document has been finished, it is archived. While impact monitoring still occurs, it is meant to address issues if acceptable standards are surpassed indicating an impact could occur. When accounting for climate change and biodiversity, the EIA becomes a living document that is revisited on a regular basis as new baseline data is collected and weighed against the project. Collection of data should be undertaken both for

climate and *biodiversity* in the area. While it is not explicitly the responsibility of the project to mitigate biodiversity loss if it is not directly affecting this trend, it is part of a larger responsibility to helping maintain the environmental and social integrity within the area of impact, and the plants and animals therein. After all, once species become extinct, it is impossible to reclaim them.

Support ecosystem services to help reduce environmental damage

By using local natural resources that provide essential services to the environment, a project can reduce costs and help maintain more resilience in the face of climate change. Ecosystem services are geographical or ecological features in an area that help people benefit from the environment around them. This may include provisioning services such as wild foods, medicines and fresh water; regulating services like wetlands and forests; cultural services such as parks and green spaces; and supporting services that form soil, photosynthesize and cycle nutrients. All such environmental features help to maintain and keep the surrounding environment healthy.

Consider the adaptability and resilience of the impacted environment

All environments have limits to the amount of change they can absorb. Different factors, such as ecosystem services, biodiversity, amount of prior human development and cumulative environmental impacts from other projects all contribute to the ability of the environment to adapt to climate change. All ecosystems have limits that define their ability to cope with change without losing their primary attributes. While national and international standards are appropriate to use as benchmarks for a project, environmental limits specific to the impacted area's environment should be identified at the beginning of the EIA process, and standards made more rigid where deemed necessary. If adaptability and resilience of the environment are important factors in assessing impact severity, then the less adaptable and resilient the environment of the impact area is, the more severe the impact will be.

Remember that the more the climate changes, the more unpredictable it becomes. While weather patterns still follow general trends throughout the year, many places are experiencing changes in extreme weather conditions; temperature highs and lows, precipitation, storms and so on. It is now essential to incorporate disaster risk management into an EIA.

Considerations for biodiversity

We recognize the benefits of an environment with a diverse subset of flora and fauna species. Biodiverse environments are more resilient to natural disasters and changing weather patterns, and each plant and animal plays an essential role within the functioning of the ecosystem. Such diverse systems also provide many benefits to humans living within or near these natural environments, many of whom depend on the system for their livelihoods. This means that an Environmental Management Plan (EMP) should focus on avoiding irreversible biodiversity loss, seek alternative solutions that minimize such loss, use mitigation to restore biodiversity where loss is unavoidable, compensate for unavoidable loss, optimize environmental benefits and seek to revive declining species populations. There are many factors that contribute to a loss of biodiversity. When undertaking an EIA it should be understood how biodiversity loss occurs and ensure that EMPs prioritize a strategy of "no-net-loss." Biodiversity loss can result from:

- Habitat loss and degradation
- Changes to ecosystem services

- Habitat fragmentation
- Creating change in the natural environment that unbalances the natural order of the ecosystem
- Man-made structures that may directly impact species
- The spread of invasive alien species that can disrupt natural environments
- Changes in the environmental processes (river flow or levels, erosion control etc.)
- Pollution introduced into the ecosystem be it in the air, water or soil

Assessment of Project Resource Use

Many large-scale projects—such as mines, energy generation or large-scale agriculture—use large amounts of surrounding natural resources. As climate changes, the availability of these natural resources may be insufficient to sustain the project. If an area experiences extended periods of severe drought and water becomes scarce, a gold mine will need to adapt its processes and outputs based on the reduced availability of this resource. On the other hand, if a changing climate brings heavy or prolonged rains, overflow areas may need to be designed so that the floodwaters do not cause the tailings ponds to overflow, contaminating surrounding waterways.

Identifying vulnerable populations

While it is a common practice to identify which populations will be adversely affected by project impacts, this process should go further to determine what the cumulative effects of both project impacts and climate change will mean for such populations. Mitigation strategies should always account for cumulative effects. Finally, always work under the assumption that, if insufficient information is available, EIA mitigation measures must err on the side of caution. Where uncertainty does exist—in that quantitative data is unavailable or unreliable to help guide the EIA—qualitative data can be collected to help supplement what information is available.

References

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