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FACT SHEET

CULTURAL HERITAGE ASSETS

ADDRESSING CLIMATE CHANGE IMPACTS ON INFRASTRUCTURE:
PREPARING FOR CHANGE

Roof built to protect SOLI Basilica mosaics in Cyprus. Photo Credit: Glen Anderson, 2008

- Climate change impacts include erosion of structures and decorated surfaces, flooding of buildings, and salt weathering of irreplaceable historic and archeological materials.
- Since cultural heritage assets are critical to the preservation of cultural values and identity and often play a key role in supporting regional economies, climate change impacts on these assets may have far-reaching effects on development programs.
- Cultural heritage adaptation options include maintaining and reinforcing structures, monuments, and buildings; building dykes or dams to protect sites; or moving cultural heritage infrastructure and artifacts from low-lying areas.

CULTURAL HERITAGE ASSETS INCLUDE:

- Monuments
- Historic structures and settlements
- Places of worship
- Cemeteries
- Archeological sites

CULTURAL HERITAGE ASSETS SUPPORT:

- Education
- Cultural and social development
- Economic growth

CULTURAL HERITAGE ASSETS ARE INTEGRAL TO DEVELOPMENT PRIORITIES

Cultural heritage assets help provide and preserve social, cultural, and educational resources. The often irreplaceable buildings, monuments, and settlements contribute to tourism and economic development, resulting in job creation and income generation.

USAID missions and other development practitioners work with local organizations to preserve cultural heritage and support the development and use of conservation skills. ***By protecting cultural heritage and supporting sustainable tourism, development practitioners can also enhance future economic opportunities.***

CLIMATE STRESSORS CAN SIGNIFICANTLY IMPACT CULTURAL HERITAGE ASSETS

Climate stressors can directly affect cultural heritage buildings, monuments, and settlements. Sea level rise threatens coastal assets with increased erosion and salt water intrusion. More frequent and intense storms and flood events can damage structures that were not designed to withstand prolonged structural pressure, erosion, and immersion. Changing precipitation patterns can quickly erode assets built for a different climate. For example, buildings in the rare medieval city of Leh in Ladakh, India, were constructed in a high altitude desert environment and are ill suited to current increases in precipitation. Increases in soil moisture due to increased precipitation can reduce the physical stability of historic buildings and archeological remains. Warmer temperatures and increased humidity can damage building materials and structures by encouraging rot, pest infestations, and erosion. Drought, warmer temperatures, salt weathering, and erosion threaten cultural heritage assets in desert areas such as the Chinguetti Mosque in Mauritania, built with dry stone and mud brick. These and other climate change risks vary in relative importance, with a range of cost implications, compounding effects, and impacts on development objectives. Please see Table 1 for additional examples.

DEVELOPMENT ORGANIZATIONS CAN INTEGRATE CULTURAL HERITAGE-RELATED ADAPTATION INTO EXISTING PROGRAMS

USAID, other development practitioners, and local decision-makers can identify adaptation action priorities and integrate them into existing improvement and maintenance programs. Through a screening process, adaptation priorities may be selected based on local decision-makers' assessment of the following four key factors (presented with illustrative questions). Table 2 provides an illustrative list of potential adaptations. For more information, please refer to the Overview.

- ***Criticality*** – Is the cultural heritage asset important to the area's history and the people's sense of identity? Is the asset an important tourist attraction?
- ***Likelihood*** – What is the probability that climate change will impact the cultural heritage asset?

Table 1. Examples of Potential Climate Change Impacts on Cultural Heritage Assets and Artifacts[1]

	Artifacts, Structures, Buildings, and Settlements
Temperature Change	• Deterioration due to thermal stress and biochemical activity • Damage due to increased pest frequency • Damage from freeze-thaw cycles or frost • Damage inside brick, stone, and ceramics in which water freezes before drying • Overheating of the interior of buildings and artifacts, which leads to inappropriate alterations to materials
Precipitation Change (including glacial melt)	• Loss of stratigraphic integrity due to cracking and heaving from changes in sediment moisture • Physical changes to porous materials and finishes due to rising humidity • Crystallization and dissolution of salts from wetting and drying affecting standing structures, archaeology, wall paintings, frescos, and other decorated surfaces • Erosion and corrosion of metals due to flood waters • Biological attack of organic materials by insects, molds, fungi, and invasive species such as termites • Splitting, cracking, flaking, and dusting of materials and surfaces from changing relative humidity cycles
Sea Level Rise	• Erosion or loss of sites • Saltwater intrusion of subsurface structures • Permanent inundation of resources in low-lying areas
Wind	• Penetrative moisture into porous materials • Structural damage and collapse • Deterioration of surfaces due to erosion
Desertification	• Erosion • Salt weathering • Collapse of structure

- ***Consequences*** – Will the consequences of climate change impacts permanently destroy irreplaceable heritage assets? Is the damage repairable?
- ***Resources available*** – Can existing heritage assets be preserved at costs within the government's budget? Is a gradual timeline required to restore and protect assets?

For example, in Bangladesh, the historic city of Sonaragaon contains thousands of elaborate buildings from the Middle Ages. The buildings are already deteriorating due to lack of maintenance, as well as sea level rise and flooding caused by loss of natural barriers such as mangrove forests. Future sea level rise could lead to more intense flooding that would lead to further loss of cultural heritage, as well as the displacement of significant numbers of people. Decisions makers should consider these climate change impacts, consequences, and necessary resources to adequately raise awareness of current and future threats, build capacity, and protect and maintain the site.

Cultural heritage-related adaptation options include: increasing necessary skillsets among stakeholders; changing management practices and policies related to infrastructure maintenance, reinforcement, and development to protect and fortify structures; and developing partnerships that include benefits sharing, since the people seeking to preserve a site may be different from those whose actions are required to protect it. Some adaptation strategies may require little or no additional funding, if climate factors are incorporated into upfront planning and design, while others may require significant additional resources. Mainstreaming adaptation strategies into existing cultural heritage management plans and programs can strengthen long-term preservation efforts.

When cultural heritage assets are rehabilitated, renovated, and monitored, all relevant long-term factors should be taken into account. For example, there are three World Heritage sites along the River Thames in and near London. When assessing the capacity of the Thames barrier to protect the city from flooding, city officials are considering the protection of property and people as well as the preservation of the World Heritage sites. This effort requires analyzing existing data, as well as monitoring and predicting changes in surface water levels, sea level, and precipitation due to climate change. This assessment can be done in conjunction with other city and adaptation planning.

While some adaptation measures for cultural heritage assets are similar to those for other kinds of infrastructure, cultural heritage assets also present unique challenges. For example, cultural heritage assets are generally not replaceable. In addition, some adaptation strategies are specific to heritage assets, such as combining traditional materials and skills with modern engineering when reinforcing, stabilizing, and renovating historic assets to both preserve their historic aesthetics and enhance their longevity. Adaptation options also differ depending on whether the cultural heritage asset can or cannot be relocated. Table 2 presents examples of the variety of adaptation options that may be appropriate during the Design and the Implement and Manage stages of the Climate-Resilient Development (CRD) Framework. See the Overview for further guidance on the CRD Framework.

[1] Adapted from (UNESCO), 2007. World Heritage Reports 22 - Climate Change and World Heritage: Report on predicting and managing the impacts of climate change on World Heritage and Strategy to assist States Parties to implement appropriate management responses. Colette, A. (ed). UNESCO World Heritage Centre.

Table 2. Examples of Cultural Heritage-Related Actions by Project Cycle Stage

Project Cycle Stage	Project Cycle Actions
	• Identify cultural heritage-related development goals important to the country, community, or sector you are working with • Identify inputs and enabling conditions necessary to achieving those goals • Consider the impacts of climate and non-climate stressors on those inputs
	• Assess climate threats, impacts, and vulnerabilities to understand adaptation needs • Evaluate climate-related risks in light of all existing risks to cultural heritage resources
 Planning Policy Changes Project Development	**Adaptation Options (Examples)** • Develop multilateral environmental agreements and build partnerships and networks to facilitate development and implementation of adaptation strategies, monitoring, and evaluation efforts • Plan for emergency preparedness
 Construction Operation Maintenance Program Activities	**Adaptation Options (Examples)** • Regularly maintain and restore cultural heritage structures, buildings, and settlements • Reinforce dikes and drainage systems to deal with rising sea levels and intense rainfall events • Relocate artifacts and structures out of low-lying, high risk areas • Regulate water inflow or outflow with dams and anti-flood protection • Replace historic water disposal and capture systems that are not capable of handling heavy rainfall • Create boundaries and buffer zones to protect buildings and structures from sand encroachment • Implement multilateral initiatives to support adaptation efforts for cultural heritage • Increase awareness on climate change challenges, best practices, research, and adaptation • Train stakeholders, decision-makers, and local communities on management, emergency preparedness, and monitoring • Conduct research to support national and regional decision-making • Support traditional practices and materials
	• Track performance of adaptation actions and assess the need to develop and implement new or improved methods such as repairing older materials or replacing them with similar, more resilient materials • Conduct ongoing mapping, monitoring, and reporting on the rate and intensity of climate impacts on cultural heritage assets, including: cracks in structures, buildings, or monuments; storm tide and wave activity around low-lying coastal structures and sites; efficacy of rainwater drainage systems; efficiency of buffer zones; and weathering on the surface of structures

FURTHER READING

United Nations Educational, Scientific, and Cultural Organization (UNESCO), 2007. World Heritage Reports 22 - Climate Change and World Heritage: Report on predicting and managing the impacts of climate change on World Heritage and Strategy to assist States Parties to implement appropriate management responses. http://whc.unesco.org/documents/publi_wh_papers_22_en.pdf

UNESCO, 2007. Case Studies on Climate Change and World Heritage. http://unesdoc.unesco.org/images/ 0015/001506/150600e.pdf

Questions, feedback, suggestions, and requests for support should be sent to **climatechange@usaid.gov.**

Published: November 2012