

Climate Change Impact on endangered cultural heritage in Afghanistan

Tayebeh Nazarian | Afghanistan, Asadullah Movahedi | Afghanistan

Afghanistan, situated at an important junction on the ancient Silk Roads, has been the crossroads of cultures since time immemorial and has been known for its rich cultural heritage. It is important to note that Afghanistan's cultural heritage sites have faced the dangers of conflict, looting, neglect, and erosion amidst a volatile political climate for a long time. Today cultural heritage in Afghanistan is facing increasing risks to its historical and archaeological sites due to the impacts of climate change. Rising temperatures, changing precipitation patterns, and extreme weather events pose significant threats to the preservation of these invaluable cultural treasures. The Global Adaptation Initiative currently ranks Afghanistan 173 out of the 181 countries it scored in terms of a nation's vulnerability to climate change and its ability to adapt (URL1). Afghanistan is already highly vulnerable to natural hazards and climate change unless measures are taken. This country has implemented the National Adaptation Programme of Action (NAPA) and National Capacity Self-Assessment (NCSA) processes with support from the United Nations, which can help mitigate the effects of climate change.

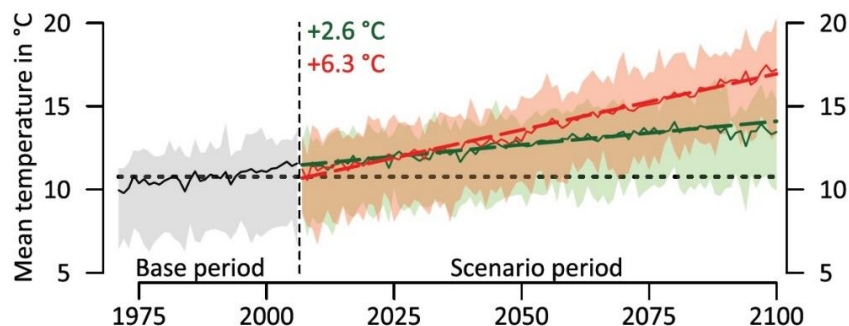
This study aims to the specific impacts of climate change on cultural heritage in Afghanistan, highlighting the urgent need for action. In addition, it seeks to provide solutions to reduce the risks of climate change on endangered cultural heritage in Afghanistan. The research method is descriptive-analytical and applied in terms of type. In this process, the prepared model is according to the climate change data and the cultural heritage features of Afghanistan. The detailed solutions in this study have been completed based on the global guidelines for climate change mitigation in Afghanistan.

Climate Change in Afghanistan

Afghanistan's cultural heritage, encompassing ancient archaeological sites, historical monuments, and unique cultural practices, is at risk due to the adverse impacts of climate change. Rising temperatures, changing precipitation patterns, and increased frequency of extreme weather events threaten the preservation and integrity of these invaluable cultural assets.

Projection of mean annual temperature for Afghanistan for a base period (grey: 1975-2005) and a scenario period (2006-2100) shows the effect on the temperature of relatively limited greenhouse gas emissions (green, RCP 4.5, emissions peaking in 2040 and then declining) and uncontrolled greenhouse gas emissions (red, RCP 8.5); (Figure 1).

Figure 1- Projection of mean annual temperature for Afghanistan (URL2)



The projections using what they called a “moderate” scenario, (RCP 4.5) would see greenhouse gas emission peaking in 2040 including Temperatures in Afghanistan would increase by more than the global average and there would be further melting of glaciers and snow cover, a shift in precipitation from snow to rainfall and a rise in demand for water for crops, with plants possibly requiring extra irrigation. There would be an increase in drought and flood risks. Local droughts would become the norm by 2030, while floods would be a secondary risk. Snowfall would diminish in the central highlands, potentially leading to reduced spring and summer flows in the Helmand, Harirud-Murghab, and Northern River basins, while spring rainfall would decrease across most of the country. In the northeast and small pockets of the south and west, along the border with Iran, there might be a five percent or more increase in ‘heavy precipitation events’ that can lead to flash floods. However, these potentially devastating events might actually decrease across most of the South and other parts of the North. In the medium term, the frequency of snowmelt-related floods in spring might increase simply due to accelerated melting associated with higher spring temperatures (URL2).

These climate changes would be affected the cultural heritage of Afghanistan. The major impacts of climate change on cultural heritage are:

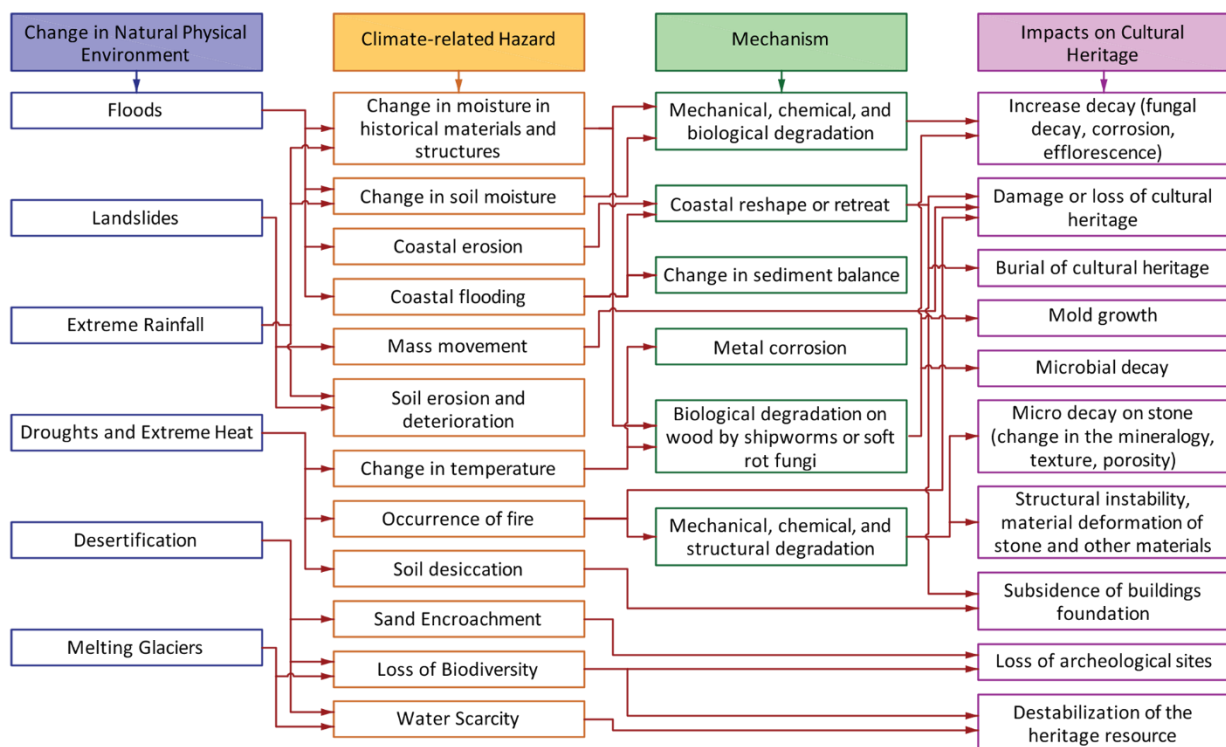
- Increased Erosion and Deterioration: Increased Erosion and Deterioration: Climate change exacerbates erosion and deterioration processes, posing a significant threat to Afghanistan's cultural heritage. Changing rainfall patterns can lead to increased soil erosion, which can undermine the stability of ancient structures and cause irreversible damage (Aziz et al., 2021). Deterioration of stone and other building materials can occur due to increased exposure to extreme weather events, such as heat waves and heavy rainfall (Fai et al., 2015).
- Flooding and Water Damage: Climate change-related flooding events pose a substantial risk to cultural heritage sites in Afghanistan. Increased intensity and frequency of heavy rainfall can result in inundation and waterlogging, leading to structural damage, mold growth, and degradation of historical artifacts (Jigyasu et al., 2019). Flooding can also erode foundations and destabilize ancient structures, further compromising their integrity (UNESCO, 2016).
- Desertification and Sand Encroachment: The process of desertification, driven by climate change, threatens Afghanistan's cultural heritage in arid regions. As desertification expands, sand encroachment becomes a significant challenge, burying archaeological sites and eroding exposed structures (Aziz et al., 2021). The shifting sand dunes can cover or damage precious artifacts, making their preservation and excavation more difficult.

- Loss of Biodiversity and Traditional Knowledge: Climate change impacts can disrupt ecosystems, leading to the loss of biodiversity and traditional knowledge associated with cultural heritage in Afghanistan. Changes in temperature and precipitation patterns can negatively affect the flora and fauna surrounding archaeological sites, interrupting the delicate balance that has influenced cultural practices for centuries (Fai et al., 2015). The loss of biodiversity and associated indigenous knowledge systems can have profound implications for the understanding and preservation of cultural heritage.

- Melting Glaciers and Water Scarcity: Glacial retreat resulting from global warming is a significant concern for cultural heritage sites situated near Afghanistan's mountainous regions. The melting of glaciers can lead to water scarcity and changes in hydrological patterns, impacting irrigation systems vital for maintaining ancient agricultural practices and supporting historical sites (Jigyasu et al., 2019). Water scarcity poses challenges to the preservation of cultural landscapes and can accelerate the deterioration of ancient irrigation infrastructure.

According to this research changes in the natural physical environment affecting cultural heritage in Afghanistan consists of flood, landslides, extreme rainfall, droughts and extreme heat, desertification, and melting glaciers. Every change in the natural physical environment has climate-related hazards, mechanisms, and impacts on cultural heritage (Figure 2).

Figure 2- Changes in the natural physical environment affecting cultural heritage in Afghanistan



Climate Change and cultural heritage monuments in Afghanistan

Classification of Afghanistan's Cultural Heritage Monuments consists of UNESCO world heritage sites, archaeological sites, fortresses and palaces, religious monuments, and cultural landscapes. One notable example of cultural heritage sites is the Minaret and Archaeological Remains of Jam, a

stunning 12th-century architectural masterpiece located in the rugged landscape of western Afghanistan (UNESCO, 2021a). The exquisite craftsmanship of the minaret and the surrounding archaeological remains showcase the country's rich historical and artistic legacy. The city of Balkh, with its historical significance as a major center along the Silk Road, is a notable example of an archaeological site (Musavi, 2017). Balkh's archaeological remains, including the ancient city walls, Buddhist stupas, and Islamic structures, offer a glimpse into the region's diverse cultural heritage. Afghanistan boasts magnificent fortresses and palaces that exemplify its architectural grandeur and historical importance. The Citadel of Herat, a UNESCO World Heritage Site, dating back to the 3rd millennium BCE, showcases architectural elements from various periods, including the Timurid and Safavid dynasties (UNESCO, 2021b). Religious monuments hold significant cultural and historical value in Afghanistan. The Buddhas of Bamiyan, unfortunately, destroyed by the Taliban in 2001, were iconic examples of ancient Buddhist art and architecture (UNESCO, 2011). These colossal statues, carved into the cliffs of Bamiyan, represented the country's rich Buddhist heritage. Also, the cultural landscape and archaeological remains of the Bamiyan Valley, another UNESCO World Heritage Site, showcase the harmonious interaction between human settlements and the natural environment (UNESCO, 2021c). The landscape includes archaeological sites, caves, and remnants of monastic ensembles, reflecting the historical and cultural evolution of the region.

Most of the cultural heritage sites in Afghanistan are made of stone, limestone, marble, local shell rock, and brick. These monuments usually receive little attention and the damage caused by climate change. Each site has unique features, including the time of construction, the material from which it is made, and the climatic conditions in which it is located, which requires an individual approach to assessing the impact of climatic conditions on the degradation of materials. Sites made of the same building material, being in contrasting climatic conditions, have their own characteristics of destruction. In this study, 18 cultural heritage monuments in Afghanistan have been investigated. In each of them, climate change, the impacts of climate change on cultural heritage, and the solutions used to reduce their destruction have been determined (Table 1).