Transactions on Environment, Energy and Earth Sciences
ISSN: 2960-1924, eISSN: 2960-2300 | Volume 3
GRET 2024

Conflict and Coexistence of Natural Resource Exploitation and Ancient Monument Group Conservation - Exploration of the Path of Sustainable Development

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Abstract. The article reviewed several impacts of conflicts between resources exploitation and heritage protection in worldwide. Infrastructure construction as a major project for developing countries with poor heritage exploration might directly expose the archeological heritage under atmosphere, and lead to severe oxidization. Fossil fuel factories will release sulfur dioxide and nitroxide into the air, and following acid deposition will harm the surrounding heritages made with marbles or wood and cost high repairing fee for the government. The destruction of minority's heritages by mining projects also happened around the world, which brings up concerns of minority rights lost and poor supervision to the companies. The unbalanced economic growth has result to the illegal deeds like stolen or looting frequently happened in developing countries with relatively poor checking, and lead to many valuable artifacts are traded in the black markets. With plenty of concerns and difficulties in applying heritage protections, the paper has stated the potential direction for solution, which involved a long-term cooperation between local government and international archeology organization through public education to complete legislation.

Keywords: Ancient Monument Group Conservation; Natural Resource.

1. Introduction

Throughout archeology, many astonishing, unique historical settlements have been damaged or severely destroyed into ruins—wars, colonization, and natural disasters were the main factors contributing to most of the destructions. However, in the 19th-20th century, fast economic development and industrialization promoted the growth of many countries, and a large portion of natural resources have been exploited for such intense development. Historical sites around the world, as most of them have already lost their functions and structure, have been treated badly during the developments. People from poor countries grow up with a background lacking lawful knowledge and education, so they might constantly take or destroy local heritage to meet their basic needs, it also raised the importance of education and assistance from international organizations. Today, fast development and resource exploitation have become one of the problems for historical site protection worldwide, and it can be summarized into infrastructure works, resource exploitation, and lack of legislation. In Romania, due to a lack of archeology legislation and related studies, the highway building plan has crossed an area with accumulated archeology sites, which causes great trouble for researchers and scientists examining the area [1]. Underground sites, like burials, are difficult to find without professional detection and mapping, as the vegetation covering, and buried soil completely hide it from general observation. Unlike the remains above grounds, the burials, and ancient sites might be preserved well in an isolated condition when it has been buried, and construction machines might accidentally dig them out and expose these sites in the atmosphere, which leads to immediate oxidizing and rusting of the items [2]. Though the infrastructure has played an important role in the transportation and communication of the society, lack of legislation and supervision on the infrastructure might lead to increasing crime in illegal artifacts trading, archeological looting will rise in poor areas with ample ancient artifacts and items [3]. Aside from infrastructure construction, natural resource exploitation can have both direct and indirect impacts on multiple levels and greatly shape the local ecosystem. For example, mining and oil extraction will permanently change the land

structure in one place, and the impacts spread radically into surrounding environments. Holes in the mountains and the hollowness of subsurface structures will lead to potential land collapsing risks, and the destructed soil will no longer be beneficial for plant growth. Besides, manufacturers like coal factories would release a lot of polluted chemicals, like sulfur dioxide into the atmosphere, which can react with water and form acidic rain in nearby regions. Settlement built by marble can be severely damaged under the acid rain. In Mexico, the threat from acid deposition has greatly affected the protection of archeological zones, as pollution sources are built very close to the sites [4, 5]. The constant weathering of carbonate buildings will cause long-term repair fees and time for protection organizations. In addition, resource exploitation also includes the construction of massive water conservancy projects, such as dams, or canals, which can modify the flow rate and volume of water bodies. The construction of the Dam involved a step of submerging surrounding areas to build a large water reservoir, and it can completely change the local ecosystem and all nearby buildings. Dams in North Africa and the Middle East were constantly affected by these natural disasters, underling the affection of climate change, the disaster of flooding, and heavy rainfall can be deadly threats to those ancient buildings [6]. In summary, the inevitable conflicts between archeological sites and natural resource exploitation are a sharp problem for archeology protection, and this paper aims to give a review of several major impacts of natural resource exploitation from both direct and indirect perspectives, and lists several challenges in legislation, protection technics, and economic development.

2. Impact of natural resource development on ancient monument complexes

2.1. Impacts of Natural Resource Exploitation

Natural resource exploitation involves direct extraction, usage, and process of natural resources, and the impacts of these behaviors are not only restricted to the forced removal of many natural resources but also the pollution of processing and products. Infrastructure construction is one of the major threats to the heritage site. If the government didn't know much about the location of heritage sites, the construction of highways, rails, or roads would pass through these places and threaten the sites. Burials, or underground buildings that have been buried for centuries are vulnerable to changes in upper-ground pressure, which might even result in road collapse. The probability of infrastructure plans overlapping with historical sites is not a rare thing, as the landscape doesn't change much compared with a hundred years ago, and people might choose similar road-building plans. Thus, it would be important to do an in-depth archeological discovery before the construction, advanced geology tools like GIS mapping can map out the environmental conditions and potential site's location easily, and local archeologists would have more prepare the potential discoveries. Once the burials are exposed to the air, the oxygen in the atmosphere will quickly oxidase all the matter in this area. Walls, metals, and clothes can turn into fragile or rusty textures in minutes, and the values of the site decrease exponentially after a few days, and the decaying condition would vary depending on local weather and climate.

Aside from infrastructure construction, water conservancy projects can also lead to great dangers to surrounding archeological areas. The construction of a Dam, which requires a large area of land to be submerged under water to form a water reservoir, would highly affect the humidity of surrounding undergrounds. As water infiltrates and separates into surrounding areas, archeological sites especially with wooden structures will endure greater erosion. Wooden items are common materials for furniture, coffins, and artifacts, and the bacteria that decompose wood are usually favored in places with ample oxygen supply and high humidity [7]. Furthermore, since temperature-driven climate change is gradually strengthening its intensity and frequency, unusual or extreme climate events have greatly increased in frequency compared with thousands of years ago [8]. The standard of hundred years of flooding has been doubted under climate change situations, as coastal hurricanes and desert flooding have become more frequent, and the high intensity can quickly break the defense system built for weaker flooding. In 2012, an archeological site Mogao Grottoes in the Northwest of China endured

a flooding at three-hundred-year level, and the defense level of the site doesn't have a level, which shows the severity and great change in local climate. Thus, most of the water conservancy programs and infrastructure construction plans recommended to get advice from professional archeologists' group in their country for protecting any potential heritages.

2.2. Acid deposition

Acid deposition is one of the major threats to heritage protection in the city, as the industrial revolution happened in the last few hundred years, burning fossil fuels for energy has released large amounts of chemicals that can lower the pH in the environment, and it has long-term harm to surrounding biotic and abiotic matters. Acid deposition in the city usually results from fossil fuel manufacture, especially coal processing. Burning coal can release sulfur dioxide and nitroxide into the atmosphere and react with water in the air which leads to acid deposition. Acids produced by deposition can enter the ecosystem by directly attached to the surface of soil or organisms or accumulating in the water bodies. In heritage protection, the major threat of acid deposition is its strong corrosion to the ancient buildings that were made of wood, metal, limestone, sandstone, and marble. For limestone, the sulfate acid consumes calcium carbonate into calcium sulfate and produces water and carbon dioxide, the surface of the buildings or artifacts will be severely damaged by corrosion [9], and repairing fees will be a burden for protection organizations to take. The detection and evaluation of acid deposition conditions can be done by collecting water bodies, and soil samples and testing the pH to map the affecting zone and severity. Since acid deposition can only affect a close area, the lined sampling would eventually find the source of pollution. However, in undeveloped countries, a lack of detecting technologies and environmental protection legislation might result in difficulties in dealing with the problem. Considering factory shifting is costly and cannot be done in short time intervals, solutions like reducing pollutants during manufacturing and long-term protection of heritage can also be useful. Clear environmental laws are needed for many countries in modern days, as they can help to evaluate and analyze the many harmful impacts of human activities on surrounding environments and minimize the loss before reaching the margin.

2.3. Social economic development

Social economic development is the main driving force for heritage destruction and protection. A society with developed economies can use late technology and hiring professions to preserve and exploit for cultural or economic benefits, but the early and middle stages the urbanization and industrialization, lead to an urgent need for wide infrastructure, fast resource exploitation and more lands for increasing population usually will ignore the importance of heritage protection. Many ancient heritages lost their importance in the economy and culture of current society, which led to many governments forcing the removal or destroying the sites for other needs.

First, infrastructure is one of the needs for economic growth, and when the project manager didn't explore their planning region of potential heritages, severe destruction of the site might happen. Since Earth's landscape didn't change as much as a hundred years ago, many burials or heritages may just be in the region that is suitable for humans to reach too. As infrastructure needs massive machines to clear roads or dig into the mountains, they might destroy a large portion of the heritage before finding it, and when burials are suddenly exposed to the air, fast and irreversible oxidization will ruin most of the items into waste pieces.

Secondly, resource exploitation also threatens the heritage. Resource exploitation after industrialization has become way more massive and quicker than it was in the past. The work of mining or oil extraction covers a large area with a visible affection to the local ecosystem. Due to the enormous land needs for the resource's exploitation, some companies will ignore the cultural resources and sites in areas with substantial profits. In many places around the world, mining companies have illegally destroyed the sites for aboriginal people for digging ores or coals [10]. Aboriginal people as a weak group can hardly perform their right in coping with these massive companies to protect their cultural heritage, which shows the importance of supervision and law

restriction to any illegal mining. The heritage protection organization also needs to build a tight connection with Aboriginal people, giving them rights and positions today and pursuing their cultural resources in heritage and artifacts with a careful and respected attitude.

Thirdly, illegal trading of ancient artifacts and resident destruction is another major threat to a country with ample archeology resources or a country with a poor economy. In China, ample ancient burials resources made a long history of heritage looting, many valuable artifacts in the burials have been secretly looted and sold to private collectors or black market. The vasty burials around the countries have made even scientists aren't able to locate exact locations, so the looting events are usually limited by restrict supervision of police force [11]. In poor countries, the residents might take a brick or other valuable artifacts like furniture to decorate their house, which causes long-term irreversible damage to the heritage. To better protect this heritage from residents and illegal trading, target education and protection are needed for these places. An improvement in archeology protection needs the effort of the government and other international organizations from multiple levels to educate them on the importance of heritage protection and improve the living conditions of residents, which can reduce their looting profits, and set restrictive laws to prevent looting.

3. Conclusion

In summary, archeological heritage protection today facing a lot of challenges between site protection and social development, infrastructure construction and resources exploitation have greatly threated the heritage and environment. Unawareness or ignorance the importance of archeological cultural resources has result to the destructions of many human shared knowledges and treasures. Infrastructure construction without a beforehand exploration and supervision of professional archeologists would result to the direct destruction to the heritage, and immediate oxidation will ruin most valuable things into dust. Similarly, resources exploitation would cover large area and has visible impacts to the whole area. Mining and Oil extraction will create vulnerable ground area that easily collapsing, and some big companies might directly exploit the heritage areas without a permission and lead to irreversible destruction. Aboriginal people as a minority have endured serious heritage destruction in worldwide, but their position and voice barely stop these illegal mining companies. Also, processing of fossils fuels like coals can result to acid deposition in surrounding areas, which lead to severe damage of heritage and artifacts made of limestone, marbles, woods and metals. Furthermore, in countries with poor protection and supervision, residents live close to the heritage might directly take its materials or items for build their own house, or even try to loot luxurious for moneys. In conclusion, the protection of global archeological resources required the efforts of government in multiple levels like education, legislation, supervision. To better protect these sites, different government needs to evaluate their own economy and urbanization state. Referencing the importance of archeological exploration before planning any big infrastructure or resource exploitation project can reduce the risk of accidental destruction. Also, a restrict and detailed legislation and regulate company's behavior in reducing potential harm to the heritages. In addition, the involvement of international organization might can be important for countries with poor archeology resources and knowledges. These organization can assist the heritage protection not only by direct control or inference, but trained local people with archeology knowledges, and guide the local government to set up the protection project. At last, a long-term, stable education for publics is vital to bring out a new generation with a correct understanding about the heritage values and get involved in heritage protections.

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