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Evaluation of the Effects of Climate Change in Destruction Procedure on Iran's Historic Buildings

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***Abstract*—**Climate change could lead to changes in cultural environments and landscapes as we know them.Climate change presents an immediate and significant threat to our natural and built environments and to the ways of life which co-exist with these environments. In most traditional buildings, the harmony of texture with nature and environment has been ever considered; so houses and cities have been mixed with their natural environment so astonishingly and the selection and usage of materials have been in such a way that they have provided the utmost conformity with the environment, as the result the created areas have a unique beauty and attraction.The extent to which climate change contributes to destruction procedure on Iran's historic buildings.is a subject of current discussion. Cities, towns and built-up areas also have their own characteristics that might make them particularly vulnerable to climate change.

***Keywords*—**Climate Change, historic buildings, Iran

I. Introduction

CLIMATE change is a significant and lasting change in the statistical distribution of weather patterns over periods ranging from decades to millions of years. It may be a change in average weather conditions or the distribution of events around that average (e.g., more or fewer extreme weather events). Climate change may be limited to a specific region or may occur across the whole Earth.

The most general definition of climate change is a change in the statistical properties of the climate system when considered over long periods of time, regardless of cause.[1] Accordingly, fluctuations over periods shorter than a few decades, such as El Niño, do not represent climate change.[2]The term sometimes is used to refer specifically to climate change caused by human activity, as opposed to changes in climate that may have resulted as part of Earth's natural processes[3]. In this latter sense, used especially in the context of environmental policy, the term climate change today is synonymous with anthropogenic global warming. Within scientific journals, however, global warming refers to surface temperature increases, while climate change includes global warming and everything else that increasing greenhouse gas amounts will affect[4].

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The environment in which archaeological material is found is of great significance for how the material is protected. When the climate changes, the conservation conditions for the archaeological material in situ may also change. There is, however, a great deal of uncertainty regarding what effects can be expected and how great these effects may be. Climate change will also affect archaeological sites in different ways, depending whether they are in air, in earth, in ice, in snow or in water. This will often be of greater significance than what the archaeological material itself consists of. This section on the effects of climate change on archaeological material is therefore divided according to the conservation context in which the material is located[6].

II. The Effects of Air Pollution on the Buildings

Normal environmental destructive factors such as severe fluctuations in temperature and moisture and the seasonal changes in these two factors, fire… are not new; they have always existed and have had their destructive effect on the cultural heritage over the years. But in the twentieth century, especially during the recent decades, destructive mechanisms have become so sophisticated and their pace so fast that if proper attention is not paid, complete collapse of part of the historical monuments and other cultural heritages might really occur. And perhaps it is because of this serious warning that, recently, various institutions and centers have employed researchers and experts in different scientific fields such as chemistry, physics, restoration of historical monuments, biology, geology, archeology, osteology… who meticulously study these historical/cultural properties and the mechanisms of their destruction. Undoubtedly, one of the major responsibilities of such centers would be the scientific and accurate study of disintegration processes of various materials and, in fact, diagnosis of the problems of these monuments. And in this regard, the effect of environmental pollution especially chemical and acid rains in deteriorating the construction materials and, consequently, historical monuments is very important. And the results of such studies will directly contribute to conservation, restoration, and maintenance of our cultural heritage.

One of the gases which contaminates the air in industrial regions is andheri sulfur gas which, eventually, changes into sulfuric acid and affects many substances. The corrosive effect of this acid on materials which are exposed to open air such as construction stones and metals is quite conspicuous.

Fig. 1 Decomposition of stones due to Climate Change- Takhte Jamshid -Shiraz

III. Biological Decomposition

Timber and other organic building materials, such as turf, straw and seaweed, are naturally decomposed by different kinds of bacteria, fungi and insects. The activity of these organisms is greatly dependent on climatic conditions such as temperature and humidity. Biological impact on organic material is therefore a type of damage that will be affected by climate change, as pointed out by the UNESCO World Heritage Centre (2007), and others[5] . Timber has long been an important building material in the Nordic countries. This section, which covers the biological decomposition of built environments under the influence of the climate, will therefore largely concern itself with the decomposition of timber[6].

Fig. 2 Decomposition of Wooden door – Abyaneh Esfehan

Fig. 3 Damage to the historic building of temperature and humidity changes

IV. The Use of Wood in the Houses of Temperate and Humid Regions

Wood and the plant achievements are of materials which have been naturally accessible to human beings from ancient periods. Many years ago, in the forested regions, the people have used wood and plant materials in order to make instruments and shelters and they have provided their food from wild products. Since wood is not permanent and it decays, the instruments and the wooden and plant constructions have not been remained gradually, but remaining some wooden and artistic constructions from ancient Egypt and Iran civilization shows antiquity and the common application of wooden materials in the history of these civilizations.

They have used woods in order to make the skeleton of rooms, the balcony column, the staircases, breast summers, and the covers of breast summers in the temperate and humid regions in the north of Iran. They provided these woods from the near gardens with neighbors' cooperation and carried them to the place where construction was making. Finally it has been coated with mud and the other materials such as stone, adobe and tile have been used in the fully wooden constructions. Stone is used in the foundation and in constructing the stairs. These stones were provided from around the rivers. The rice stems are the main constituent elements in sloping ceilings coating in the houses of temperate and humid regions. Those are rice remainders which they themselves have planted and harvested and they are completely native. In order to keep rain penetration to the construction by wind, the sloping ceiling continues in the vicinity of the floor in one or two side of the construction which is on the direction of wind. Also, in order to keep

humidity penetration from the floor into the construction, its surface will locate higher than the floor and the air flow in the spaces between the floor and the earth leads to evaporation and ventilation and make the floor of construction dry and usable.

As it was mentioned all of the utilized materials in the construction are of the available materials in the place which have led to reduction of energy in material transportation from other points.

Fig. 4 Decomposition of Wooden door – Ghavam House -Shiraz Esfehan

Fig. 5 Decomposition of Wooden door – Ghavam House -Shiraz Esfehan

V. Conclusion

Climate change, is applied additional pressure on many sites of cultural heritage. Although it may prove the claim that the damage caused by climate change is very hard.

However, much of the damage incurred to monuments related to climate change that has been controlled by frequent inspection and maintenance of external.Wet and frost in the mountainous and Cold regions is one of the most important factors of crushing rocks.

The climate subjects the built environment to impacts such as humidity, temperature fluctuations and wind. All building materials will be subject to deterioration over the course of time and climatic conditions will be of decisive significance for the rate at which this occurs.

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