

The Implication of Fire From Sacred Symbolism to Ecological Restoration

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Abstract:

The purpose of this paper is to determine the forest fire implications for human beings and the ecosystem. With further study, we can find that, apart from wildfires impacting these two, but they are also influenced by them to change forest fires in some typical ways. It will study from three perspectives: how humans' attitudes changed on fire, how people reconstructed after a horrible fire, and the rules of using fire as a technique. Landscape architecture is also an essential factor to consider in this process. People have a strong stereotyped image of fire from ancient to modern times. In their minds, fire always plays an evil role in holding the development of nature and ecology back. However, fire does have a positive aspect in that process. If it is 100 per cent resisted in the forest, it will lead to mountains of litter that primarily consist of dead branches or leaves accumulated on the ground. This status of the natural environment prevents the new shoots from absorbing the sunlight poorly because of heavy litter. It can quickly result in a terrible forest fire during the parched season. This kind of fire tends to be out of control, and the damage is often severe in the end, so it is necessary to organise fire at certain times in the forest. The fire they need is burning to set in precise control in case it would destroy too much to put it down on time.

Keywords:

Landscape, Fire, Ecology, Societal, Spatial

1. Introduction

Fire is considered a significant power from nature in essence. It is one of the elements that have accompanied human beings in this world with the other three components, including the Earth, water, and air. [1] They were supporting people to survive. Even though we have so many different cultures and visions of myths, they are similar when discussing the fire stories. All the people believe that the fire did not belong to them and that the seed of fire was brought from the god or someone stole from the god. In ancient Greek mythology, the god Prometheus (Figure 1) brought fire to private men and then accepted the punishment from Zeus, the King of God [2]. In Chinese fairy tales, the seed of the original fire was stolen by a human named Yan Bo from the Jade Emperor, and in the end, Yan Bo (Figure 2) was sacrificed for human beings' well-being of life [3] they were converging together. Gradually, they constituted primitive tribes, and then the concept of the community appeared in

everyone's mind, which means that fire can be seen as the age of civilization's beginning.

Although fire is considered the footstone of modern society, it is also seen as a horrible disaster. Nowadays, countless accidents and forest fires frequently happen every year. They cause mountains of natural resources and money loss and sometimes even threaten people's lives. For example, there were 74 forest fires in California wildfires last year [4], and it happened again on January 15th, 2021, the most recent forest fire until now [5]. These constant fires are just like time bombs if we only know little about the implications of fire superficially.

We need to learn more. Fire has different effects in different types of forests. For instance, certain times of forest fire are the key to maintaining the structure of the forest, the function of the forest, and local species in tropical dry forests, boreal forests, or some conifer forests. In contrast, it is the worst forest fire situation in a tropical moist forest [6]. Besides, the fire condition would be easily changed by external factors, so it is essential to have a completed plan and strategy for managing burying.



Figure 1. Prometheus in Ancient Greek Mythology.



Figure 2. Yan Bo in Chinese Fairy Tales.

Source: <https://mythcrafts.com/2017/10/19/prometheus-and-the-gift-of-fire/>

https://k.sina.cn/article_6093535129_16b33f799001010ns0.html?from=history

2. Human Impact

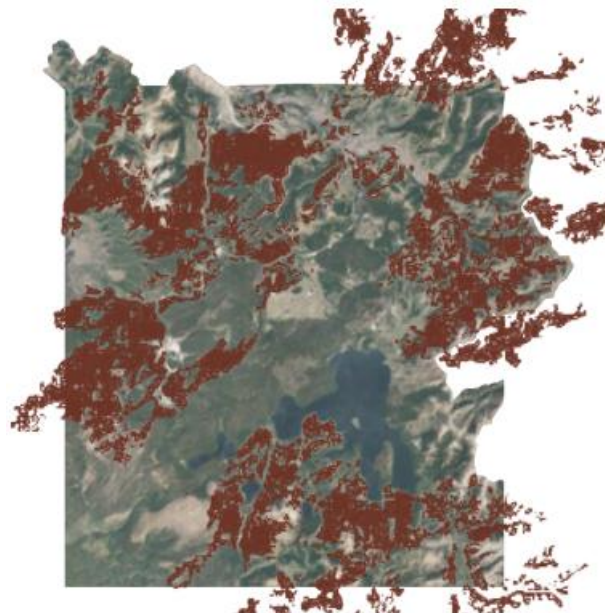
2.1. Attitude Changed

The United States has a history of forest fires, and an educational fire happened there. After experiencing this, Americans' perceptions of fire have entirely changed.

The fire happened in the Yellowstone National Park in June. 14, 1988 (Figure 3). In the beginning, there were 18 fires caused by the lighting. After evaluating them, both park management and related experts agree that these wildfires continue to burn in the national park because they will develop like usual years as they forecasted. In previous years, the local climate and weather would become humid in July, and the intensity of fires became increasingly lower until they went out naturally. 1988 is different from other years in that in July, the weather was still arid. The fires were not weaker than before, but combined, they became unimaginable and spread faster and more extensively. Even if the authorities and related departments started to take some measures to try to stop that, it was already too late to control the wildfire well [7]. In the end, the damaged area was equal to one-third of the national park's, and the snow finally put out a wildfire in September of 1988.

When people learned about one of the worst fires in Yellowstone National Park from the news, they blamed the official managers who had learned more about climate change and the forest's original status before this fire to prevent damage. Fire will threaten everything nearby, which might cause an irreversible loss on the Earth, including lives, ecological sources and the obstruction of society. We can't wait for that and only pray to god to wish the development of fire can be done by itself. It is too late for us to stop it until it has already happened. It is too late for people to turn the whole situation over, from negative to positive, until they lose a great chance. Considering that, we should never stop the steps from studying it in depth and not only rely on the experience and forecast analysis from history, according to this recorded interview from The New York Times with Robert Barbee, superintendent of Yellowstone National Park, John Varley, chief of research for Yellowstone National Park, and Donal Hodel, secretary of the interior [8]. They discussed how the authorities seemed unaffected by this wildfire and believed that certain survival mechanisms are encoded in each plant's genetics. In this way, they trusted the theory as the words from Projective Ecologies by Chris Reed and Nina-Marie Lister, "... the extreme heat of fire to release and disperse seeds and facilitate forest renewal-and sometimes, a shift in the complement of species." I also acknowledge their idea that human kinds are always a component of the ecosystem, and whatever they have done absolutely would impact other parts of ecology [9]. Local people took much longer to turn a positive attitude toward fire than them. When they witnessed how the vegetation rebirthed again, and the forest thrived again. Everything has regrown and developed better than before. Americans understand the beliefs of the authorities and experts about fire.

On the other hand, this fire made the official departments realize deeply that forest fires are still unpredictable, uncontrollable, and unthinkable. From my perspective, they should be more careful in developing forest fire strategies and carrying out plans.



■ Areas burned in Yellowstone National Park on September 15, 1988

Figure 3. Disaster Area in the Summer of 1988 Wildfires.

Source: <https://yellowstone.co/maps/1988firemap.htm>

2.2. Restoration and Design

Today, it is more common for someone to start designing and separating different steps for restoration after a forest fire. In this way, disaster recovery designs usually focus not only on restoring the damaged area and ecosystem to their previous status but also on considering other aspects and creating new functions to improve the local economy. The project in Chinese Gao Ming Ling Yun Mountain is a typical example (Figure 4).

That forest fire happened on December 5, 2019, near Ling Yun Shan Yingang Reservoir, burning for four days. According to the published report by the authorities, around 924 hectares of the area were destroyed in this disaster [10]. The local government immediately calls for related experts to plan a programme about its ecological restoration, figuring out a countermeasure to COVID-19, the arid season, and high temperatures with little rainfall [11]. There is little information about this program because it is not open yet. The program's steps and the whole design are introduced to the public following specific numbers of news. Designers decided to restore the ecosystem by removing excess vegetation, having polite experiments with nursery stocks to refresh the ecosystem, and extending the local species diversity.

Meanwhile, infrastructure construction will also be finished in the first step. Next, the second design step was based on Ling Yun Mountain's original character, which was familiar to residents of a national forest city (Fo Shan Radio Station, 2020). That became the concept of promoting local natural civilization and local cultural reconstruction. In addition, expanding tourism projects was also a significant aspect that must improve the local economy as their imagining. The completed design is separated into three themes. One of these is keeping the development of typical vegetation that prevents soil erosion well—the other two aim to raise local incomes from the industries of touring and agriculture.

This restoration method demonstrates that human beings are part of the ecosystem, participate in all the unfolding processes and can create their ideal environment [11]. This disaster allows humans to rebuild a progressive circumstance to meet people's needs in a changeable society. It can be positive. Changing is an essential factor for the ecosystem. If it always remains the original status, the apocalypse will be nigh certainly in its self-destruction sooner or later.



Photo Credit: Fo Shan Radio Station

Figure 4. The design plan of restoring the Ling Yun Mountain.

Source: https://www.sohu.com/a/426495623_658489

3. Ecosystem Impact

Sometimes, fire harms most vegetation if it is a massive, intense burning. However, in some cases and for specific plant types, they are waiting for it to help them refresh the existing ecosystem and flourish again.

Although nature can auto-repair itself naturally after undergoing a forest fire, most of the time, the situation is that extreme temperatures are created too many times in these horrible fires, which cause vegetation seeds to have fatal injury and soil degradation seriously. When the forest starts to grow back on its own, more than 30 per cent of them can fail in this first step without any artificial equipment. Some of the others turn out to be brushlands of ecologically lower value easily, which would also be a potential danger for nearby communities by the second wildfire [12].

However, some plants used to live in forest fires or restoration use fires, such as eucalyptus, pine, etc. Eucalyptus is the main component (about 80 per cent) in Australia's forests. That is considered one of the most important reasons forest fires happen so many times in a period. It would also absorb nearby groundwater and result in other plants dead in the burning caused by lacking water to destroy competitors. These characters even expand the damaging area of the fire and the spreading spread. It has evolved into a tall tree with tiny leaves and thick bark that can prevent trees from overburning. Eucalyptus also seem to provide an extra condition for forest fire and is called "gasoline tree" locally, which is the consequence of those scientists studying in the Faculty of Agriculture, University of Coimbra, Portugal, found in forest fire research in Australia in 2017 [13]. Also, as we all know, pine is extraordinary vegetation that cones would only release its seeds from its cones [14].

On the other hand, forest fire is not the direct reason to influence local wildlife. A significant part of wildlife dies from smoke inhalation, and the reason for other species' deaths is not so apparent that it is speculated to be the problem of forage burning or an arid environment.

The fire played a double-edged sword for the whole ecosystem, which is advantageous to some vegetation but, at the same time, disadvantaged to the rest of the species. In this disaster, each vegetation and wildlife relationship becomes complex, with critters interpenetrating each other and exploiting others' resources. Following the words in *Staying with the Trouble* [15], "..., thereby establish sympoietic arrangements that are otherwise known as cells, organisms, and ecological assemblages." All species cannot guarantee survival by themselves in the forest; they need a competitive relationship with others to improve their evolution and better suit the changeable environment in the future.

4. Technology

With the continuous development of society and technology, fire has already been one of the common approaches to restoring the forest. Nevertheless, if the fire turns out of control and causes immeasurable damage, it should be analyzed and planned thoroughly before being implemented.

The forest fire cycle, the time it takes for a forest in an area to burn completely, is an essential issue that should be studied well. It would also demonstrate the frequency of forest fires on that land and the average damaged area. The different forests have their own specific forest fire cycles, which are decided by various vegetation species in that forest. There is even a formula to calculate the cycle [16].

$$C = 1 / P$$

C is the period for the forest's specific forest fire cycle.

P is the ratio of the average annual forest burning area to the total forest area.

Through this formula, plenty of forests managers realised the most suitable forest fire cycle to restore forests. In China, Da Xing An Forest is also a site that has often experienced forest fires. It is famous for its timber production base and is one of the most severely damaged forests. Due to its vast area, forest managers and experts separate it into three parts by position to organise it in different forest fire cycle strategies. Fire improves the progress in local ecosystems at a certain extent. In the north of Da Xing An Forest, its cycle lasts 110 to 120 years. The medium and south of Da Xing An Forest are 30 to 40 and 15 to 20 years, respectively [17].

Seven kinds of plants are planted in the Da Xing An Forest, likely Dahurian larch, Mongolian scotch pine, oak tree, black birch, white birch, aspen, and Korean spruce. According to the table below, the number of coniferous trees decreased from the northern region to the southern part, and at the same time, other broad-leaved trees planted in the southern area are more than in the northern area. Even if the forest fire cycle period is not identical in each forest, we can still find a specific rule for changing vegetation types in one forest in history. Interestingly, all seven vegetation types have certain different extents of adaptive capacity on fire, which influence the ways and distance that how their seeds spread. Therefore, each forest's authority and managers have the duty to analyse each forest's status and condition if they choose fire as the means of restoration.

Another typical example to illustrate how helpful fire is in restoring the forest is Yellowstone National Park. Its unique landscape, the Greater Yellowstone Ecosystem, needs fires that significantly coordinate each relationship in vegetation. Most of them are already adapted to fires; sometimes, the situation depends on it. The management of Yellowstone National Park decided to keep certain times fire in a period by the fire's low intensity. The biggest reason for choosing low-intensity fire is that most of the time, it cannot attach to the top of trees and only removes useless residue on the ground to make vegetation's seeds and seedlings connect to soil more easily. After that, they would not have to undergo lousy damage. The consequence of forest fires will also benefit the condition of forest plantations. It even protects the forest from pests, diseases, and rodents, increasing the nutrition of the land [18].

In Yellowstone National Park, without artificial burning, another wildfire often comes from lightning. Sometimes, this lightning would light tens of forest fires in the summer, but it would go out naturally in the range of half an acre area. People would search for the torch first, and then they would isolate related trees and plants that are cultivated near these points. Ultimately, wildfires became smouldering ground fires and went out independently [19]. Recent reports on Yellowstone National Park found that these forests, which often stand-replacing fires, affected forest situation constantly until 200 years ago. When they experienced fire again, the intensity and spreading speed would be much lower than typical wildfire unless they stayed in drought season in the long term. In some cases, fire even skips areas destroyed by fire the last time [20]. So, each forest manager and related department in the local government should have a map illustrating the damaged area in previous fires and update the current fire position to predict the direction of the current and next fire.

5. Conclusions

In the past 10 years, forest fires have kept occurring year by year, again and over again, on a worldwide scale. In this progress, it is never about blaming the authority or any individual's decision. To sustain the environment of all species' development, people have to set multiple efficient plans to return to the site for collecting study references for later presence, reorganize various terrible situations to set the alarm in everyone's awareness, and take control to put it on the track. Taking these actions seems to push the "Pause" to stop any irreparable consequences and "Re-start" to strengthen the connection between humans & nature (forests), and that can even be seen as an opportunity for society's development.

Fire is a bomb from lighting or artificial accidents to destroy everything. On the other hand, it can also be seen as a valuable approach to updating the forest's ecosystem, just like pushing a reset button for the forest. A Chinese proverb states that fortunes of dependency mean nothing is absolutely good or bad stuff, and crises or opportunities are hidden behind that. Human beings should search for these opportunities in every disaster and prevent trouble. Everything has particular meanings that we cannot assess from a short-term but long-term perspective. Then, we will understand the importance of them.

Conflicts of Interest

The author declares that there is no conflict of interest regarding the publication of this article.

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