

Construction of China's "Large Ruins" Monitoring System Based on the Comparative Analysis of World Cultural Heritage Monitoring

—An Example of the European-style Palace of the Old Summer Palace

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KEY WORDS: Large Ruins, Monitoring, the World Cultural Heritage, the Old Summer Palace Ruins, European-style Palace, System

ABSTRACT:

The result of the comparative study on monitoring of culture heritage between China and the world shows that it is imperative for China to carry out Large Ruins monitoring. Some key questions that this paper will consider are: What should be monitored at Large Ruins? How do we build monitoring systems? To answer these questions, this paper, will use the Old Summer Palace ruins as an example and look at its design of monitoring systems and upcoming monitoring activities of its ruins. It will also consider how the Old Summer Palace makes a preliminary attempt to build a monitoring system for one of China's "Large Ruins" by exploring the aspects of monitoring necessity, identification of monitoring targets, and building of monitoring system of the European-style Palace of the Old Summer Palace.

1. INTRODUCTION

At present, the heritage management system of mainland China has basically formed an architectural system of: "World heritage—Large ruins—national level cultural relics protection units—municipality and county level key cultural relics protection units—other cultural relics protection units". "Large Ruins" is a heritage type only next to the world heritage. There is no clearly defined authorized and official definition of "Large Ruins", and there is also no corresponding name of "Dayizhi" (Large Ruins) outside of China. The first official definition of "Large Ruins" in China comes from the "Management Method of Special funds for the Protection of Large Ruins" promulgated by the State Administration of Cultural Heritage. That is, "Large Ruins mainly include the relics, relics clusters, and cultural landscapes such as large scale human settlements, ancient city ruins, palaces, mausoleums and tombs, which reflect the historical and cultural information of various development stages of ancient history of China, including politics, military, science and technology, industry, agriculture, construction, transportation, water conservancy, etc., and are featured with grand scale, high value, and with far-reaching influence." (Ministry of Finance, State Administration of Cultural Heritage, 2005)

Regulatory agencies and academic circles have reached preliminary consensus on the definition of world cultural heritage monitoring, namely, "monitoring is one of the major important methods for world heritage protection and management, and is the most basic and effective protection means for maintaining heritage safety (World Heritage Division of the State Administration of Cultural Heritage, 2007). However, monitoring of Large Ruins has long been a controversial topic and the focus of the controversy is whether it is necessary to monitor the Large Ruins. If yes, what will be the content of monitoring and how do we build a Large Ruins monitoring system? Based on the world cultural heritage monitoring activities carried out in China, this paper, by taking the monitoring system of the European-style Palaces of the Old Summer Palace as an example, one of around 150 Large Ruins in China, makes an attempt to answer the above questions.

2. ANALYSIS ON THE NECESSARITY OF LARGE RUINS MONITORING

Why it is necessary to monitor Large Ruins? The answer can be worked out by comparing the monitoring of world cultural heritage. The reasons for monitoring world cultural heritage are as follows. Firstly, it is of significant value. Secondly, the World Heritage Committee requires conducting heritage monitoring. Finally, it is an intrinsic requirement of world cultural heritage for their protection, management and exhibition. Here we examine whether we should also monitor Large Ruins based on the above mentioned aspects.

2.1 Value Reference of World Cultural Heritages

The "Convention on the Protection of the World Cultural and Natural Heritage" passed at the 17th UNESCO Heritage Conference held in 1972 made a clear definition on world cultural heritage; it stated: "monuments, group of buildings, and sites, which are of outstanding universal value from the point of view of history, art or science, and these heritages [*sic*] [sites] are clearly confirmed by UNESCO World Cultural Heritage and World Heritage Committee." (Cheng Xiaolin, Jing Feng, 1996).

By comparing the definitions between "Large Ruins" and world cultural heritage, it is found that the later is listed in the "World Heritage List" for special protection due to its outstanding universal value, but the former has no such laurels. However, both have the same significance in inheriting Chinese culture. Large Ruins such as the Old Summer Palace Ruins, Sanxingdui Ruins, and Bohai Kingdom Ruins, can be described as "grand scale, high value, and with far-reaching influence" and are no worse than world cultural heritage in terms of their value to Chinese culture. We should not pay less attention to them since they are not recognized by the people from other countries.

In fact, there is no impassable gulf between Large Ruins and world cultural heritage. Among the about 150 Large Ruins nominated during the "12th Five Year" period in China, 8 are world cultural heritage sites; and among the "World Cultural Heritage Preliminary List", these sites are Large Ruins.

Today's Large Ruins are likely to be the world cultural heritage of tomorrow. Thus it is questionable for the decisions on which heritage needs to be monitored and which don't purely based on their grade rather than from the perspectives of their value and cultural connotation.

2.2 References on Monitoring History of World Cultural Heritage

From the practice of both China and internationally, the course of world cultural heritage monitoring was never smooth sailing, and there is a lot of literature focusing on this topic (Herb Stovel, 2004; Herman Van Hooff, 2004). From the literature review, it can be seen that the heritage monitoring we are referring to started from the heritage reporting system established by the World Heritage Committee. The 1994 World Heritage Committee Conference required its member countries to submit a scientific report on the status of world heritage protection in their countries, but member countries asked the World Heritage Committee to provide a legal basis for submitting the report. After over three years heated debate, an agreement on the issue of regular heritage monitoring had been reached in accordance with Article 29 of the "Heritage Convention". (Zeng Chunjing, 2008)

After the establishment of the system, heritage sites, including the heritage sites of China were obligated to collect data in order to provide high quality reports. Obviously, world heritage monitoring in China is not a direct requirement of the World Heritage Committee, but an indirect outcome. In addition, from the perspective of heritage sites, monitoring is an outcome of external pressure and requirements, rather than an outcome of active action. It is no surprise that the effect of external pressure is certainly not as satisfactory as voluntary action.

World heritage monitoring in China has experienced the same course of gradual development. Mo Kao Grotto at Dunhuang is one of the organizations which first conducted world heritage site monitoring in China with best practices. From simply guarding the site at the early period of the foundation of the Peoples Republic of China (PRC), to the establishment of meteorological stations, to monitoring of the internal and external environment of few caves, and to the current long-term and stable monitoring system formed by cooperation with international research institutions, this site has experienced 50 years of development. Just as Fan Jinshi, President of the Dunhuang Academy said, it "experienced a course from non-existence to existence, from simple to complex, from intuitive judgement to systematic monitoring, and from passive monitoring to active monitoring" (World Heritage Division of the State Administration of Cultural Heritage, 2007a). In recent years, protection and management organizations for 25 world cultural heritage sites and 4 world cultural and natural heritage sites at all levels in China have launched their monitoring operations, and some have established special monitoring units. For example, Suzhou City has established the World Heritage Monitoring Center in 2005. (World Heritage Division of the State Administration of Cultural Heritage, 2007b)

However, we can also find that, the establishment of the above mentioned heritage site monitoring systems is the outcome of external pressure such as the "Measures" and "Rules" promulgated by the State Administration of Cultural Heritage. The State Administration of Cultural Heritage promulgated the "World Cultural Heritage Protection and Management Measures" in November 2006, and it formulated, in accordance with the "Measure", the "China World Cultural Heritage Expert Advisory Management Principles" and the "China World Cultural Heritage Monitoring and Checking Principles" in 2007. In the same year, China held the World Cultural Heritage

Monitoring Conference in Dunhuang in November, discussing the "World Cultural Heritage Monitoring Rules (draft for solicitation of opinions)". A series of such methods and rules have facilitated world heritage sites to start to establish monitoring systems. Obviously, it is external pressure both from home and abroad that serves as the important factors for heritage sites of China to carry out monitoring activities.

It can be seen from the above mentioned analysis that whereas internal needs for influencing heritage itself and monitoring preservation environment are not the major driving force for the construction of monitoring system., external forces such as the World Cultural Heritage Committee, State Administration of Cultural Heritage, and other international cultural heritage protection organizations are the major determinants for China to carry out monitoring activities on world heritage sites. By the same token, large ruins monitoring also needs pressure from external forces, because without the attention of international organizations, most of this kind of force would come from the State Administration of Cultural Heritage. Meanwhile, it is necessary to exchange ideas with world cultural heritage sites and international organizations for the protection of cultural relics and to form internal and external driving mechanisms, so as to realize the comprehensive construction of large ruins monitoring systems.

2.3 References on Monitoring Content of World Cultural Heritage

There is no unified standard on the contents of world cultural heritage monitoring both at home and abroad. However, neither within academic circles nor the State Administration of Cultural Heritage has ceased their efforts to explore this question.

In November 2006, the State Administration of Cultural Heritage introduced the "Protection and Management Methods for World Cultural Heritage" (Ministry of Culture of China, 2006), but it has not provided a clear answer as to what should be monitored and how to monitor. In the same year, the "China World Cultural Heritage Monitoring and Checking Principles" issued by the State Administration of Cultural Heritage in December made a rather clear explanation on the above mentioned questions, and further proposed monitoring types of daily monitoring, regular monitoring (including system monitoring and key monitoring), and reactive monitoring (the State Administration of Cultural Heritage of China, 2006). However, at the operational level, this method is still an instructive document, and there is still no unified guideline on the specific content to be monitored. The "National World Cultural Heritage Monitoring Working Conference" held in 2007 focused their discussion on the "World Cultural Heritage Monitoring Rules (draft for solicitation of opinions)" compiled by ICOMOS CHINA, and proposed revising their opinions. These rules were later revised and became the "Implementation Guideline for World Cultural Heritage Monitoring in China(Provisional)". Because of the diversity of world cultural heritage, this guideline was, eventually, not released due to the lack of a unified standard. However, the monitoring contents reflected in the guideline could be taken as an analytical basis for the necessity of conducting large ruins monitoring.

Major types of monitoring	Subtypes of monitoring
Basic situation investigation	Heritage identification information
	Compositions of heritage
	Outstanding universal values, authenticity, and integrity

	Preservation status of various components at the time of declaration, and their major influence factors
	Protection, management, utilization, research status at the time of declaration, and measures taken, related plans, planning and their major contents.
Monitoring of protection targets	Historic buildings
	Ancient sites
	Ancient tombs
	Grottoes and carved stones
	Historical and cultural towns, villages, and historical streets
	Cultural landscapes, historic gardens, cultural routes(Heritage canals), industrial heritages, the 20 th century heritages
Monitoring of environment elements	Climate
	Geology, geomorphology, hydrology
	Ecological system
Monitoring of the impact of human activities	Pressure from construction of adjacent areas
	Pressure from tourism
	Impact from management activities
	Other human impacts
Monitoring of support systems	Policy support
	Formulation of protection plan and implementation revision
	Capital support
	Technology support
	Institution and personnel support
	Public support and involvement

Table 1. Monitoring content specified in the “World Cultural Heritage Monitoring Rules (draft for solicitation of opinions)”

From table 1, regarding monitoring contents of world cultural heritages, it can be observed that the only difference between large ruins monitoring and world cultural heritage is the classification of monitoring targets. According to the definition of large ruins, it mainly includes two types: ancient sites and ancient tombs. Although the contents of ancient buildings, ancient sites, ancient tombs, grottoes and carved stones, historical and cultural towns and villages and historical streets as well as cultural landscapes are more abundant, it cannot be taken as the reason for monitoring world cultural heritage rather than monitoring Large Ruins.

3. CONSTRUCTION OF MONITORING SYSTEMS FOR THE EUROPEAN-STYLE PALACE OF THE OLD SUMMER PALACE

3.1 Necessity of monitoring the European-style Palace of the Old Summer Palace

3.1.1 The Old Summer Palace makes its monitoring a significant means to protect its outstanding values.

It is well-known that Old Summer Palace has special significance both at home and abroad, and it is a true description of relationship between China and the Western world, especially the European-style Palace, reflecting a combination of Chinese and Western elements in landscape architecture art.

3.1.2 There are a variety of threats in the European-style Palace area, the development of which needs real time monitoring.

After site investigation, existing threats of the European-style Palace area include cracking, deformation, development of fractures, weathering, crumbling, plant aggression, pollutants, erosion due to rain and snow, damage by tourists, and so on.

Sources of influential factors	Construction materials	Environment	Human factors
Influential factors	Stone material joint development, salt content, foundation settlement	Rain water, groundwater, wind, temperature, humidity, freezing and thawing cycle, acid-base gas, air pollution, exposure, dust, and so on.	Moving, trampling, climbing, splashing, carving and drawing
Threat symptoms	Crack, collapse, slope, deformation, displacement, weathering, crumbling, plant aggression, pollutants, erosion due to rain and snow, trampling, carving and drawing, surrounding landscape, and so on.		

Table 2 Threats and Influential Factors of the European-style Palace in the Old Summer Palace

Influential factors, most of which come from environmental and human behaviour, reflect themselves on the sites in the form of various threats. Combined effects of factors such as rainwater, moisture, change of temperature and exposure to sunlight induces an accelerated development of the stone material intrinsic joint, which is embodied as accelerated development of stone material intrinsic joint, weathering, crumbling, and so on.

3.1.3 Protection and exhibition of the European-style Palace area lacks support.

Both the government administrative departments and experts believe that the European-style Palace area needs to implement protection and exhibition projects as soon as possible, but they also hold the view that earlier stage monitoring data is required before the implementation of related projects. The monitoring of European-style Palace area This hard problem can be solved by monitoring European-style Palace.

3.2 Key points regarding the monitoring of the European-style Palace area in the Old Summer Palace

The purpose of identifying and monitoring key points of the European-style Palace area is to meet the requirement of threat monitoring, protection, and management. Monitoring should not only focus on threats reflected at the site, such as the above mentioned threats (table 2), but also on the influential factors behind the threats, such as change of temperature, sun light exposure, foundation settlement, tourist behaviour, and so on, so as to accumulate and identify early warning signs, and to provide complete data support for future protection.

Within the structure of the information collection system (monitoring) and the design of software, the monitoring system is divided into four modules: the main structure, environment, spatial position of remaining components, and tourist behaviour.

Tourist behaviour turns out to be the most important influential factor of the preservation of the European-style Palace site. Although this influence is accidental, the damage caused by it is permanent. Currently, the Management Office of the European-style Palace site in the Old Summer Palace is compiling the "Project Plan for the Protection and Exhibition of the European-style Palace Site". The site will be separated from tourists so as to decrease or avoid serious damage caused by tourist behaviour. In order to examine the effect of the protection and exhibition project, it is proper to conduct simultaneous monitoring, so as to make a joint analysis on tourist behaviour, major structures, and the environment. At present, there are only a few monitoring facilities in the European-style Palace area, and they are not systematically established. Furthermore, there is no plan for the establishment of tourist monitoring and security and protection systems during the implementation period of the project. In order to ensure the completeness of monitoring, the project, without increasing costs, is to add a few monitors to monitor the behaviour of tourists.



Since the cultural relics of the European-style Palace site is both a patriotic site as well as a national archaeological site and is extremely valuable, thus there is a very high requirement on preservation of cultural relics and on tourist visiting the site. From the perspective of preservation of cultural relics, the layout of monitoring facilities should not damage cultural relics and their surrounding environment, so the number of monitoring instruments should be limited. From the perspective of tourist visiting the site, too many monitors may affect the landscape feature. For this reason, it is suggested to use a balanced combination between instrument monitoring and manual monitoring to build the monitoring system of the European-style Palace site. By sticking to the principle of minimal intervention and appropriate monitoring, the monitoring shall focus on the locations of key threats.

Currently, the existing world cultural heritage monitoring and early warning systems are divided into indicator types of influential factors, protection and management behaviour, security assurance, main structure factors, and so on, which have great reference value for this project. However, among problems faced by the European-style Palace in the Old Summer Palace site, there is an urgent need to provide data support to the monitoring of the preservation conditions of the main structure and of the conditions of threat development, thus a solution can be developed. The project, as a pilot project of the overall Old Summer Palace dynamic information and monitoring and early warning system, firstly focuses on solving the most urgent problems. The overall system should be improved and perfected in the future.

In order to avoid disturbing the site by laying network cables, all of the data transmission of this project uses a 4G network. Construction of the 4G network mainly makes use of

the base stations of the “Broadband Beijing plans” outside the European-style Palace in the Old Summer Palace, using the services provided by existing service provider, so as to reduce the construction costs of the project. The monitors mainly use batteries. The instruments which need a power source may use the existing lighting circuit within the scenic region of the European-style Palace site, and no new cable will be added so as to avoid earthwork nearby.

Equipment in the monitoring center is placed in one step, but the site selection is divided into three steps. During the implementation of this project, a monitoring center will be constructed in the existing facility used for administration within the scenic region, and the facilities will be equipped according to the system layout of the whole garden. After the follow up monitoring and early warning system of the whole garden, the monitoring center will be moved to the Condition Administration Office. After the long term planning of the Old Summer Palace Archaeological Site is worked out, the monitoring center will be moved outside of the Garden along with the administration office. Since the system uses wireless network transmission, it has good flexibility in terms of spatial arrangement.

The database of the whole system will be backed up at a remote site by the data maintenance company.

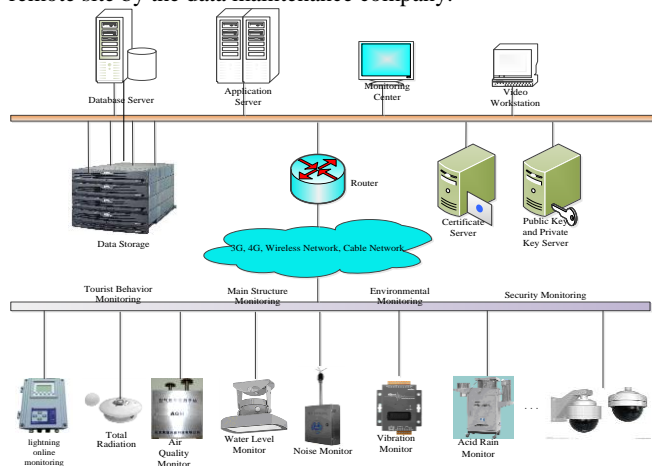


Figure 2. Streamline Chart of the data collection, processing, and release of monitoring system

3.6 Data management and sharing

The large ruins monitoring system focuses on constant updating and use. With the consideration of practical operability, the system management modes of the project design are:

(1) Management Office of the European-style Palace in the Old Summer Palace has established a special organ responsible for the dynamic information of the European-style Palace area and for the maintenance and use of the monitoring and early warning system.

(2) The technical maintenance of the monitoring system and daily data collection, and data mining work are assigned to a company with the capacity of cultural relics information maintenance.

(3) The Monitoring System Management Organ of the Management Office of the European-style Palace in the Old Summer Palace is responsible for supervising the outsourced companies, and, as appropriate, hold expert review meetings, conducting appraisals and acceptance inspections on the outsourced data maintenance and data mining work.

The advantages of the above mode is that it can standardize the operation, management, and maintenance of the system through a clearly defined relationship without increasing the burden of establishing a Management Office in the European-style Palace in the Old Summer Palace.

The system not only needs to meet the needs of administrators, but also allow for public sharing. A “terminal-service” model is provided for managers; a “Page-service” model is provided to the public. Recently, the monitoring center opened to the public, and guided the public to visit and supervise the operation of the monitoring system; in the long run, combined with the construction of a website for the Old Summer Palace, it establishes a special forum for the public to view approved non-classified data remotely.

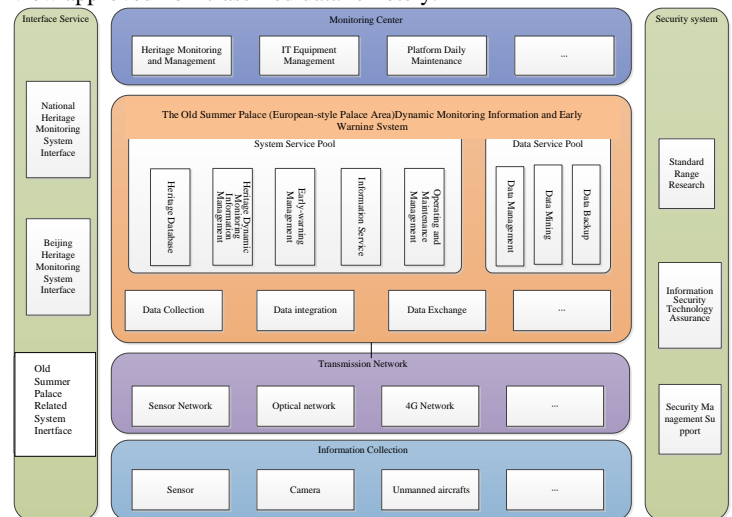


Figure 3. Overall Structure of the Monitoring System

4. CONCLUSION AND OUTLOOK

From the development experience of world cultural heritage monitoring, purely relying on the large ruin management body to promote the monitoring program of Large Ruins will be a very long process, while conditions of a majority of Large Ruins urgently need to be monitored. External pressure is urgently required to promote monitoring work. Therefore, the State Administration of Cultural Heritage needs to introduce related measures, policies and methods to facilitate the monitoring work of large ruins.

Heritage protection should be internal, and not fully rely on pressure from external entities. The management body of Large Ruins should actively carry out related monitoring programs from the perspectives of site protection and management.

From the monitoring practices of world cultural heritage and the European-style Palace in the Old Summer Palace, it can be seen that contents of the two types of monitoring are basically the same in a large framework, but for the specific key contents of every system, it is necessary to have different approaches in the actual demands of major threats, protection, and management features. For example, there are obvious differences in monitoring between earthen ruins and stone historical relics, southern ruins and northern ruins, as well as above ground ruins and underground ruins.

The major purpose of Large Ruins monitoring is to provide data support for protection, exhibition, and management of the ruins, which needs to sufficiently extricate data, clarify the relationship among different data, and finally form a data linkage mechanism. Even the monitoring program

of world cultural heritage sites are not sufficient, but we believe, along with the implementation of large ruins monitoring, the monitoring work will be further improved.

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