

Study on the Haze Biological Warning System Construction

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Abstract. This paper reviewed the study of haze harm and warning in China, based on this; it put forward the necessity and feasibility of haze biological warning. Then, the paper built the three dimensions conception model of the haze biological warning system. At last, the paper built the haze biological warning system.

Introduction

Haze formation is the embodiment of the cumulative effect of the atmospheric environment pollution, which is the disaster by man-made in a lot of developed countries. Due to the environmental damage, air pollution does harmful to human beings. It is potential and accumulation, therefore it's easy to be ignored. However, the damage has gone into the human body slowly and threatening people's health. In recent years, haze has become a hot issue of research in China, because it happens frequently and the range of haze is gradually expanding. Among them, the study of the potential hazards of haze on human health has become a hot topic of focus. At present, there is still a lack of effective scientific test can predict the potential harm to the human body; the relevant medical is also limited by the lack of factual basis. Haze contains lots of inhalable particles. Among them, the heavy metals and industrial emissions of particles has serious harmful to the human body, so its visibility isn't always proportional to potential harm. Due to the lack of reliable monitoring defense system, a lot of people have a general understanding of haze in life. When they see visibility decrease, they are worried about their own health, even afraid to go out. This situation not only has a great obstacle to the scientific prevention of haze, but also causes people's psychological panic and affect people's normal work and study life.

In order to make people have a correct understanding of the dangers of haze and the extent of injury on human body, it is necessary to establish a haze warning system. This system will provide scientific support for preventing haze reasonably and protecting people's health.

Review of Present Research

Haze Hazards and Early Warning Research. At present, the study of haze hazards more focused on the theoretical level, such as, the study focused on the cause of the formation of the haze [1-3], the research of haze hazard[4-6], the research of controlling haze [7-9], the protection research [6,10] and early warning [11-13], etc..

The study of early warning is mainly focused on the necessity, urgency and related methods, which are discussed theoretically and lack of the related research of warning system. Wenjie Li (2014) chose three places, Beijing, Shanghai, Guangdong, as the research object, where are information developed and haze serious areas. Selecting six representative newspapers from three cities and summing up agenda settings of haze reporting, in addition he sums up the disadvantages of agenda settings in media [14]. Lihong Ma (2013) studied the early warning system of mental illness in the haze weather through the questionnaire survey. To prevent the psychological harm caused by haze, at first, we should determine the early warning object and evaluate the obviously influence on susceptible of mental

illness. Secondly, we should establish the evaluation criteria and know the symptoms of mental illness in the haze weather clearly. Then we developed a monitoring program and improved the warning system of mental health in the haze. Finally we must strengthen the crisis intervention and make a prevention program [15]. Qian Jin (2014) analyses the characteristics of the current haze disaster on media crisis on the base of the stages and characteristics of evolution of the haze disaster crisis, including weather forecast, external radiation, test and review and play edge ball etc. She predicted the trend of media warning in the era of big data, and pointed out that it's necessary to establish the database of the media [16].

Research of Biological Warning. Biological Warning is a method that observes the tested organisms by using a variety of biological monitoring technology, which observes the tested organisms' behavior activity, growth and reproduction in a specific environment. Therefore we can analysis the effective data and know the prevention threshold. We can analysis the test information before the disaster and other dangerous situations; we also could predict the future and potential protected objects and report the dangerous situations in time to avoid damaging the protected objects.

The biological warning research started late in China, there is no perfect application mechanism. By searching the relevant literature on CNKI, it shows that our earlier research literature on biological warning is 'The discussion on biological warning system', which was published in the <Journal of Biomathematics> and written by Kaihua Zhu and Wenqin Chen in 1991. In this paper, we propose a biological warning research based on the background that the environment has been severely damaged and the new material may have a negative impact on the environment.

In twenty-first Century, the research on biological warning mainly focused on water pollution (Zongming Ren, Kaifeng Rao etc. 2008), agricultural and forestry pest control (Shiheng Dong, Yurong Li, 2006), alien species invasion (Ying Fan, Guogui Wu, 2005) and other aspects. These researches study on the safety of water quality, agricultural pest control, species invasion and other fields, but it lacks air pollution biological warning.

The Necessity of the Research on the Biological Warning of the Haze. At present, the research on the early warning uses the traditional physical and chemical monitoring technology in academic community. Physical and chemical monitoring technology has its own advantages; it not only can measure major pollutants in the haze accurately, but also measure the proportion of the material. But its disadvantages can not be ignored, the physical and chemical monitoring technology need to analysis regularly. It is difficult to achieve real-time online monitoring and pre alarm, and it can not reflect the pollutants in the haze and the risk evaluation. In addition the industrial emissions, geographical location and other factors in different regions affect on the specific components of the haze. There are a lot of uncertainties and components recombination continuously, which can generate new hazardous substances, so it's very difficult to monitor the toxicity of haze in real time by using physical and chemical detection.

Biological warning system can monitor the pollutant toxicity by using biological indicators, and it also has the function of online monitoring in real time. The harmful ingredients of haze are very unstable, they will continue to react in the air to generate PM1.5, PM2.5, PM1.0 and other inhalable particles. In a word, it's very difficult to reflect the damage extent of haze visually by physical and chemical monitoring, but by using real-time online security monitoring can reflect the damage extent of haze through biological vital signs and behavioral changes.

Biological warning analysis the abnormal changes in the biological test by various monitoring techniques and according to the human body's immune ability to determine the defense value.

The key of biological warning is to reveal the damage extent of many substances in a short time by the short period and the sensitive material, so when the haze damage is more than human body's immunize ability; we can find out the potential impact early and provide the reasonable protection.

Three-Dimensional Concept Model of the Haze Biological Warning System

In 1969, American scholar, Holzer, put forward the system engineering of three-dimensional structure. It provides a unified method to solve the issue of planning, organization and management in the large-scale complex system, and thus it has been applied widely in the world. The 3D structure includes time dimension, logic dimension and professional dimension. Time dimension represents the whole process of system engineering activities from beginning to end by time sequence. The system is divided into seven stages, which are planning, working out, development, production, installation, operation and updating. The logical dimension means the work content and the thought process that should be followed in each phase of the time dimension, including definite problem, determination of the target, system synthesis, system analysis, optimization, making decision and implementation. Knowledge dimension lists all kinds of knowledge and skills including engineering, medicine, architecture, business, law, management, social, arts, and so on. The framework of system engineering research is described by the three-dimensional structure system, and it can be further expanded to form a hierarchical tree system.

Inspired by the three-dimensional structure, we can establish a three-dimensional concept structure of haze hazard warning according to the basic principle and requirements and characteristics of biological warning (Fig. 1).

Time Dimension. 1) Planning. In this stage, we make a general planning, such as the test environment, representative sampling points, representative biological, compare test, test cycle and so on; 2) Proposing. Monitoring the priority material of the haze, according to the life cycle of different subjects; 3) Trial. Data acquisition test is conducted on the change of the biological behavior with constant sampling rate, and the data are recorded in the database; 4) Trial correction.

In the experiment, we have to correct the environmental conditions so that we can achieve the desired results; 5) Gathering trial information. According to the abnormal observation of organisms' behavior and reproduction, we can collect the information of the specific environment. In addition, we can collect the effective test information from the deviation information by selecting; 6) Information analysis. The importance and practical value of information is determined by the comparison of the information analysis and the different test organisms. In addition, we can determine the limit threshold on human health by setting different critical values; 7) Warning forecast. When the threshold reaches the upper limit of the human body, this is a symbol of warning and it must alert in time.

Logical Dimension. 1) Determine the problem. We should make the test data more intuitive to reflect the value of the human body injury, under what circumstances, by what method. That is, the relevance of human injury by microscopic observation; 2) Test purpose. Haze warning system determines the extent of damage mainly through observation and data analysis. When it is such weather, what kind of measures we should take; 3) Experiment. According to the problem and purpose, we need put forward several alternative projects and know the point in every project; 4) Biological warning system. This system is used to collect data that relate to human health damage in simulation test by system analysis and information collection. We should set alarm threshold, according to experts' experience and alarm theory, through a series of indicators; 5) Evaluation. Comparing the test data with the history data and evaluating the warning system; 6) Implementation. When we found the alarm intelligence, we need report to relevant authorities in time. The expert groups in the supervision institution check the alarm intelligence and make a scientific judgment, then putting forward the protection level and implement the alarm intelligence by relevant agencies.

Professional Dimension. Different engineering projects involve different professional knowledge. Professional dimension is the knowledge and expertise which need to accomplish the various stages. The biological warning system uses the symptoms of different levels of organisms' body to protect human health, so the content involves many disciplines, such as: botanical experts, animal experts,

medical experts, etc. Therefore, the warning system is not an isolated subject, it need a comprehensive application of multiple disciplines from the beginning to the end.

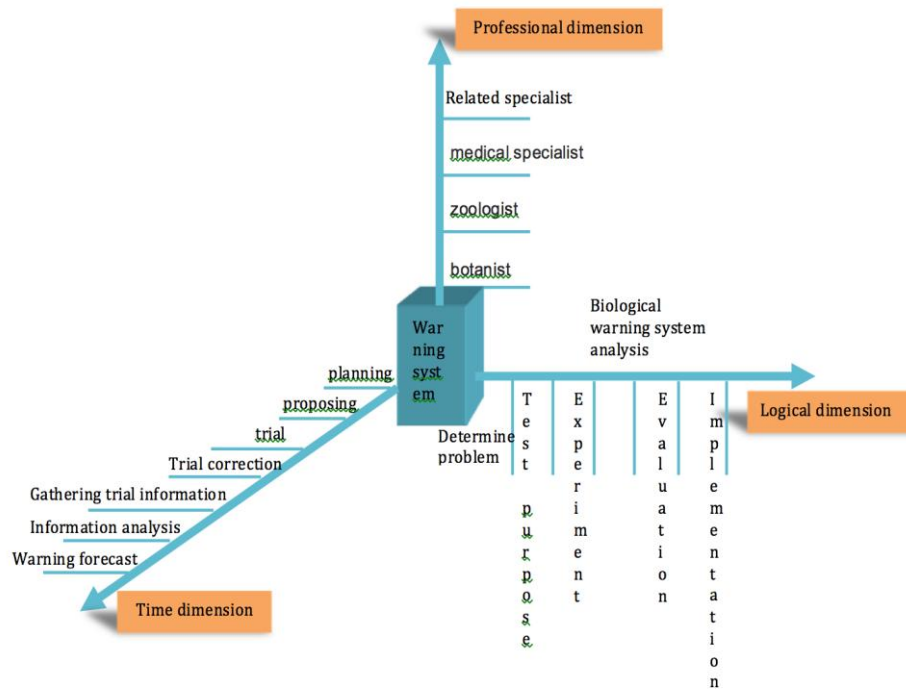


Figure 1. Three-dimension structure of haze damage's biological warning

Conclusions

In order to meet the needs of the rapid economic growth, people exploit and utilize the energy continuously, but they neglect protecting the natural environment. Haze is a phenomenon that reflects abusing energy and disordering emissions. In recent years, this phenomenon is increasingly serious in our country; it has brought serious adverse effects to people's life and health. Haze formation is a slowly process, but its damage is very large. Its governance is a long process, so it is particularly important to carry out the biological warning. In this paper, at first we analysis the haze research in China, secondly we discuss the advantages and the necessity of biological warning system, finally we construct the warning system of haze further. In a word, we hope that we provide a useful reference for the prevention and treatment of haze through writing this paper.

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