

LETTER TO THE EDITOR

Online Monitoring Method for Ecological Environment Pollution Data under Internet Environment

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Data monitoring of Eco-environmental pollution is an important means to prevent and control eco-environmental pollution, improve the eco-environment and maintain the sustainable development of the environment. An on-line monitoring method of ecological environment pollution data under Internet environment was proposed, focusing on the online monitoring of agricultural ecological environment pollution data. Firstly, the status quo of agricultural ecological environment pollution is analyzed, then the information of agricultural atmospheric, soil and water pollution is collected by sensors, transmitted by wireless communication module in the Internet environment, and the monitoring results are presented by display. The experimental results show that the monitoring method has higher accuracy of pollution data acquisition, less monitoring delay, and is more practical.

Internet Environment; Ecological Environment Pollution; Data; Monitoring

1 INTRODUCTION

At present, the problem of environmental pollution is becoming more and more serious, and the affordability of ecosystem is becoming more and more fragile. Therefore, it is urgent to solve the problem of ecological environment pollution (Garcia-Garcia et al. 2017). Accurate acquisition of ecological environment pollution data is becoming more and more important. Among them, agricultural environmental pollution restricts the transformation of agriculture from quantitative type to quality-benefit type, and poses a threat to the sustainable development of agriculture and human health (Maleki-Ghelichi and Sharifi 2017, Amiri et al. 2017). The prevention and control of agricultural pollution plays an important role in the sustainable development of agricultural production. In order to further improve the agricultural ecological environment and promote the development of green countryside and green agriculture, it is necessary to continuously optimize the agricultural ecological environment and improve the monitoring of pollution data.

Qing Zhu published an article entitled "Data Acquisition Technology of Air Pollution Sources in Ecological Monitoring Database" in the Journal of Ekoloji in Issue 107, 2009. This paper studies the air pollution data acquisition technology in ecological pollution monitoring, and mentions an online monitoring method of air pollution data. By using the location algorithm based on sparse system identification, the problem of atmospheric pollution source location is modeled as the problem of sparse system parameter identification (Liu et al. 2017). The sparse signal is reconstructed, and the precise location of air pollution source is realized. Then, the air pollution source is collected by Zigbee sensor network, and the key functions of data acquisition in ZigBee sensor network are designed. Through the storage table and writing method based on HBase, the collected and monitored data of

air pollution sources are stored. The experimental results show that the leakage rate of air pollution source data monitored by this method is low. However, this method can monitor the air pollution data by needle insertion. On this basis, the method can be optimized to realize online monitoring of large-scale environmental pollution data.

Literature proposed a method of collecting ecological environment information based on mobile Internet technology, in order to monitor the pollution of farmland ecological environment. A data acquisition system consisting of ARM9 series S3C2440 processor, GPRS module and sensor is developed, which realizes the real-time collection of farmland ecological environment pollution information. The information transmission between embedded system and mobile Internet is realized through GPRS module, and the remote monitoring of farmland ecological environment pollution is completed. A monitoring system of wetland ecological environment pollution information is designed in literature. It includes monitoring terminal and software platform to solve the continuous monitoring of wetland ecological environment and real-time collection, reporting, display and early warning of environmental pollution (Akhmedenov 2017). It is of great significance for assistant decision-making departments to monitor and analyze wetland changes, prevent pollution and take timely protective measures. However, the accuracy of pollution data acquisition is not high in both methods.

This paper focuses on the agricultural ecological environment and studies an online monitoring method of agricultural ecological environment pollution data under the Internet environment, aiming at the environmental pollution of water, air and soil in the agricultural ecological environment. Based on the analysis of the importance of agricultural ecological environment pollution monitoring, this paper expounds the present situation and existing problems of agricultural ecological environment pollution, and puts forward the main indicators and methods of monitoring agricultural ecological environment pollution.

2 IDEA DESCRIPTION

2.1 Present situation and problems of agricultural eco-environmental pollution

(1) The serious imbalance of agricultural ecological environment is mainly manifested by the increasing soil erosion, the accelerated expansion of desertification, the degradation of soil quality, the impact of biodiversity, and the reduction of the ability of farmland to resist natural disasters. The imbalance of ecosystem causes agricultural natural disasters from time to time, and the sustainable productivity of agriculture declines. According to experts' estimates, the annual losses caused by natural disasters in China far exceed the growth of agriculture. Under the influence of harmful climatic conditions, agricultural production either decreases in yield or quality. The destruction of ecology needs long-term restoration of ecology and gradual optimization of environment to be solved thoroughly.

(2) Agricultural ecological environment is seriously polluted. There are different degrees of pollution problems in farmland in China. On the one hand, the pollution of chemical fertilizers and pesticides is more serious. A large number of chemical fertilizers and pesticides were put into the field soil, which not only polluted the soil, affected the soil nutrient structure and was not conducive to the sustainable recycling of farmland, but also destroyed the agricultural ecological environment, affected the ecological balance and increased the pesticide residues in crops. After the spread and accumulation of food chain, it will eventually cause adverse effects on human health. On the other hand, pollution problems such as cropland straw burning and plastic bags are significant. Straw incineration is a common phenomenon in rural areas, especially wheat straw and corn straw incineration. Although the phenomenon of straw incineration has been alleviated to some extent with the enhancement of people's awareness of environmental protection and the advancement of national environmental protection policy, it still occurs. In the process of incineration, not only a large number of harmful substances are produced, the atmospheric environment is polluted, but also straw resources are wasted, and natural fertilizers cannot be rationally allocated.

2.2 Construction of online monitoring system for ecological environment pollution data under Internet environment

As shown in Figure 1, the overall structure of the online monitoring system for agricultural ecological environment pollution data under the Internet environment is shown. The environmental pollution information of agricultural atmosphere, soil and water is collected by sensors, and transmitted through wireless communication module in the Internet environment. The monitoring results are displayed in the display first. Next, the monitoring methods of agricultural atmospheric, soil and water environmental pollution data are described.

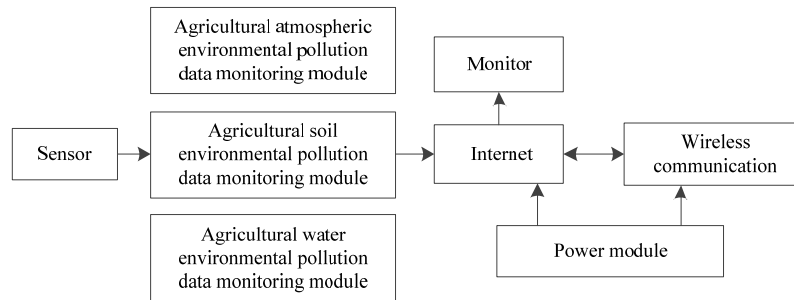


Figure 1 The overall structure of agricultural ecological environment pollution data monitoring system under the Internet environment

2.2.1 Data monitoring of agricultural atmospheric environmental pollution

The monitoring of agricultural atmospheric environmental pollution is an important link in the monitoring of agricultural ecological environment pollution. Generally speaking, air pollution is mainly composed of industrial exhaust gas, transportation exhaust gas, coal heating, agricultural incineration and so on. The sources of air pollution closely related to agricultural ecological environment are shown in Table 1.

Table 1 Sources of agricultural atmospheric environmental pollution

Category	Proportion (%)
Industrial waste gas	29
Transportation tail gas	23
Coal heating	16
Agricultural incineration	20
Other	12

The harmful effects of atmospheric environmental pollution on agricultural ecological environment mainly include oxidative hazards caused by ozone, peroxyacetyl and other substances, reductive hazards caused by hydrogen sulfide and sulfur dioxide, acid hazards caused by hydrogen fluoride and hydrogen chloride, alkaline hazards caused by ammonia, physiological hazards caused by ethylene and other substances, dust and heavy gold, etc. The residue hazards caused by substances and so on can be determined according to different atmospheric characteristic pollutants emitted from agricultural ecological environment pollution sources, and accurate pollution data can be obtained.

2.2.2 Data monitoring of agricultural soil environmental pollution

Because of the complexity and diversity of agricultural soil environment, the process of determining monitoring indicators and monitoring points is more complex, and there are strict requirements for chemical reagents, analytical equipment and analytical techniques in the process of monitoring soil environmental pollution. Therefore, when monitoring soil environmental pollution, it is necessary to take measures according to local conditions and carry out monitoring work according to the monitoring situation of local atmospheric and water

environment. When choosing monitoring points of soil environmental pollution, we should set them scientifically according to the atmosphere and water environment monitoring points to ensure the accuracy of data. In the process of monitoring soil environmental pollution, we should select monitoring indicators accurately, not many indicators. We should pay attention to the rationality and practicability of the selection of indicators, so as to guide the improvement of soil environmental status.

2.2.3 Data monitoring of agricultural water environmental pollution

The sources of pollutants in agricultural water environment are complex and diverse. The factors causing water environmental pollution include not only industrial wastewater, heavy metal pollution in domestic refuse and bacterial and viral pollution, but also the transmission of pollutants in rain and air, and the immersion of residues in pesticide and fertilizer. There are many and miscellaneous pollutants in the water environment, which brings some difficulties to the monitoring of water environmental pollution. In addition, in the process of monitoring agricultural water environmental pollution data, there are many monitoring indicators involved. In addition to water temperature, total salt content, pH value and other common indicators, there are chemical oxygen demand, dissolved oxygen, permanganate index, sulfide, cyanide, nitrogen, phosphorus, potassium, biochemical oxygen demand, volatile phenol, anionic detergent and other monitoring indicators. The agricultural water environment is monitored by ZigBee and Labview technology. The model is shown in Figure 2.

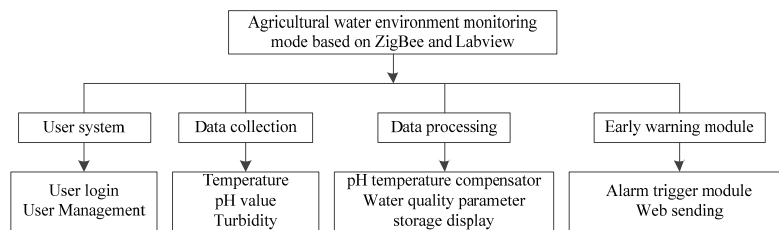


Figure 2 Agricultural water environment monitoring mode

The data monitoring mode of agricultural water environmental pollution based on ZigBee and Labview technology includes four parts: user system, data acquisition, data processing and early warning module. Data acquisition can monitor the pH value, temperature and turbidity of agricultural water environment. Data processing methods such as water quality parameter storage can accurately grasp the situation of agricultural water pollution.

3 RESULTS

In order to verify the effectiveness of the proposed online monitoring method for Eco-environmental pollution data in the Internet environment, an experimental test is needed. The experiment was carried out under the software of MATLAB7.0. The operating system is Windows 7 and the memory is 244B.

In order to enhance persuasion, the online monitoring method of environmental pollution data in Internet environment was compared with the remote monitoring method of mobile Internet based on farmland ecological environment proposed by Zhu SP et al. The collection accuracy of pollution data in different monitoring methods was tested. The experimental results are shown in Figure 3.

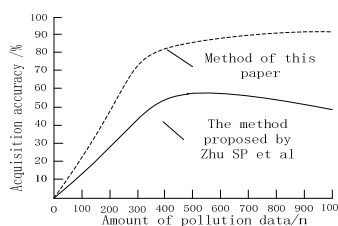


Figure 3 Comparison of pollution data collection accuracy of different monitoring methods

Analysis of Figure 3 shows that the accuracy of data acquisition increases rapidly with the increase of data volume in the monitoring of agricultural ecological environment pollution data using two monitoring methods. When the amount of data is between 0 and 300, the accuracy of data acquisition of agricultural ecological environment pollution by the monitoring method in this paper rises greatly and steadily, and the highest accuracy can reach 90%. When the amount of data is between 0 and 350, the accuracy of data acquisition of agricultural ecological environment pollution by Zhu SP and other monitoring methods increases greatly, and then shows a small downward trend. Obviously, the data acquisition accuracy of the monitoring method in this paper is higher than that of Zhu SP et al. and its performance is better.

In order to further verify the performance of this monitoring method, the pollution data monitoring delay of this monitoring method is compared with that of Zhu SP et al. under the condition of changing data increment. The experimental results show that with the increase of data increment, the pollution data monitoring delay of the monitoring method proposed by Zhu SP et al. increases gradually, while the monitoring delay of the monitoring method in this paper is always smaller than that of Zhu SP et al. and the real-time monitoring is better.

4 DISCUSSION

With the increasingly serious problem of agricultural ecological environment pollution, the monitoring of agricultural ecological environment pollution is becoming more and more important. In this paper, online monitoring of agricultural eco-environmental pollution data is carried out under the Internet environment, and the effectiveness of the proposed method is verified by experiments. The experimental results show that:

(1) The accuracy of pollution data acquisition in this method is higher than that proposed by Zhu SP et al. This is because the monitoring process proposed by Zhu SP et al. is complex. Pollution data monitoring can only be realized after pretreatment, clustering, index analysis and weight normalization. However, the data of agricultural ecological environment pollution is large, and the monitoring method proposed by Zhu SP and others is difficult to achieve high accuracy collection.

(2) Compared with the monitoring method proposed by Zhu SP and others, the accuracy of pollution data acquisition of this monitoring method is higher, and the monitoring delay is always smaller, so it has more application advantages.

5 CONCLUSION

An online monitoring method of ecological environment pollution data under Internet environment was proposed, focusing on real-time and effective monitoring of agricultural ecological environment pollution data. Based on the analysis of the current situation of agricultural ecological environment pollution, the information of agricultural atmospheric, soil and water environmental pollution is collected by sensors, transmitted through wireless communication module in the Internet environment, and the monitoring results are displayed in the display first. The experimental results show that this method has higher accuracy of pollution data acquisition and less monitoring delay, which provides support for ecological environment monitoring and protection.

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