The Role Of Computer Technology In Environmental Health Monitoring And Management

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Article Info	ABSTRACT
Keywords: Computer technology, monitoring, environmental health management	Environmental health is gaining prominence on the global agenda due to the serious impact of increasing air, water and land pollution on human health. Computer technology offers a potential solution by enabling more accurate and efficient data collection, more comprehensive data analysis, and more informed decision making. This research aims to understand the role of computer technology in monitoring and managing environmental health in detail. Using qualitative methods, data from various sources is analyzed to provide in-depth understanding and recommendations for stakeholders. The research results show an increase in the use of computers and technology in monitoring, modeling and predicting environmental hazards, as well as their support for environmental health policy decision making. However, challenges such as cost, data privacy and coordination between institutions need to be overcome for this technology to provide maximum benefit to society as a whole.
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INTRODUCTION

Environmental health is a major focus on the global agenda today, with increasing levels of air, water and land pollution having serious impacts on human health. Although monitoring and management efforts have been carried out, limited technology and resources are the main obstacles in overcoming this problem. As a result of previous research, it was found that computer technology offers a potential solution. With this technology, more accurate and efficient data collection can be carried out, more comprehensive data analysis can be carried out, and more informed decisions can be taken (Sumantri, A. 2010).

The study of the role of computer technology in environmental health monitoring and management promises substantial benefits. In addition to increasing our understanding of the potential of computer technology in addressing environmental problems, it also provides in-depth information about its various applications. Furthermore, this encourages the development and implementation of more effective and efficient computer technology to maintain environmental health and increases public awareness of the importance of environmental health and the contribution of computer technology in environmental conservation efforts (MAHENI, N. P. A. 2023).

The Role Of Computer Technology In Environmental Health Monitoring And Management–
Paska Marto Hasugian et.al
310 | P a g e

The aim of this research is to explore the role of computer technology in monitoring and managing environmental health in more detail. It is hoped that this research can provide a deeper understanding for various stakeholders, including the government, non-government organizations and the general public. With the information produced, it is hoped that concrete steps can be taken to improve the quality of environmental health and maintain environmental sustainability for the welfare of future generations.

METHOD

This article uses qualitative methods (qualitative research) by conducting a literature review or literature study. Data is collected from various sources, such as scientific journals, books and research reports. The collected data is analyzed qualitatively to produce conclusions and recommendations.
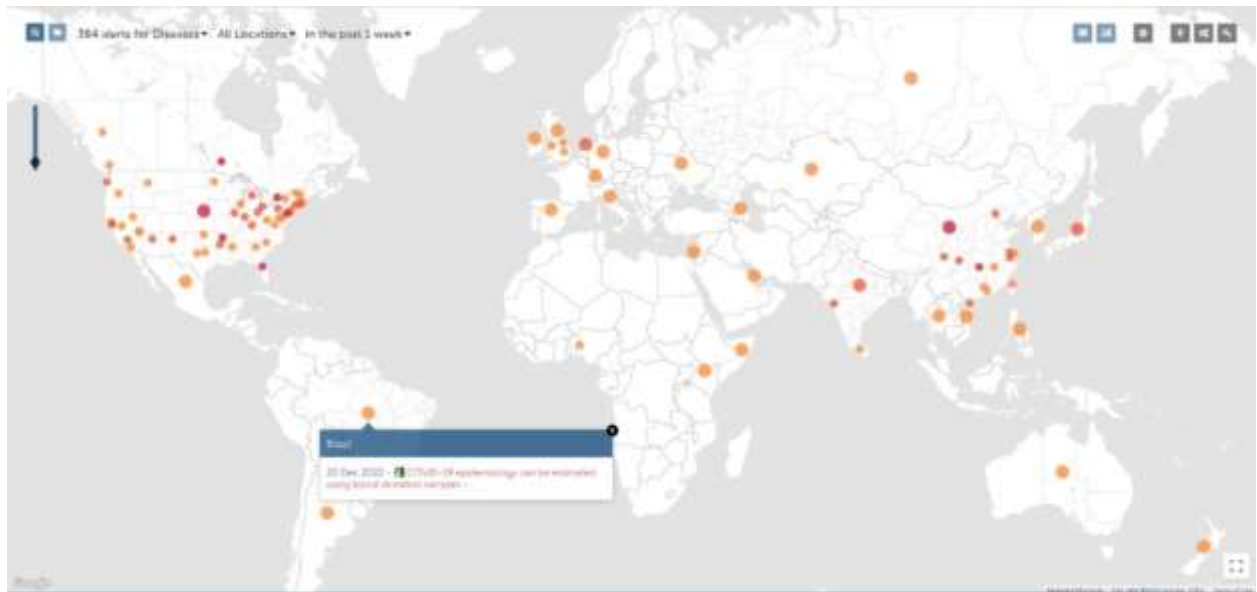
RESULTS AND DISCUSSION

Computers and technology are increasingly being applied in the field of environmental health to improve monitoring, modeling, and prediction of environmental hazards and to aid decision making regarding environmental health policies. Here are some specific examples:

Geographic Information Systems (GIS)

GIS is a system that can support spatial decision making and is able to integrate location descriptions with the characteristics of phenomena found at that location. A complete GIS includes the necessary methodology and technology, namely spatial data, hardware, software and organizational structure (Gistut 1994).

GIS technology enables the collection and analysis of geographic data related to environmental health. This technology can be used to map the distribution of environmental hazards, track exposure patterns, and identify at-risk populations. Geographic Information Systems (GIS) have proven useful in various fields, including spatial planning, disaster mitigation, environmental management, and public health. In spatial planning, GIS helps in mapping and data analysis to produce better spatial plans. In the field of disaster mitigation, GIS is used to map natural disaster risks and assist in disaster preparation and response. The use of GIS is also widespread in environmental management and public health, where it helps in creating effective policies and programs to protect the environment and improve public health .

When using GIS to monitor health status, it will be easier for you to identify problems that occur in society. The GIS feature will then map community groups and their areas according to certain health status. One example of monitoring that is often carried out is pregnancy status. From the results of the analysis that will be obtained later, you can determine the number of pregnancies and births that occur.

The Role Of Computer Technology In Environmental Health Monitoring And Management–
Paska Marto Hasugian et.al
311 | P a g e

Health Condition Map | Source: https://healthmap.org

GIS can also be used to detect disaster management. Currently, many websites and organizations that focus on disaster management share information regarding mapping related to disaster management, such as that carried out by the Disaster Management Agency.

Source: BNBP

Disaster maps like this make it easier for many people to easily access information about disasters. Although it has many advantages, such as improving efficiency, accuracy, communication and decision making, GIS is also faced with several challenges. Key challenges include the high costs of GIS software and hardware, the specialized skills required to use GIS effectively, and the need for accurate and up-to-date data. However, with a deep understanding of the benefits and challenges of GIS, steps can be taken to maximize the potential of this technology in its various fields of application.

The Role Of Computer Technology In Environmental Health Monitoring And Management–
Paska Marto Hasugian et.al
312 | P a g e

Environmental Monitoring

Computers and sensor technology make it easier to monitor air and water quality, as well as other environmental factors that affect human health. This monitoring system can be used to collect data in real-time, enabling early detection of hazards and timely intervention. Environmental monitoring is an important process in collecting and analyzing data about environmental conditions. The results of this monitoring have several benefits, such as identifying environmental problems such as pollution and deforestation, tracking the progress of environmental conservation efforts, and evaluating the effectiveness of environmental policies. Environmental monitoring methods include direct measurements, remote sensing, and modeling using computer technology. Despite its significant benefits, environmental monitoring is also faced with challenges such as high costs, specialized skills required, and the need for accurate data processing.

One of the technologies used to detect changes in the environment is the use of the Internet of Things (IoT) which is hardware that detects changes in the environment and collects data. They are part of the IoT ecosystem that bridges the digital world to the physical world. IoT sensors can detect things like temperature, pressure, and movement, and if connected to a network, they share data with the network.

Source: istockphoto.com

One type of IoT sensor, this sophisticated tool is equipped with a circuit with an LED light that turns on automatically when it detects heat. Its general use is in fire alarms, temperature indicators for electronic equipment, and the manufacturing industry. There are various types of IoT sensors that are currently being used by large companies. Each of these equipment has characteristics and advantages. The technology in these tools is really needed because it is a solution to complete work quickly and efficiently. Many of them are able to increase human work productivity, and solve problems according to their function.

Modeling and Simulation

Computer modeling and simulation are becoming important tools for environmental health researchers and policy makers to understand the impact of environmental hazards on human health. Using these models and simulations, they can predict potential health risks

The Role Of Computer Technology In Environmental Health Monitoring And Management—
Paska Marto Hasugian et.al
313 | P a g e

resulting from certain environmental factors, such as air pollution or water pollution. In addition, these models also allow evaluation of various intervention strategies that can be implemented to reduce these risks, ranging from environmental policies to prevention efforts at the individual level (Romadhon, A., & Suryani, E. 2020).

Computer modeling and simulation make an important contribution to efforts to understand and manage the impact of environmental hazards on human health. By enabling risk prediction as well as evaluation of intervention strategies, these models and simulations assist policymakers in taking appropriate steps to protect public health from environmental threats. However, the use of these models and simulations also requires accurate data and appropriate parameters, as well as careful interpretation to ensure reliable and relevant results for decision making (RESTIANA, R. 2022).

Electronic Health Records (EHRs)

Electronic Health Records (EHRs) have become a very useful instrument in tracking the health impacts caused by environmental hazards on populations. By using EHRs, health data related to environmental exposures can be collected and analyzed more efficiently. This allows researchers and policymakers to identify trends and patterns that may be related to environmental exposure, such as increased cases of certain diseases in areas exposed to high air pollution or water contamination. Thus, EHRs play a key role in enabling a better understanding of the relationship between the environment and human health and assisting in making more informed decisions in an effort to safeguard public health (Fadhal, M. 2022).

The use of Electronic Health Records (EHRs) offers much potential in tracking the health impacts of environmental hazards and aiding in the understanding of trends related to environmental exposures. However, it is important to remember that the use of EHRs also comes with challenges, including data privacy and security, standardization of data collection, and complex system integration. Therefore, collaboration is needed between relevant parties, including health service providers, researchers, and government agencies, to overcome these challenges and ensure that the use of EHRs in monitoring environmental health impacts can provide maximum benefits for society (Pertiwi, T. S., & Supryatno, A. 2023).

Public Health Surveillance

The development of public health surveillance systems supported by computers and technology has opened the door to real-time monitoring of environmental hazards and health outcomes. This system enables rapid and accurate data collection and analysis, allowing for more effective identification of potential environmental disease outbreaks. With the early detection generated by this system, interventions can be implemented immediately to prevent the spread of disease, reduce its negative impact on public health, and improve response to crisis situations (Mukti, Y. I. 2019).

Public health surveillance supported by computers and technology provides significant progress in efforts to protect public health from environmental hazards. However, to achieve the full potential of these systems, reliable infrastructure, good data accessibility,

The Role Of Computer Technology In Environmental Health Monitoring And Management–
Paska Marto Hasugian et.al
314 | P a g e

and effective coordination between government agencies, research centers, and health service providers are required. Apart from that, issues of data privacy and information security must also be considered so that the public health surveillance system remains reliable and provides maximum benefits for the welfare of society as a whole (Rohayati, R. 2020).

CONCLUSION

Overall, the application of computers and technology in environmental health has improved our ability to detect and prevent environmental hazards and protect public health. The application of computers and technology has opened up various possibilities in the field of environmental health. Geographic information systems (GIS) have been proven to provide great benefits in various aspects, including spatial planning, disaster mitigation, environmental management, and public health. Environmental monitoring, computer modeling and simulation, and the use of electronic health records (EHRs) have also become important tools in understanding and addressing the impact of environmental hazards on human health. Meanwhile, public health surveillance supported by technology enables early detection of potential environmental disease outbreaks and timely implementation of interventions. However, challenges such as cost, data privacy, and coordination between agencies still need to be overcome to ensure that the use of technology in environmental health provides maximum benefits for society as a whole.

REFERENCE

Sumantri, A. (2010). Kesehatan lingkungan.
https://www.quora.com/What-is-the-role-of-information-technology-in-environmental-health
Budiyanto, E. (2002). Sistem Informasi Geografis Menggunakan ArcView GIS. Penerbit Andi.
Jiwa, P. J., Araswati, F. D., & Meutia, W. (2021). Pelatihan Pengembangan Aplikasi Sistem Informasi Geografi (Arcgis) Bagi Surveyor Pemetaan Wilayah. Jurnal JANATA, 1(1), 1-6.
Fadhal, M. (2022). Penggunaan Electronic Health Record (EHR) Dalam Keperawatan Jiwa: Literature Review. Citra Delima Scientific journal of Citra Internasional Institute, 5(2), 113-124.
Pertiwi, T. S., & Supryatno, A. (2023). Literatur Review: Dampak Implementasi Electronic Health Records (EHR) di Pelayanan Kesehatan. JOURNAL OF BAJA HEALTH SCIENCE, 3(01), 61-77.
Cintya, R. E., Prasetijo, A. B., & Purnami, C. T. Pengembangan Sistem Informasi Inspeksi Kesehatan Lingkungan Rumah Sehat Berbasis Website. Jurnal Sistem Informasi Bisnis, 13(2), 172-178.
MAHENI, N. P. A. (2023). PENGARUH PROGRAM PELATIHAN, PARTISIPASI MANAJEMEN, PENGALAMAN KERJA, KECANGGIHAN TEKNOLOGI DAN PENGAWASAN TERHADAP EFEKTIVITAS SISTEM INFORMASI AKUNTANSI PADA

The Role Of Computer Technology In Environmental Health Monitoring And Management–
Paska Marto Hasugian et.al
315 | P a g e

LEMBAGA PERKREDITAN DESA DI KECAMATAN DENPASAR TIMUR (Doctoral dissertation, UNIVERSITAS MAHASARASWATI DENPASAR).

Sundari, S., Rahmani, A., Min, J. L., Arsyad, Z., & Jumiyani, R. (2023). PEMANFAATAN TEKNOLOGI INFORMASI (TI) UNTUK MASYARAKAT PEDESAAN. Jurnal Difusi, 6(1), 48-48.

Romadhon, A., & Suryani, E. (2020). Pemodelan simulasi sistem dinamik untuk meningkatkan jumlah pendapatan unit rawat inap Rumah Sakit Islam Surabaya A. Yani. Jurnal Teknologi Informasi dan Ilmu Komputer (JTIIK), 7(3), 581-589.

RESTIANA, R. (2022). Pemodelan Dan Simulasi Sistem Antrian Pelayanan Poliklinik Serta Usulan Perbaikan Dengan Menggunakan Flexsim (Studi Kasus: Puskesmas Gunung Samarinda, Balikpapan).

Mukti, Y. I. (2019). Sistem Informasi Monitoring Kesehatan Masyarakat Berbasis Web Menggunakan Metode Unifed Modelling Language. Jusikom: Jurnal Sistem Komputer Musirawas, 4(1), 1-8.

Rohayati, R. (2020). Aplikasi e-Health Berbasis Teknologi Smartphone dalam Monitoring Klien di Komunitas: Studi Literatur. Jurnal Penelitian Kesehatan" SUARA FORIKES"(Journal of Health Research" Forikes Voice"), 11(2), 120-124.

Dr.PH, Noor Alis Setiyadi, S. KM , M. KM; M.PH, Sri Darnoto, S. KM; M.Pd, Miftahul Arozaq, S. Si. *Sistem Informasi Geografis (SIG) Kesehatan Masyarakat*. Muhammadiyah University Press. ISBN 978-602-361-422-6.

https://www.technogis.co.id/5-contoh-pemanfaatan-sig-di-bidang-kesehatan-yang-dapat-diaplikasikan/

https://skota.id/peran-teknologi-sensor-iot-dalam-memantau-polusi-udara/

https://misel.co.id/jenis-sensor-iot-yang-digunakan-di-berbagai-industri/

The Role Of Computer Technology In Environmental Health Monitoring And Management–
Paska Marto Hasugian et.al
316 | P a g e