

USING ADVANCED INFORMATION AND COMMUNICATION TECHNOLOGIES IN ENVIRONMENTAL AND EMERGENCY MANAGEMENT

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Abstract: Sustainable development represents a balanced, intergenerational equitable development of a society, that is, of humanity as a whole. Since this is a continuously changing process in all areas, there is a need for a reliable framework for monitoring changes and creating improvements based on the results of the checks performed. Today's advanced information and communication technologies are the dominant tool for collecting and systematizing data in the field of environmental quality, economy and social well-being, i.e. the pillars of sustainable development. Equally important is the need to provide timely information to all stakeholders in the society-environment-economy triangle. Therefore, the aim of this paper is to present the potentials and experiences of applying advanced information and communication technologies in the given fields, with special emphasis on the potential of information visualization and marketing to stakeholders in a convenient time and form.

Key words: advanced ICT, sustainable development, data processing, visualization, stakeholders

1. INTRODUCTION

The Brundtland Report has popularized the notion of environmental sustainability and human development, i.e. the term sustainable development, when it was published in 1987. In this report, sustainable activities are defined as those that meet the needs of current generations without compromising the ability to meet the needs of future generations. What the Brundtland definition of sustainable development implies is an equal distribution of resources, not only spatially between users over a period of time, but also temporally between users over time. The idea is that resources are used in such a way that they are adequately accessible to all generations, without any fear that a generation will fare worse than the current ones (*Brundtland, 1987*).

All settings, defined by the desire to move through sustainable development, impose many obligations. There are problems with incorporating these, de facto, high-concept ideas into established social streams. However, this is not impossible, and it requires some changes in the way we presently use natural resources.

In order to achieve sustainability, the concept of what we consider to be basic needs warrants some rethinking. It is common understanding in today's society that we need the resources to meet certain needs, but the real question is how much do we really need any of these needs? Also, the basic needs of our ecosystems and the living organisms within them need to be taken into account. Defining the concept of "basic needs" is perhaps the greatest challenge for adopting sustainable practices in our daily lives. The interpretations of needs vary greatly from region to region, village to village, and even person to person.

In recent years, there has been a shift from the traditional top-down approach to the notion of management towards more open management systems at all levels where the allocation and use of a resource is being decided. When properly implemented, this approach to governance ensures that the needs and responsibilities of those who are most influential in the use of resources are respected without losing the ability to involve the wider community in the governance process (*Law on Environmental Protection, 2018*).

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What is most important to us at the moment is to answer the question of how a resource is managed. The answer to this question involves understanding all the information and relevant data related to a resource. Understanding user needs, as well as opportunities and limitations in resources, is essential for effective resource management. This requires the dissemination of modern scientific knowledge as well as the establishment of dialogue between individuals and responsible institutions. With relevant data, appropriate development strategies can properly address the challenges of resource availability and sustainability, followed by the challenges of distribution, access, rights, etc.

Needless to say, effective communication between different users and different levels is the key to successful resource management. Only when the needs are clearly defined can the resources be managed at an acceptable level, i.e. in a sustainable manner.

2. ICT IN SUSTAINABILITY SERVICE

Information and communication systems have reformed all spheres of people's lives and work in a revolutionary and previously almost unimaginable way. Within the European Union, information and communication systems have been recognized as a major factor influencing economic growth and innovation. One of the seven flagship initiatives of the Europe 2020 economic strategy is the Digital Agenda for Europe, which indicates the importance of information and communication systems in the development of modern economy (*Strategy of Information Society Development, 2010*).

The environmental information system is an arranged set of pieces of environmental knowledge that aims at strengthening appropriate behavior towards the environment. On the basis of this information system it is possible to forecast future changes in the environment and to create forecast and dynamic models.

The environmental information system is important for establishing legislation and for monitoring the state of the environment, because control of the state of the environment is possible if the information about the state is available, and environmental management can only be conducted if the subject of such management is known.

The task of the environmental information system is to provide access to environmental, economic, demographic, health and social data, all for the purpose of harmonious sustainable development.

Information and communication systems in the national context that are important for effective risk management in the environment and the society include:

- information system of the Republic Hydrometeorological Institute;
- Environmental Protection Agency information system;
- Ministry of Interior information system;
- Ministry of Health information system;
- information system of the Ministry of Defense and the Serbian Armed Forces;
- seismological information system;
- GeoSrbija geoportal, etc.

International information and communication systems that are important for the effective management of risks in the environment and society include:

- Global Environmental Monitoring System (GEMS) enables organized monitoring of the state of the environment through 25 major global monitoring networks, each with an appropriate database, with comparable data;
- International Environmental Information System (INFOTERRA) is the main channel for the international exchange of environmental information and is supported by a global network of governmental and non-governmental actors;
- Global Resource Information Database (GRID) is a worldwide network of geo-referenced environmental data that archives, collects and transmits digital information downloaded from maps, satellite images, statistical tables and other sources within and outside the United Nations;
- Global Disaster Reduction Knowledge Management Portal (PreventionWeb) is a key portal for defending user needs and sharing information relevant to disaster prevention, as well as developing tools that support collaboration in a collaborative environment. It contains information related to the design and development of projects within this field;
- European Network for Environmental Information and Monitoring (EIONET) is a key tool for cooperation between the EEA (European Environmental Agency) and its Member States (*Indić, 2013*).

A developed system of communication in the society-environment system is the key to achieving:

- functional distribution of information on the state of the environment and society;
- two-way communication;
- emergency robustness.

Information and communication systems in regular circumstances must adapt to the needs of users at a given moment (*Lovreković, 2015*). In the event of an emergency, regression plans should allow the integration of most existing communications systems into a single system. The basic types of information and communication systems are:

- radio links;
- fixed telephony;
- mobile telephony;
- Internet communications;
- Geographic Information System (GIS);
- television and radio stations.

The ability to transfer information at a lower technological level, e.g. by a courier or through direct contacts, is also significant. On the other hand, large telecommunication companies (mobile operators, etc.) can be a part of the system for:

- popularizing responsible environmental and social management through the development of applications for the visualization of environmental components for dominant operating platforms: iOS, Android, Windows mobile;
- popularizing security culture.

In terms of communications, a key component of emergencies is:

- increased flow of information, often unnecessary;
- reduced information transmission capacity, which can lead to potential congestion that threatens or impedes line services.

Emergency communications must rely on the effectiveness of existing systems, i.e. equipment and manpower.

3. CONCLUSIONS

Information and communication technologies have revolutionized the way of life, learning, work and entertainment over the course of a single human generation. ICT is increasingly transforming the way people, businesses and public institutions interact. Overall changes in all aspects of society enabled by the application of ICT mark the development of the information society.

Human society has always been exposed to various harmful influences derived from the environment. On the other hand, the pressure on the environmental media derived from human activities constantly increases. However, with the increase in the number of inhabitants and technical installations, there is a higher incidence of unwanted events with harmful consequences both for human health and for environmental quality. In this respect, an efficient information exchange system is more than desirable.

Mechanisms of communication, coordination, cooperation and collaboration are important in a socio-environmental system in order to achieve the desired results – reduce the consequences of mutual adverse impacts. The key conclusion of this paper is that, in addition to data processing, it is of paramount importance to focus on their visualization, taking into consideration the different levels of knowledge of stakeholders.

4. REFERENCES

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