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Opinion
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Managing Water Resources Using - Water Radioactive Isotopes Monitoring and Risk Mapping

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Opinion

Radioactive contamination, also called radiological contamination, is the deposition of, or presence of radioactive substances on surfaces or within solids, liquids or gases (including the human body), where their presence is unintended or undesirable. Contamination may affect a person, a place, an animal, or an object such as clothing. Following an atmospheric nuclear weapon discharge or a nuclear reactor containment breach, the air, soil, people, plants, and animals in the vicinity will become contaminated by nuclear fuel and fission products.

As far, it is scientifically proved that there is a direct correlation between the incidence of cancers and radiation exposure of the human body, water is agent that is permanently in contact with both: nature and people. From this point of view, it is extremely important to evaluate the water quality. The major objective of the proposed project is to measure and evaluate, from the radiation point of view, the quality of the natural and industrial water resulted from the mining of the radioactive and complex minerals. By achieving the proposed objectives, the project will promote conditions for environmentally sustainable, economically efficient and equitably allocated use of water resources.

The investigation will cover mountains regions where water resources have been affected by mining of the radioactive and complex minerals. The possible measurement points will be: decontamination stations, rivers, and main water confluences. First, the team research unit will optimize the number of measurement points by environmental survey tools and geological methods.

Next the research team experts will design and implement a radiation PIN-based smart sensor. Due to measurement specificity, each sensor will be calibrated in site conditions. For this action a probe sensor will be designed and implemented. The probe will be a reference measurement system and it will be used each time when a sensor will be started-up in local measurement conditions. The sensor is controlled by a microcontroller which will be also responsible for measuring some other radiation favorable parameters. For powering the entire measurement system, a solar panel-based power supply will be designed and implemented.

The data from the measuring points will be sent to a central processing unit through a measurement network. The major network support is the Internet with TCP/IP protocol. Because the measurement points are located in insulated and heavy Internet access areas, we will design and implement a radio communication dedicated device, also controlled by the same microcontroller. For linking the measurement points with first Internet access points, the Norway partner will design a transceiver that will fulfill some constrains: secure radio connection, efficient power consumption, in a license free radio communication band. The Norway partner will use a radio device that respects the main constrains list and they will add to its firmware also some specific legislation functions. It will become a specific protocol called radiation protection transmission protocol- RPTP.

The partners propose the use of ICT solutions for water management that could benefit different categories of stakeholders (public and private institutions, organizations, general public, etc) and that could improve water resources planning.

For the evaluation of the water quality from radiation isotopes of view, all measured data will be collected into a database, located in a computing center in Alba Iulia city- as central geographical point. The project aims to design and develop a dedicated software solution capable of analyzing the data gathered from the field research in order to generate different reports and statistics. Radiation data is processed, with a referee to the additional measured parameters that will be able to generate some alert messages for warning and notifications of the public and authorities. A spatial data analyzer module of the proposed software system will be able to use the data gathered and analyzed in order to create risk maps that will be used to monitor the environmental impact demonstrated by life cycle analysis and also to provide information about the effects of the climate changes in the river basins. The early warning solution is

design, to take into consideration the risks involved and to provide essential information in order to set priorities for mitigation and prevention strategies that could affect communities, economies and the environment.

The project is in accordance with the call's scope by implementing new activities of new or improved innovative water solutions in a real environment addressing in the same time 3 out of the 5 thematic priorities: water reuse and recycling; water and wastewater treatment and ecosystem services in the provision of water related services; and also 2 out of the 3 cross-cutting priorities: water governance; decision support systems and monitoring.

Acting as a decision support system for monitoring the status of the water resources, the ICT system developed in the project will deliver warning messages to the potentially affected locations to alert local and regional governmental agencies, ensuring them that they have available all the needed information to coordinate and to establish good governance and appropriate action plans for any given situation.

The main objective of the proposal is to create wide and fast deployment of sustainable innovative solutions in the water management sector based on solid research, capable of making a significant impact on the improving the air and water quality, reducing soil pollution and ecosystems change, and preventing loss of biodiversity and habitats, land.

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