

Towards an Environmental Knowledge System in Water Management

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Abstract : Water supply and water quality are key problems of mankind at the moment and - due to increasing population - in the future. Management disciplines like water, environment and quality management therefore need to closely interact, to establish a high level of water quality and to guarantee water supply in all parts of the world. Groundwater remediation is one aspect in this process. From a knowledge management perspective it is only possible to solve complex ecological or environmental problems if different factors, expert knowledge of various stakeholders and formal regulations regarding water, waste or chemical management are interconnected in form of a knowledge base. In general knowledge management focuses the processes of gathering and representing existing and new knowledge in a way, which allows for inference or deduction of knowledge for e.g. a situation where a problem solution or decision support are required. A knowledge base is no sole data repository, but a key element in a knowledge based system, thus providing or allowing for inference mechanisms to deduct further knowledge from existing facts. In consequence this knowledge provides decision support. The given paper introduces an environmental knowledge system in water management. The proposed environmental knowledge system is part of a research concept called Green Knowledge Management. It applies semantic technologies or concepts such as ontology or linked open data to interconnect different data and information sources about environmental aspects, in this case, water quality, as well as background material enriching an established knowledge base. Examples for the aforementioned ecological or environmental factors threatening water quality are among others industrial pollution (e.g. leakage of chemicals), environmental changes (e.g. rise in temperature) or floods, where all kinds of waste are merged and transferred into natural water environments. Water quality is usually determined with the help of measuring different indicators (e.g. chemical or biological), which are gathered with the help of laboratory testing, continuous monitoring equipment or other measuring processes. During all of these processes data are gathered and stored in different databases. Meanwhile the knowledge base needs to be established through interconnecting data of these different data sources and enriching its semantics. Experts may add their knowledge or experiences of previous incidents or influencing factors. In consequence querying or inference mechanisms are applied for the deduction of coherence between indicators, predictive developments or environmental threats. Relevant processes or steps of action may be modeled in form of a rule based approach. Overall the environmental knowledge system supports the interconnection of information and adding semantics to create environmental knowledge about water environment, supply chain as well as quality. The proposed concept itself is a holistic approach, which links to associated disciplines like environmental and quality management. Quality indicators and quality management steps need to be considered e.g. for the process and inference layers of the environmental knowledge system, thus integrating the aforementioned management disciplines in one water management application.

Keywords : water quality, environmental knowledge system, green knowledge management, semantic technologies, quality management

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