Application of ICT in Development of Agriculture Water Management Portal

Water is a natural resource which is the fundamental to life, livelihood and food security. India has more than 18% of the world's population, but has only 4% of world's renewable water resources with 2.6% of world's land area. There are further limits on utilizable quantities of water owing to uneven distribution over time and space (Anonymous, 2014). With a growing population and rising demand in a fast developing country as well as the given indications of the impact of climate change, the availability of utilizable water will be under further strain in future. Low awareness about the scarcity of water and its life sustaining and economic value, results in its mismanagement, wastage and inefficient use (Ghorbani and Moradi, 2014). In addition, there are inequities in distribution and lack of a unified perspective in planning, management and use of water resources. Rapid industrialisation and urbanization coupled with continuous decline in per capita water availability is putting a lot of pressure on the available water resources in the country. As per report of standing sub-committee for assessment of availability and requirements of water for diverse uses in the country, the future water requirements for meeting the demands of various sections in the country for the year 2025 and 2050 have been estimated to be 1093 BCM and 1447 BCM respectively (Anonymous, 2008). The increasing gap between water availability and demand highlights the need for conservation and proper utilization of water.

Information technology is used in development of a web portal mainly for collecting, storing, processing and communicating information to the end users. Information and communication technology (ICT) delineates how these various forms of digital mediums interact with each other through web based applications to meet a specific objective (Nayak, 2015). A Rice Knowledge Management Portal (RKMP), the first step towards enabling the use of ICTs in agriculture was developed by ICAR. The RKMP served as an information highway for sharing rice knowledge through latest ICT tools. It helps agricultural departments' ongoing activities in reaching out to the farmers through extension advisory services, in a most effective way for information communication (Anonymous, 2016). In national level, one portal on water management was developed as India Water Portal (Anonymous, 2015), which is a web-based interactive platform for sharing water management knowledge amongst practitioners and the general public. The portal covers topics closely related to the challenges in the water sector in India and practical solutions for day to day water related problems faced in the country. The topics broadly covered in the portal include rainwater harvesting, agriculture, drinking water, urban water management, sanitation and wastewater management. But, there is no proper web based information system available specifically on agriculture water management aspects. Therefore, an attempt has been made to develop a web portal with the objective to provide proper water management techniques for better agricultural development.

There are various steps to create a web portal such as information gathering, planning, design and development, testing and maintenance. The first step, the information gathering is very important in developing a successful web portal. Many things need to be taken into consideration when the look and feel of the site is created. Using the information gathered from phase one, planning is required for developing the web pages. The site map is a list of all main topic areas of the site, as well as sub-topics. The end-user of the web site must be kept in mind in designing the site. Target audience is one of the key factors in development of a web portal. The portal is to be tested before uploading for public and regular maintenance is required for updating the information available for general public. The literature on research work and extension activities on agriculture water management were collected for developing the web portal and e-learning module for the farmers and other stakeholders. The web pages have been prepared on open source PHP language (Holzner, 2008).

Using the information communication technology application, a web based information system namely agriculture water management portal (AWMP) was developed. The portal was created on web 2.0 standards

with different modules such as research, extension, farmers, general information, e-learning and contact details for use of different group of stakeholders as shown in Fig.1. The information of All India Coordinated Research Project (AICRP) on Water Management Centres regarding their general information and information related to their research activities were collected and compiled in the web pages. Webpage format has been prepared for researches carried out by AICRP Centres across the country to share the related information to the public. The background information, centre information, theme of research, location map, soil type, along with the major accomplishments done by the centre so far was uploaded on the website (Fig. 2).

An e-learning module of the web portal was developed for the use of farmers and other researchers based on the literature on research carried out and extension activities specific to agriculture water management. The webpage format for e-learning is shown in Fig. 3. The published literature, bulletins and leaflets for agriculture water management in Hindi and Odia language were made available on the web pages as e-books. The bulletins published by the Institute and e-books already available in the Institute website have also been linked with the web portal.

The success stories on agricultural water management by different coordinating centres of AICRP on Water Management have also been incorporated in the portal. The success stories and technologies are categorized on the basis of different agro-ecological regions, irrigation methods for easy interpretation of the data by end users as shown in Fig. 4. An user after entering to the website can get the information about the major technologies available across the country and their application in agriculture. The progressive farmers who have been awarded for adopting different kind of agricultural technologies in their fields was also available in the web portal. The web pages are also prepared on various technologies developed under different research aspects at this Institute *viz.* rainwater conservation, micro level water resource development, farm pond based agriculture, crop diversification, rubber check dam for watersheds, raised and sunken bed, system of rice intensification, sub-surface water harvesting structure and waterlogged area management as depicted in Fig. 5. The information has also been created in Hindi

Fig. 1. Homepage of the Agriculture Water Management Portal

Fig. 2. Webpage depicting information about AICRP

Fig. 3. Webpage showing the e-publication module

Fig. 4. Webpage for success stories categorization

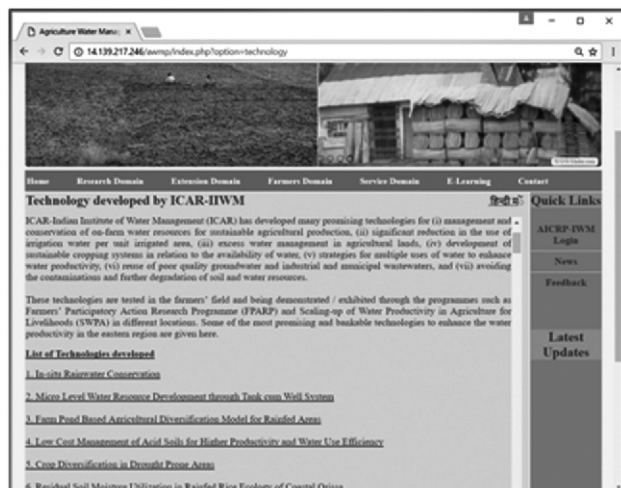*Fig. 5. Webpage for technology developed by ICAR-IIWM*

language. The list of progressive farmers who were awarded by the Institute are also made available in the portal along with their adopted technologies.

The growth of ICT in developing countries offers a new technological aspect and new opportunities for sharing useful information for farmers and other stakeholders. The mechanisms is sharing the information on agricultural water management through web portal for farming community, which has long been plagued with problems related to technologies for soil, water and management aspects. In this connection, the developed web based information system on agriculture water management will be useful for better utilization of water resources in agriculture. The uniform resource locator (URL) of the web portal is http://www.iiwm.res.in/awmp which is accessible to general public. The information available in the web portal are useful for researchers, farmers and other stakeholder to know the agricultural technologies developed across the country. The published literature, bulletins and leaflets for agriculture water management in English, Hindi and regional language are made available on the webpage in the form of easily accessible e-books which can be viewed by general public. The success stories available in the portal on agricultural water management by different coordinating Centres of AICRP on Water Management in the country are useful for the farming communities. The success stories and technologies are categorized on different agro-ecological region-wise, irrigation method-wise for easy interpretation of the data by end users.

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