Review of real-time effective decision support system for water resource management

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Abstract. The current technologies are predominantly attract the water resource management(WRM); if this water can not adequately utilizing for human activities, then several future problems are happening. Therefore super hydro controlling technology and it's management systems are necessary. In this investigation, various water resource management methodologies, it's merits and demerits are reviewed.The 2R-decision support system(DESS) implementation can change the conventional water management mechanisms, DESS addresses the engineering and non-engineering issues related to WRM system. The global WRM system designs and utilizations are facing many questionaries from experts. In India, there are many WRMs, but these are work for the nation, due to this limitation nations are facing many contemporary issues. Several methods have overcome these limitations but 2R-DESS answering the complete and accurate solutions to WRM. The advanced WRM system and its functionalities are verified on one example with the river basin agencies through DESS adequately. In this research work, for WRM calculating the various measures such as catchment area improvement, supply flow, upper flow, lower flow and acknowledgement of various effecting factors. The designed 2R DESS challenging the present WRM methodologies and results outperforms present technologies.

1 Introduction

The various water resources are continuously offering the many application related to public, economic, national and environmental issues. The unnecessary usage of the volume of water can disturb the humans lifestyle and living beings. The growth of population, current trending lifestyle and redondant utilization of water resources can create the hazardous and droughts. To change or address this type of problems, there is an advanced solution for WRM. The lack of human power and mobilization can not give the proper solution *t*o the following challenge. There should be a paradigm for resources utilization, thinking of wastewater management and recycling. In recent days many principles and models are dealing with this type of issues, but for future generations an advanced WRM system necessity is there. The decision support system (DESS) is implementing forthe decision-makers during different stages of water resources management. The DESS were addressing industrial and non-engineering issues related to WRM. The DESS can forecast the peak flow of two percent error, and it gives more and more acurate results. In recent past many methodologies designed for WRM, it is identified that such methods are facing managirial type of problems. These limitations and difficulties are briefly explained in the below literature survey. As of now, the different methods dealing the WRM such as 3R principles,closed-loop management, environmental recycling model, one-way WRM and etc. These methods are dealing with the resources Formatting the title, authors. The plan of Johannesburg and his implementation done in 2002, it directly explores the sustainable countries in their devolpments. This theory gives the solution for sustainable WRM, management of recycling and reuse parameters.

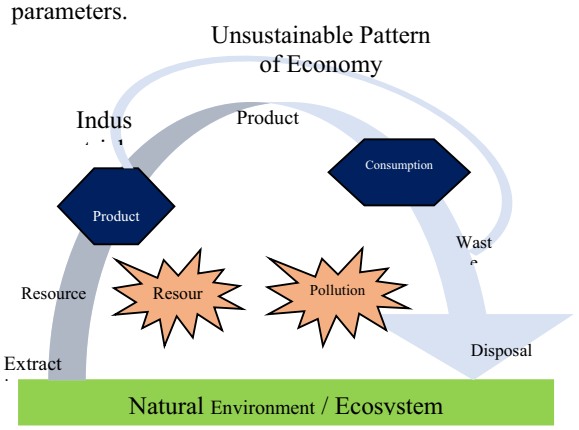

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Fig1. WRM system

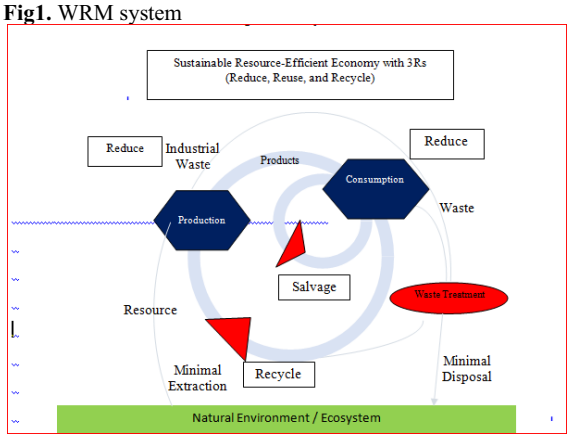

Fig-2 2R-WRM system

The figure1 and figure -2 clearly explain about water resource management system in general arctecture. It is identified that every WRM mainly depending on resources and their proper utilization. The main resoucres of WRM is rains, ground water, rivers and lakes. The leading economy in India majorly depending on water-related applications such as hydropower, industrial utilization, crops, the supply of drinking water and domestic usage. Without any proper drain system at industrials pollute the WRM system. Therefore environmental and health-related problems are happening. The recycling and resources utilization parameters are the key factors of 2R-WRM. The above all discussion gives the usage of a conventional technique for water resource management.

2 Critical WRM issues for developing

In this section, various development actions and plans are discussed with roles and their responsibilities. The individuals, communities, business sectors, public sector and private sectors deal the organizational level potentiality of WRM implementation.

Table 1. Role of function

S.No	Governing bodies	Roles and functionalities
1	Environmental conditions	To implement any WRM, a powerful environmental and eco-friendly platform is necessary.
2	Local government authorities	For the advanced ware resource management system necessary to initiate the local bodies and collaboration with international partners. This object can solve the accommodate issues at the time of national strategy of WRM design
3	Land pooling and commodities	In this, abi-lateral and multi-lateral land donor can support financial issues. For a wide range of project development, it is necessary.
4	Private sector	Different vendors in the private sector offer project stability, reusability and success rate.
5	Informal sectors	The local sub bodies, NGO's are supporting the project always happen when the collaboration between them is a success.
6	Small-medium enterprises (SME)	The SME's continuously boosting the project and adding the improvement with the help of governments.
7	Scientific and academic research	The academic institution and research groups develop the project using the transfer of knowledge between them. The traing, educating and extension is the main motto of our proposed WRM

3 The motivation of the work

In India tropical climates are helping the agriculture and industries, water supply for these sectors can be provided through various resources and it's management. The centralized water projects would take many alternative solutions for the food supply chain in the country. The lack of water resource utilization, uncertainly decreases the countries growth and advancements. Therefore in this research work, decision-support-system based WRM design is implemented.

3.1 Objectives

1. An implementation of a roubust water resource management model using 2R-decision- support-system in India.
2. The rainfall catchment areas designed using water land interlinking techniquic with help of WRM-DESS.
3. A river basin and river interweaving centralized project design for water resource management system.
4. Drought, floods and drinking water management system using 2R ranking decision support system.

4 Literature survey

The satellites and remote sensing radar observes the water resources for future generations. In this work, various atmospheric and weather monitoring satellites continuously predict the geometrical relation of water at geographical conditions. Along with these functionalities, these satellites observe the rains,

snowfalls, occasion monitorization and rivers. This satellites fixed in the particular orbit for monitoring the environmental and geographical conditions [1]. The European space agency started a program for water resources in the earth, and these are addressing the critical and specific issues of geographical conditions for WRM[2].

The large scale climatically, environmental problems have prominently interacted with bio-physical monitoring. The tropical climates support the bio-diversity project. Thus the global problems have been solved based on human action and their technological WRM projects [3]. The mathematical and physical theories support the water resource management system in a research manner. The significate and sudden raises of environmental conditions seriously produce global issues. The European Union, Netherland states establishing the space and satellite programs for water resource management system. This program providing the crop, water and irrigation projects support. Therefore water resources, weather and environmental conditions are normalized [4]. In extension to classify the requirement of DESS for integrated water resource management (INWRM), different planning's and management are required. The DESS is the advanced and reviewed past study, which can make the WRM efficient. In this research, various significant points are DESS and development of INWRM techniques are investigated [5]. The disaster management and it's supporting systems are clearly explain in [6]. In this work, various research activities related to WRM has been explained based on KAKU K et al. theory. A space related water resource management system can helps the local and global issues for irrigation applications. A decision support human knowledge system design for floods management. The decision management system is an virtual tool it can plan the different real time projects such as forecasting of environment, hydro dynamic applications and flood control system. In this work an advanced DESS implementations are performed an CANADA, Red base in rever, this analysis predict the 2% peak flow error and revise the operating rules of water management system [7]. Alemu, ET et al [8], in this work various stream predictions and energy forecasting mechanisms are scheduled based on reservoir regulating model. This investigation supports the decision based system with two integrated models, in first step water management and its supply chain mechanisms are analyzed. Coming to second stage DESS provides the time to time updates of reservoir. This resulting that improving the WRM and makes the model in a good manner. Andreu J et al [9] a generalized DESS originally implemented fro decision making association for difficult river basins system. The computer aided design and its modules are makes the system proper design utilizations of water resources.

This research work take reference as segura and tagus river basins as example, this study validate the various river based agencies and its efficient management resources. Arumugam N et.al [10] the irrigation and water management methodologies are verified on Heih river basin. The DESS is a design which related to integrated water resource problems and its limitations are explore. The main aim of this study to allocate the relationship between supplies and demand. This examination analyzes the various ground evel decision making river basin systems on 40 locations. Costelletti A et al [11] In this integrated WRM systems are recognized and analyzed for planning the feature usages. The European union in 20k explains about U.n.e.s.c.o countries and their applications. However the implementations of WRM success rate are very high. The control and analytical theory prove that modeling of WRM system takes the decision procedure and identifies the contribution of outstanding work. This work is more conceived the advanced presentation related to constructive discussion.

5 Key features

- Contribution of water resource management and its applications in specialist field.
- Compramisation between theory and practical work.
- Integration of various aspects and decision modelling techniques.

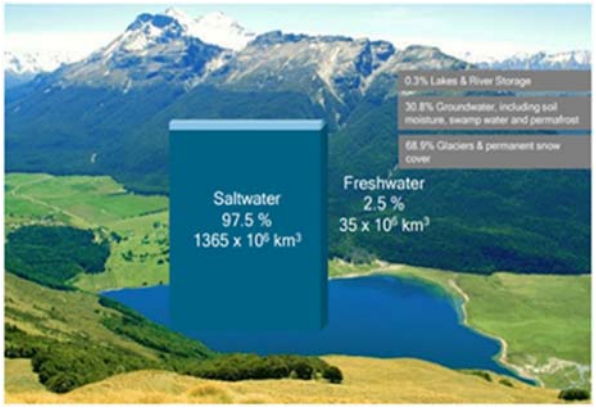

Fig.3. Catchup area estimation(Google source).

various water policies based on different indications they are meteorological, distributive, productive, hydrological, water temperature, river flow and agriculture production [16]. On the other hand various computer aided designs and information technology had increases the real time project assistance. The efficient signal supporting and batch verification is performed on cultivated land. This technique posibily cooperated the alternative development of WRM system [17].

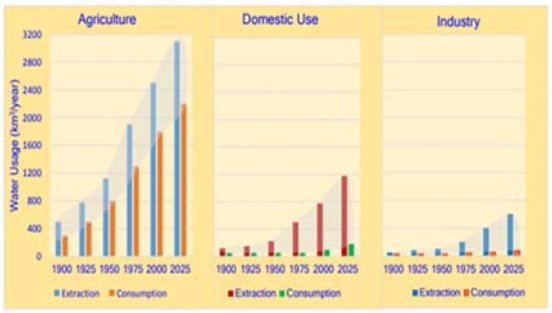

Fig 5: water resource extraction and consumption.

The above fig.5 clearly explains about three types of sectors using water resources; these are nothing but agriculture, domestic and industry. The graphical representations easily figure out the extraction and consumption parameters. Coming to agriculture field at 1990 around 420km^3 water extraction has
Been performed. Coming to consumption 320km^3 water resources are identified. This value raises around 8% compared to year of 1990, at this domestic usage that values are diminished by around 10% [18]. Coming to industrial usage water consumption is very less compared to extraction.

6 Key points about water usage

- Agriculture sector is an highest usage system it consumes around 70% of usage.
- Coming to second largest consumers is an industry system, it consumes at 19% of usage.
- The municipal and drinking water withdrawals are 11% of usage.

Table 1. Showing references numbers and details.

Reference No	Technique	Key points Reference No
[19]	Decision support IWRM	In this system around multiples of 10 multiples of river basins are analyzed with integrated water resource management. A prototype of DESS resource planning's are developed and effectively analysed with IDESS.[19]
[20]	WRM managemen t for developing countries. Learning an experience model.	The learning and experience model designed for water resource management system , in the intended users and their responses are updated with prority based efforts.
[21]	Integrated advisory WRM	The lack of integrated tools are planned and managed during the water resource estimation process. In this work planning and management of water resources are designed based on dish and making process.
[22]	Integrated river basin managemen t.	The DESS challenges the various temporary and spatial water resources. This is experience the development and decision support system for multi layer structure. For example pre methods are handling the DESS, these are time resolution methods, short range model and long range method. These methods are configure and demanded the DESS options.
[23]	A generic and rapid multi model assessment.	In this work data interference, database content, data visualization and data analysis are investigated for rivers and reservoirs. The reservoirs and river basin methods are quantify the losses and routing lacks for statistical characterization.
[24]	Web based decision support system.	The web based DESS providing the potential support and safety measurement for WRM. This model improves the 91.82% web based improvement has been attained.
[25]	Surface water planning in river basin.	In this research DESS is effectively improves the speed, quality and management of water resource management system. The Chicago river basin has selected as example of water resource management system using DESS.

The above literature survey concentrates the various methods effecting the water resource management and recognizes the solution for limitations. This study improves the feature coming water resource management system with advanced controlling techniques[26][27].

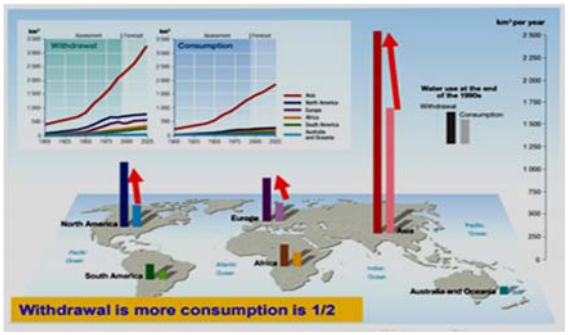

Fig. 6. Consumption VS withdrawal

The figure 6 clearly explains about various water resources withdrawal and consumption in various continents. The selected continents are North America, sourth America, yurup, Africa, Asia and Australia. The observation of this theory explains about withdrawal percentage is 50% more compared to consumption[28-29]. Therefore for feature WRM system design advanced methods to balance the withdrawal and consumption [30].
The above figure7. clearly explains about feature design flow chart of DESS mechanism. In this an integrated compure aidded software designed and gives the assistance for resource planning. This flow chart reduces the risk factors facing by various supply water mechanism. To estimate average rainfall, river basin, sub basin strategies are estimated with above flow diagram[31[32]. This system decrease in the risk factor and gives the reasonable solutions for water supply

system management. The above flow chart resulting that the water shortage and its impact parameters are analysed easily. This mechanism clearly estimating the intake, withdrawal measures, extraction and conventional operations with more improvement i.e. 3.7%, 0.7%, 4.4% and 7% respectively[33][34].

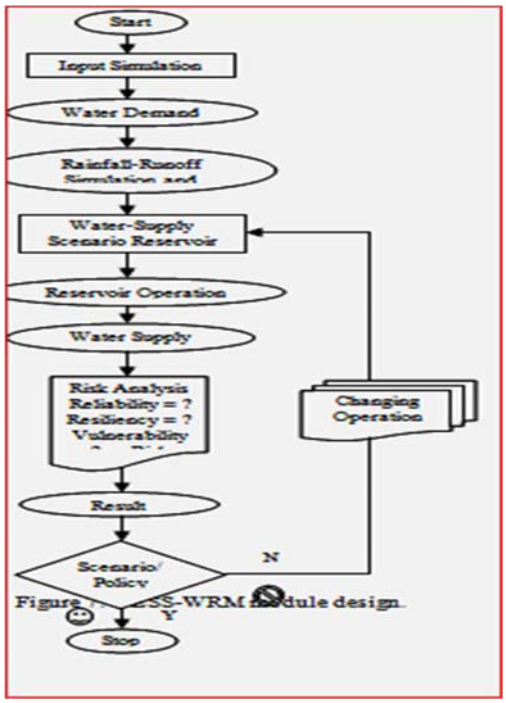

Fig.7. DESS-WRM module design

Fig. 8. a) General project

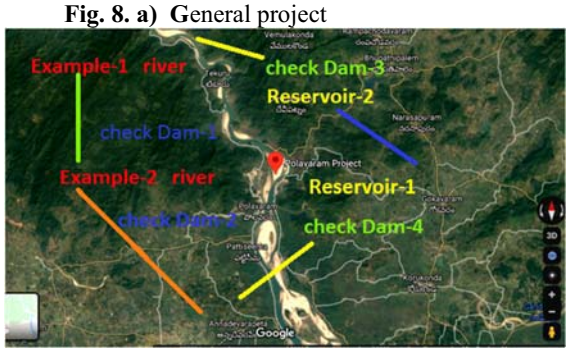

Fig. 8 b). 2R DESS WRM hypothetical example

In this work the figures 8a) and figure 8b) clearly explains about reservoir, check dam and catch up area maintenance for 2R-DESS. The WRM system is designed with the help of following techniques to improve the resources and withdrawal management easily [35]. The proposed decision support systems are planned with 2R-IWRM process, therefore the proposed objectives are successfully attains the expected results. The participatory, institutional aspects and long term sustainability has been achieved.

Problem statement

In India many water resources are present; these are utilized for agriculture, domestic, industrial and hydro power generations. If these water resources are do not properly managed by river basin system and check dams then automatically floods and droughts have been happening. More over environmental conditions and geographical resources are control the humans and living beings. The agriculture 57%, industrial 16% and domestic purpose 27% water resources are necessary. Therefore without proper water resource management system this supply chain has been broken and many problems are creating. So, in this research work a well planned decision support system based WRM has been implementing.

Conclusion

The DESS technique gives the great potential services for WRM at river basins and check dams. The entire proposed design is simulated on water resource management tool with advanced technique. The proposed 2R-DESS gives the solution for risk management, evaluated management and alternative WRM strategy. In feature 2R-DESS technique with adaptive models enhance the performance measures such as peak flow, upper flow and lower flow parameters. This proposed design improves the WRM at risk facing and critical hydrologic conditions. in feature work we are implementing the objectives which are defined in the above sections.

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