iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 6 **Issue:** XII **Month of publication:** December 2018

DOI:

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 6.887
Volume 6 Issue XII, Dec 2018- Available at www.ijraset.com

Assessment of Water Resources: A Review

Miss. Sneha Sanjay Bhalvankar[1], Mr. S.M. Bhosale[2]
[1, 2]Environmental Science and Technology, Department of Technology, Shivaji University, Kolhapur, Maharashtra, India

Abstract: Water resources can not only developed but not also managed rationally without an assessment of both the quantity and quality of water available. To evaluate water resources in relation to a reference frame and to evaluate the progress of the water resources in relation to human impact or demands for this Water resources assessment (WRA) is essential. WRA is applicable for a unit such as a catchment, sub-catchment or groundwater reservoir. It is part of the Integrated Water Resource Management (IWRM) approach and to link social and economic factors to the suitability of water resources and associated ecosystems. WRA may recognize a range of physical, chemical and biological features in assessing the dynamics of the resource, by using this objective assessment of water quality is done. Water resource assessment is a precise study of the status of water supply and resources, and of trends in convenience and demand within a specific period of time. Water resources assessment is a mandatory for sustainable development and management of water resources globally.
Keywords: Assessment of water resources, water quality evaluation, Principal component analysis, groundwater quality, water quality process

I. INTRODUCTION

Water is most essential for all living things to grow and reproduce and it plays an important role in the world economy. Water is used for further purposes like agricultural, industrial, household, recreational and environmental activities. Water resources are natural source and which is probably useful. From the total available water On the Earth, 97% of the water is salt water and remaining 3% is fresh water; partly 2/3 of this is frozen in glaciers and polar icecaps. The remaining unfrozen freshwater is found as groundwater, with a small portion above ground or in the air. Water resources are suffering from major forces around the globe. Water sources like Rivers, lakes, and underground aquifers supply fresh water for the purpose of irrigation, drinking, and sanitation, although the oceans provide territory for a large share of the planet's food supply. In industry and houses huge quantities of water, ice, and steam are used for cooling and heating. Water is a finest solvent for an extensive variety of chemical substances and it is widely used in industrial processes, cooking and washing. Water is significant to many sports and other forms of entertainment, such as swimming, luxury boating, boat racing, surfing, sport fishing, and diving. Water resource assessment on quantity, quality and utility is the infrastructure of its scientific development, planning, management and protection. Now a days, expansion of agriculture, damming, diversion, over-use, and pollution threaten these irreversible resources in many parts of the globe. Water resources assessment is the process to measure, collect and analyse suitable parameters on both the quantity and quality of water resources for the purposes of a superior development and management of water resources. According to the monitored data of water quality, Water quality assessment is make the bad or good degree of quantitative description. Assessment of natural groundwater recharge is a basic requirement for effective management of these resources and is especially vital in those areas where shallow groundwater is mostly polluted by highly toxic contaminants. It is important either to determine the processes which affect water quality or to determine how water quality is changing over a period of time. Operating a water resources assessment provides you with an extensive understanding of the quality and quantity of water resources in your area. WRA is a tool not only to evaluate water resources in relation to a reference frame but also to evaluate the dynamics of the water resource in relation to human impacts or demand. The most fundamental component of water resources assessment is that monitoring of the quantity and quality of surface-and groundwater, at an appropriate frequency and for a suitable period of time. Scientific concepts and technological tools used for measuring the water supply, expanding choices for water use and reducing the uncertainty in water availability and quality by using. New measurement techniques, innovative observational network design are improved data access and water-supply forecasting which are helpful for developments.

II. LITERATURE SURVEY

Wang Jingmeng, Guo Xiaoyu, Zhao Wenji, Meng Xiangang [1] researched on water environmental quality evaluation and characteristics analysis of TongHui River. The development of economy and population increases continuously, industrial, and sewage of urban, non-point pollution of urban and rural led to water pollution. Nitrogen and phosphorus pollution is the main factors of surface water pollution. Beijing is going to maintain a large amount of water supply, need both water supplies engineering and fully adventure the potential of internal water resources utilization. All sorts of production and wastewater of life should be treated and recycled and these water rationally reused able to reduce the water environment pollution also able to minimize water shortages of war. According to the water samplings of TongHui River, this paper used fuzzy comprehensive evaluation method to evaluate and sort the water quality of TongHui River, reused various statistical methods of gathering analysis to analyze the spatial distribution characteristics .The results of evaluation and hierarchical analysis provides scientific basis for water pollution management and control.

Xuedi Zhang Jianhua Wu and Baode Song [2] gave the application of principal component analysis in groundwater quality assessment whereas Groundwater hydrochemistry can be affected by multiple natural factors such as chemical reactions between water and soil or sediment, biochemical reactions, surface water and groundwater interactions, and human activities. The disposal of industrial and municipal wastewaters, which is either treated or not, it can be a perpetual polluting source of changing the groundwater hydrochemistry. Also, groundwater can be affected by non-point source pollutions, caused by surface and subsurface runoff coming from irrigation water and waste plants in urban areas. These human impacts on groundwater chemistry changes have been broadly studied. Yet, the process of industrialization and urbanization, increasing agricultural irrigation, the pollution of shallow groundwater, and the surface irrigation system evolution all have adjacent relations with groundwater. This issue solved by using Principal Component Analysis (PCA) and which is a good method and tool to convert the various original indicators into several composite indicators (called the main principal components). It has been introduced into the land resources protection, the assessment of environmental susceptibility and many other fields. It was used to analyze water samples by collecting data from the second water source area in Shizuishan city as well as to determine the impact factors of water quality with possible contamination sources.

Statistical assessment of groundwater resources is done by Rajat Agarwal and P. K. Garg [3]. Particularly in those areas where shallow groundwater is mostly polluted by highly toxic aspects, there is analysis of natural groundwater recharge is a basic pre-requisite for effective management of these resources. Monitoring of ground water level provides various measurements in space and time, which are the basic requirement for the quantitative assessment of groundwater resources. To make decision in several areas including engineering and environmental fields, The Geo-statistics analysis in GIS environment are useful emergent techniques. Monitoring and interpreting changes in ground water level are crucial for groundwater management. The effect of rainfall on ground water level variation is an important factor for viable groundwater development. The results of Mann Kendall's test and linear regression for pre- and post-monsoon groundwater levels illustrate that most of the wells have a declining trend. The groundwater development needs to be taken up in a planned manner in order to prevent adverse impact on groundwater for protecting from more depletion. To avoid the declining trend in groundwater levels by artificial recharge implementation. These are by virtue of the surface water irrigation without environmental application of environmental conditions. So that, there is necessary to accept the cooperative water use in the area having water logging problems.

Z.W. Kundzewicz, V. Krysanova, R.E. Benestad, Hov, M. Piniewski, and I.M. Otto [4] represent the applications of the uncertainty concept such as results of change detection, process understanding and modeling of systems, and projections of future climate change impacts on water resources. They present a structure of determining and reducing uncertainty and come up with measures that could improve uncertainty communication. Generally meaning of the term "uncertainty" is lack of certainty about something, ranging from small doubts and minor defect to a complete lack of definite knowledge. The broad term "uncertainty" has many various explanation for di□erent things by di□erent people. This paper study the assumption of uncertainty in climate change impact assessment on water resources. It is important in assessing the range of potential outcomes that may be related to observation data, to process understanding and modelling as well as to projections for the future. Uncertainty assessment and opportunities for its both reduction and implication for management are discussed. The authors concern that this paper gives to improving analysis of the concept of uncertainty in climate change impacts on water resources and sketches agenda of challenges in the problem area.

Effect of climate change on humic substances and quality of surface water and ground water is studied by Ewa Lipczynska-Kochany [5]. In the biosphere humic substances are known as major carbon basin and it plays important role in the global warming has been identified and greatly studied. However, some consideration has been compensated so long to effects on the surface water and groundwater quality, which may result from the climate induced impact on HS. Biodegradation of soil organic matter (SOM), an enhanced concentration of dissolved HS in freshwater as well as microbial growth can be accelerated also biodegradation of pollutants in water can be enhanced due to the climate change. On the other hand, negative effects may be also anticipated which includes an inhibition of solar disinfection in brown lakes and an impact on the treatment of freshwater. In this article, many of the possible climate changes are described which has yet to be analyzed and understood. This review is massive potential for interesting, multidisciplinary research which will encourage to readers for conducting studies for research area. Temperature rise and enhanced biodegradation of SOM leads to increase in the production of dissolved organic matter (DOM), while the flooding and runoff export it from soil to rivers, lakes and groundwater. Increased concentration of DOM in water will stimulate to microbial growth and it may enhance biodegradation of pollutants in water as well as in the source freshwater may create problems for drinking water production facilities. However, it may have also negative effects, including inhibition of solar disinfection in surface waters.

V. Olaru and O. Ivan [6] are presented the integrated system for underground water management. The Romanian Ministry of Education and Research was financed this project for development within the CEEX Programme. In the development of the project, for the evaluation of underground water resources a national database has been elaborated and a pilot system was implemented in the Ilfov County. The integrated system will provide durable management of underground water resources, for an adequate water supply with high quality water. It is necessary for the durable, balanced and equitable use of the resources, the correct treatment of the content of the residuum in resources, the conservation of the natural underground resources and their protection against natural and anthropic harming effects. For the estimation of the total available quantity of water resources and their potential use, the forecast of the quantity and quality of water resources is necessary. The underground water is living water because the water is the life support on Earth. Aquifers are underground water resources can be derived and used for drinking, industry as well as agriculture. If we take advantage without thinking, the underground water recharge is hard but is harder to clean when we have identified and eliminate the source of pollution. Groundwater pollution leads to failure to use the aquifer for very long periods of time and this is by cause of extremely low rates of groundwater flow. Groundwater may be polluted by following major polluters as petroleum products, products from industrial processes, chemicals used in agriculture, domestic and livestock products, heavy metals, etc. The ultimate aim of the study of groundwater pollution is to achieve of qualitative and quantitative forecasting models as well as to establish the programs for optimizing the environmental studies.

Nowadays increasing demands for the environmental things and the growing importance of the pollution reduction for a sustained development, Rui Peixeiro, Octavian Postolache and José Miguel Dias Pereira [7] are represented the basic instrument for measurement of water quality parameters. For studying the physical and chemical characteristics of all kind of water, the water quality monitoring is very important and useful. Also it is essential for understanding the needs to protect and recover the quality of particular element which is vital to all of us and also all the beings who surround us. To develop a low cost virtual instrument for measurement of water quality parameters is the target of this research. In water quality monitoring the electrical conductivity, temperature and turbidity this three most important physical variables are measured by the developed system. The flexibility is an important characteristic of adding other measurement channel without changing hardware component of system. Appropriate battery supply selection provides system autonomy for making measurements for several hours in remote locations. The designed and implemented virtual instrument is accurate and satisfied for the application of water quality assessment in rivers and estuaries. The objective of this project was the Development of a virtual instrument for three parameters which are help to identify the water quality in river and estuaries. So that a conductivity measuring system was designed on the basis of two electrodes cell in combination with a temperature compensation in conductivity. A turbidity measurement channel is the third parameter of the system and it was developed on the basis of to detect the transmitted and scattered light due to the particles in suspension in the water. Development of appropriate conditioning circuits for all the systems which is connected to the data acquisition (DAQ) system and makes possible to the measure and process the data by software developed in LabVIEW. It was first necessary to conclude the experimental procedure in order to find the characteristic curve of each variable to be implemented for creating this virtual environment in WQ-VI software developed in LabVIEW. The temperature compensation associated with water conductivity measurement is made by software which is controlling the turbidity sensor. As future work, by using this software to take readings permanently in remote locations, which is needing for to develop a wireless communication system in way to indicate the variables in one permanent place easily like a laboratory.

The impacts of climate change on groundwater and dependent irrigation cost in northwest Bangladesh was studied by Golam Saleh Ahmed Salem, So Kazama, Shamsuddin Shahid and Nepal C. Dey [8] with the help of an ensemble of eight (General Circulation Model) GCMs of CMIP5 for three (Representative Concentration Pathways) RCP scenarios. The results show that climate change will cause an increase in annual mean of daily temperature as well as total rainfall in the study area. Declination of groundwater levels during the pre-monsoon irrigation period due to comparatively higher increase in temperature and no measureable change in rainfall in winter and pre–monsoon months. The study declare that climate change causing the declination of groundwater level therefore, the irrigation cost for all of three RCP scenarios will increase. However, the amount of groundwater declination and indirect increase in the irrigation cost will depend on climate change scenarios. Analysis of data explain that the increases in irrigation cost by virtue of climate change induced groundwater level drop is related to that for the increases in energy charge, fuel prices and fertilizer costs. Also, it may be significant in the regions where the depth to groundwater level is high. The objective of the present study was to assess the impacts of climate change on irrigation cost in a northwest Bangladesh which is groundwater dependent irrigated region. Altogether, an general circulation model (GCMs) was used for the projection of climate, support vector machine (SVM) which is an empirical hydrological model was used to simulate groundwater level from climatic variables, as well as a multiple-linear regression (MLR) model was used to estimate the irrigation cost by virtue of changing in groundwater level. The study concludes that due to impact of climate change, fluctuations in groundwater level on crop production cost is much less compared to other costs, but it may be significant in locations where groundwater level is refusing fastly.

Now, the increase in population and indiscriminate utilization is vital resource under tremendous pressure on river basins so that Anoop Kumar Shukla, C. S. P. Ojha and R. D. Garg [9] has an effort to develop a methodology of integrating the Water quality index (WQI) with geographic information system (GIS) for an effective analysis of both the quality and health status of the Ganga River basin (GRB) and it has been taken as a case study. WQI is used for the physical, chemical and biological analysis and GIS platform is used for spatial distribution maps of selected water quality parameters which is depend on the results of the analyses. A significant deterioration is observed in the WQ of the stations located in the lower reaches of the river basin, whereas the Allahabad is the most polluted station followed by Kanpur and Varanasi. In the pre monsoon season of 2010 at Varanasi station, the most inferior WQ with (overall index of pollution) OIP value of 4.18 (polluted class) is observed. The OIP is based on the individual index values. Also the individual index values was estimated by giving the values in terms of pollution indices. Water quality assessment with OIP could help to manage the available water resources sustainably. Not only to integrate complex data but also to generate a score that defines water quality status and assesses water quality trends, is the main purpose of OIP. While integrating multiple water quality variables, but some facts are missing and this loss is overcame by the gain in understanding of water quality issues with help of the public and policy makers.

The future scope of this study contain the understanding of hydrologic and ecological response of the water quality variations across the river basin. Almost 20% of the total population is either directly or indirectly dependent on Ganga River so that it has extreme importance in India. The quantity and quality of river water are adversely affected Due to increased anthropogenic activities in the Ganga River basin. Water quality is a vital indicator of river basin health so that the information of the water quality and its variation in the state is necessary for better river basin design and management. This study establish that the determination and assessment of water quality of Ganga river basin (GRB) with the help of OIP index and finally illustrating it by geographical information system (GIS).

Seasonal and life-long variations in water Quality of the skeena river at usk, British Columbia was studied by Indra Bhangu and Paul H. Whitfield [10], in this study to analyze the data collecting from the Skeena River at every 2 weeks between 1984 and 1992 for determining the processes which was affecting the water quality. Also, this study determined the data for the presence of trends, modelled the series as well as forecast future water quality of the river. To determine which processes affect water quality by using Hysteresis diagrams and it exposed the relevance of snowmelt and rainfall peaks on water chemistry. To model the observed patterns in water quality by using Univariate Box-Jenkins techniques. These models were then used to project past patterns as well as relationships into the forecasting.

These anticipated estimates may then relief in both planning and decision making. The hydrologic processes active in the watershed resulting the water chemistry of rivers and streams.

The variation in water quality is due to these seasonal processes. These seasonal variation is significant In the Skeena watershed. A negative relationship to discharge is shown by Major ions and the pattern of hysteresis shows a differential snowmelt dilution between spring and fall. Metals, sediments and total phosphorus presented patterns that reflect erosion resulting from sediment transportation.

The concentration of nitrogen affected by biological processes. The Skeena River shows reasonable seasonal variation for most water quality variables.

The time-series models were fitted which was suggesting that there are existing no trends. A non-parametric test is confirmed that in the recorded data tends are absent. Models which were fit were all ARIMA, without a trend component. These models calculate future values which were dependable on the identified processes and may be applied to a broader dimensional area than the Skeena River. Presently, the Skeena River is indicating no either long-term trends in ion export or changes in seasonal patterns.

III. CONCLUSION

After surveying all the above research articles, it can be concluded that, the assessment of water resources is essential for maintaining the quality and quantity of resources.by conducting this assessment we can establish the common and trusted information which is helpful for making effective decision. It is important to know various parameter related to water resources for improving both quality and quantity.

REFERENCES

[1] Wang Jingmeng, Guo Xiaoyu, Zhao Wenji and Meng Xiangang; Research on Water Environmental Quality Evaluation and Characteristics Analysis of TongHui River; 978-1-61284-340-7/11/$26.00 ©2011 IEEE

[2] Application of Principal Component Analysis in Groundwater Quality Assessment; Xuedi Zhang, Jianhua Wu and Baode Song; 978-1-61284-340-7/111$26.00 ©2011 IEEE

[3] Statistical Assessment of Groundwater Resources and Long Term Trend Using Geospatial Techniques; Rajat Agarwal and P. K. Garg; 978-1-5090-3332-4/16/$31.00 ©2016 IEEE

[4] Uncertainty in climate change impacts on water resources; Z.W. Kundzewicz, V. Krysanova, R.E. Benestad, Hov, M. Piniewski, I.M. Otto; environmental science and policy 79 (2018)

[5] Effect of climate change on humic substances and associated impacts on the quality of surface water and groundwater: A review;Ewa Lipczynska-Kochany; science of the total environment 640-641 (2018)

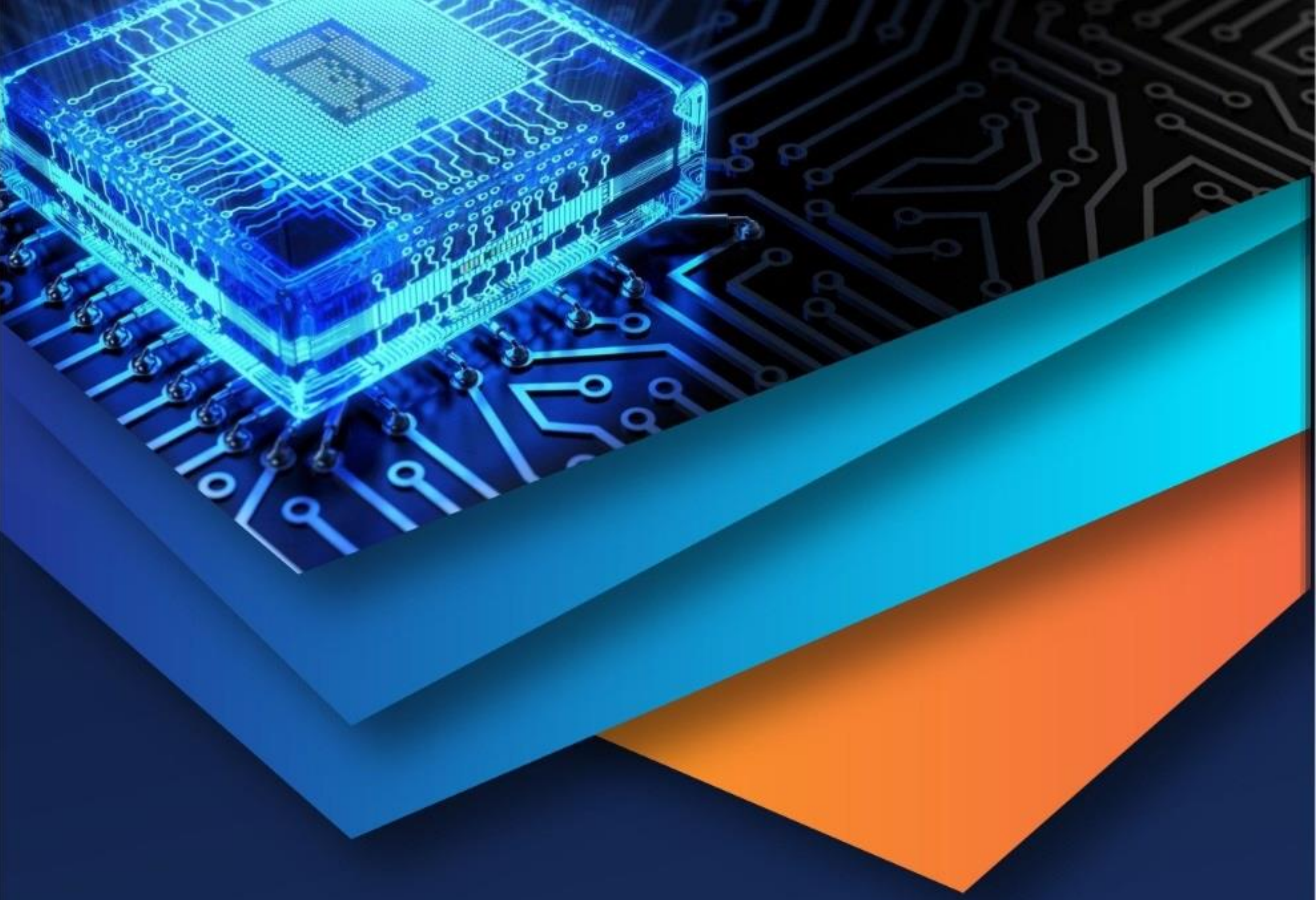
[6] Integrated System for Underground Water Management; V. Olaru, O. Ivan

[7] Virtual Instrument for Water Quality Parameters Measurement; Rui Peixeiro, Octavian Postolache, José Miguel Dias Pereira; 978-1-4673-1172-4/12/$31.00 ©2012 IEEE

[8] Impacts of climate change on groundwater level and irrigation cost in a groundwater dependent irrigated region; Golam Saleh Ahmed Salem, So Kazama, Shamsuddin Shahid, Nepal C. Dey; agricultural water management 208 (2018)

[9] Surface Water Quality Assessment of Ganga River Basin, India Using Index Mapping; Anoop Kumar Shukla, C. S. P. Ojha and R. D. Garg; 978-1-5090-4951-6/17/$31.00 ©2017 IEEE

[10] Seasonal and Long-Term Variations in Water Quality of the Skeena River at Usk, British Columbia; Indra Bhangu and Paul H. Whitfield; War. Res. Vol. 31, No. 9, pp. 2187-2194, 1997



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