# Dr. ANITA MUKHERJEE

## PRESENT STATUS

**Doctor of Philosophy (Ph. D.) awarded on 03-07-2019**
from Indian Institute of Technology Kharagpur, West Bengal, India.

**The title of the Ph.D. Thesis is**
"Approaches to Link Water Resource Management with Land-Use Planning in Gangetic West Bengal, India".

## WORKING DOMAINS

**Geography** *with special focus on*
Water Resources Management, Sustainable Land-use Planning, Urbanization, Hydrology, GIS-Remote Sensing, Geomorphology and System Dynamics.

## CONTACTS

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**PERMANENT ADDRESS**

C/O Mr. Koushik Banerjee , 5, Gopal Bhattyacharya Lane, Ichapore, Nawabgunj, North 24 Parganas, PIN-743144, West Bengal

## ACADEMIC QUALIFICATION

| Board / University | Examination | Marks Obtained (%) | Year | Subjects |
|---|---|---|---|---|
| IIT Kharagpur | Ph. D. | --- | 2019 | Water Resources Management And Land-Use Planning |
| University of Calcutta | B. Ed. | 76.0 | 2010 | Geography, Economics |
| University of Calcutta | M.A. | 70.4 | 2008 | Geography |
| University of Burdwan | B.A. | 64.25 | 2006 | Geo (Hons.), Hist., Eco, Eng, French |
| W.B.C.H.S.E. | H.S. | 74.0 | 2002 | Beng, Eng, Maths, Geo, Eco, French |
| W.B.B.S.E. | Madhyamik | 86.75 | 2000 | Beng, Eng, Maths, Phy. Sc., Life Sc., Hist., Geo, French |

## PROFESSIONAL EXPERIENCE

**Part-time Lecturer**, Lalbaba College, Belur Math, Howrah from 19-08-2010 to 21-12-2010.

## RESEARCH EXPERIENCE

Worked under the MHRD funded mega project, 'Future of Cities' initiated by IIT Kharagpur, West Bengal, from January, 2015 during Ph.D. as a **Research Scholar**.

And, as a
**Research Associate** in the Project entitled "*Assessment of relationship between urban development and water use, annual rainfall Vs. runoff and land cover parameters in residential cluster of small and medium towns in humid West Bengal (TMB)*" from 31-12-2018 to 29-03-2019 in the Department of Architecture and Regional Planning, IIT Kharagpur.

## PUBLICATIONS

1. Mukherjee, A., Sen, S., Paul, S. K. (2017), A Deviation from standard quality approach for characterization of surface water quality, International Journal of Sustainable Development and Planning, Vol. 12, No. 1, pp. 30-41.

   ISSN: 1743-7601 (paper format), ISSN: 1743-761X (online),
   http://www.witpress.com/journals DOI: 10.2495/SDP-V12-N1-30-41

2. Mukherjee, A., Sen, S., Paul, S. K. (2017), An approach to link water resource management with landscape art to enhance its aesthetic appeal, ecological utility and social benefits, Geophysical Research Abstracts, Vol. 19, EGU2017-1153, 19th EGU General Assembly 2017, the conference held on 23-28 April, 2017 in Vienna, Austria.
   Published/Hosted by Copernicus Group, ISSN (electronic): 1607-7962 http://adsabs.harvard.edu/abs/2017EGUGA..19.1153M

3. Mukherjee, A., Sen, S., Paul, S. K. (2016), Climate change and risk to water resource planning: needs proactive management, Extended Abstract Collection, Integrative Risk Management- towards resilient cities, In the proceedings of the 6th International Disaster and Risk Conference IDRC Davos 2016, 28 August to 01 September 2016, Davos, Switzerland, pp. 440-443.

4. Mukherjee, A. (2016), Proactive Management Strategies for Water Resources Planning to cope with climate change in India. Short Abstract Collection, Integrative Risk Management- towards resilient cities, In the proceedings of the 6th International Disaster and Risk Conference IDRC Davos 2016, 28 August to 01 September 2016, Davos, Switzerland, pp. 130.

5. Mukherjee, A., Sen, S., Paul, S. K. (2013), Conceptual Development of a Spatially Distributed Water Budget Model and Application in Indian Watersheds, In the proceedings of The International Conference on Adavances in Water Resources Development and Management (AWRDM) held on 23-27 October, 2013 organized by CAS,

Dept. of Geology, Panjab University, Chandigarh and National Institute of Hydrology, Roorkee, pp. 82-83.

## FELLOWSHIP & AWARDS

1. Received the **Early Career Scientist's** Travel Support award to join the European Geoscience General Assembly 2017 held in Vienna, Austria from 23 April to 28 April 2017.

2. Qualified the **UGC National Eligibility Test (NET)** for **Junior Research Fellowship (JRF)** and Eligibility for Lectureship on 29th April, 2010.

3. The Certificate of Merit in recognition of qualifying for awards of '**National Scholarships Scheme' in the Higher Secondary Examination from West Bengal** in 2002.

4. The Certificate of Merit in recognition of qualifying for awards of '**National Scholarships Scheme' in the MadhyamikPariksha from West Bengal** in 2000.

5. Awarded by **"Certificate d'ÉtudesPrimairesÉlémentaires de Français" by Municipality of Chandannagar, Hooghly, West Bengal** in 2000**.**

## SHORT-TERM COURSE/ WORKSHOP

1. Short-term course on "Advanced Surveying & Geo-information for Mining and Geo-Spatial Industries" offered by Indian Institue of Technology, Kharagpur, on 18-21 February, 2013.

2. Off-Campus outreach certificate course on ' Geospatial Technologies for Urban Planning' conducted by Indian Institute of Remote Sensing from February 11, 2016 to March 15, 2016.

3. A one day "Author Workshop" jointly organized by Springer and IIT Kharagpur on 12th February, 2014.

4. The symposium on 'Urban Informatics and AI-driven Analytics' held at the department of Architecture and Regional Planning, IIT Kharagpur on 9th and 10th April, 2018

5. The National Seminar on 'Environment and Development' held at the Central Glass and Ceramic Research Institute, Kolkata on February 22-23, 2008.

## SOFTWARE KNOWN

- ERDAS Imagine
- ArcGIS
- Vensim
- SPSS
- Microsoft Office

## LANGUAGES KNOWN

Bengali (Native), English, French, Hindi

## PERSONAL INFORMATION

| | | |
|---|---|---|
| Date of Birth | : | 10 September, 1983 |
| Gender | : | Female |
| Marital Status | : | Married |
| Nationality | : | Indian |
| Father's Name | : | Mr. Debnarayan Mukherjee |
| Husband's Name | : | Mr. Koushik Banerjee |
| Hobbies | : | Photography<br>A special interest in Dance and Aerobics, trained in Bharatanatyam (Kalakshetra).<br>Drawing & Painting. |

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Signature
Date: 17.05.2020

## APPENDIX : PUBLICATIONS (Preferable 3)

Publication Sl. No. 1

*A. Mukherjee, et al., Int. J. Sus. Dev. Plann. Vol. 12, No. 1 (2017) 30–41*

# A DEVIATION FROM STANDARD QUALITY APPROACH FOR CHARACTERISATION OF SURFACE WATER QUALITY

A. MUKHERJEE, S. SEN & S.K. PAUL
Architecture and Regional Planning, IIT Kharagpur, India.

ABSTRACT

Classification of water bodies into various classes of water use is a multi-criteria decision-making problem. Water Quality Index (WQI) and Analytic Hierarchy Process (AHP) were successfully used to assess overall water quality, but are not able to evaluate level of acceptability of water for specific use. Our objective is to develop a method of water quality assessment to evaluate the level of acceptability of a water body for specific use and to provide degree of potential effect of individual parameter on its overall quality. Here, AHP was modified and used to rank water bodies based on their quality. Modified AHP gave acceptable ranking of water bodies; but it failed to identify the reasons for what a waterbody got its corresponding rank. Therefore, a new approach of water quality assessment, named 'Deviation from Standard Quality (DSQ)' was developed. Calculation of positive or negative deviation from the desired threshold of water quality parameters is the key method of this approach. It denotes whether water could be used directly for the desired purpose or for which parameters and to what extent purification is required. We found inclusion or exclusion of any parameter had low sensitivity in evaluating ranking of the waterbodies by the DSQ method. This method was statistically validated. Empirical validation was done considering the field data obtained from Saraswati sub-watershed, Hugli, West Bengal.
*Keywords: alternative, analytic hierarchy process, deviation, index, parameter, water quality, waterbody, wateruse.*

## 1 INTRODUCTION

Assessment of existing water quality is the first step of wise use of waterbodies; determination of the designated use based on the result of water quality assessment is the next step. Designated use of a waterbody should be the highest attainable use and should consider social demand for its existing or desired use. If the existing or desired use is not attainable as per the authorized standards, immediate restoration is needed. Therefore, determination of the level of acceptability of a waterbody for a specific use is required.

Since 1960s, Water Quality Index (WQI) served as an important tool in water quality assessment [1–3]. The first attempt to categorise water according to its degree of purity was made by Horton [4] and a general WQI was proposed by Brown *et al.* [5]. Thereafter, a number of water quality indices (WQIs) were developed worldwide [6–9]. Review of different WQIs was carried out by various authors [2, 3, 10, 11]. Most of the attempts in developing WQIs took the approach of expert opinion that included a subjective constant [12, 13]. Many researchers took initiatives to develop WQIs with objective approach, like statistical indices those are not considered personal opinions regarding comparative weights of different parameters to be analysed [14–16]. The statistical methods developed till today had some other limitations. The 'objective water quality index' proposed by Harkins [14] was not suitable for

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Sujata Mukherjee
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WIT CONFERENCES
This paper is part of the Proceedings of the 13th International Conference on Modelling, Monitoring and Management of Water Pollution (Water Pollution 2016)
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DOI: 10.2495/SDP-V12-N1-30-41

Publication Sl. No. 2

Geophysical Research Abstracts
Vol. 19, EGU2017-PREVIEW, 2017
EGU General Assembly 2017


# An approach to link water resource management with landscape art to enhance its aesthetic appeal, ecological utility and social benefits

Anita Mukherjee (1), Somnath Sen (2), and Saikat Kumar Paul (3)

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Landscape art or land art is the discourse of scientific application of artistic skill to integrate man-made structures with the natural landscape for planning, design, management, preservation and rehabilitation of natural and built environment. It does beautification of the landscape enhancing its utility for habitats. Availability of water with acceptable quality is crucial for economic growth, social peace and equality and of course for environmental sustainability. Development of new and growth of existing urban and suburban units are obvious. It postulates the increase of population density and percent of the impervious area in an urban unit. The demand for water is increasing with progressive concentration of population, the volume and velocity of surface runoff increase and the travel time decreases. At the same time, an increase in the volume of gray water not only contaminate water bodies, it also reduces the quantity of available freshwater transforming a portion of blue and green water to gray one and would intensify the pressure on water resources of the area. Therefore, to meet the incremental pressure of demand for and pollution of water collection, treatment and reuse of wastewater, both sewage and storm water, are on the requirement to improve urban water security. People must be concerned not to stifle urban lives with concrete; rather must provide all basic amenities for achieving a higher standard of life than the previous one with the essence of natural green spaces. The objective of the study is to propose a conceptual design and planning guidelines for developing urban and suburban drainage network and reuse of surface runoff and sewage water utilizing less used natural water bodies, such as paleo-channels or lakes or moribund channels as retention or detention basin. In addition to wastewater management, the proposal serves to promote the aesthetics of environmental engagement, ecological utility and restoration of moribund channels incorporating the perception and principles of landscape art. Successful implementation of such project not only upgrade the aesthetic appeal of the process of water resource management but also would benefit the society reducing flood risk, creating riparian habitat and recreational sites and in long turn may help in climate change adaptation by reducing maximum temperature and increasing evapotranspiration.

Publication Sl. No. 3

Proceedings of the 6th International Disaster and Risk Conference

# IDRC Davos 2016
# Extended Abstract Collection

**Integrative Risk Management - towards resilient cities**
28 August - 01 September 2016
Davos, Switzerland

Edited by
Marc Stal
Daniel Sigrist
Susanne Wahlen
Jill Porturaro
James Glover
Nikki Bernabe
David Moy de Vitry
Walter J. Ammann

Global Risk Forum GRF Davos, Davos, Switzerland

GLOBAL RISK FORUM GRF DAVOS
GRF

# Climate Change and Risk to Water Resource Planning: Needs Proactive Management

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ABSTRACT: The phenomenon, climate change, spreads its impact over various aspects of environment and human habitat. Irregular monsoon, a direct impact of climate change enhances uncertainty to Indian agricultural economy either by sudden over-rain or drought or shifting pattern of rainfall. As rainfall, the basic input to water resource is subjected to highly irregular, a successful water resource planning even for five years is challenging. This study identified the components of water resource planning for agricultural sector, ascertained the components vulnerable to climate change, especially to erratic nature of monsoon and proposed some proactive risk management strategies. Data and information from Indian agriculture was used to analyze the impact of climate change on the components of water resource planning.

Keywords: climate change, agriculture, rainfall, water resource, sustainable development.

## 1. INTRODUCTION

Sustainable water resources management is a prerequisite for resilience of social, economic and environmental systems in the era of rapid urbanization and unpredictable climate changes. The degree and consequences of climate change varies across the globe; Droughts or water crisis and extreme weather events are the two severe living challenges to the world while the impact of long period of hot weather and rising sea level are felt by less (Stokes et al. 2015). Inability of adapting and mitigating climate change impacts was ranked 'as the most impactful global risk and third most likely to occur and water crisis as the third most impactful and ninth most likely to occur' in the report of the Global Risks Report 2016, 11th edition(The World Economic Forum 2016).

Conventionally, we know about the six pillars of agriculture: climate, water, land or soil, seeds, capital and human resources. Certainly, climate has the supreme control over all other components of agriculture. Changes in the pattern of hydrological cycle and its geographical distribution coupled with increasing frequency of extreme events adversely affect agricultural activity as well as the national economic growth and food security (UNEP 2008). Therefore, in water resources planning, strategies of climate change adaptation should be focused to deal with increasing variability of timing and intensity of precipitation and freshwater availability.

In this study, an attempt has been made to analyse theoretically the needs of implementing proactive strategies in water resource planning for agricultural sustainability and to develop a framework of an e-application that would help people to choose alternative options of agriculture during the crisis period as well as promote water-efficient agricultural practices.

## 2. NEEDS OF PROACTIVE MANAGEMENT: THEORITICAL ANALYSIS

When we think about sustainability or sustainable development, we desire that the coordination of natural events with the flow of human activities would follow the state of dynamic equilibrium and finally leads to achieve the steady state equilibrium.We do pre-planning to avoid unstable equilibrium. When the system is affected by any sort of disturbances like issues of climate change, we ought to find a way through which we can regain the state of stable equilibrium.

The concept of sustainable agriculture refers to making the agricultural system capable for self-regulation by negative and positive feedback mechanisms so that it can regain its previous state of equilibrium after facing disturbances. Here, we assumed that farmers were informed with the know-how of alternative agriculture, though they were liked to follow the conventional agricultural pattern during the normal climatic condition. Conventional agriculture referred to the cropping pattern and techniques used in agriculturenative to a particular region and did not use water efficiently. Alternative agriculture was defined as the system of agriculture that encourage the notion of 'more crop per drop' (Merrey 1997), i.e., adaptation with new cropping pattern and water-efficient technologies.The Figure1 illustrated an ideal situation that might happen if efforts had been made for promoting adaptive managementstrategies among people presuming risk and potential damage caused by climatic disturbances.

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