

## CURRICULUM VITAE

### Dr. PURUSHOTTAM SAUDAGAR DANGE

B.E. CIVIL,  
M. Tech. CIVIL (ENVIRONMENTAL ENGG.)&  
Ph.D. (ENGG.)



<b>Name</b>	<b>Dr. PURUSHOTTAM SAUDAGAR DANGE</b>
<b>Gender</b>	Male
<b>Date of Birth/Age</b>	15.05.1983 / 35 Yrs.
<b>Nationality</b>	INDIAN
<b>Category/ Religion/ Caste</b>	Open/ Hindu/Maratha
<b>Current Location of Work</b>	PUNE, MAHARASHTRA, INDIA
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<b>Teaching Experience</b>	5 Years
<b>Industry Experience</b>	6 Years

## EDUCATION

**Doctorate of Philosophy**, June 2017, SPPU, Pune

- ❖ **Title:** A Fuzzy Approach for Environmental Acceptability of Sewage Treatment Plant Using Natural Coagulant

**M.Tech. Environmental Engineering**, July 2009, VJTI, Mumbai

- ❖ CPI-5.7

### GATE 2007

- ❖ Percentile – 83

**B.E. Civil Engineering**, July 2006, STBCE, Tuljapur, Dr. B.A.M.U. A'bad.

- ❖ 73.33%, First Class with Distinction

**H.S.C. Science**, Oct 2001, Rajarshi Shahu College, Latur

- ❖ 58.00%, Higher Second Class

**S.S.C., June 1999**, Chh. Shivaji High school, Osmanabad

- ❖ 83.60%, First Class with Distinction

## EXPERIENCE

June 26<sup>th</sup>, 2019 to Till Date, ICEM, Pune

**Associate Professor in Civil Engineering**

August 1<sup>st</sup>, 2017 to June 25<sup>th</sup>, 2019, DYPIT, Pimpri, Pune

**Associate Professor in Civil Engineering (02 Years)**

December 5<sup>th</sup>, 2014 to July 31<sup>st</sup>, 2017, Ashok Constructions, Pune

**Project Manager (02 Year 06 Months)**

August 1<sup>st</sup>, 2013 to December 4<sup>th</sup>, 2014, JSPM's NTC, Narhe, Pune

**Assistant Professor in Civil Engineering (01 Year 04 Months)**

November 26<sup>th</sup>, 2012 to July 30<sup>th</sup>, 2013, MESCOE, Pune

**Assistant Professor in Civil Engineering (08 Months)**

April 24<sup>th</sup>, 2012 to November 24<sup>th</sup>, 2012, SSB Engineers, Talegaon, Pune

**Project Manager (08 Months)**

August 4<sup>th</sup>, 2011 to April 23<sup>rd</sup>, 2012, SIT, Lonaval, Pune

**Assistant Professor in Civil Engineering (08 Months)**

August 1<sup>st</sup>, 2009 to July 30<sup>th</sup>, 2011, Ashok Constructions, Pune

**Project Manager (02 Years)**

September 18<sup>th</sup>, 2006 to June 30<sup>th</sup>, 2007, MRM Pvt. Ltd., Surat

**Site Engineer (09 Months 12 Days)**

## AWARDS/ACHIEVEMENTS

- ❖ **First prize** for research article "Sewage Water Quality Index of Sewage Treatment Plant Using Fuzzy MCDM Approach." Presented in Fifth International Conference on Fuzzy and Neuro Computing (FANCCO - 2015), at IDRBT Center of Excellence in Analytics Hyderabad, Sponsored by Springer International Publishing Switzerland.

## PATENTS

Title	Status
❖ Vascular Bundle of wasted leaf stalk of coconut tree as a natural coagulant to treated sewage water	Published in Journal of Patent
❖ Acceptability of sewage treatment plant on the basis of water pollution potential and quality	Published in Journal of Patent
❖ Delay, Cost and Wastage potential in construction of residential and commercial building	Published in Journal of Patent
❖ Safety Status for a Highway Project	Published in Journal of Patent
❖ An evaluation of optimum percentage of pond ash in concrete using fuzzy approach	Published in Journal of Patent

## PUBLICATIONS

### INTERNATIONAL JOURNAL

- Paper published on “A Treatment of Sewage using Natural Coagulant”. **International Journal of Emerging Technologies and Applications in Engineering, Technology & Sciences**, April 2015.
- Paper published on “Upgrading Conventional Sewage Treatment Process by Using Mangifera Indica” **International Journal for Scientific Research and Development**. Volume: 3, Issue: 2. May 2015.
- Paper published on “A Treatment of Domestic Sewage and Generation of Bio Sludge using Natural Coagulants” **International Journal of Research in Engineering and Technology**. Volume: 4 Issue: 7 July 2015.
- Paper published on “Vascular Bundle of wasted leaf stalk of coconut tree as a natural Coagulant to Treat Sewage Water.” **Indian Journal of Science and Technology**. Vol 9(44), November 2016.
- Paper published on “A Fuzzy Rule Based System for an Environmental Acceptability of Sewage Treatment Plant.” **Korean Society of Civil Engineers (KSCE) Journal of Civil Engineering [Springer]**, Volume 21, Issue 7, pp 2590–2595, 2017.
- Paper published on “Domestic Waste Water Treatment Using Modified Root Zone Technology”. **International Journal for Scientific Research and Development**, October 2017.
- Paper published on “Construction and Demolition Waste Its Reuse and Recycle and its Cost Benefits”. **International Journal of Management Technology and Engineering**, July 2018.

### PROCEEDINGS

- Paper published on “Sewage Water Quality Index of Sewage Treatment Plant using Fuzzy MCDM Approach.” **Advances in Intelligent Systems and Computing** Proceedings of the Fifth International Conference on Fuzzy and Neuro Computing (FANCCO - 2015) **Springer International Publishing Switzerland, Dec. 2015**.
- Paper published on “Fuzzy Sludge Quality Index on the basis of Fertilizer Potential after Primary Clarifier.” **ELSEVIER Procedia Technology** Proceedings of International Conference on Emerging Trends in Engineering, Science and Technology (ICETEST - 2015) **2016**.
- Paper accepted for published on “Enhancement of Stabilization Pond for Nitrification and De-nitrification of Sewage.” **Springer Publications** Proceedings of International Conference on Advanced Technologies for Societal Applications (Techno-Societal 2018) **2018**.

## CONFERENCE

- Paper presented on “Sewage Water Quality Index of Sewage Treatment Plant using Fuzzy MCDM Approach” at **5<sup>th</sup> International Conference on Fuzzy and Neural Computing (FANCCO 2015)** held from 17<sup>th</sup> to 19<sup>th</sup> December 2015 at **Institute for Development and Research in Banking Technology, Masab Tank, Hyderabad.**
- Paper presented on “Fuzzy Sludge Quality Index on the basis of Fertilizer Potential after Primary Clarifier” at **International Conference on Civil Engineering Advancements for Sustainable Infrastructure Development and Environment (CEASIDE-2015)** held from 9<sup>th</sup> to 11<sup>th</sup> December 2015 at **Government Engineering College Trichur Engineering College, Thrissur, Kerala.**
- Paper presented on “A Treatment of Sewage using Natural Coagulant” at **International Conference on Research, Design and Development in Engineering, Management & Sciences (IC-RDD-EMS-2015)** held on 26<sup>th</sup> April 2015 at **Kalol Institute of Technology & Research Centre, Kalol, Gujarat.**
- Paper presented on “Enhancement of Stabilization Pond for Nitrification and De-nitrification of Sewage” at **International Conference on Advanced Technologies for Societal Applications (Techno-Societal 2018)** held on 14 and 15, December 2018 at **SVERI, SCOEP, Pandharpur, Maharashtra.**

## FDP/WORKSHOPS ATTENDED

- Participated in two days workshop on “Outcomes –Based Education” conducted by DYPIET in association with IUCEE on January 9<sup>th</sup> and 10<sup>th</sup>, 2016.
- **Organized and Participated** a two days onsite National Level Workshop On “Water Conservation with Ferro-cement and Fiber Cement” in Association with IWWA; Jalvardhini Prathishthan & Srushti Club during 10<sup>th</sup> & 11<sup>th</sup> October, 2017.
- **Coordinated and Attended** a National Level Seminar On “Role of Civil Engineers in Sustainable Urban Development” Organized Under QIP, BCUD, SPPU, during 21<sup>st</sup> and 22<sup>nd</sup> December, 2017.
- Attended a two days conference on “Innovative Water and Sewage Management Practices in Urban Environment” Organized by IWWA, Mumbai Centre and IIT Powai, Mumbai during 20-21 January 2018.
- Participated in one day workshop on “Standard Test Methods for Analysis of Waste water” organized by PCCOE, Pune on 15<sup>th</sup> June 2018.
- **Coordinated and Participated** a two days workshop on “Enhancing Durability with Advanced Waterproofing Practices” organized by Dr. Fixit Institute Mumbai at DIT, Pimpri, Pune during 30-31 August 2018.

## OTHER WORKS OF RELEVANCE

### SOCIAL WORK

- Delivered a lecture on **“Rural Sanitation”** at **Z. P. Primary School, Ghonshet, Maval, Pune 410507.**
- Coordinated an awareness rally **“World Peace Water Walk”** with India’s water man, **Mr. Rajendra Singh** at Dr. D. Y. Patil Institute of Engineering and Technology, Pimpri, Pune.
- Coordinated **“An Environmental Awareness Rally”** with Srushti Environmental Awareness Club, Dr. D. Y. Patil Institute of Engineering and Technology, Pimpri, Pune at Pimpri Chichwad.
- Organized Street play on social and environmental issues with Srushti Environmental Awareness Club, Dr. D. Y. Patil Institute of Engineering and Technology, Pimpri, Pune
- Coordinated **“Tree Plantation”** with Srushti Environmental Awareness Club, Dr. D. Y. Patil Institute of Engineering and Technology, Pimpri, Pune at Sewage Treatment Plant, Pimpri Chichwad.
- Organized Poster Presentation Competition on occasion of Youth Day Celebration with Srushti Environmental Awareness Club, Dr. D. Y. Patil Institute of Engineering and Technology, Pimpri, Pune.
- Delivered a session on **“Water Knowledge Center a Social and Technical Perspective”** at **TATA Motors Pimpri.**
- Delivered a session on **“Ozone Depletion”** at **TATA Motors Pimpri.**
- Delivered a lecture on **“Sanitation and Cleanliness”** at **Z. P. Primary School, Vadgaon, Maval, Pune 410507.**

### DEVELOPMENT OF LABORATORY

- Setting up of Basic Civil and Environmental Engineering and Mechanics Laboratory at SIT, Lonavala, Pune.
- Setting up of Environmental Engineering and Transportation Engineering Laboratory at JSPM’s NTC, Pune.
- Setting up of Environmental Engineering Laboratory at DIT, Pune.
- Setting up of **Center of Excellence Laboratory** in association with **Dr. Fixit Institute** at DIT, Pune.

### ADMINISTRATIVE WORK

#### **M. R. M. Pvt. Ltd. Surat**

#### **Site Engineer**

- Drafted Drawing of Site office
- Site incharge for Site office building construction
- Team Leader for Survey Work for NH 8 (Kim Circle To Surat)
- Incharge Maintenance Engineer - Mumbai Pune Express Way

### **Ashok Constructions, Pune**

#### **Project Manager**

- Involved in activities like design and drafting quotations.
- Manage activities like resource planning, execution of different construction on site.
- Involved in activities like estimation and billing.
- Handled team of Engineers, supervisors and labors on site.

### **Sinhgad Institute of Technology, Lonaval, Pune**

- Working as a **committee member** for documentation of **NBA** work.
- Working as Class Teacher of F.E. class.

### **SSB Engineers, Talegaon Dabhde, Pune**

#### **Project Manager**

- Involved in activities like design and drafting quotations.
- Manage activities like resource planning, execution of different construction on site.

### **Modern Education Society's College of Engineering, Pune**

- Working as a **committee member** for documentation of **NBA** work.
- Working as Class Teacher of F.E. class.

### **JSPM's Narhe Technical Campus, Narhe, Pune**

- **Incharge** of Environmental Engineering Laboratory.
- **Training and Placement Coordinator**, Department of Civil Engineering.
- **Co-ordinator** for **"Paper Presentation Competition"**.
- Working as a **committee member** for documentation of **NBA** work.

### **Ashok Constructions, Pune**

#### **Project Manager (Quality)**

- Manage operations to ensure materials and construction practices meet construction standards and guidelines.
- Test, inspect, and examine construction sites and equipment.

### **Dr. D. Y. Patil Institute of Engineering and Technology, Pimpri, Pune**

- **Industry Institute Interaction Cell** - Departmental Coordinator
- **Innovation & Entrepreneurship Development Cell** – Departmental Coordinator
- **Testing and Consultancy Cell** - Departmental Coordinator
- **Incharge** of **Water Knowledge Center**.
- **Training and Placement Coordinator**, Department of Civil Engineering.
- **Srushti Environmental Awareness Club Faculty Coordinator**
- Working as a **committee member** for documentation of **NAAC** work.
- Working as a **Criteria Coordinator** and **committee member** for documentation of **NBA** work.

## MAJOR WORK OF RELEVANCE

### TESTING AND CONSULTANCY

Actively involved in the testing and consultancy in the field of Civil Engineering:

- Environmental Engineering
- Concrete Technology

### OTHER

- As a Project manager completed six construction projects individually.
- Delivered an Expert lecture on “**Project Economics and Financial Management**” at Working Engineers training Program organized by (PWD) Public Works Department Osmanabad.

**Place:** Pune, Maharashtra, India

**Dr. Purushottam Saudagar Dange**



# A Fuzzy Rule Based System for an Environmental Acceptability of Sewage Treatment Plant

Purushottam S. Dange\* and Ravindra K. Lad\*\*

Received August 31, 2016/Revised December 12, 2016/Accepted December 21, 2016/Published Online March 7, 2017

## Abstract

An involvement of human awareness in the process of decision making implies great complexity in acceptability of Sewage Treatment Plant (STP) on the basis of environmental quality of receiving water bodies. Social environment, physical surrounding and economic constraints have an effect over complex human perception. An importance of pollution parameters in determining an acceptability of STP has a major bearing on the human decisions. Both the decision processes are complex with higher degree of subjectivity involved and therefore call for the analytical computing tools which can imitate the behaviour and bring the results close to the reality. A treated sewage from STPs is generally disposed in water bodies without considering Environmental Quality, which promotes degradation of quality of water bodies. An attempt has been made to formulate Fuzzy Rule Based System (FRBS) for an environmental acceptability of STPs, based on their water pollution potential and Environmental Quality of water body. An Environmental acceptability with degree of certainty of these STP has calculated to justify the quality of treated sewage as one value by considering all parameters. A case study of Sewage Treatment Plants which are located in the vicinity of Pimpri, Pune, Maharashtra, India is also incorporated in this study.

**Keywords:** *fuzzy rule base system, environmental acceptability, sewage treatment plant, water pollution potential status, quality of receiving water body*

## 1. Introduction

A natural environment is disturbed due to increase in pollution levels. Jahagirdar *et al.* (2015) discussed issues related to waste water generation and sludge generation from textile industries. Jha and Singh (2008) discussed about river quality and described concentration of pollution changes with time and space of river water. The permissible limits prescribed by the regulatory agencies allow discharging treated wastewater of Sewage Treatment Plant in the receiving water bodies. Depletion of water and rising pollution load in receiving water body with time are the serious matter. Disposal of treated sewage water without adequate dilution, within the pollution norms also contributes in overall environmental degradation. Disposal norms set by authorities long back and present environmental quality of receiving water bodies are degraded which is a serious issue in disposal of treated sewage from STPs. For example, quality of Treated sewage based on parameter Chemical Oxygen Demand [COD], For COD disposal standards set by the Central Pollution Control Board is 250 mg/l when disposed in the surface water body. This indicates the crisp value of effluent stream for COD of 251 mg/l, disobeys standard disposal norms but the effluent with 248 mg/l

of COD disposing the effluent within the defined norms and are no legal offence. On the other side, the present environmental quality of receiving water body is already degraded, so even COD of 150 mg/l also contributes in pollution of water bodies. So consideration of Environmental quality of receiving water body is also important to check an acceptability of Sewage Treatment Plant. From the Fuzzy Rule-Based System (FRBS) results, STP can be classified as low, medium, high and very high pollution potential and on the basis of pollution potential of STP and pollution quality of water body, an environmental acceptability of STP can be calculated as Highly Acceptable [HA]; Acceptable [A]; Just Acceptable [JA]; Not Acceptable [NA].

Other computing methods like Multi Criteria Decision Making and Analytical Hierarchy Process are available for the calculation of index value but it is difficult to interpret acceptability in different linguistic terms like HA, A, JA and NA with particular degree of certainty between 0 and 1 value. In FRBS method, it is also possible to classify pollution potential and Environmental Acceptability with degree of certainty. For example, rules can be defined like; If Physical Status of Treated Sewage Water is [LOW] and Chemical Status of Treated Sewage Water is [LOW]

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International Conference on Emerging Trends in Engineering, Science and Technology (ICETEST  
- 2015)

## Fuzzy Sludge Quality Index on the basis of Fertilizer Potential after Primary Clarifier

Ravindra K. Lad<sup>a</sup> and Purushottam S. Dange<sup>b</sup>

<sup>a</sup>Dean Administration and Professor, Department of Civil Engineering, D.Y.P.I.E.T., Pimpri, Pune 411018, MH, India,  
Savitribai Phule Pune University, Pune, MH, India

<sup>b</sup>Research Scholar, Department of Civil Engineering, D.Y.P.I.E.T., Pimpri, Pune 411018, MH, India,  
Savitribai Phule Pune University, Pune, MH, India

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### Abstract

The sludge is generated from the two treatment units of Sewage Treatment Plant (STP) like primary and secondary clarifier. In the activated sludge process, the sludge produced after secondary clarifier can be recycled and wasted sludge can be used as fertilizer after sludge treatment. The chemical sludge produced from primary clarifier is not suitable to be used as fertilizer because of the use of chemical coagulants for coagulation process. As considering this problem, a pilot plant study was done using natural coagulants to produce pure bio sludge. A methodology is also developed for ranking of different STPs on the basis of fertilizer potential of sludge from primary clarifier by developing Fuzzy Sludge Quality Index (SQI). A case study of three STPs which are located in Pimpri Chinchwad Municipal Corporation, Pimpri, Pune, Maharashtra, India is also incorporated in this study.

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(<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Peer-review under responsibility of the organizing committee of ICETEST – 2015

**Keywords:** Fuzzy Sludge Quality Index; Multi Criteria Decision Making; Ranking of STPs; Fertilizer Potential and Natural Coagulants.

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### 1. Introduction

The treatment of sewage or waste water is a nuisance and costly affair for concern authorities. Similarly, using chemicals for treatment, leads to degradation of environment.

An attempt has been made in this study to resolve this issue. Actually, generated bio-sludge after secondary

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# Vascular Bundle of Wasted Leaf Stalk of Coconut Tree as a Natural Coagulant to Treat Sewage Water

Purushottam S. Dange<sup>1\*</sup> and Ravindra K. Lad<sup>2</sup>

Department of Civil Engineering, Dr. D. Y. Patil Institute of Engineering and Technology,  
Savitribai Phule Pune University Pune 411018, Maharashtra, India;  
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## Abstract

**Objectives:** To enhance conventional sewage treatment by natural coagulation to remove TSS, BOD and COD with better efficiency, to reduce the energy required in secondary treatment operation and to produce plant nutrients as bio sludge in the primary treatment process. **Method:** Chemical sludge generated through coagulation and flocculation is one sort of chemical waste. The use of the chemicals to treat sewage, generates an enormous quantity of sludge which pollutes an environment by its disposal. Conventional sewage treatment based on microbial metabolism may also affect due to dissolve concentration of chemicals in sewage by chemical coagulation. In water treatment, natural coagulants are effectively used as alternatives to chemical coagulants. Yet limited work has been observed on treatment of sewage by natural coagulants. This study carried out to check potential and use of the extract from 'Vascular Bundle' a fibrous material (**VBPCN**) of wasted leaf stalk [Petiole] of coconut tree [*Cocosnucifera*] as a natural coagulant and in combination with Alum to treat sewage. **Findings:** From this study, it is seen that the BOD and TSS are removed with efficiency of 50% and 70% respectively after primary treatment and therefore, reduced the organic load on secondary treatment units. The Primary Sludge is also enriched with plant nutrients. **Novelty /Improvement:** Present inventions upgrades conventional sewage treatment process, reduce use of energy for treatment, reduces land area required to establish treatment units, easily handle fluctuations in flow and characteristics of sewage and minimized the overall cost of treatment.

**Keywords:** Clariflocculator, Natural Coagulant, Plant Nutrients, Sewage, VBPCN

## 1. Introduction

Sewage a waste generated through human activity treated and disposed off in the surface water body or on land. Inadequate treatment process and improper infrastructural facilities to handle sewage water cause failure of the conventional treatment process. This leads to polluting an environment. Solid waste dumping and sewage disposal are responsible for contamination of ground water resources. Generally, the chemical coagulants are used to handle situations arises due to fluctuation in flow, characteristics of sewage and failure of secondary treatment. Another side of chemical treatment generated enormous quantity of chemical sludge as a type

of solid waste; dissolved chemicals lead to the adverse effect on microbial activities of secondary treatment and cost of chemicals are also high. Natural coagulants proved efficiency in treatment of water. In sewage treatment, natural coagulants can be best alternative to handle adverse situations like seasonal fluctuations in flow, characteristics, and failure of secondary treatment. Natural coagulants may also upgrade conventional sewage treatment with improved BOD, COD and TSS removal efficiency in the primary process.

Water crises force to think about minimization of waste water generation as well as recycling water for different purposes which leads to conserve natural fresh water resources. Treatment of sewage up to recycling

\* Author for correspondence

# Study of Construction and Demolition waste for reuse and recycle

Mr. A. R. Makegaonkar<sup>1</sup>, Dr. P. S. Dange<sup>2</sup>, Mr. R. B. Waghmode<sup>3</sup>

<sup>1,2,3</sup>Department of civil Engineering, Dr. D. Y. Patil institute of technology, Pimpri, Pune

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**Abstract:** The construction and demolition waste is the waste mainly generated from the two activities i.e. from the construction activity and demolition activity. The waste which is produced during construction activities are called as construction waste and the waste produced during demolition activities are called as demolition waste. The Demolition waste is generated from the demolition of old structures like buildings, bridges, malls and roads. Construction industry in India generates about 20-32 million Tons of waste annually. So this C and D waste should be managed properly. Most of the construction and demolition waste in India is getting disposed into the landfills. This may lead to the environmental pollution. The rules and regulations regarding to the land filling disposal are not implemented properly So this paper is expected to reduce the landfill disposal of the construction and demolition waste and to achieve the aim of reuse and recycle of that construction and demolition waste. The objective of this paper is to study the various strategies of the reusing and recycling of the C & D waste adopted by different countries. The paper also focus on the recycling of the aggregate for its reutilization in the construction activities, so that by using the Recycled aggregate the cost of the project also gets down. By taking the sample tests in the Pune region the recycling of the aggregate is done and which can be used for the pavement designs and other construction purposes.

**Keywords:** demolition waste<sup>1</sup>; disposal<sup>2</sup>; recycle<sup>3</sup>; reuse<sup>4</sup>; pollution<sup>5</sup>

## 1. INTRODUCTION

The infrastructure of India is growing rapidly so that fast growth of construction industry will cause the generation of construction and demolition waste therefore proper management of construction and demolition waste should be needed. Reusing and recycling is one of the measures to reduce the construction and demolition waste. The market demands for the material which is used for the construction purpose is more and the supply of the material is low comparing with the demand so to attain the demand of the market recycling is one of the major aspects. So reusing and recycling is the important term in the market to satisfy the demand of construction material in the market. Concrete is the major product of

the construction and demolition waste. So by applying recycling techniques we can recycle the ample amount of good quality of aggregate. Recycling of aggregate material from construction and demolition waste may reduce the demand-supply gap in the construction market. The aggregate from the construction and demolition waste can be utilized from the construction and demolition waste by applying some tests over it. Aggregate is one of the major components which get recycled. So that aggregate recycling helps to reduce most of the construction and demolition waste. In this paper we perform some tests on construction and demolition waste and try to recycle the good quality of aggregate from the construction and demolition waste. So that by proper construction and demolition waste recycling we can recycle almost 50 to 60 percent of aggregate and some amount of sand, silt and clay also utilized. The recycled aggregate can be used for the pavement designs as well as many other construction purposes also. So that the recycling of aggregate may meet the demand of market and it may help to reduce the demand of natural resources also. And automatically it will reduce the environment pollution.

## 2. AIM AND OBJECTIVE

The construction and demolition waste management is one of the vast aspects of the construction industry. The main aim of this project is to reduce the construction and demolition waste generated by reusing and recycling the construction and demolition waste our approach is to fulfill the increasing demand of the resources by providing the recycled materials and to minimize the earth pollution. The main objectives the project is as follows

- To study demolition waste management policies of different countries.
- To study the role of regulatory authorities in demolition waste management.
- To study the C and D waste generation, its sources and streams.

# Sewage Water Quality Index of Sewage Treatment Plant Using Fuzzy MCDM Approach

Purushottam S. Dange and Ravindra K. Lad

**Abstract** Sewage produced from the human activity leads to pollute an environment. A tremendous environmental degradation because of less focus on pollution due to sewage. Therefore, it is required to revise pollution control strategies. This problem is taken into consideration and a feasible method is proposed for ranking of Sewage Treatment Plants (STPs) based on their environmental pollution potential. The sensitivity analysis is also includes in this study to see variation in the pollution potential of STPs. This analysis can be used for making policy of paying tax on the basis of pollution potential to control the pollution. The framed method explained in the paper using Fuzzy Multi Criteria Decision Making (FMCDM) for ranking the STPs is one of the important methods in decision problems. The case study is also incorporated which relates to three Sewage Treatment Plants located in Pimpri Chinchwad Municipal Corporation, Pimpri, Pune, Maharashtra, India.

**Keywords** Sewage water quality index · Fuzzy multi criteria decision making · Linguistic variable and ranking of sewage treatment plant

## 1 Introduction

Ever increasing pollution levels are primarily responsible for impairing natural environment. The permissible limits set by the pollution control authorities permit to discharge treated sewage of Sewage Treatment Plant in the receiving water bodies (e.g. rivers, streams and alike). The water flow is depleting in water bodies

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