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Vol 1 Issue 1 (Jan - June 2023)

An official publication of Bhagwan Mahavir University, Surat

"SAMHITA" *Multi- Disciplinary Research Journal*

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"In the vast landscape of academic publishing, 'SAMHITA', a Multi-Disciplinary Research Journal, holds a unique and esteemed position. Published under the aegis of Bhagwan Mahavir University, Surat, this journal is not merely a platform for scholarly discourse but also a reflection of the university's commitment to fostering research and intellectual growth. As an official publication of Bhagwan Mahavir University, Surat, 'SAMHITA' encapsulates the institution's vision and dedication to academic excellence. Every article, research paper, and editorial published within its pages is a testament to the rigorous standards and values upheld by the university. The ownership and rights to 'SAMHITA' are securely vested with Bhagwan Mahavir University, ensuring that its legacy of quality and integrity remains uncompromised."

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Editorial board

Message from Chief Patron

Shri. Anil Jain
Founder Member & Managing Trustee, Bhagwan Mahavir Education Foundation, Surat, Gujarat, India

I am honored to present the inaugural issue of the "SAMHITA" Multi-Disciplinary Research Journal, an official publication of Bhagwan Mahavir University, Surat. This journal embodies our commitment to academic excellence, fostering communication between scholars, and promoting innovative ideas in the sciences.

I'd like to commend the dedication of Bhagwan Mahavir University and the Editorial team in bringing this initiative to fruition. I anticipate fruitful collaborations in upholding the high standards of this journal. Our vision with SAMHITA is not just to present research, but to stimulate discussions, provoke thought, and inspire future investigations. We believe that in today's interconnected world, multi-disciplinary research is the keystone to innovation and progress.

Wishing everyone a valuable learning experience from this first issue!

A Message from Chief Patron

It is my pleasure and great privilege to present to you the introductory issue of "SAMHITA" Multi-Disciplinary Research Journal the official publication of Bhagwan Mahavir University, Surat. University Journals aims to provide high quality, reviewed, open access infrastructure for scholarly articles and other products of research.

"SAMHITA" Multi-Disciplinary Research Journal is a small step towards achieving our quality standard initiatives for academic excellence. Academic journals enable communication between scholars, form the basis for the development of further ideas, and track emerging ideas in the field of sciences. The journal provides an apt platform for reporting significant findings of research for both college teachers and students. The papers submitted to the journal undergo a rigorous peer review process.

Prof. Sanjay Jain
President, Bhagwan Mahavir University, Surat, Gujarat, India

I am delighted to congratulate Bhagwan Mahavir University and the Editorial team, for their commitment and drive in launching the journal. I also look forward to our teamwork in creating guideline to maintain the good standards of journal.

I wish you all have a good learning experience from this first issue of journal!!

A Message from Patron

Dr. Nirmal Sharma
Provost, Bhagwan Mahavir University, Surat, Gujarat, India

In this era of industrial development and the economic growth scenario, research has become a backbone of the progress. Industry and academia needs to go hand in hand for the entire process of the development. Our economy is required to be routed from developing country to the developed country.

Research publications by the scholars from the Universities can and will bring a desired change in industrial and economic growth. I am pleased to extend my most sincere congratulations to Bhagwan Mahavir University and the Editorial team, whose dedication, commitment, and scholarly excellence is reflected by publishing first issue of "SAMHITA" Multi-Disciplinary Research Journal under the umbrella of Bhagwan Mahavir University. "SAMHITA" Multi-Disciplinary Research Journal showcases the creative and multidisciplinary publication of Master's and Doctoral students in subject areas that include Engineering, Pharmacy, Science, Management, Commerce, Computer Application, Health Science, Education & Humanity. The journal culminates and disseminates the excellent research and scholarly contributions of faculties, research scholars & students.

I want to extend my most sincere congratulations to editorial team of Bhagwan Mahavir University and to faculties research scholars who, submitted their review article research work, reviewed the manuscripts, and managed the publication of this journal.

It is a privilege and a pleasure to promote and share this first issue of the first volume of the Journal.

Message from Editor-in-Chief

"**Learning gives creativity, creativity leads to thinking, thinking provides knowledge and knowledge makes you great.**" - Dr APJ Abdul Kalam.
We are very glad to present the first volume of multi-disciplinary research journal of Bhagwan Mahavir University with title quot ;SAMHITA" Multi-Disciplinary Research Journal.

Dr. Zarna Dedania
Editor-in-Chief, "SAMHITA" Multi-Disciplinary Research Journal

This volume contains a wide range of research papers covering different spectrums of Engineering, Pharmacy, Science, Management, Commerce, Commuter Application, Health Science, Education and Humanity. Authors from different areas like technical, personnel, academicians and Multi-Disciplinary Researchers contributed peer quality research papers to this Journal. This journal will be very helpful to develop a new breed of Entrepreneurs and Research Scholars.

We would like to place in record the patronage and support provided by Board of Management and our beloved, BMU Provost Dr. Nirmal Sharma, Research Dean, Dr. Vineet Jain and other authorities of BMU for their encouragement in publishing this pharmaceutical research journal. The journals aim to publish a broad ranging open access journal, eminent editorials from thought out the nation, rapid publication High visibility, Expert peer-reviewed research that will serve to create innovative information.

We invite the researchers to share knowledge and research activities in the form of review and research article for the publications at "SAMHITA" Multi-Disciplinary Research Journal and hence contribute to the field of innovative research that will serve to create a holistic understanding of the human dimension in these society.

Thankful to Dr. Pooja Desai amp ; Mr. Naishadh Solanki, Associate Editor of Journal for successfully bringing this issue at right time. At the end, we hope that this issue of "SAMHITA" Multi- Disciplinary Research Journal would fortify the bond between industry, researcher amp ; academia fostering evolution of the multi-disciplinary spectrums to nation.

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About Journal

"SAMHITA" Multi-Disciplinary Research Journal (SAMHITA) is a peer reviewed, open access, official journal of Bhagwan Mahavir University, Surat in India. Journal serves local as well as a global platform for Engineering, Pharmacy, Science, Management, Commerce, Computer Applications, Health Science, Education, Architecture & Humanity research which can generate and strengthen the scientific evidences. The journal's full text is available online at Website http ://journals.bmusurat.ac.in. The journal allows free access (Open Access) to its contents and permits authors to self-archive the final accepted version of the articles.

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About Bhagwan Mahavir University

Bhagwan Mahavir University is committed to inclusion and innovation in education through philanthropy and pioneering initiatives. Bhagwan Mahavir University provides world-class education and empowering opportunities for all sections of society. As the world of business and job opportunities are changing rapidly, we are evolving to make our students not just job-ready but also life-ready, to help them see learning as a continuous process and become future-ready professionals.

Aim & Scope

"SAMHITA" Multi-Disciplinary Research Journal (SAMHITA) is issued under the patronages of Bhagwan Mahavir University, Surat in India. SAMHITA is a national journal which published six monthly in English. Journal publishes papers, review articles, and short communications dealing with all aspects of the Engineering, Pharmacy, Science, Management, Commerce, Commuter Application, Health Science, Education and Humanity subjects that are of interest to all professionals with strong emphasis on originality and scientific quality.

Editorial policy

"SAMHITA" Multi-Disciplinary Research Journal (SAMHITA) is committed to the timely publication of peer-reviewed articles in journals. SAMHITA requires all authors to comply fully with current ethical standards for publication in their disciplines. Manuscripts submitted to the journal must represent reports of original research, and the original data must be available for review by the editor if necessary. All authors of a manuscript must have agreed to its submission and are responsible for its content, including appropriate citations and acknowledgments, and must also have agreed that the corresponding author has the authority to act on their behalf in all matters pertaining to publication of the manuscript. By submission of a manuscript to the journal, the authors guarantee that they have the authority to publish the work and that the manuscript, or one with substantially the same content, was not published previously, and is not

being considered for publication elsewhere. When submitting papers for publication, it is expected that the authors will provide written assurance and describe the novelty of their work or in the approach taken in their research in a covering letter.

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Nosodes - A Jewel in Homoeopathy : Needs Scientific a Basis of Pharmacological Proving

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Abstract : "Nosodes are homeopathic remedies prepared by source from microbial culture, viruses, fungi, pathological secretions, and excretions of disease individuals. They are used in the treatment of various acute, intercurrent, and chronic diseases in homeopathic practice. All the homeopathic remedies were proven long back by evaluating their effect on healthy individuals and notifying volunteers subjective and objective symptoms. There is a paucity of the available scientific basis for the method of their preparation, standardization, purity, efficacy, and mechanism of action of these remedies Even after advancements in modern technologies, no additional studies have been conducted to prove their all-aforementioned characteristics that limit the acceptance of these remedies in modern science. As per the regulatory requirement, homeopathic remedies are included in the Drug and cosmetic act 1940, therefore it's necessary to produce data on toxicity in laboratory animals as per Schedule Y if anyone needs to introduce a new drug or formulation clinically. The main aim of this review is to compile the essential experimental in vitro and in vivo pharmacological findings of nosodes to trace out available literature, mode of action, and efficacy/toxicity profile to open another area of research for young researchers.

Key Words : Nosodes, Homeopathy, Pharmacology, *in vitro*, *in vivo*, Psorinium, Tuberculinum, Carcinocinum.

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1. Introduction

Nosodes are broad-spectrum, widely used, potentized isopathic preparations that homeopaths use in regular clinical practice to treat various diseases [1,2]. All the nosodes are prepared by homeopathic standards of drug preparation. In the homeopathic system of medicine, remedies are prepared by a process termed potentization or dynamization. The process of potentization or dynamization helps the crud drug material open to potential nanoparticles and relatively nullify the toxic effect of the crud drug[2]. Isopathy is an the approach in homeopathy that used nosodes in the treatment of acute and chronic diseases. In isopathy, the remedies are prepared from the the same material that is capable of producing a disease condition using the potentization process.

In homeopathic practice, nosodes are an essential part. They are frequently used by homeopaths as common, intercurrent, chronic, and acute remedies depending on the background knowledge, experience, and expertise of prescribing physician [3]. The first nosode was prepared by Dr. Hering in 1830. Between 1875 to 1925, most of the other nosodes were prepared [4]. Lack of availability of advanced and sophisticated limits the standardization process of nosodes concerning their safety, efficacy, characterization, purity, and microbial count. In 1901 Homoeopathic Pharmacopeia of the United States established guidelines for the preparation of nosode. The commonly used major nosodes like Psorinium, Medorrhinum, Symphilinum, Tuberculinum, pyrogenic, carcinocinum, and variolinum are developed before 1901. After that none of this, these nosodes were remade by using guidelines[2]. Even a paucity of literature available on the method of preparation, proving, standardization, purity, and efficacy limit the acceptance of nosode in modern science. All homeopathic medicines including nosodes are based on the principle of "Similia, similibus, curentur" which means the "like cure by like" concept introduced by Dr. Samuel Hahnemn is a 'founder of homeopathy [1]. Several homeopathic remedies are being used clinically for decreasing the severity, complete elimination of disease state, and prevention starting from a simple cough or cold to major diseases like cancer, asthma, autoimmune diseases, rheumatic disorders, and metabolic diseases. These remedies are prescribed by homeopaths who understand the subjective and objective symptoms of a patient [3]. All the available homeopathic remedies were proved by direct administration of prepared remedies to healthy volunteers and notifying the subjective and objective symptoms, while the efficacy of medicine was proved by administrating them, disease individuals.

In the current scenario, the basic requirement to introduce any new drug or formulation clinically before scientific proofs of preclinical toxicology studies, therapeutic efficacy, mode of action, and a metabolic pathway is the utmost requirement. As per the Indian regulatory requirement, homeopathic remedies are also included in the Drug and Cosmetic Act of 1940[5]. Therefore, it becomes compulsory to produce data on each drug for its therapeutic/toxic effect in laboratory animals as per Schedule Y[6]. However, to establish the the scientific basis for efficacy and mode of action of nosodes it is crucial to prove them using a series of invitro as well as invivo preclinical models in pharmacology. After the advancement in

scientific knowledge in the field of in-vitro and in vivo pharmacology, and molecular biology many Indian and foreign scientists are researching the unproven part of homeopathic medicine. But the number of scientists working proving of homeopathic remedies from a pharmacological perspective is less as compared to a scientist working on modern medicine.

The main objective of this review is to compile the important experimental in vitro and in vivo pharmacological findings of nosodes to trace out their available literature, mechanism of action, and efficacy/ toxicity profile as well as to open a new area of research for researchers.

2. Materials and methods

Nosodes are the homeopathic remedies sourced from diseased pathological secretions or excretions, a clinical sample of microbes including bacteria, fungi, and viruses or parasites diseased tissues (cancerous tissue), or decomposition product of humans and animals [1,2,7].

2.1. Definition

The term nosode is related to the Greek prefix "noso" means disease, therefore the prefix noso is added to the word which has a characteristic relation with the disease. The term nosode is also connected to the Latin word "noxa" which means damage indicating the use of noxious material as a source of remedy[3,7].

2.2. Classification of nosodes

The nosodes are divided into four groups depending on the source material used in their preparation[1,8]

- N-I- Preparations made from bacterial endotoxin
- N-II- Preparation obtained from microorganisms having the ability to produce exotoxins
- N-III-Preparations sourced from purified toxins
- N-IV- Preparations obtained from a a microorganism or diseased subjects. Based on their sphere of action and clinical use, they are classified as [9] :
- Basic nosodes- Psorinum, Tuberculinum- Bacillinum, Syphilinum, Medorrhenium, and Carcinosin
- Exanthem nosodes-Morbillinum, Parotidinum, BVAccinium, Pertussin, Anthacenum, Variolinum etc.
- Isopathic nosodes- Sterptococcin, Malaria Officinalis, etc.
- Intestinal nosodes – Batch nosodes- B.Morgan, Morgan pure, Morgan gaetner, Dysntery co., B. proteus, Baccillus No. 7, etc.
- Autogenous nosodes- Prepared from secretions and discharges from the pathological tissue or organ of the patient himself for threatening disease condition (Tautophathy)
- Lesser used – Ambra grisea, cholera toxin 90, Secale cor, Eosinophillinum, Histamine, Typhiodinum, etc.
- The Oscillococcinum and HIV nosode were newly added nosodes prepared from newer microorganisms like leprosy Human immunodeficiency nosode.

2.3. Method of preparation of nosodes

Homeopathic remedies are prepared by a series of systemic dilutions of starting material and a succession (a forceful shaking) that leads to minimization, relatively nullifying the toxic effect of crude drug substances and increasing their curative property. The below-mentioned steps are involved in the preparation of nosodes :

Step 1 : **Identification, authentication, and procurement of source material :** It is of prime importance to identify, authenticate and document the starting material. The standard test must be used to confirm the exact microorganism. The microorganisms and biological material is procured from various commercial and noncommercial sources. Most commonly latest virulent or standard microorganism strains are used, when microbial culture is not available fresh clinical samples or biological material of the disease subject is used for the preparation of nosode. The homeopathy pharmacopeia of India (HPI) had given a limit for recommended the microbial count is 20 billion CFU.

Step 2 : **Nature of material :** The homeopathy Pharmacopoeia of India divided the nosode into four categories depending on the nature of the source material and whether the organism used in the preparation of nosode can produce endotoxins, exotoxins, viruses, or clinical material (Sputum, Urine, Blood, Secretions, and Excretions) from disease subject.

- N -I – Remedies prepared by using lysates of microorganisms that can produce bacterial endotoxins e.g. Salmonella Typhimurium, Escherichia Coli, and Staphylococcus
- N-I – Nosodes made from the source microorganisms capable of producing exotoxin, e.g. Corynebacterium diphtheriae.
- N – III – Remedies prepared using purified toxins
- N-IV – Preparation made from the clinical material/microorganisms/viruses of the disease subject e.g. Variolinum, Influenzinum, Psorinum, Syphilinum, HIV nosode, Hepatitic C nosode.

Step 3 : **Removal of common co-infection / contamination** This process is done to ensure the purity of the preparation. The process involves the elimination of all possible contaminants from the source material. This step is only followed for the source material taken from a clinical sample of a diseased subject, if the source material is pure culture this step is not required.

Step 4 : **Removal/ separation of other components** Depending on the nature of starting material removal/separation of another the component is carried out using filtration, centrifugation, scraping, etc. E.g. If the starting material for the preparation of nosode is serum, then expression, centrifugation, and/or filtration of serum sample is carried out to obtain the pure organism. The cell debris and unknown bacteria from the blood sample (if the source material) is removed by the process of centrifugation and filtration. For filtration generally, Seitz filters are used. To isolate the pure parasite sourced from parasite-infected animal-human tissue the skin of the infected the subject is used to scrap the source material. Then these scrappings are boiled with potassium hydroxide solution using water as a medium.

Step 5 : **Characterization of source material** In this step, the source material is characterized concerning its genotype and strain using the latest technologies.

Step 6 : **Safety** The handling of the source material is carried out in a strict biosafety compliment an environment with the least handling using sealed containers and disposable auto-tip puppets.

Step 7 : **Preparation of mother tincture** This step is the defined quantity of pure culture of one strain or mixed strain used in the preparation of nosode. The alcohol, a mixture of alcohol in water and water for injection are used as a vehicle for the preparation of the mother tincture. For source materials that are soluble in alcohol mother tincture is prepared by mixing equal parts by weight of drug material and alcohol or sometimes alcohol : water (9 :1) ratio and the mixture is succussed. The source material that is insoluble in alcohol is prepared by means Hahnemann method of trituration. In this method, the starting material is triturated with solid vehicle lactose in a 1 :10 ratio. Afterward, this solid mixture is converted into liquid potency and the process of succussion and potentization are performed. The the mother tincture is denoted by Symbol 'Q'.

Step 8 : **Dynamization of potencies** The process of serial succession and dilution is referred to as dynamization or potentization. "1C" potency is prepared by mixing one part of the mother tincture in 99 parts of alcohol or a mixture of water and alcohol. Further, the obtained liquid is succussed 10 times in a bottle by firmly hitting the base of the bottom of a leather-covered book. This mixture has a dilution ratio of 1 :100 (1C). One part of 1c potency is again diluted and, succussed in 99 parts of alcohol or water and the water mixture produces 2C potency. This process is further repeated to produce desired potencies.

Scale	Dilutionrate	Notation
Decimal	$1:10$	X, D, DH
Centesimal	$1:100$	C, CH, CK
Millesimal	$1:1000$	M
50 Millesimal	$1:50,000$	LM

Step 9 : **Safety checking for human use** The safety of nosodes is confirmed by performing sterility testing mentioned in the Indian Pharmacopoeia and European pharmacopeia for aerobic and anaerobic bacteria.

Step 10 : **Lyophilization** This process is performed for future use of the original stock solution for preparing nodoses.

3. Conclusion :

Conclusively no proper scientific explanation has been provided to date about the mechanism of action and efficacy of nosode, available studies only put some light on the acceptance of the health claim of nosodes scientifically. So the preclinical study of the nosode is required to prove efficacy and mechanistic. The preclinical pharmacological study not only provides information on the efficacy and possible mechanist approach of drug action of homeopathic nosodes but also serves as scientific proof or justification for the clinical use of these remedies as well as supports a homeopathic system of medicine scientifically in the scientific fraternity in a more satisfactory way. A homeopathic system of medicine has tremendous scope in preclinical pharmacology to prove its efficacy, mode of action using invitro and/or in vivo study models, and also from standardization, method preparation point of view of nosodes using modern tools, and available technology.

4. Acknowledgement

The authors are thankful to Prof. Dr. Piyush S. Gujarathi (M.D., Homoeopath) for help in understanding the basic concepts of homeopathy.

Name of Nosode [22-27]	Source material [22-27]	Uses [22-27]	Preclinical experimental studies	References
Psorinum (Queen of Antipsorics)	Sero-purulent matter (containing mite Sarcoptes scabiei) in a scabietic the vesicle of infected skin Epidermoid efflorescence of pityriasis The salt forms the product of psora	Allergy, asthma, bronchitis, cold, depression, dermatitis, eczema, acne, headache, insomnia, mild ear infection, psoriasis	The therapeutic evaluation of psorinum 30CH in combination with other homeopathic remedies was conducted in 16 dogs affected with canine oral papillomatosis. The result finding showed early recovery and a significant decrease in the oral lesion in the group treated with the homeopathic combination compared to the placebo- treated group. The cell viability assay of Psorinum 6X was performed using anticancer cell lines A549, HepG2, and MCF07 using MTT assay. Psorinum 6X inhibited cell proliferation at 24 hours and arrested the cell cycle at the sub-G 1 stage of the A549 cell. It was found that psorinum 6X promotes apoptosis of A549 cells by up-and-down-regulation of p53, caspase-3, Bax, and Bcl-2.	10,11
Tuberculinum	From the sputum of a tubercular patient Made from sterilized Mycobacterium tuberculosis culture Pus with bacilli are removed from tubercular abscess patient	Respiratory tract ailments tonsilitis, bronchitis, cold, hay fever	Preparation, standardization, and in vitro safety testing of polyvalent (multistrain) and univalent Mycobacterium nosodes was carried out by Suvarna Joshi et. al prepared nosode did not show growth of mycobacterium above the 5C potency, 30C nosode was found to be free from any organism and DNA material in in-vitro studies, indicating safe use and handling of Univalent and polyvalent nosode.	12
Syphilimum (Leutinum)	Prepared from syphilitic discharge containing Treponema pallidum spirochaete bacterium from the primary chancre	Sciatica, eye inflammation, mouth and skin sores, Rheumatic pain, chronic skin eruption		7
Medorrhinum (Glinicum)	Prepared from the purulent discharge of a blennorrhagic patient having gonorrhea, the discharge contains Neisseria gonorrhoeae cocci	Suppressed gonorrhoeae, Chronic urethritis, eczema of buttocks in baby, gonorrhoeae	Medorrhenium was evaluated using FCA induced rheumatoid arthritis model in rats. Medorrhenium significantly decreases the serum TNF- α level, expression of II- 1β, Il 6 level, and expression of NF- KB compared to the CFA control group. This study's finding revealed that medorrhenium ameliorates rheumatoid arthritis in experimental animals.	13

Name of Nosode [22-27]	Source material [22-27]	Uses [22-27]	Preclinical experimental studies	References
Carcinocin	Biopsy tissue of adenocarcinoma of the urinary bladder, biopsy tissue of adenocarcinoma of the intestine, biopsy tissue of Scirrhous Carcinoma of the breast, biopsy tissue of squamous carcinoma of the lung	Lung, Breast, liver, intestine, urinary bladder cancer, abscess, acne, asthma, bronchitis, chronic fatigue syndrome, colitis, diabetes, dysmenorrhea, insomnia, moles, ovarian cysts, rectal prolapse, Sinusitis, premenstrual syndrome	Carcinocin 200CH was used in the treatment of p-Dimethylamineoazoenzene-induced liver cancer in experimental animals, study findings showed that carcinocine shows amelioration hepatocarcinoma in mice. Carcinocin 1000C was evaluated for its anticancer potential against prostate and breast cancer using DU-145, LNCaP, MAT- Lylu, and MDA-MB-231 cells by measuring cell growth and gene expression (Bax, bcl-3, bcl-x, caspase-1, caspase-2, caspase-3, Fas) by MTT assay and multiprobe ribonuclease protection assay. In this study, the carcinogen did not show an accountable effect on cell growth and gene expression in vitro studies. Carcinocin 30C was tested for its antidiabetic potential using streptozotocin-induced beta cell dysfunction in mice and in vitro using a culture of islets cells to evaluate the the functioning ability of islets.	14–17
Diptherinum	Serum consisting of live attenuated Diptherium bacilli Diphtheritic membrane sourced from a throat swab of a patient suffering from diphtheria	Prophylactic and curative of diphtheria, chronic tonsillitis, epistaxis		7
Pyrogenum (Artificial sepsin)	Decomposed lean beef, for 2 weeks beef allowed to stand in the sun and then potentized.	Septic fever, typhoid, conditions associated with poisoning, offensive discharge, or secretions of the body	Pyrogenium 200Ch and 1000Ch were evaluated for their antipyretic activity using Baker's yeast model in rabbits. At given potencies pyrogenium significantly reduced fever in treated rabbits compared to the negative control group.	18
Staphyllococcinum	Endotoxine of Staphalococcinum aureus	Acidity, toothache, acne, apyjae, arthritis, dermatitis, fever, headache, urinary tract infection	Staphallococcinum 30C, 200C, and 1M dilution showed antibacterial activity against Staphylococcus aureus. Compare to 30C and 1M dilution 200C dilution of staphalococcinum showed the best antibacterial potential.	19

Name of Nosode [22-27]	Source material [22-27]	Uses [22-27]	Preclinical experimental studies	References
Hydrophobinum (Lyssin)	The saliva of a Rabid dog	Corns, Diarrhea, dysentery, Leucorrhea, Landry's paralysis, neuralgia, hydrophobia	-	7
Anthracinum (Anthrax poison)	The spleen of cattle affected by anthrax	Septic inflammation, malignant ulcers, burning pain	-	7
Influenzinum	A nasal smear of a patient having influenza and containing the virus of Orthomyxoviridae	Flue like symptoms	-	7
Malaria Officinalis	A peat or decayed vegetable matter, taken from a marsh during dry weather	Cough, diarrhea, vertigo, nausea, malaria, liver infection, neuralgia	In vitro antimalarial activity of malaria officinalis was observed using a β-hematin formation assay. The results of this study showed the inhibition of hemozoin in the drug- the treated group is greater than in the chloroquine-treated group of animals. 30C and 200C potencies were utilized to evaluate the in vivo schizonticidal activity in mice using Peter's 4-day test for Plasmodium berghei. 30C potency of nosode shows considerable antiplasmodial activity against P. berghei compared to 200 C potency.	20,21
Ambra grisiea	Belly of the sperm whale-physic/macrocephalus	Abdominal pain, weakness, hearing loss, convulsion		7

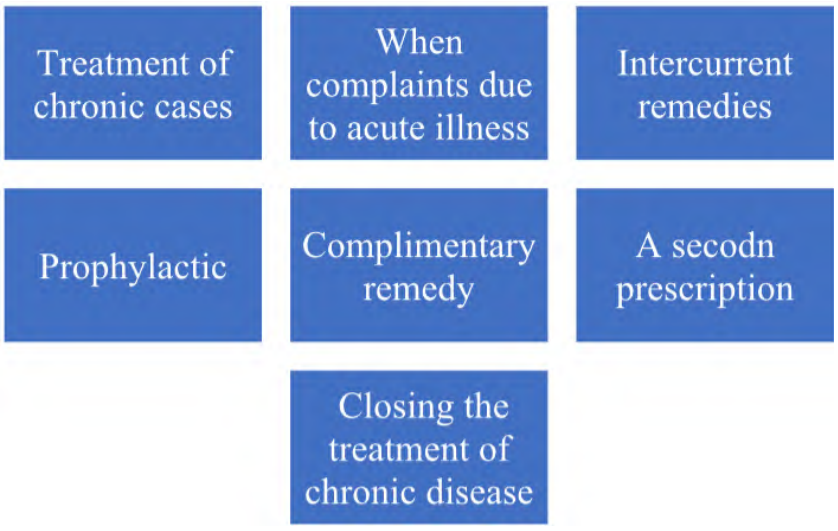

Figure 1 – Distribution of student nurses with regard to their residence.

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A Big Data Analytics Perspective in Indian Scenario

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Abstract : "In the present scenario Big Data analysis is the process of examining and interpreting large and complex data sets to identify patterns, trends, and insights that can inform business decisions, drive innovation, and improve outcomes. Big data analysis involves the use of advanced data analytics tools and techniques, such as data mining, machine learning, and natural language processing. Big data analysis can be applied to various domains, such as healthcare, finance, retail, manufacturing, and transportation, among others. Some common use cases of big data analysis include fraud detection, customer segmentation, predictive maintenance, and sentiment analysis. To carry out big data analysis, organizations need to have a robust data infrastructure, skilled data professionals, and appropriate data governance policies in place. India is a developing country and too competitive than the developed countries. Nowadays in the information technology sector, Indian IT professionals are doing well even in the domain of Big data analytics we are at the top position, and this sector also affects the lifestyle and Indian perspectives in a positive shape. This paper is an attempt to portray the small piece of the picture in reference to big data analytics and development in India.

Key Words : Big data, Enormous, Machine Learning, Business Intelligence Analyst, E-commerce

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1. Introduction

Big data analytics has the potential to revolutionize various sectors of the Indian economy, such as healthcare, education, finance, e-commerce, and manufacturing. With the rise of digital technologies and the increasing volume of data generated by them, the importance of big data analytics in India has grown significantly in recent years.
One of the main areas where big data analytics has made a significant impact in India is healthcare. By leveraging big data analytics, healthcare organizations can analyze vast amounts of patient data to identify patterns and insights that can lead to better diagnosis and treatment. This can improve patient outcomes, reduce costs, and enhance the overall quality of healthcare.
Another area where big data analytics has made an impact is an e-commerce. Indian e-commerce companies are using big data analytics to gain insights into customer behavior, preferences, and purchase patterns. This enables them to personalize their offerings, improve customer engagement, and increase sales.
In the financial sector, big data analytics is being used to manage risk, detect fraud, and improve customer service. Banks and financial institutions are leveraging big data to analyze customer data, transactional data, and market data to make informed decisions and drive business growth.
Manufacturing is another area where big data analytics is gaining traction in India. By using sensors and other connected devices, manufacturers can collect vast amounts of data on machine performance, production efficiency, and quality control. This data can be used to optimize production processes, reduce waste and improve overall productivity. However, there are also challenges that need to be addressed in the Indian contexts, such as data privacy and security concerns, inadequate infrastructure, and shortage of skilled data professionals. Addressing these challenges will be critical to realizing the full potential of big data analytics in India.

2. 6V's of Big Data Analytics :

The analysis of big data requires specialized skills and tools, as traditional data analysis techniques are inadequate to handle the volume, variety, and the velocity of big data. The three main characteristics of big data, known as the three Vs, are :

1. Volume : The sheer amount of data that needs to be analyzed is enormous, typically measured in petabytes, exabytes, or zettabytes.
2. Velocity : The speed at which data is generated, processed, and analyzed is extremely high, often in real-time or near- real-time.
3. Variety : The types and formats of data are diverse, including structured, semi- structured, and unstructured data from various sources such as social media, IoT devices, and sensors.
4. Veracity : This refers to the quality, reliability, and trustworthiness of the data. With big data, there is often a concern about the accuracy and completeness of the data, as it may come from a wide range of sources and may not always be fully validated.
5. Value : This refers to the usefulness and relevance of the insights gained from big data analysis. It is important to ensure that the insights are actionable and can lead to tangible benefits, such as increased revenue, cost savings, or improved customer satisfaction.
6. Variability : This refers to the degree of change or inconsistency in the data over time. In many cases,

big data is generated in real-time or near real-time, and the patterns and trends observed may change rapidly. This requires a flexible and adaptable approach to big data analysis to keep up with the changing data landscape.

Figure 1 – Prime Analytics based Jobs in India

In totality, the 6 Vs provide a more complete and a nuanced understanding of the challenges and opportunities presented by big data, and can help organizations to develop effective strategies for leveraging big data to drive business value.

The field of big data analytics is rapidly growing in India, and there is a high demand for skilled professionals who can work with large and complex data sets. Some of the popular job roles in big data analytics in India are :

1. **Data Analyst :** A data analyst is responsible for analyzing data and identifying patterns and insights that can inform business decisions. They use statistical tools and techniques to clean, process, and transform data to make it usable for analysis.
2. **Data Scientist :** A data scientist is responsible for developing and implementing advanced statistical models and machine learning algorithms to analyze and interpret data. They use programming languages such as Python and R to manipulate data and develop predictive models.
3. **Big Data Engineer :** A big data engineer is responsible for designing and building the the infrastructure required for storing, processing, and analyzing large and complex data sets. They work with tools such as Hadoop, Spark, and NoSQL databases to develop scalably and distributed systems.
4. **Business Intelligence Analyst :** A business intelligence analyst is responsible for developing and maintaining dashboards Business Intelligence Analyst : A business intelligence analyst is responsible for developing and maintaining dashboards.
5. **Data Architect :** A data architect is responsible for designing the data the architecture of an organization, including the data storage, integration, and processing systems. They work closely with other data professionals to ensure that the data architecture is scalable, secure, and meets the needs of the organization.
6. **Machine Learning Engineer :** A machine learning engineer is responsible for developing and implementing machine learning algorithms that can learn from data and make predictions or decisions. They work with tools such as TensorFlow, Keras, and Scikit-Learn to develop and deploy machine learning models.

These are the primary job titles among the many job roles available in the field of big data analytics in India. With the increasing importance of data- driven decision-making, the demand for skilled professionals in this field is only expected to grow in the coming years.

The Data scientist job framework is just similar profiled job to Data analytics both are required similar kinds of skills. In the Indian scenario, there are key skills that may secure Data Scientists/ analytics jobs are mentioned in the figure-2. There is a clear depiction that statistical proficiency, communication skill both oral and written along with computer programming knowledge is the basic need.

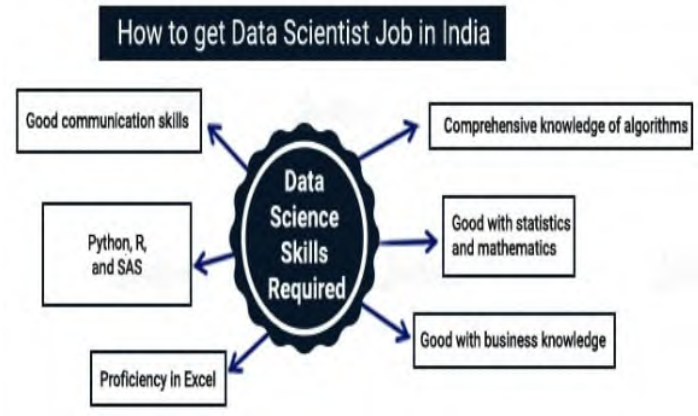

Figure 2 – Skill Require for Data Analytics and Scientist

3. Financial Statistics of Big Data Analytics Productivity of India

There is limited information available on the financial statistics of big data analytics productivity in India. However, the Indian big data analytics market is expected to grow at a compound annual growth rate (CAGR) of 30.08from 2021 to 2026, according to a report by Mordor

Intelligence. The report also states that the market is driven by factors such as the increasing the volume of data generated by organizations, the growing adoption of cloud-based big data solutions, and the rising demand for real-time analytics.
Furthermore, the report suggests that the banking, financial services, and insurance (BFSI) the sector is one of the major end-users of big data analytics in India. The BFSI sector uses big data analytics for various purposes such as fraud detection, risk management, and customer segmentation, among others.
In terms of productivity, big data analytics has the potential to improve decision-making, optimize operations, and drive innovation in various industries. For example, a study by the National Association of Software and Services Companies (NASSCOM) and CRISIL found that the use of big data analytics in the Indian retail sector could lead to a 60-65% improvement in inventory turnover, a 5-10% increase in sales, and a 25-30% reduction in inventory carrying costs. On the whole, while there is limited information available on the financial statistics of big data analytics productivity in India, there is no doubt that the the market is growing and has significant potential to drive business value across various industries.

4. Job Number Statistics in Big Data Analytics in India

Rendering to a report by Analytics India Magazine, the big data analytics job market in India has been growing rapidly over the past few years. The the report suggests that the number of job openings in this field has more than doubled from 2016 to 2019, with an average annual growth rate of 36%.
Moreover, a study by the National Association of Software and Services Companies (NASSCOM) and BlueOcean Market Intelligence estimates that the big data analytics industry in India will require around 1.5-2 million data scientists and analysts by 2020.
The report by Analytics India Magazine also identifies the top cities in India for big data analytics jobs, based on the number of job openings. These include Bengaluru, Mumbai, Delhi NCR, Pune, and Hyderabad. In addition, the report suggests that the most in-demand skills for big data analytics jobs in India include proficiency in programming languages such as Python and R, knowledge of big data technologies such as Hadoop and Spark, and experience with machine learning and artificial intelligence. These statistics suggest that the big data analytics job market in India is growing rapidly and is expected to continue to do so in the coming years, creating significant opportunities for skilled professionals in this field.

5. Revenue Generation from Big Data Analytics in India

The revenue generation from big data analytics in India is significant and is expected to grow in the coming years. According to a report by Markets nd Markets, the big data analytics market in India is expected to reach USD 13.95 billion by 2025, growing at a compound annual growth rate (CAGR) of 26.4% from 2020 to 2025. The report suggests that the key drivers of this growth are the increasing volume of data generated by organizations, the growing adoption of cloud- based big data solutions, and the rising demand for real-time analytics. Furthermore, the report identifies the banking, financial services, and insurance (BFSI) sector as the largest end-user of big data analytics in India, followed by healthcare, retail, and e-commerce.
In addition, a study by the National Association of Software and Services Companies (NASSCOM) and CRISIL found that the use of big data analytics in the Indian retail sector could lead to a 60-65% improvement in inventory turnover, a 5-10% increase in sales, and a 25-30% reduction in inventory carrying costs. This highlights the potential for big data analytics to drive revenue growth and cost savings for organizations across various industries in India.
The revenue generation from big data analytics in India is significant and is expected to grow in the coming years, driven by the increasing demand for data- driven decision-making and the growing adoption of big data technologies across various industries.

6. Conclusion

Big Data Analytics is becoming increasingly important in the field of finance in India, as it can help financial institutions make informed decisions, improve risk management, and enhance customer experiences. Some of the key ways in which Big Data Analytics is being used in finance in India include : Fraud detection, Risk management, Customer analytics, Trading and investment decisions etc. Big Data Analytics can help financial institutions make more informed trading and investment decisions by analyzing market trends and predicting future outcomes. Big Data Analytics has the potential to revolutionize the financial industry in India, enabling financial institutions to make faster, more accurate decisions and improving their overall performance. However, there are also challenges that need to be addressed, such as data privacy and security concerns, as well as the need for skilled professionals who can analyze and interpret large amounts of data.

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A Study on Investment Management at The Surat District Cooperative Bank

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Abstract : The Surat District Cooperative Bank is one of the leading cooperative bank in the South Gujarat Region. The first decade of the 20^{th} century was a very important era in the history of cooperation for the entire country and the Surat District as well. Many cooperative institutions were initiated during this period. A A descriptive study was adopted to achieve the objectives of the study and the study was conducted in The Surat District Co. Op. Bank Ltd., "Investment Management of Surat District Cooperative Bank". Based on the finding, a logical conclusion is drawn and further, suitable suggestions & recommendations are brought out. The entire project report is presented in developed, logical & sequential form.
Key Words : Descriptive study, Investment Management, Surat District Cooperative Bank

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1. Introduction

The bank was decided as the best bank by NABARD and for the year 1995-96, the bank was granted for best execution grant by NABARD. Bank has consistently been getting Audit characterization under classification &# 39 ;A&#39 ; and has delivered the most noteworthy reasonable profit to its individuals under State Co. Operation. Act. The bank should get ready for modernization exercises under the climate of progression. To proceed with the present- day banking framework, the bank has acknowledged the Automation of banking work. At present 67 branches are modernized.

PRODUCTS & SERVICES PROVIDED BY THE SURAT DISTRICT CO. OP. BANK LTD.

1. Primary Service :

A. Accepting Deposits

a) Fixed Deposits

Fixed deposits are kept within the bank for an extended period. A customer can deposit the money within the bank at a better rate with safe custody. Customers get a payment amount [Principal + Interest] at the maturity of the deposit. A fixed deposit gives the next charge per unit than a saving account.

b) Current Account

Current Account is mainly conveying for businessman, firms, companies, public enterprise, etc. A customer can deposit and withdraw any amount at any time whenever they want. Current Accounts are conveying neither to earn interest nor for Savings but only for the benefits of the business.

c) Saving Account

Saving Account is a safe and easy way to secure money. Customers can deposit or withdraw their money at any time. In return, the bank pays interest to the depositor. 3given to the depositor by the Surat district co- operative bank ltd.

d) Recurring Deposit account

A Recurring Deposit Account is conveying for investors who want to deposit fixed money every month, to get a lump sum after one to five years. This is one of the best investment options for low-income groups.

2. Secondary Service :

A. Loans

The Surat District Co. Op. Bank Ltd. provide following different types of loan :

1. Non-Agriculture Individual Medium- Term Loan for Home Appliances
2. Individual Housing Loan
3. Vehicle Loan
4. Loan / Overdraft against Kisan Vikas Patra / National Savings Certificate
5. Cash Credit General Insurance

The Surat District Co. Op. Bank Ltd. offer different type of general insurance policy :

1. Marine Insurance
2. Industrial Insurance
3. Motor Insurance
4. Fire Insurance
5. Liability Insurance
6. Miscellaneous Insurance
   - Accident and Hospitalization Insurance
   - Social Insurance
   - Rural Insurance
   - Travel Insurance
   - Package Insurance
   - Business Insurance
   - Life Insurance

The following Offers are provided to the customer by the bank :

1. Whole Life
2. Endowment
3. Child Policy Single Premium
4. Pension
5. Term

6. Fixed Term Protection Plan
7. 5 Year Recurring Premium Investment Cum Protection Plan

2. Research Methodology

2.1. Problem Statement

The statement of the problem under study is to analyses the investment pattern of Surat District Cooperative Bank.

2.2. Research Objectives

From the above literature review, it may be seen that the studies in respect of Investment pattern with reference to Surat district cooperative banks were not made earlier. Hence an attempt has been made in this to study and analyses the investment pattern of the banking professionals with the following objectives :

1. To study the types of investment done by Surat District Cooperative Bank
2. To study investment strategies adopted by Surat District Cooperative Bank

2.3. Research Design

1. Descriptive research design
2. Exploratory research design
3. Causal research design

Descriptive research design' is used in this project for research. Descriptive research design answers What, Where, When and How question. Descriptive research design focus to describe the situation accurately.
Data Collection Methods

1. Primary data collection
2. Secondary data collection

In this research, the secondary data collection method is used. The secondary data is collected from :
— the Annual report of the Bank
— Case Study
— Another necessary theoretical requirement
— Websites & Magazines of the bank
— Bank Officers
The primary data is collected from :
— From Bank STL (accounts) department
Sampling Procedure : Quantitative Sampling Technique
Last five years of balance sheet has been taken as sample to study the investment management of The Surat District Co-operative Bank.
Description of Variables :
— Availability of Finance Government Policy
— Interest Rate
— Return on Investment
— Frequency of Return
— Liquidity
— Risk in Investment
— Safety in Investment
— Yield
— Maturity of Investment

Analytical tools used
— Information gathering
— Graphical method

2.4. Limitations of Study

1. Guidelines of Reserve Bank of India related to investment will keep on changing every year. The research of finding is only for specific period.
2. The bank operation is confidential and because of that some information cannot be obtained.
3. The sample size is limited to five financial years. Therefore, the detailed analysis gives different results compared to a lengthy period.
4. Due to corona pandemic, there was hyper volatility in Indian economy, especially in financial sector.

3. Data Analysis And Interpretation

3.1. Investment With Other Bank (Amt In Cr)

Year	Investment in Government Securities
$2016-17$	1212.20
$2017-18$	1280.73
$2018-19$	1229.58
$2019-20$	1103.75
$2020-21$	1309.73

Investment in the government sector is calculated for the purpose of maintaining the SLR of the bank. And if such investments can be bought and sold in the money market, profits can be made through transactions based on the condition of the money market.
From 2017 bank gradually increased its investment in the government sector year by year. In 2020 bank maintained SLR year about 18 to 19% due to low-yield government sector but has more focused on Mutual Fund investment.Recently, in the year 2021 bank increased investment in this segment by 18.66% which was amounted to 205.98 crores.

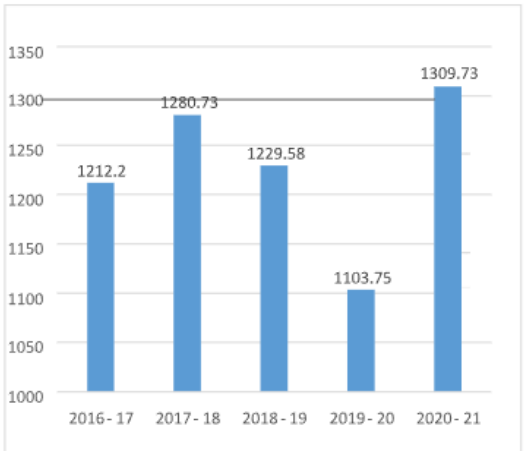

Figure 1 – Investment in Government Securities

Year	Investment in Public Sector Undertaking Bonds
2016 – 17	139.25
2017 – 18	137.61
2018 – 19	122.81
2019 – 20	114.78
2020 – 21	144.93

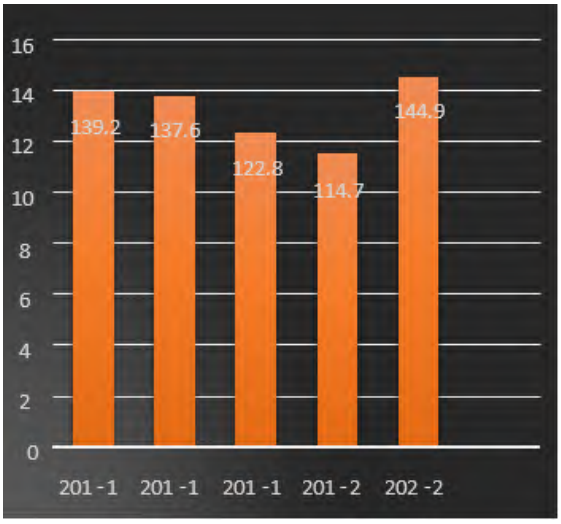

Figure 2 – Investment in Sector Undertaking Bonds

Bank is not permitted to invest in other banks shares, so new fresh investment in this segment can be done. Bank retire their investment in shares gradually. From, 2017 bank maintained an average rate of investment in PSU bonds, gradually it increased in the last five years by 5.68 crores.

In 2021, the highest amount was invested in PSU bonds in the last five years.

Year	Investment in Shares of Other Cooperative Bank
2016 – 17	0.47
2017 – 18	0.57
2018 – 19	0.57
2019 – 20	0.49
2020 – 21	0.50

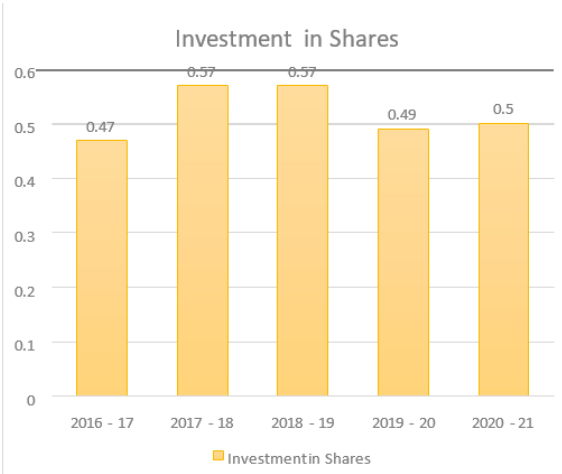

Figure 3 – Investment in Shares

Year	Investment in Mutual Fund
2016 – 17	267
2017 – 18	359
2018 – 19	379
2019 – 20	391
2020 – 21	430.5

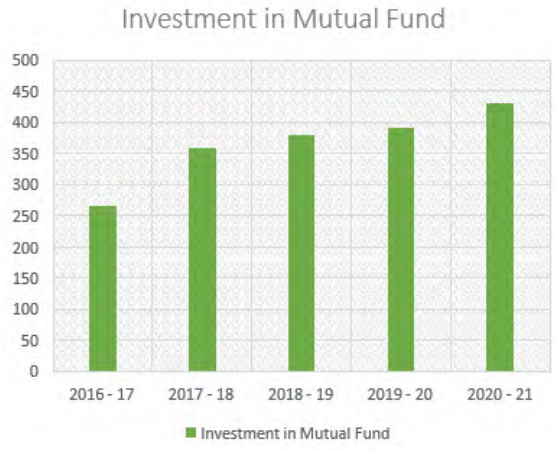

Figure 4 – Investment in Mutual Fund

From 2017 banks increased investment in Mutual Funds due to high IRR/Yield. The handsome growth rate in the Mutual Fund investment segment. It has grown by 61% from 2017. It has shown a progressive trend.

3.2. Fixed Deposit With Other Bank

Investment/ Year	2016-17	2017-18	2018-19	2019-20	2020-21
Fixed Deposit in Apex Bank		125	100	50	450
Fixed Deposit in Notif. Bank	7.8	41.8	250	519.39	524.04
Cumm Dep. Notif. Bank	1709.15	948.49	835.54	1159.65	1454.49
Cumulative Deposit With Apex Bank	249.22	266.76	192.42	184.91	32.23
Cumulative Deposit With ACS Bank	37.66	40.45	43.99	45.15	31.21
Cumm Approved Bank	10.53	10.94		40.2	43.03
Total	2014.36	3451.44	5465.8	4019.3	4556

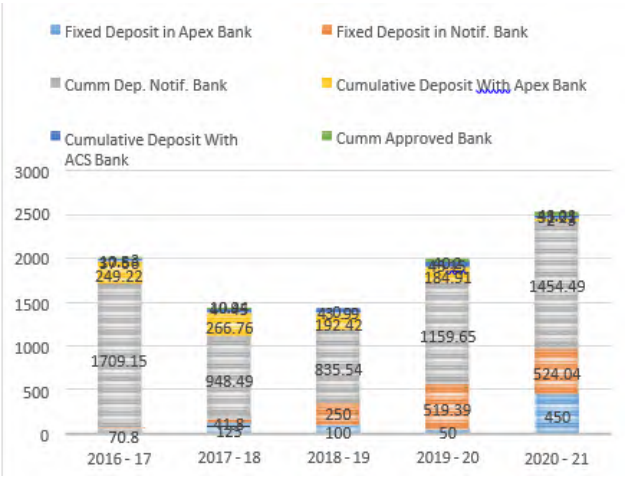

Figure 5 – Fixed Deposit With Other Bank

In the last five years, the bank has added 2542 Crores of investment in bank deposits. The known percentage has increased by 126% in the last five years. Bank gradually decreases investment in Apex (GSC) bank Fixed Deposit and tried to increase investment proportion higher in Notified Bank Fixed Deposit.

3.3. Non SLR Investment

Year	Total of PSU Bonds and Mutual Fund
2016 – 17	406.25
2017 – 18	496.61
2018 – 19	501.81
2019 – 20	505.78
2020 – 21	575.43

The total Non-SLR investment includes the Public Sector Undertakings Bonds and Mutual Funds. The Non-SLR investment also includes the shares but as per the restrictions imposed by the Reserve Bank of India in the Master Circular of investment :- Fresh investment in shares of All India Financial Institutions will not be permitted for Cooperative Banks. In the last five years, the bank has increased its investment in the Non-SLR segment by 42%.

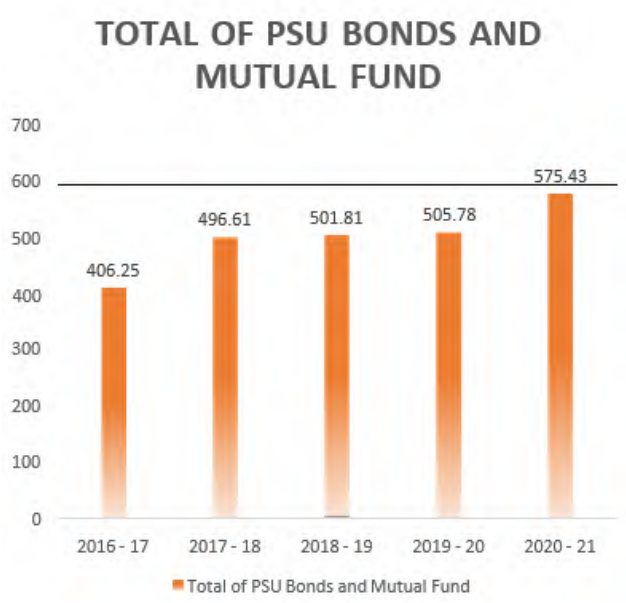

Figure 6 – Non-SLR Investment

3.4. Total Investment

Year	Average Investment
2016 – 17	3579
2017 – 18	3464
2018 – 19	2994
2019 – 20	3246
2020 – 21	3955

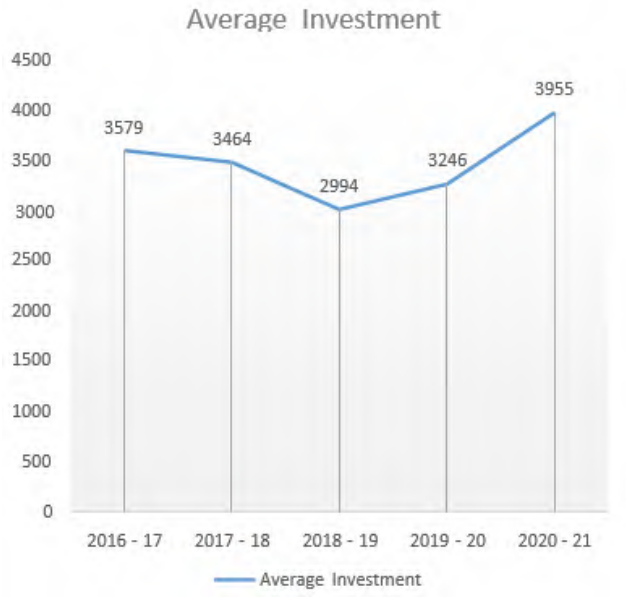

Figure 7 – Average Investment

The average investment has decreased to 2994 Crores in the year 2018-2019 but against it has increased to 3955 Crores in the the year 2020-2021.

4. Findings

1. Investment in equity is a good option but section 19 of the Banking Regulation Act 1949 stipulates that no cooperative bank should hold the shares.
2. Bank shall not invest in Perpetual Debt Instruments because it's not permitted. Weighted average coupon rate 7.83% which has improved from last year's 7.47%. Bank maintained its Statuary Liquidity Ratio of more than 18% to 20% every year.
3. Average investment of the bank is 3955 Crores which is 58% of the bank's total deposit. Banks rely more on investment rather than advances.
4. Bank invests in other Notified banks and Apex Bank's Fixed Deposit. It covers about 60 to 70
5. Bank needs to control fund flow as per market volatility so the bank can invest in higher rate opportunities.
6. Bank has to manage also cash inflow-outflow so the bank can turn its cashflow into a fund for investment.

5. Conclusion and Managerial Implications

1. Bank maintaining 12% of total investment in Treasury bills which need to be increased by at least 5% to 10%.
2. Bank earns more return on its investment in a mutual fund which is 8.68% in the year 2021 so the bank can increase its investment portion in the mutual fund segment.
3. Bank is committed to investing 10% of its total deposit in Non-SLR funds like PSU Bonds.
4. Bank can increase its investment in PSU bonds rather than other banks' Fixed Deposits so the bank can earn 2% to 3% more than the average investment rate.
5. Bank fixes investment limit as per other bank's status like Small Finance Bank, Private Bank, Nationalized Bank, Apex Bank. Bank should have reduced its investment in Apex Bank FD.
6. As per the market average rate of return on investment is reducing so the bank cut its advances rate to earn more and increases its profit.
7. Better Cash Management plan should be implicated so banks can turn cash into funds available for investment.
8. In order to earn a higher return, a proper investment plan should be made in coordination with cash management.
9. Higher return on investment requires a higher risk, the manager should focus more on risk-taking and decision-making strategy.
10. Bank can earn a good return on investment in equity but as they are not permitted, it should focus more on other NON-SLR investment which has a good rate of return.
11. As we have seen, the bank is investing just 12% of the total investment in T-Bills which needs to be increased but has still not come into action.
12. If cooperative banks/societies genuinely want to add value to the members of the society, they should not leave any stone unturned while evaluating investment opportunities.
13. Provide optimum infrastructure to the investment department for better decision-making so they can grab opportunities in time.

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Isolation of Indole Acetic Acid Producing Endophytic Bacteria from *Lantana Camara*, An Invasive Weed

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Abstract : "Endophytic bacteria are microorganisms that live within plant tissue without causing harm to the host. They produce a variety of natural products, including indole acetic acid (IAA), a plant growth regulator. The current study isolated endophytic bacteria from Lantana camara, an invasive weed, and evaluated their ability to produce IAA. A total of twenty-three bacterial strains were isolated, twelve from the root, eight from the leaves, and three from the stem of the plant. Four isolates, designated as LCL1, LCL4, LCR7, and LCR9, showed positive results for IAA production. Maximum IAA production (43.81 ± 0.12 μg/ml) was obtained from LCR7. The identification of the isolates by 16srRNA gene sequencing is still ongoing. However, the results of this study suggest that endophytic bacteria from Lantana camara have the potential to produce IAA, which could be used for a variety of applications in biotechnology.
Key Words : Bacterial Endophyte, Biochemical characterization, IAA production, *Lantana camara*, Morphological characterization

Received Date : 01/05/2023 Revised Date : 19/05/2023 Acceptance Date : 24/05/2023

1. Introduction

Endophytes and plant growth-promoting rhizobacteria (PGPR) are gaining popularity as supplements or alternatives to the use of pesticides to boost crop yield in agriculture. These bacteria have been demonstrated to benefit plants in a variety of ways, including :

- Boosting growth and yield
- Increasing stress tolerance
- Promoting disease resistance

The use of endophytes and PGPR in agriculture is still in its early stages, but there is a lot of promise for these bacteria to help improve crop productivity and sustainability (1). Endophytes are microorganisms that survive and colonize internal tissues of host plants and do not cause visible harm. They may be transferred directly from parent to progeny through seeds or plant to plant by entering the plant tissue through root zone or aerial portions such as flower stems and cotyledons(2). Lantana camara is a flowering plant that is native to the Americas and the Caribbean. It is a member of the Verbenaceae family and is known for its attractive flowers. Lantana camara can grow in a variety of climates, but it thrives in the humid heat of the tropics and subtropics. Lantana camara is an invasive plant, meaning that it spreads rapidly and can displace native plants. It is listed as a top ten global noxious weed, and it is a problem in many parts of the world, including India (3).

2. Materials And Methods

2.1. Collection of plant sample

Healthy plant samples of *Lantana camara*(Figure 1) were collected at the flowering stage from Vesu, region of Surat, Gujarat. At the flowering stage, the plants were gathered in a bag, brought to the laboratory, and gently cleaned under running water to remove any adhering dirt and debris.

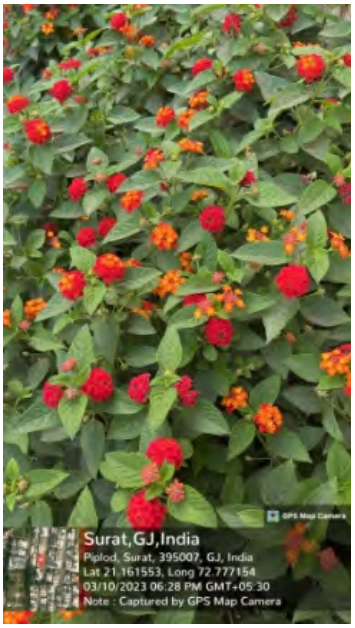

Figure 1 – Lantana Camara

2.2. Isolation of Endophytes

The flower and the leaves were divided into pieces that were two to three centimeters in length. After placing the parts in a beaker and soaking them in distilled water for a period of time, the beaker was afterwards drained of its contents. This piece of the leaf and flower was first sterilized on the surface with 0.1 % $HgCl_2$ for three minutes, after which it was disinfected with 70% ethanol for thirty seconds. After that, the tissue was sterilized by being washed multiple times in sterile water. Homogenizers were used to perform an aseptic maceration on portions that had been surface-disinfected. By adding 9 volumes of sterile distilled water, tissue that had been macerated was made into dilutions with a ratio of 10-1. A serial dilution was performed up to a factor of 10 - 6, and 0.1 milliliters of the appropriate dilution was spread out and plated on Nutrient Agar (4). Plates were then sealed with paraffin to prevent contamination and to ensure that the greatest number of endophyte colonies were recovered. The plates were then incubated at a temperature of 28 degrees Celsius, and observations were made between 24 and 48 hours afterward.

2.3. Estimation of IAA

The colorimetric approach developed by Gordon and Weber (5) was utilized for the purpose of performing a quick quantitative estimate of IAA in broth culture. The cultures were cultivated in the dark for seven days, and daily samples were taken during the process. After being centrifuged at 13,000 rpm for ten minutes, the supernatants were analyzed to determine how much IAA was produced. The amount of IAA that was present in each supernatant was evaluated using a colorimetric method after Salkowski's reagent was added. It is combined in a ratio of 2 :1, with two parts of 0.01 M $FeCl_3$ in 35% $HClO_4$ to one part of supernatant, and then the optical density is measured at 530 nm after 25 minutes. After reading off the recorded absorbance, a standard curve was created from pure IAA (Hi-Media), and the amount of IAA was measured with the help of the IAA standard curve.

2.4. Morphological characterization

Following the purification process of the colony, a comprehensive analysis was conducted on each individual isolate in order to ascertain its morphological resemblances to other colonies. The observed similarities encompassed various characteristics of the colonies, such as their size, shape, margin, elevation, pigmentation, and opacity. Following the established guidelines for standard microbiological testing, the Gram staining procedure was employed to assess the characteristics of each individual isolate. This involved the application of crystal violet and safranin staining techniques (6).

2.5. Metabolic activities of the isolates

In order to measure the metabolic activity of bacteria, a number of the regular biochemical tests were carried out. These tests were carried out in accordance with a standard technique (7), and the names of the biochemical assays are as follows : Uses of carbohydrates as well as organic acids The Methyl-Red (M-R) test, the Voges-Proskauer (V-P) test, and the Citrate Utilization Test were all utilized during the testing process. The indole synthesis test, the urea hydrolysis test, and the nitrate reduction test were used in the carrying out of the examination of the utilization of nitrogenous compounds. The Catalase test was carried out so that a variety of other tests might be identified. The triple sugar iron agar test was performed as part of an effort to identify integrated tests by making use of composite test media.

3. Results and Discussions

A total of 23 endophytic bacterial isolates were obtained from *Lantana camara.* Twelve from the root, eight from the leaves, and three from the stem of the plant. These isolates were further screened for IAA production.

Plant part	Isolates	Number of isolates
Roots	LCR1, LCR2, LCR3, LCR4, LCR5, LCR6, LCR7, LCR8, LCR9, LCR10, LCR11, LCR12	12
Leaves	LCL1, LCL2, LCL3, LCL4, LCL5, LCL6, LCL7, LCL8	08
Stem	LCS1, LCS2, LCS3	03
Total		23

Table 1 – Distribution of bacterial endophytes obtained from different parts of the plant *Lantana camara*

3.1. IAA production :

Only four of the twenty-three endophytic bacterial isolates exhibited positive results for IAA synthesis by forming a pink-colored ring. These isolates were the only ones to produce this outcome. Using the Salkowsaki reagent, a spectrophotometric analysis was carried out in order to obtain a quantitative determination of IAA at 530 nm. The highest IAA production (43.81±0.12µg/ml) was observed in endophytic isolate LCR7 (Figure 2, Table 2). The least IAA production (30.12±0.41 μg/ml) was recorded from isolate LCR9(Figure 2, Table 2). Comparable results of IAA production in a range from 10.96 to 37.78 μg/ml by plant growth-promoting rhizobacteria (PGPR) isolates were reported by previous work7. Another study8 reported IAA production in a range from 32.56 μg/ml to 56.12 μg/ml by PGPR isolates in the presence of L-tryptophan.

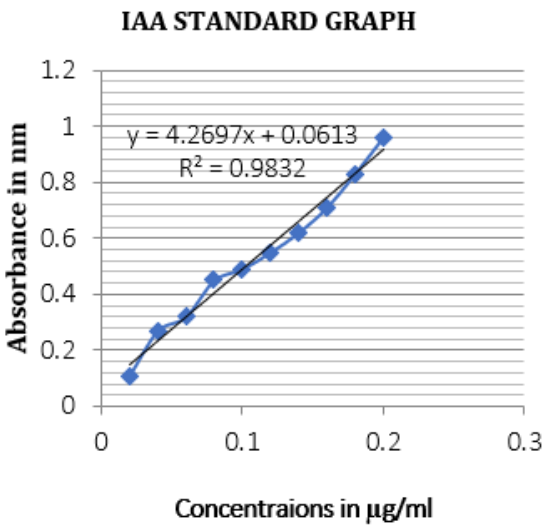

Figure 2 – Standard graph of IAA

Isolates	Concentration μg/ml
LCL1	37.59±0.23
LCL4	34.48 ± 0.37
LCR7	43.81 ± 0.12
LCR9	30.12 ± 0.41

Table 2 – IAA production by the bacterial endophytes

3.2. Morphological & Biochemical characterization

Characterization of the isolates in terms of their morphology and their biochemistry may be found in Tables 3 and 4, respectively. The morphological analysis of the IAA-producing isolates revealed that Gram-negative bacteria, which made up 55% of the total, were more prevalent in the root of the plants than Gram-positive bacteria, which made up 45% of the total. These findings are consistent with those that were established in other papers (9).

Morphological features	Isolates			
	LCL1	LCL4	LCR7	LCR9
Size	Medium	Small	Small	Small
Shape	Round	Round	Round	Round
Margin	Entire	Entire	Entire	Entire
Elevation	Flat	Raised	Convex	Flat
Pigmentation	White	Yellow	White	Yellow
Opacity	Translucent	Opaque	Transparent	Opaque
Gram's Reaction	+ve	-ve	+ve	-ve

Table 3 – Morphological traits of the isolates

Test	Isolates			
	LCL1	LCL4	LCR7	LCR9
M-r test	-	-	-	-
V-p test	-	+	-	+
Citrate utilization	-	-	+	+
Urea hydrolysis	-	-	+	-
TSI	+	+	+	+
Catalase	+	+	+	+
H2s production	-	-	-	-
Nitrate reduction	+	+	+	-

Table 4 – Biochemical traits of the isolates

4. Conclusions

IAA is a commercially valuable product having widespread application in agriculture and horticulture sector. IAA is naturally produced by microorganisms, mostly fungi, and bacteria. In the the current study, IAA was found to be produced by four endophytic bacterial isolates designated as LCR7, LCR9,LC1, and LCL4 isolated from root and leaf of the invasive weed *Lantana camara*.Further the study is required for the identification of the IAA producing strains and efficiency of the IAA produced under field conditions.

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Phenol Red Dye Decolorization by Bacterial Isolates

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Abstract : The textile and dyeing industries produce large amounts of wastewater that are highly colored. This wastewater can be a major environmental pollutant, and it is important to find ways to decolorize it. This study investigated the ability of bacterial isolates to decolorize phenol red dye. Phenol red dye is a common dye that is used in the textile industry. The bacterial isolates were obtained from a previous study, and they were screened for their ability to decolorize phenol red dye in a Bushnell-Hass (BH) medium. The screening revealed that only two of the seven isolates tested positive for dye decolorization. These isolates were named R3 and R7. The degree of decolorization was determined by measuring the percentage of dye loss in relation to the control group. The isolates R3 and R7 decolorized the phenol red dye to a degree of 75 % and 90 %, respectively. The isolates R3 and R7 were identified as Pseudomonas spp. and Staphylococcus spp., respectively. These identifications were based on the morphological, colony, and biochemical characteristics of the isolates. These results suggest that the bacterial isolates R3 and R7 have the potential to be used to decolorize phenol red dye. respectively.
Key Words : Decolorization, Phenol red dye, *Pseudomonas spp*, *Staphylococcus spp*

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1. Introduction

Numerous industrial sectors including the textile, chemicals, leather, pigment, and dyeing industries release a vast amount of colored effluents that contain dyes as a potential source of pollutants (1). The textile industry is one of the largest producers of effluents contaminated with dyes (1). Different organic pollutants are introduced into the natural water resources and the land by the residual dyes that are released from these effluents. (2). About 15% of the dyes that are used extensively in industrial applications end up in effluents. (3). Triarylmethane dyes are synthetic organic compounds containing triphenylmethane backbones. At least two aryl groups in phenol dyes have hydroxyl groups at the para locations.

Phenol red dye is used pH indicator dye widely used as an analytical reagent, diagnostic agent for assessing kidney function (injection), and intestinal absorption of medicines (taken orally). It is beneficial in the pH range of 6.8 (yellow) - 8.4 (red), commonly used as a water-soluble sodium salt or as a the solution in dilute sodium bicarbonate or sodium hydroxide. Unfortunately, traditional wastewater treatment methods are ineffective at getting rid of dyes and are expensive, produce potentially dangerous byproducts, and use a lot of energy (4). One of the biggest issue facing the modern world is the environmental contamination caused by textile dye. For the removal of colors from textile effluent, a variety of physical treatments, including ultrafiltration, reverse osmosis, ion exchange, and dye absorption on different absorbents are available. As an alternative, biological techniques remove dyes from the polluted region using a variety of taxonomic families of microbes, including bacteria, fungi, yeast, and algae (5). Thus, the present study aimed to isolate, screen, and quantify the capability of bacterial isolates for decolorizing dyes.

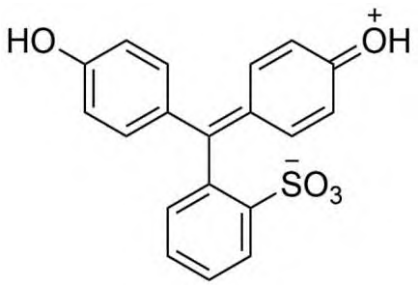

Figure 1 – Chemical structure of Phenol Red dye

2. Material and Methods :

2.1. Sample collection :

In sterile containers, 500 ml of textile effluent samples were taken from the industrially contaminated site at GIDC, Pandesara, Surat, Gujarat, India. Prior to further analysis, every sample that was obtained was kept at 4°C.

2.2. Isolation and Screening of dye-decolorizing bacteria :

1ml of the sample was inoculated in 100ml of sterile modified Bushnell Hass (BH) medium containing 0.4% glucose, 0.% yeast extract, and 100mg/l of phenol red dye were used as the inoculation media. The medium's pH was maintained at 7.0. Flasks were incubated for 24 hours at 37°C and 150 rpm. The broth was serially diluted up to 10 -6 after incubation. A modified Bushnell Hass (BH) medium mixed with 100 mg/l of Phenol red dye was used to plate each dilution. The plates were incubated for 48 hours at 37 °C. Bacterial isolates with a dye decolorization zone were selected, and they were streaked on a nutrient slant until they were used. (5).

2.3. Dye decolorization Assay :

Each isolate screened positive was further assayed for its dye decolorization efficiency. Each isolate was inoculated in Erlenmeyer flasks (250 mL) containing 50 mL of sterilized modified BH medium (pH 7.0) amended with 100 mg/l phenol dye and incubated for 6 days at 37°C with 150 rpm. Control was maintained without inoculation. The culture broth was centrifuged for 15 minutes at 10,000 rpm after 2, 4, and 6 days of incubation to measure the absorbance of the supernatant at 540 nm for each dye solution. The equation following was used to compute the decolorization activity in terms of percentage decolorization.

$$\% \text{ dye decolorization} = \left(\frac{\text{Initial absorbance-final absorbance}}{\text{Initial absorbance}}\right) \times 100$$

2.4. Morphological, Colonial & Biochemical Characterization of bacterial isolates :

Each isolate exhibiting dye decolorization was subjected to morphological, colonial, and biochemical analysis for partial identification. The findings were evaluated utilizing standard descriptions given in Bergey's Manual of Determinative Bacteriology (7).

3. Results and Discussion

3.1. Isolation, screening and identification of dye decolorizing bacterial isolates :

The enrichment medium was used to isolate bacteria that decolorize dyes. 07 isolates selected having distinct colony characteristics were screened by repeated streaking. During the screening process, a zone of decolorization around bacterial colonies was observed. 02 bacterial isolates labeled R3 and R7 were chosen for additional research on the medium.

Figure 2 – Dye decolorization efficiency by isolates R3 and R7

3.2. Analysis of decolorization efficiency

In the current work, phenol red dye at a final concentration of 100 mg/l was examined for its capacity to decolorize several bacterial isolates. According to reports, a typical textile effluent comprises 10 to 50 mg/l of dye material. So, for the duration of the study, a final dye concentration of 100 mg/l was chosen for the decolorization assay. The dye decolorization by chosen bacteria produced good results after 2, 4, and 6 days of incubation. Previous studies (9, 10, 11) revealed that only a few scientists had been successful in identifying bacterial cultures that could use dyes as their entire source of energy. This might be because microorganisms in natural habitats co-metabolize. Certain co-substrates are added during the co-metabolic process, which can cause the biodegradation process and, as a result, shorten the overall process time (12). After the incubation period of six days, decolorization of phenol red by specific bacterial isolates was observed and recorded (Fig. 1). When the decolorization effectiveness of the chosen isolates was further examined, isolates R3 and R7 both demonstrated a significant decolorization of 75% & 90% the phenol red dye respectively (13).

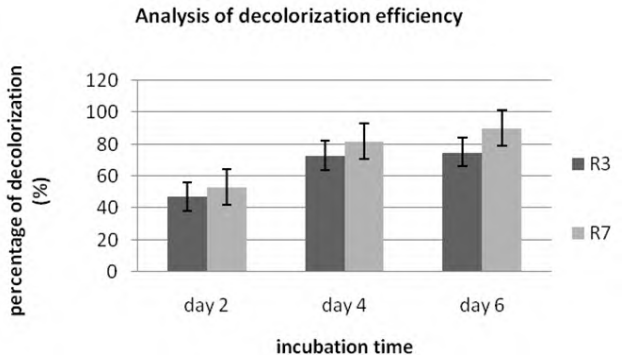

Figure 3 – Analysis of decolorization efficiency of isolates R3 and R7

3.3. Morphological, Biochemical Characterization of bacterial isolates

Based on their cultural, morphological, physiological, and biochemical traits, the chosen bacterial isolates were characterized and the results are shown in Table 1. The conventional Bergey's Manual of Determinative The bacteriology description was then put up against all of these traits. R3 Bacterial isolates were identified as Pseudomonas spp. and isolate R7 as Staphylococcus spp. (7).

4. Conclusions

Based on the results of this experimental work, one can conclude that the bacterial isolates had the ability to decolorize phenol red dye and were of the species Pseudomonas spp. for isolate R3 and Staphylococcus spp. for isolate R7. Both of these bacterial isolates were identified using biochemical characterization. As a result, they can be used to

treat textile effluent. However, additional research is required to validate the isolates as potentially useful bioremediation agents. This includes molecular characterization of the bacteria that were isolated, optimization of the cultural conditions under which they grew, and the detoxification mechanism.

Isolates	R3	R7
Gram reaction	Gram negative	Gram Positive
Morphological characteristic	rods	cocci
Biochemical characteristic		
Indole Production	Negative	Negative
Methyl Red Test	Negative	Positive
Vogas Proskauer Test	Negative	Negative
Citrate utilization Test	Positive	Positive
Nitrate reduction	Positive	Positive
H2S production	Negative	Negative
Urea hydrolysis test	Negative	Positive
Gelatin liquefaction Test	Positive	Negative
Glucose fermentation	Negative	Positive
Lactose Fermentation	Negative	Positive
Mannitol fermentation	Positive	Positive
Maltose fermentation	Negative	Positive
Xylose fermentation	Negative	Negative
Sucrose fermentation	Negative	Positive
Catalase Test	Positive	Positive
Oxidase Test	Positive	Negative

Table 1 – Morphological and Biochemical Characterization

5. Acknowledgement

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Privruta Abhivram- "Environmental Life" Wetland Welfare and Environmental Research

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Abstract : This topic discusses the welfare and research of wetlands. It explores how people can nurture nature, and how nature can provide a platform for people to reconnect with nature. As humans have evolved, they have destroyed nature and wetlands for their comfort. Wetlands are the kidneys of the earth, providing fresh water and other natural resources to humans and animals. They have their own microclimate, which supports their own unique vegetation. The study proposes creating a welfare center to enjoy environmental life and forget urban chaos. At this center, people can learn about wetlands, their vegetation, species biology, sustainable farming, and aquaculture. The purpose of this center is to create a symbiotic relationship between humans and wetlands. The study is divided into three parts : a tourist center, a native center, and a research center. The tourist center will generate revenue for local people and give them an opportunity to learn about wetlands. The native center will provide a place for native people to learn about and practice their traditional way of life. The research center will explore new ways to construct sustainable modules that will create zero carbon emissions and create a self-sufficient environment that does not depend on the outside world.
Key Words : Aquaculture, Humans and wetlands, Reconnecting to nature, Sustainable farming

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1. Introduction

In today's era, people are destroying nature for their convenience and comfort every year flora and fauna are getting destroyed because of human activities illegal fishing on wetlands, cattle grazing, using more and more chemical fertilizer due to hydrological fragmentation, salinity, soil erosion and no awareness about the wetland, the life-cycle maintained of the surrounding flora and fauna are getting destroyed and it will be affected on the microclimate of that wetland region.
Wetland is a study of the biology of flora and fauna, and how the ecosystem is working. In what ways every species has its role to perform ? How local people are benefiting from this type of ecosystem and how the ecosystem is benefiting by native communities ?
The finding of the study identified research gaps that require establishing strategies that consider how native communities surrounding the wetland will get the benefit without harming the wetland.

1.1. Role of wetlands and its ecosystem across the globe

Wetlands are defined as locations where water is always present on the soil's surface or is present for extended periods of time throughout the year, including the growing season. Wetlands are an essential component of our natural ecosystem. They prevent erosion, lessen the effects of flooding, filter out harmful substances, and boost overall water quality. They serve as homes for a broad variety of fauna, and many of them are home to species that can't be found anywhere else on Earth.
Humans rely heavily on wetland ecosystems. They provide a source of water and productivity, respectively, for numerous plant and animal species, making them among the world's most productive habitats and a cradle of biological diversity. Invaluable "ecosystem services" provided by wetlands include flood control, groundwater recharge, and climate change mitigation in addition to freshwater supply, food and building materials, and biodiversity.

1.2. Role of flora and fauna in wetland ecosystem

The ecological value of the vegetation that grows around freshwater bodies of water, such as streams, rivers, lakes, and the like, is greater than the ecological significance of marine vegetation. In addition to their function in the food chain, these organisms help to keep the water clean by filtering out particles and nutrients. Waterfowl species will eat the seeds or tubers that can be found in environments that are associated with fresh water. A great number of plants enter the food chain in the form of detritus, which consists of minute plant particles that are created as a byproduct of plant decomposition and are then devoured by invertebrates.
Therefore, freshwater vegetation acts as a breeding ground for both aquatic and terrestrial species of flora and fauna. It gives migratory birds a place to nest while they are here. Submerged water plants are entirely submerged in water and serve as a source of nutrition for the native flora and fauna as well as a habitat for invertebrates. In addition to that, they have the ability to filter. Floating water plants require calm, slow-moving water to thrive, and their roots are typically very shallow. Birds and other flying creatures use them as a source of food. In marshy areas, emergent water plants have their leaves and stems growing above the water while their roots remain submerged. Riparian

water plants are any trees or shrubs that grow along the margins of wetlands or other bodies of water and get their name from their location.

Figure 1 – Types of Wetlands with its ecosystems

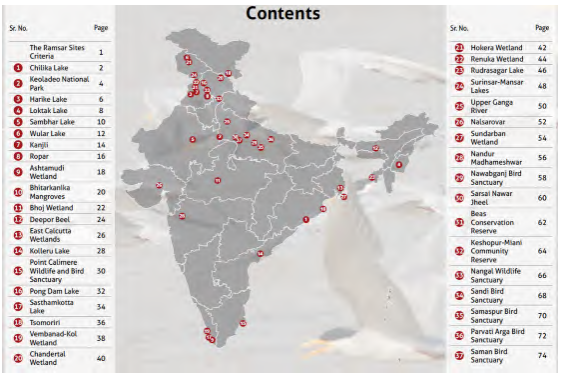

Figure 2 – Number of Wetland in India

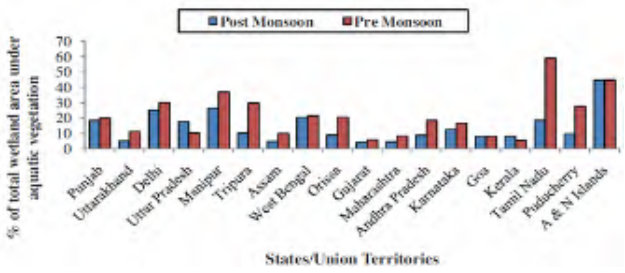

Figure 3 – Number of Wetland in India

There are a total of 27,304 wetland areas in India. 23,444 wetland areas found inland There are 3,959 coastal wetlands that take up 18.4 % of the land area of the country, and of that percentage, 70 % are used for paddy farming. Only 1.5 million hectares of India's total 4.1 million hectares (excluding irrigated agricultural areas, rivers, and streams) of wetland are natural, whereas 2.6 million hectares have been created by humans. It is estimated that 6,750 square kilometers are taken up by the coastal wetlands, the majority of which are covered in mangrove trees. According to a survey conducted by the Wildlife Institute of India, their population is declining at a pace that ranges from 2 % to 1 % every year.

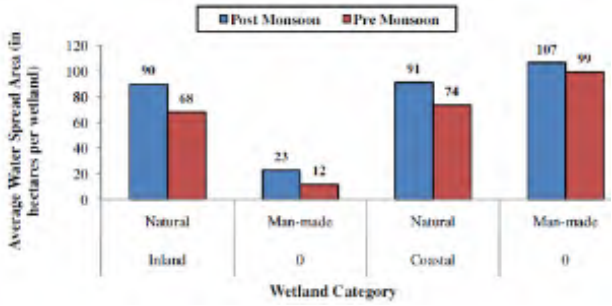

Figure 4 – Wetland Category

2. Aim, Objective, Scope, and Methodology

2.1. Aim

The aim is to create awareness about the unique biodiversity and ecology of the wetland, which could educate the local people and tourists about why wetlands are important in the world and why we have to save them by which humans and nature co-exist. The idea is to teach local communities about sustainable farming techniques and about vegetation so the ecosystem of the surrounding can be maintained.

2.2. Objective

1. To create a design that will be harmonized with nature and be built with the exploration in local materials of that region. The activities will be in accordance with the surrounding environment, which adds to the designation of that region's characteristics of the surrounding environment.

2. To design the structure which responds to the climate and minimizes the negative impact on the wetland ecosystem. The idea is to monitor endangered species, migratory birds, and other flora and fauna.
3. The activities will be also training the locals that how can they help the wetland ecosystem as well as the surrounding. Constructing artificial wetlands for water recycling.
4. The idea is to design a management process developed in a phase through time to understand the process that had happened on the site and happening in the site at present
5. To understand the ecology, biology, and biodiversity of the region. Studying the architecture of the wetland ecosystem.
6. To understand the ecology, biology, and biodiversity of the region. Studying the architecture of the wetland ecosystem.

2.3. Scope

The study will explore the different aspects of innovative construction on wetlands with the exploration of local materials. The study can propose how architecture can be used for helping nature and its surrounding. A study will involve the ideas of landscapes and trails for the visiting people. Also, different aspects of sustainable landscape and transitional landscape will be achieved.

2.4. Methodology

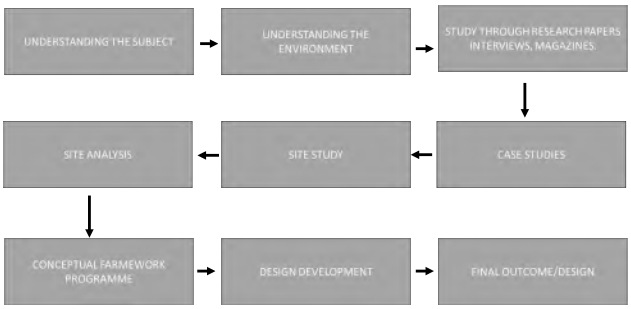

Figure 5 – Working Methodology Process

3. Site Study

The site brief includes basic site information like site location types of wetlands, wetland area and selected site area.

1. Site location :-Nandur Madhmeshwar wetland ,Niphad,Nashik, Maharashtra
2. Type of wetland : -Marsh-barrage and water collection
3. Wetland area : -1400-hectare
4. Selected site area : -50,000 sqm (1st phase)
5. Regional context : Nandur Madhameshwar Wildlife Sanctuary and Wetland, Majargoan, Niphad Taluka, Nashik District

3.1. Introduction to Site

It is believed that the Nandur Madhameshwar wildlife sanctuary has been preserved in its current state as a closed area ever since 1983. Other variables that have an effect on the preparation and implementation of the scheme include the many stakeholders in the usage of the reservoir. These stakeholders include the residents of the 11 villages that are located on the outskirts of the reservoir, as well as the fisherman who fish on a regular basis. individuals who work in the galleries or do seasonal cropping, individuals who rely on the reservoir for irrigation or drinking water, visitors, people who enjoy watching birds, and government offices that deal with irrigation, fisheries, and tourism all depend on the forest. As a result, the wildlife sanctuary of Nandur Madhameshwar requires a management strategy that is more adaptable. There are six talukas that make up the district, and their names are Nandurbar, Nawapur, Shahada, Naloda, and Akkalkua and Akrani respectively. In total, there are 16,46,177 people living in the Nandurabar district, and the population density there is 276 people per square kilometer. According to the census taken in 2011. The majority of the population is engaged in agricultural activities.

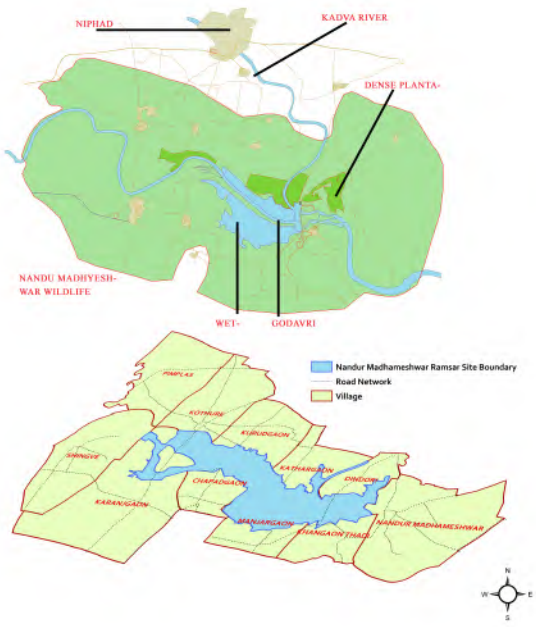

Figure 6 – Site Context

3.2. Site Analysis

The Nandur Madhameshwar is located at a distance of about 40 km East of Nishik in Niphad Taluka in the Nashik district of Maharashtra State. It is about 55 km from Nashik Road Railway station. Niphad Township is 12 km to the North of the pick-up weir of Nandur Madhameshwar.
The area is easily approachable by pucca roads from Nashik as well as from Niphad. State transport buses are playing regularly over these roads. The Nandur Madhameshwar reservoir falls in the biogeographic province 6D. of the central plateau region. Topography is mostly flat, with average elevation of 640 Ms. Highest point is 815 Mts.

Figure 7 – Site Analysis Diagram

3.3. Demographic Data's

The total population of Niphad Taluka is 493,251 out of which the urban population is 74,398 while the rural is 418,853. As per Census 2011, the total number of families in Niphad was 16,442.

Description	Total	Rural	Urban
Population	493,251	418,853	74,398
Children (0-6 yrs.)	62,999	53,827	9,172
Literacy	83.53%	82.51%	89.92%
Sex ratio	936	937	934
Schedule Caste	10.2%	9.2%	9.5%
Schedule Tribes	19.4%	21.2%	9.5%

3.4. Existing site analysis

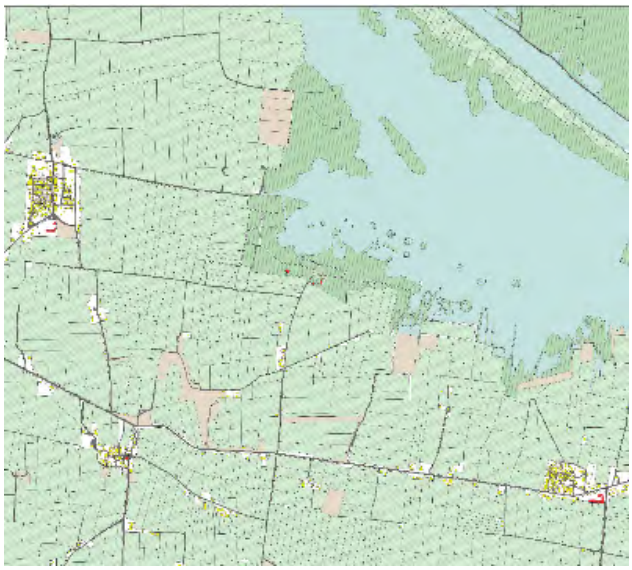

Figure 8 – Land use Map

Figure 9 – Open Built Map

The above maps show the land use and open building of the site and villages near the context. Other than it also shows human encroachment and how they are expanding their land towards the wetland.

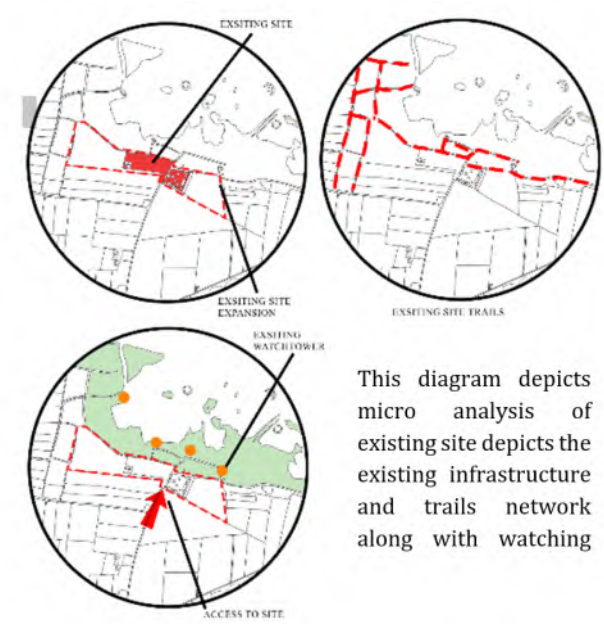

Figure 10 – Existing Site and Wetland Mapping

Figure 11 – Existing Site and Wetland Images

Figure 12 – Site Plan with the extended site and section

3.5. SWOT Analysis

Strength :

- Every year about 20,000 birds come on the site and because of this there is a major tourist attraction.
- The site is an international wetland.
- It is lifecycle maintaining ecosystem for the migratory and native birds.
- Providing livestock and fishes to native people
- There are already natural birds island on the site, as well constructed watch towers are there.

Weakness :

- There is no proper demarcation of anything on the site and because of it there is no control on human activities.
- Site is approachable from secondary road and there are no proper infrastructure facilities on the site.
- Site is surrounded by agricultural land and because of that wetland faces the problem of various chemical as fertilizers, etc.
- There is not proper transportation system form Nashik to Nandur Mdhameshwar

Opportunities :

- The project can be developed as Eco-tourism, awareness activities, research, and conservation will give opportunities to the tourist to truly understand the importance of it to the region and life.
- Site can be redeveloped with a new infrastructure which will attract more tourist.
- View from the site of wetland and its surrounding.
- The site has been allotted with spaces for flora and fauna growth. Where by migratory birds will attract people towards it.
- The site will create opportunities for native people for jobs and employment.

Threat :

- The water released from the dam water can be affected by the site.
- Excessive use of chemical fertilizer and no crop rotation can de lead to hydrological fragmentation and soil erosion.

4. Design Solution And Execution Details

The motive of design is to use architecture and the environment as a tool to harmonize humans and nature. To make them realize that they can co-exist to gather, and because of nature, they are here. The design strategy mixture of architecture and environment to constantly engage them and enhance learning about wetlands.

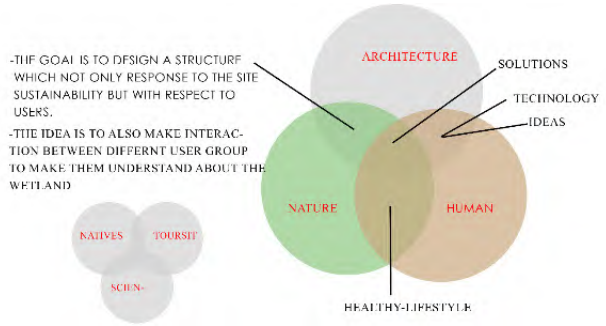

Figure 13 – Design concern elements

To design eco-sensitive (architecture) which not only invites humans but also nature, birds and insects. To create spaces that connect to nature and understand the lost importance of reconnecting to nature. To design spaces where one can forget the urban chaos and experience the beauty of architecture, nature, and ecology of the surrounding. The major architectural concern is to create a symbiotic relationship between humans, the environment, and the wet.

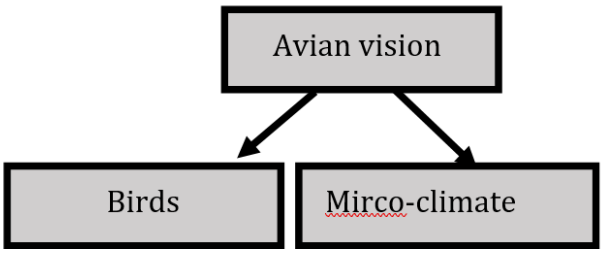

Figure 14 – Design concern elements

4.1. Design Considerations

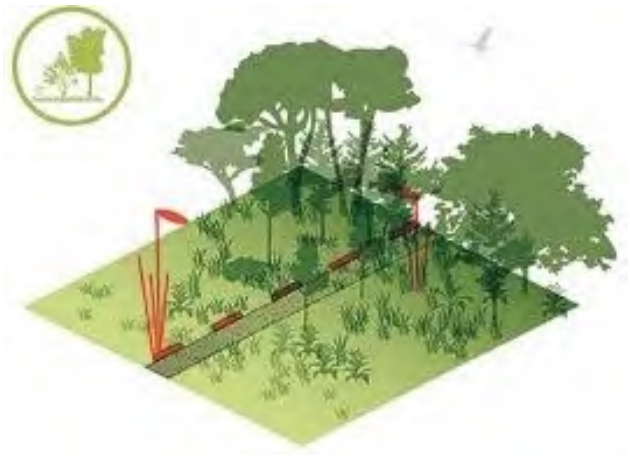

Figure 15 – Ecological Landscape : • Meadows and forests that provide • Habitat and other environmental Benefits • Nature parks • Rapid reforestation

Figure 16 – Rain water harvesting : • landscapes that capture Stormwater and clean air • Large lake • Swales+ infiltration medians • Smaller retention carbon forces • Infiltration Park Pond

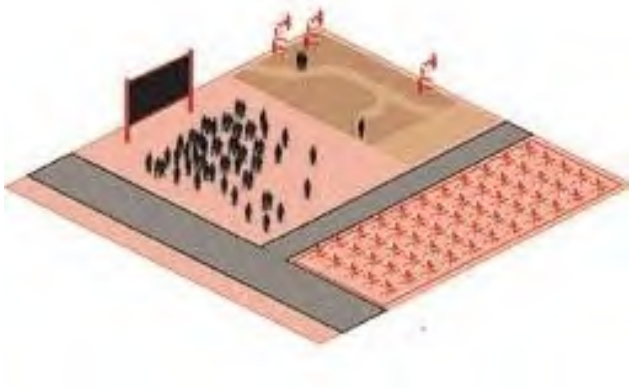

Figure 17 – Productive Landscape : • Landscapes that Generate new Knowledge, grow Energy and food. • Create new urban Experiences • Research Landscape • Urban farm • Aquaculture Hydroponics • Algae-culture • Energy field or forest

Figure 18 – Transitional Landscape : • Temporary landscapes that clean soil and enable new forms of social life and creative displays • Event landscapes • Remediation fields or Forests • Art-scopes • urban meadows

Figure 19 – Conceptual Zoning

Figure 20 – Design Master Layout of proposed site

4.2. Design Solution

Author analysis how site segregation can be achieved which is shown in the below diagrams. Whereas, the most sensitive areas which need soft light and ventilation are to be placed towards the north-east and north-west sides.

The author wants the design of site as centered around promoting the conservation and preservation of the wetland ecosystem along with providing a space for visitors to learn and appreciate its significance. The thoughtful placement of the various areas on the site ensured ease of access and convenience for all visitors, promoting a positive and immersive learning experience. The center of the site featured an exhibition center and a cafe, creating a central hub for visitors to congregate and learn about the wetland ecosystem.

On the eastern part of the site, the author has designed research areas and a constructed wetland. Where the placement of blocks is such that they are easily accessible by scientists and other researchers in a very convenient way, the loading and unloading system is properly worked out for the particular zone. Apart from that, it will be used to collect rainwater for research on aquatic plants and fish species. This approach promoted sustainability and provided valuable data on the wetland ecosystem's ecological health.

To the left of the exhibition center, I designed a learning center for the local community that was connected to the farm areas, providing an educational space for visitors to learn about sustainable agriculture and its importance in the ecosystem. And the clustering of blocks is designed in a manner that it creates a courtyard that acts as an extended space for the activities designed.

Finally, on the far-left side of the site, the author has designed a rehabilitation center that is connected to a clinic for birds. This approach ensured that the rehabilitation process was carried out without any interference, allowing the birds to recover and adapt to their natural habitat under the proper supervision of doctors.

4.3. Observation Tower / Watch Tower

The observation tower is designed in a way, it is light in weight and it is made from bamboo and metal. Apart from that creepers are used for hiding metal frames so that they can blend with the surroundings so that people can experience maximum closeness to bird species. To have an accurate analysis of the birds the design of the tower is made of 4 floors and a height of 12 mts.

The conservation and learning area are designed with a focus on sustainable and eco-friendly materials such as mud, recycled timber, straw, and a green timber roof. The walls were constructed with an outer layer of mud, which was designed to blend seamlessly with the wetland surroundings, with a moss media culture layer that would absorb moisture and promote the growth of moss. The inner walls were made of mud blocks, with bamboo insulation in between and timber sheathing.

Figure 21 – Plan of Observation Tower

Figure 22 – Section of Observation Tower

The roof was made of straw, which was locally sourced from the wetland area, reducing the project's carbon footprint and promoting sustainability. Some models also incorporated a green roof, which not only attracted birds and insects but also helped the conservation and learning area blend into the surrounding environment.

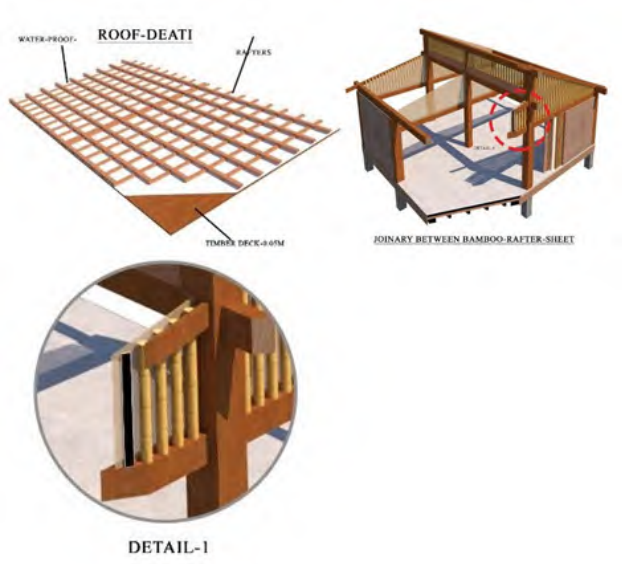

FIGURE 23 – Framing detail

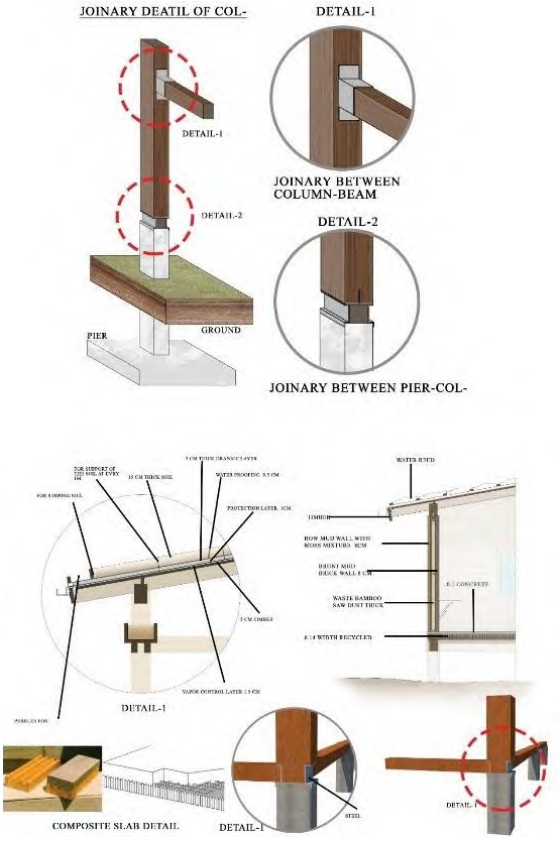

FIGURE 25 – Joinery and Roofing Details

FIGURE 24 – Detail of Green-roof and Plant species

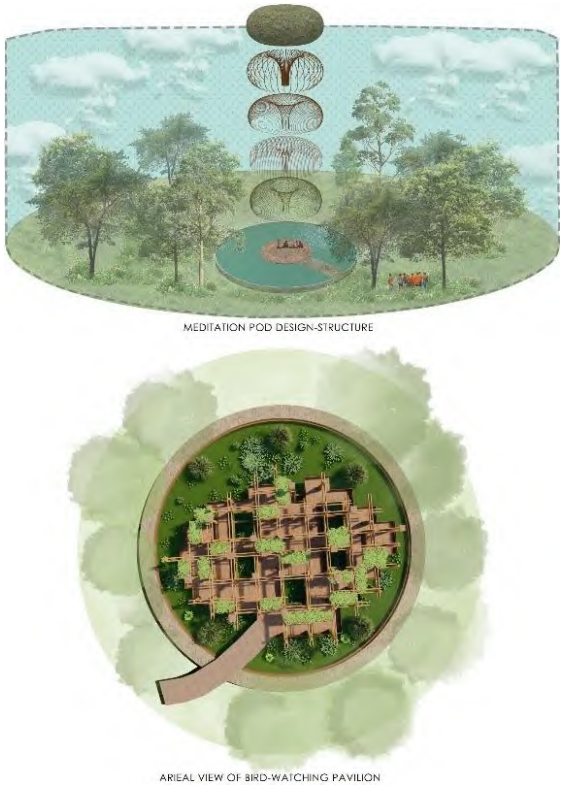

FIGURE 26 – Meditation-pod and Pavilion

Figure 27 – View of Bird Rehabilitation Center

Figure 28 – Module View

Figure 29 – Module View

Figure 30 – Internal view of Bird Rehabilitation

5. Conclusion

The research paper highlights the concern that as we progress in the technological era, humanity has become detached from nature, forgetting its crucial role in our survival and the development of civilization. As per the inspiration acquired through author's grandfather's wisdom, the author recognized the value of nature and decided to act upon it. This research led everyone to focus on wetlands, which are currently under threat due to human activities, despite being critical ecosystems that produce twice as much oxygen as other ecosystems.

To raise awareness about wetlands and their significance, the author tries to design a sustainable and energy-efficient park along with a research, training, and learning center. The project incorporates various features such as water harvesting, research on flora and fauna, medical research, a training center for local villagers, where the built bocks are designed from a mud moss wall that provides insulation which changes color to blend with nature throughout the seasons. The objective of this park is to change people's perspectives and expand their understanding of the importance of wetlands, especially for those living near the, as they use chemical fertilizers and pesticides, leading to hydrological fragmentation and disruption of the ecosystem.

Moreover, the park aims to support sustainable farming practices for the local community and facilitate advanced medicinal research for the benefit of the Nandur Madhameshwar wetland. Ultimately, this project not only benefits humans but also helps preserve endangered species and the land and aquatic ecosystems of the Nandur wildlife sanctuary.

In a nutshell, the design proposal serves as a platform to raise awareness, promote sustainable practices, and contribute to the preservation of the Nandur Madhameshwar wetland, benefiting both humans and the environment.

6. References

1. Mitsch, W. J., & Gosselink, J. G. (2007). Wetlands (4th ed.). John Wiley & Sons.
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4. Wetland Restoration : A Handbook for British Columbia" by David M. Bell.
5. "Restoring Wetlands : An Ecological Approach" by Donald A. Hammer.
6. "Ecological Design and Planning of Wetlands" by John L. Gallagher and Kenneth D. Potter.

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Neatly type every portion of the manuscript with single line spacing (a minimum of 6 mm between lines) and Narrow Margin (0.5" inch, 1.27 cm margins on all sides, including figure legends, table footnotes and references.

The manuscript should be prepared and numbered consecutively as follows:

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Authors Name: Cambria Font, Size 12

Authors Affiliation & Address: Cambria Font, Size 11, Italic

Abstract: Cambria Font, Size 10 & Italic

Key Words: Cambria Font, Size 10 & Bold

Introduction: Heading Cambria Font, Size 11, Description: Cambria Font, Size 10

Materials and methods: Heading Cambria Font, Size 11, Description: Cambria Font, Size 10

Results and discussion: Heading Cambria Font, Size 11, Description: Cambria Font, Size 10

Conclusion: Heading Cambria Font, Size 11, Description: Cambria Font, Size 10

Acknowledgements: Heading Cambria Font, Size 11, Description: Cambria Font, Size 10

References: Heading Cambria Font, Size 11, Description: Cambria Font, Size 9

Tables and Figures: Heading Cambria Font, Size 10, Description: Cambria Font, Size 9, Single Line spacing

Leave one space after a comma, except in chemical names. For the identification of pharmaceutical substances, the International Nonproprietary Names (INN) proposed and recommended by the WHO should be used. For the units of measurement, the use of the International System of Units (SI) is recommended: m (meter), g (gram), kg (kilogram), µg (microgram), s (second), min (minute), h (hour), d (day), y (year), l (litre), µl (microlitre), ng/ml not ng•ml-1 and r/min not rpm. Excessive abbreviations should be avoided and abbreviations other than those acknowledged, uniform and standard should be contained in brackets at their first use.

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Abstract: A structured abstract not exceeding 250 words should be arranged. Avoid abbreviations and references, and do not include diagrams. The abstract with keywords should be typed on a separate sheet.

Keywords: Below the abstract, type 3-6 keywords or short phrases suitable for indexing.

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The introduction should not be an extensive literature review although it should provide sufficient background information for the reader to understand and evaluate the results of the present study without referring to previous publications on the same topic.

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Present your results in a logical sequence in the text, tables, and illustrations, giving the main or most important findings first. Do not repeat in illustrations; emphasize or summarize only important observations. Extra or supplementary materials and technical detail can be placed but will not interrupt the flow of the text; alternatively, it can be published only in the electronic version of the journal.

When data are summarized in the Results section, give numeric results not only as derivatives (for example, percentages) but also as the absolute derivatives were calculated, and specify the statistical methods used to analyze them. Restrict tables and figures to those needed to explain the its support. Use graphs as an alternative to tables with many entries; do not duplicate data in graphs and tables. "Where scientifically appropriate, such as age and sex should be included. Include summary of key findings, Strengths (study question, study design, data collection, analysis and interpretation); what this study adds to the available evidence, effects on patient care and health Controversies raised by this study; and Future research directions. Do not repeat in detail data or other material given in the

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Conclusion

A short, paragraph summarizing the most important finding(s) of the research is required.

Acknowledgments

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(If more than six authors, then first three shall be listed followed by et al.)
Shah DP, Jani GK, Modification and Characterization of Gellan Gum, Pharmaceutical Technology, 2009; 33(7): 48-58.

Books and other Monographs

Author(s) of Book (Surname initials). Title of Book. Edition. Publisher; Place of publication; Year of publication.

Personal author(s)

Eisen HN. Immunology: an introduction to molecular and cellular principles of the immune response. 5th Edition. New York: Harper and Row; 1974.

Chapter or Article in a book

Author(s) of Chapter (Surname initials). Title of Chapter. In: Editor(s) name, Editors. Title of Book. Place of publication: Publisher; Year of publication, Page numbers.

Kelly HW and Sorknes CA. Asthma, Dipiro JT, Talbert RL, Yee GC, Matzke TR, Wells BG, Posey LM, Pharmacotherapy- A Pathophysiological Aproch, Sixth Edition, The McGraw-Hill; 2005.504

Patent

Larsen CE, Trip R, Johnson CR, inventors; Novoste Corporation, assignee. Methods for procedures related to the electrophysiology of the heart. US patent 5529 067. 1995.

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