

STUDY OF η -EINSTEIN SOLITON ON $(LCS)_n$ -MANIFOLD

Abhijit Nandi* and Srabani Debnath**

*Department of Mathematics, Jadavpur University, Kolkata - 700 032

**Department of Mathematics, Budge Budge College, Kolkata - 700 137

Abstract: The object of the present paper is to study η -Einstein soliton on $(LCS)_n$ -manifold. We have also studied $(LCS)_n$ -manifold admitting η -Einstein soliton where the Ricci tensors are cyclic parallel.

2010 Mathematics Subject Classification (AMS) : 53B30, 53C15, 53C25, 53C21.

Keywords: η -Einstein soliton, η -Einstein manifold, $(LCS)_n$ -manifold.

1. Introduction

The notion of Lorentzian concircular structure manifolds (briefly, $(LCS)_n$ -manifolds) was first introduced in 2003 by Shaikh [18] with an example that generalizes the notion of LP-Sasakian manifolds which was introduced by Matsumoto [11] and also by Mihai and Rosca [12]. In 2005 and 2006, the application of $(LCS)_n$ -manifolds to the general theory of relativity and cosmology was investigated by Shaikh and Baishya [21], [22]. Later many other authors like Atceken ([1], [2]), Hui ([8], [9], [10]), Narain [13], Yadav ([23], [24]), Roy, Dey, Bhattacharyya [17], Shaikh ([19], [20]) also studied the $(LCS)_n$ -manifold.

In 2016, Catino and Mazzieri [4] introduced the notion of Einstein soliton which can be viewed as a self-similar solution to the Einstein flow

$$\frac{\partial g}{\partial t} = -2\left(S - \frac{r}{2}g\right)$$

where g is the Riemannian metric, S is the Ricci tensor and r is the scalar curvature. The Einstein soliton plays an important role in solving many physical and geometrical problems. The Einstein soliton is analogue to the Ricci soliton which is also generated by a self-similar solution to the very famous geometric evolution equation Ricci flow which was used by Perelman([15], [16]) to prove Poincare conjecture. A slight deviation of the Einstein soliton, called the η -Einstein soliton is defined by the following mathematical expression,

$$\mathcal{L}_\xi g + 2S + (2\lambda - r)g + 2\mu\eta \otimes \eta = 0 \quad (1)$$

where \mathcal{L}_ξ denotes the Lie derivative along the direction of the vector field ξ , S is the Ricci tensor, r is the scalar curvature and λ, μ are real constants. The η -Einstein soliton is called



The Indian Economic Journal

JOURNAL OF THE INDIAN ECONOMIC ASSOCIATION

Special Issue, January 2022

Balanced Regional Development

- ▶ Disparities in Economic Development
- ▶ Social Development across Regions
- ▶ Poverty and Inequality Disparities
- ▶ 15th Finance Commission Recommendations and Regional Development
- ▶ Regional Pattern of Employment and Migration
- ▶ Infrastructure Development across Regions
- ▶ Case Studies of Selected States Including Intra-State Disparities
- ▶ Public Policies for Reduction of Regional Disparities



CONTENTS

- | | |
|---|---|
| <p>1. Inter-Regional Disparities in India
Bharat R. Shah..... 1</p> <p>2. Intra State Disparity In Diet Pattern And Food Diversity Among Different Income Strata of Assam
R.Santhosh
Priyesh C A..... 12</p> <p>3. Disparity in Health Sector of India Inter State Analysis
Pankaj Kumar
Dalip Kumar..... 23</p> <p>4. Issues of Poverty and Disparities in The Rural Varanasi of Eastern Uttar Pradesh
Anup Kumar Mishra..... 39</p> <p>5. Regional Disparities In Household Demand For Gold And Other Durable Goods: A Secondary Data Analysis Using National Sample Survey (Nss) Data Series
Tinu Joseph
Sneha V. Deshpande..... 52</p> <p>6. Critical Analysis of Regional Imbalance in Human Development
Amruta Suryawanshi..... 66</p> <p>7. An empirical Analysis of Poverty and inequality disparities in Karnataka
Nasir Khan B.M..... 73</p> <p>8. “Poverty and Income Inequality in India : Statewise Comparative Analysis”
Renu Sinha..... 81</p> | <p>9. Poverty and Inequality Disparities - A Comparative Empirical analysis of Chhattisgarh and Rajasthan states of India
Anish Chandra Mishra..... 94</p> <p>10. An Analysis and Pattern of Regional Disparities in the Indian States
Samit Laxman Mahore
Pramod Pandurangrao Lonarkar..... 101</p> <p>11. Unbalanced Regional Development in India: An Overview
Wishwanath Kumar..... 115</p> <p>12. Role of Bottom Level Bureaucracy In Reducing Social Disparities And Ensuring Balanced Regional Development: An Experimental Approach
Priyesh
R. Santhosh..... 125</p> <p>13. Revival of Agriculture and Rural area Development
Mayanka kumari..... 133</p> <p>14. Improving Poverty Reduction Strategies through Gender Equality in Madhya Pradesh India
Anjali Chavhan..... 140</p> <p>15. Polarisation, Poverty And Its Decomposition Among The Self-Employed Women Entrepreneurs In Kaval
Annapurna Dixit
Alok Kumar Pandey..... 152</p> |
|---|---|

32. Overview of Pradhan Mantri Pasal Bima Yojana in India's Crop Insurance Schemes and Analysis of Its Opportunities and Challenges Vipin Kumar Mishra.....	404	39. Revisiting the Environment-Growth Debate Using the EKC Hypothesis Mohammad Imdadul Haque S.M. Jawed Akhtar.....	475
33. Agriculture and Irrigation Potentialities and challenges in Southern Parts of the State of Bihar Sourav Kumar.....	414	40. Poverty and Income Inequality in Global Perspective: An Overview Anjana Kumari.....	488
34. Tribal Livelihood, Poverty and Climate Change: Study with special references of Bankura, West Bengal Sourav Kumar Das Kishor Naskar.....	423	41. Rural-Urban Migration : Opportuities & Challenges Bipin Kumar.....	500
35. Impact of Government Schemes on Socio Economic Status during Covid-19 Pandemic: A Case Study of Handiya Tahsil of Prayagraj District of U.P. Dharmnath Uraon Anup Kumar.....	434	42. Patients' Perception on Service Quality of Government Hospitals Purushothama Bhat, N.....	506
36. A Study on The Impact Of Covid-19 on India's MSME Sector M. Dillip Anand.....	453	43. Urbanisation : Causes and Consequences Binod Choudhry Gautam Kumar	519
37. Impact of Covid-19 Pandemic on Indian Economy Krishna Nand Yadav.....	461	44. Rural-Urban Migration : Model of Lewis Ritu Kumari.....	524
38. Study on Role of Self Help Group For The Development of Rural Women Raju Kumar Maddeshiya.....	471	45. Migration : Concepts, Types & Effects Balkant Sharma S.N. Pandey.....	530
		46. Employment Opportunities for the Higher Education Graduates in India Kavita Meena.....	536
		47. The Challenges and Illusion of a Revival in the India's Agricultural Sector Adivappa.N.....	543

Tribal Livelihood, Poverty and Climate Change: Study with special references of Bankura, West Bengal

**Sourav Kumar Das
Kishor Naskar**

ABSTRACT

Tribes have a government-stipulated right for attachment to specific places and resources, challenging tribes' mobility and flexibility to go elsewhere in response to future changes. Change in Climate and vulnerability of environment makes tribal jeopardy for their intimate connection with the natural for their culture, health, and livelihoods especially in Poverty. The climatic deterioration raises the question of the tribal sustainability. In this context, the paper attempts to measure tribal livelihood index based on their perception of climate change and deforestation index that have impacted on tribal livelihood index, from which poverty scenario has been evaluated. We have documented the linkages between tribal livelihoods and climate changes with their sustainable development in the Bankura district of West Bengal based on a primary field survey of the tribal community of Ranibandh block of Bankura district of West Bengal in 2015 and 2020. Deforestation and climate change have a significant impact on changing tribal livelihood and poverty scenario. The climate change and deforestation tribal livelihood have been forced to shifting their occupation to labour wage especially as migrated labour and/or labour on government programs.

Keywords: Tribal Livelihoods, Climate Change, Environmental Vulnerability, Poverty Scenario, Sustainable Development

1. INTRODUCTION

For last few decades the world is experiencing a dramatic environmental and socio-economic changes due to environmental degradation and climate changes. Climate change is one of the major threats to sustainable development because of its effects on health, infrastructure, agriculture, food security, and forest ecosystems (IPCC 2007a). India's economy is largely dependent on climate sensitive sectors such as agriculture, water resources and coastal zones, biodiversity and forestry (INCCA, 2010). In India 700 million rural populations directly depend on climate-sensitive sectors like agriculture, forest, and fisheries. Forest ecosystems provide a wide range of economic and social benefits, such as employment, forest products, and protection of cultural values (FAO 2006). Forest-dependent people comprise a significant proportion of the communities most vulnerable to the impacts of climate change on forests.

FULL LENGTH ARTICLE

Antibacterial activity of some unifloral honeys from Eastern India

Debasis Upadhyay^{*1,3}, Meghma Bera^{2,3} and Anup Kumar Sahoo⁴

¹Department of Botany, Budge Budge College, 7, D. B. C. Road, Kolkata – 700137, India;

²Department of Botany, Vidyanagar College, 7, Kolkata – 743503, India

³Centre of Advanced Studies, Department of Botany, University of Calcutta, 35, Ballygunge Circular Road, Kolkata-700019, India

⁴Department of Physics, Budge Budge College, 7, D. B. C. Road, Kolkata – 700137, India.

Received : 22.10.2019

Accepted : 18.11.2019

Published : 16.12.2019

Antibacterial activity of five natural unifloral honey samples from two districts of Eastern India was investigated by *in vitro* agar cup assay. After a part of each sample was acetolysed for pollen identification unifloral *Coriandrum sativum*, *Terminalia arjuna*, *Schleichera oleosa*, *Eucalyptus globulus* and *Aegle marmelos* honeys were assayed for their antibacterial activity against the Gram +ve isolate *Staphylococcus aureus* (ATCC 25923) and Gram -ve *Escherichia coli* (ATCC 8739) and compared with that of the antibiotic ciprofloxacin. At 50% (v/v) dilution *Eucalyptus globulus* and *Aegle marmelos* honeys produced inhibition zones broader than that produced by ciprofloxacin at 5 µg ml⁻¹ concentration against the *S. aureus* isolate with the diameter of inhibition zone measuring 41±0 mm and 34±1 mm respectively. *Coriandrum sativum* and *Terminalia arjuna* honeys produced broader inhibition zones measuring 41.3±1.5 and 37±1.5 mm respectively against the *E. coli* and 37.3±2.5 and 34±0.5 mm respectively against the *S. aureus* isolate. The findings recommend that the bee-keepers of this economically backward study area have the opportunity to share the profitable market of traditional honey based medicines to benefit the apiary industry and the rural health care improving the socio-economy of the local inhabitants.

Key words: Traditional antibacterial, honey, pollen acetolysis, agar cup assay, *Staphylococcus*

INTRODUCTION

Honey has been in use as a specific antimicrobial since prehistoric ages. Although an ancient topical treatment for wounds, honeys from all the continents of the world have been re-accepted into conventional medicine as a licensed medical device because honey's high osmolarity, low pH, hydrogen peroxide (H₂O₂), methylglyoxal and other phytochemical components derived from various floral sources confer it

antibacterial activity and honey is promoted currently as a natural healing product against various wounds and burns (White *et al.*, 1963; Molan, *et al.*, 1988b; Molan, 1992; Willix *et al.*, 1999; Allen *et al.*, 2000; Taormina *et al.*, 2001; Cooper, 2002; Bang *et al.*, 2003; Mundo *et al.*, 2004; Henriques *et al.*, 2005; Cabrera *et al.*, 2006; Maeda *et al.*, 2008; Blair *et al.*, 2009; Irish *et al.*, 2011; Mandal and Mandal, 2011; Alnaimat *et al.*, 2012). Allen *et al.* (1991) and Upadhyay *et al.* (2014) showed that the flowers serving as the source of the nectar and pollen component of honeys may determine the nature of antibacterial activity of the honey. Drug resistance presents an ever-increasing

*Corresponding author : debaup@gmail.com