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L'INSTITUT SHASTRI INDO-CANADIAN
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International Conference on ENGAGING CANADA AND INDIA: CHALLENGES OF SUSTAINABLE DEVELOPMENT GOALS

8 - 9 June, 2018

Book of Abstracts

Shastri Indo-Canadian Institute
5 Bhai Vir Singh Marg
New Delhi-110001

India-Canada Joint Statement during State Visit of Prime Minister of Canada to India (February 23, 2018): Partnership for Security and Growth



*“Noting the significant increase in number of Indian students in Canada, the leaders expressed satisfaction at the renewal of the MOU on higher education. They recognized the 50th Anniversary of the **Shastri Indo-Canadian Institute** in promoting understanding between India and Canada through academic activities and exchanges, with the support of both governments to the institute. The leaders also agreed on the benefits of supporting the arts, sports and cultural activities in each other’s country, and agreed to encourage collaboration between academia and think tanks”*

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**ENGAGING CANADA AND INDIA:
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PROGRAMME

CONFERENCE ON ENGAGING INDIA AND CANADA: CHALLENGES OF SUSTAINABLE DEVELOPMENT GOALS

June 8-9 2018, The Multi-Purpose Hall, India International Centre
New Delhi

Friday June 8, 2018

9:15 – 9:30 AM Registration

INAUGURAL SESSION – 9:30 – 11:15 AM

9:30 – 9:35 am	Welcome by Prof. Faizan Mustafa Vice-President / President-Elect, Shastri Indo-Canadian Institute
9:35 – 9:40 am	Role of Shastri Indo-Canadian Institute in achieving Sustainable Development Goals by Prof. Girish Shah , President, Shastri Indo-Canadian Institute
9:40 – 9:45 am	Overview of the Conference by Prof. Anil Mehrotra , Secretary-Treasurer, Shastri Indo-Canadian Institute
9:45 – 9:55 am	Opening of Conference by the Dignitaries- Lighting of the Lamp
9:55 – 10:10 am	Inaugural Address by H.E. Mr. Nadir Patel , High Commissioner of Canada to India, High Commission of Canada in India
10:10 – 10:25 am	Special Address by Dr.N.Saravana Kumar, Joint Secretary, Higher Education , Ministry of Human Resource Development
10:25 – 10:55 am	Keynote Address by Dr. Ashok Kumar Jain, Advisor (RD & SDGs), Niti Aayog
10:55 – 11:00 am	Vote of thanks and way forward by Dr. Prachi Kaul , Director, Shastri Indo-Canadian Institute

11.00 – 11.15 AM TEA BREAK

PARALLEL SESSION 1 A: THEME 1A- Community Well-Being

The Hall, Time: 11:15 AM – 1:15 PM

Paper	Speaker & Co-Authors
Co-Chairs: Prof. Ravishankar Rao, Department of English, Mangalore University Prof. Braj Sinha, Department of Religious Studies and Culture, University of Saskatchewan	
Engaging with Environment: Myth, Storytelling and Sustainability	S. Das Department of English, Berhampur University
Traditional Knowledge and Community Well-Being: Environmental Sustainability in North East India and Canada	D. Dattaray Centre for Canadian Studies, Jadavpur University, Kolkata
A Cross-Cultural Comparison the Traditional Healing Practices in India and Canada	M. Khosla Psychology Department, Daulat Ram College, University of Delhi
Biology, ideology, and the problem of patriarchy: Mahila Shanti Sena - a women's movement for self-driven empowerment and gender equality	R.S. Singh Department of Biology, McMaster University, Hamilton
Gender Inequality and Ill-Health: The Role of Caste and Class In Tamil Nadu, India	K Annapuranam CSSCD, Institute for Social and Economic Change, Bangalore
Discussion/QA	

PARALLEL SESSION 1 B: THEME 3 A – Improving Health

The Seminar Hall 2, Time: 11:15 AM - 1:15 PM

Paper	Speaker & Co-Authors
Co-Chairs: Prof. Pratima Tatke, Department of Pharmaceutical Chemistry, SNDT Women's University Prof. Selvadurai Daya Dayanand, Department of Biology, Concordia University	
Collaborative Initiatives between India and Canada on Health and Disease Research: Impact of Shastri Indo-Canadian Institute (SICI) Grants	A. Basak ; A. J. Purty; A.K. Das Pathology and Laboratory Medicine, Faculty of Medicine, University of Ottawa; Community Medicine, PIMS, Puducherry; Chemistry Department of Biotechnology, IIT Kharagpur
Case based Learning, Professionalism and Global Health Capacity Building: A Binational Alliance for Improving Health through Quality Medical Education	R. Sule ; S. Ginsberg; I. Silver; A. Jain; M. Mylopoulos Wilson Centre, University of Toronto; Department of Medicine, University of Toronto; Department of Psychiatry, University of Toronto; Department of Community Medicine, Kasturba Medical College; The Wilson Centre, University of Toronto
Risk pooling through Public Health Insurance Schemes: A Challenge to Reduce Poverty in India	R. Nasir Centre for the Study of Discrimination and Exclusion, Jawaharlal Nehru University, Delhi
Elderly Health in India: Through the Lenses of Social Capital Theory	S.K. Srivastava Indian Institute of Management Indore
Development of an Affordable Point-of-Use Disinfection System for Rural India	S. M. Maliyekkal ; U. Kannan Department of Civil Engineering, Indian Institute of Technology, Tirupati
Discussion/QA	

PARALLEL SESSION 1C: THEME 4A- Sustainable Energy Development

The Seminar Hall 3, Time: 11:15 AM - 1:15 PM

Paper	Speaker & Co-Authors
Co-Chairs: Prof. Enakshi Khular Sharma, Department of Electronics, University of Delhi Prof. Sada Niang, Department of French, University of Victoria	
Solar Energy: Walking Towards Sustainable Development Goals	B. Chhibber Department of Political Science, University of Delhi, Delhi
Trade in Clean Energy Technologies and Opportunities for Co-Operation – The Case of Canada and India	M. L. Tantri; V. Bhat Centre for Economic Studies and Policy (CESP), Indian Institute for Social and Economic Change (ISEC), Bengaluru; Christ University, Bengaluru
Analyzing the Electric Vehicle Innovation System of Canada: Policy Lessons for India towards Sustainable Development	R. Kumar Centre for Studies in Science, Technology and Innovation Policy, School of Social Sciences, Central University of Gujarat, Gandhinagar
Optimized Agricultural Power Tariffs as a Means of Achieving Sustainable Developments Goals in India	B.S. Sidhu Institute for Resources, Environment and Sustainability (IRES), University of British Columbia, Vancouver, BC, Canada
Sustainable Energy Development and Cities in India: A Case Study of Implementation of Solar City Programme in Chandigarh	S. Singh; K. Mehta Department of Public Administration Panjab University, Chandigarh
Discussion/QA	

PARALLEL SESSION 1D: THEME 5 A- Environmental Sustainability

The Seminar Hall 1, Time: 11:15 AM - 1:15 PM

Paper	Speaker & Co-Authors
Co-Chairs: Dr. Thomas Mathew, Science & Technology, Gujarat National Law University Dr. Gary Markle, Fashion Department, NSCAD University	
Implementation of Access and Benefit Sharing Mechanism with Responsible Consumption and Production of Biological Resources (SDG 12): A Study on India and Canada	S. Devi Rajiv Gandhi School of Intellectual Property Law, Indian Institute of Technology, Kharagpur
Vacuum Membrane Distillation for Treatment of Saline Water using PVDF Membranes	Pooja; R.R. Farnood; G. Tomar, P. Vashistha; V. Kumar Indian Institute of Technology, Delhi
Demonstration of Innovative, Integrated and Interdisciplinary Canadian Technology for Industrial Soil Reclamation in Punjab, India	N.R. Sharma; R. Gupta; M. Garg; P. Azarsa; C. Valeo; R. Kanwar; S. Prasher; P. Constabel; S. Singh; D. Bhatia; J. Samuel; J. Singh; Amandeep Department of Civil Engineering, University of Victoria; Department of Mechanical Engineering, University of Victoria; Department of Bioresource Engineering, McGill University; Biology Department, University of Victoria; Yash Industries, Ludhiana
Comparative Analysis of Erosion, Sea level Rise and Subsidence of the Nelson River Estuary Manitoba, Canada and the Ganges River Estuary West Bengal, India	A. Mukhopadhyay; N. Pramanik; D. Mitra; S. Hazra School of Oceanographic Studies, Jadavpur University; Indian Institute of Remote Sensing, Dehradun
Risk Assessment of Agricultural Amendments	S. Sharma; R. Sharma; G. Anand; U. Singh; V.S. Bisaria Department of Biochemical Engineering and Biotechnology, Indian Institute of Technology Delhi
Discussion/QA	

1:15 - 2:15 pm

LUNCH BREAK

PARALLEL SESSION 2 A: THEME 1 B- Community Well-Being

The Hall, Time: 2:15 PM- 4:15 PM

Paper	Speaker & Co-Authors
Co-Chairs: Prof. S. B. Dash, Center for Marketing in Emerging Economies, Indian Institute of Management Lucknow Prof. John Reid, Department of History & Atlantic Canada Studies Program, Saint Mary's University	
Are the Millennial Generation's Travel Patterns Sustainable? Evidence from Canada	A. Agarwal School of Urban and Regional Planning, Queen's University, Kingston, ON, Canada
Discontents of Sustainable Mobility in Indian Cities	M. Badami; G.Gopakumar McGill University, Montreal, QC, Canada
Co-Design: A Process of Community Participation in Post-disaster Reconstruction	K.N. Dev; A.K. Das Department of Design, Indian Institute of Technology, Guwahati, Assam
Field Learning on Design for Sustainability in Design Education - Shared Vision and Global Partnerships	R.M. Punekar; S. Banerjee; P. Upadhyay Department of Design, Indian Institute of Technology, Guwahati, Assam
Continued Marginalisation at the Periphery of Delhi Metropolis: Case Study of Narela	T. Chaudhary School of Development Studies, Ambedkar University Delhi
Discussion/QA	

PARALLEL SESSION 2 B: THEME 2A - Reducing Inequalities

The Seminar Hall 2, Time: 2:15 PM - 4:15 PM

Paper	Speaker & Co-Authors
Co-Chairs: Dr. Chandra Mohan, International Comparative Literature Association Prof. Sheila Embleton, Department of Languages, Literature and Linguistics, York University	
Hijras of Mumbai and the Recent Judgment of India Supreme Court on Transgenders	M. Boisvert Université du Québec à Montréal, QC, Canada
Abhorred, Disdained and Secluded - Locating Women belonging to the Denotified Tribes of India	S. Debnath; K. Khetani Tamil Nadu National Law School, TamilNadu
Women, Multiculturalism and Minority Rights: A Snapshot of Canada and India	V. Narain Faculty of Law, McGill University, Montreal, QC, Canada
Need for Redistribution of Agriculture Land in India	I. Husain National Law University, Assam
Challenges towards Empowerment: Reconstructing Narratives of Homeless Individuals with Severe Mental Illness in India	P. Bhattacharya ; R.P. Kumar Department of Humanities and Social Sciences, Indian Institute of Technology, Kanpur
Income Inequality and Human Well-being: Why do we Need to Shift our Focus?	VK.Shrotriya; S.V. P. Singh Department of Commerce, Delhi School of Economics, University of Delhi, Delhi
Discussion/QA	

PARALLEL SESSION 2 C: THEME 4 B- Sustainable Energy Development

The Seminar Hall 3, Time: 2:15 PM - 4:15 PM

Paper	Speaker & Co-Authors
Co-Chairs: Prof. Rajeswari Pandey, Department of Electronics & Communications Engineering , Delhi Technological University Prof. Daniel F. Coleman, Faculty of Business Administration, University of New Brunswick, Fredericton	
Development of Green Catalyst for Biodiesel Production from Soybean Oil	J. Gupta, M. Agarwal, A.K. Dalai and S.P. Chaurasia; Department of Chemical Engineering, MNIT, Jaipur; Department of Chemical and Biological Engineering, University of Saskatchewan, Saskatoon, SK, Canada
Valorization of Household Food Wastes through Supercritical Water Gasification for Hydrogen-rich Syngas Production	S. Nanda; A.K. Dalai; F. Berruti; K.K. Pant; J.A. Kozinski Department of Chemical and Biochemical Engineering, University of Western Ontario, London, ON; Department of Chemical and Biological Engineering, University of Saskatchewan, Saskatoon, SK; Department of Chemical Engineering, Indian Institute of Technology, Delhi; New Model in Technology & Engineering (NMiTE), Hereford, Herefordshire, UK
Clean Energy for Transportation: Next-Generation Fuel Cells	D. Khattar; F. Sharif; E. Roberts; K. Karan Malaviya National Institute of Technology, Jaipur; Chemical and Petroleum Engineering, University of Calgary, Calgary, AB
Crossflow Turbine Design for Remote Power Systems	R. C. Adhikari ; D.H. Wood Department of Mechanical and Manufacturing Engineering, University of Calgary, Calgary, AB, Canada

Enhancement of the Chemical Properties of Bio-oil as a Sustainable Energy Replacement for Petroleum Based Fuels	P. B. Saynik; V.S. Moholkar Centre for Energy and Department of Chemical Engineering, Indian Institute of Technology, Guwahati
Bifunctional Catalyst for Efficient and Economical Conversion of Biomass-derived CO ₂ Containing Syngas into Synthetic Diesel	S. Bahri; S. Upadhyayula Department of Chemical Engineering, Indian Institute of Technology, Delhi
<i>Discussion/QA</i>	

PARALLEL SESSION 2 D: THEME 5 B- Environmental Sustainability

The Seminar Hall 1, Time: 2:15 PM - 4:15 PM

Paper	Speaker & Co-Authors
Co-Chairs: Prof. Bodh Raj Mehta, Department of Physics, Indian Institute of Technology Delhi Prof. Julie McMullin, Department of Sociology, Western University	
Advances in CO ₂ Capture using Solid Sorbents	N. Mahinpey Department of Chemical and Petroleum Engineering, University of Calgary, Calgary, AB, Canada
Role of Biochar Based Sustainable Green Technology in Water Treatment Systems	J. Dhiman; S. Prasher; N.R. Sharma; R. Kanwar Department of Bioresource Engineering, McGill University, Montreal, QC, Canada
Commodification of Water: A Case Study of Khetri Copper Mining Region, Rajasthan, India	K. Sahal Department of Anthropology, University of Delhi
An Onsite Demonstration Study on Floating Filters for Wastewater Drains	J. Singh; S. Prasher; N.R. Sharma; D. Bhatia; S. Singh; D. Singh; R. Rudra; R. Kanwar School of Bioengineering and Biosciences, Lovely Professional University; Department of Bioresource Engineering, McGill University, Montreal, QC; School of Engineering, University of Guelph, Guelph, ON
Biodegradable Plastics for Commodity, Engineering and Biomedical Applications	V. Katiyar Department of Chemical Engineering, Indian Institute of Technology, Guwahati
Discussion/QA	

4:15-4:30 PM

Concluding Day 1

4:30 PM

TEA

Saturday June 9, 2018- Second Day of the Conference

11:15 – 11:30 AM

TEA

PARALLEL SESSION 3 A: Theme 3 B Improving Health

The Hall, Time: 11:30 AM - 1:30 PM

Paper	Speaker & Co-Authors
Co-Chairs: Dr. A. B. Patil, University of Agricultural Sciences Bangalore Dr. Balakrishnan Prithviraj, Department of Environmental Sciences, Dalhousie University	
Design of Novel Dietary and Therapeutic Interventions to Power the Aging Muscle in Sarcopenia, a Morbid Geriatric Disease	V. Panda; A. Hare Department of Pharmacology, KMK College of Pharmacy, Mumbai University
The Health and Wellbeing of Inuit Communities in Canada	C.A. Aimol Department of Political Science, University of Delhi
Mental Health and Wellbeing: Informing the SDGs with Culture and Context: The Experience of a Maternal Mental Health Research Collaborative in Rural Rajasthan	R. Johri ; K. Killingsworth; K.K. Shergill; E. Christenson; S. Premji; A.S. Brar School of Human Studies, Ambedkar University Delhi; School of Public Health, University of Alberta; Mata Jai Kaur Maternal and Child Health Centre; Faculty of Nursing, University of Calgary; Institute for Social and Cultural Anthropology; University of Oxford
A Pragmatic Plasmodium falciparum Glutamate Dehydrogenase based Sensor for Malaria Diagnosis	N.K. Singh; L. Ngashangva; P. Goswami Department of Bioscience and Bioengineering, Indian Institute of Technology, Guwahati
Leaving no One Behind: Healthy Aging, Social Inclusion, and the SDGs	S. Johnson University of Regina, Regina, SK, Canada
Discussion/QA	

PARALLEL SESSION 3 B: Theme 2 B- Reducing Inequalities

The Seminar Hall 2, Time: 11:30 AM - 1:30 PM

Paper	Speaker & Co-Authors
Co-Chairs: Prof. (Dr.). Srikrishna Deva Rao, National Law University Odisha Dr. Sunera Thobani , Department of Asian Studies, Institute for Gender, Race Sexuality and Social Justice, University of British Columbia	
Integrating Elderly into Community: A Socio-Economic Model	A.C. Choolayil; L. Mohan Department of Social Work, Central University of Kerala Kasargod, Kerala
Employment Equity and Reservations Impact on the SDGs	R. Haq; A. Goel Department of Marketing and Management, Faculty of Management, Laurentian University, ON, Canada; Indian Institute of Management Calcutta, Kolkata
Impact of 2030 Agenda for Sustainable Development on Population Ageing Research in India with Learnings from Canada	H. Antal; S. Bhutani Department of Geography, Panjab University, Chandigarh
Sustainable Community well-being: A Conceptual Framework Community Well-being for India	D. Dash; A. Dutta Indian Institute of Technology Kharagpur; Reliability Engineer, BHP Australia
Frame Work For Co-operation Between India And Canada on Countering Terrorism and Violent Extremism: A Study of Cyber Dome and Coastal Security alert Committees in Kerala.	B. Sajikumar Department of Public Administration and Policy Studies, Central University of Kerala
Discussion/QA	

PARALLEL SESSION 3 C: Workshop on “Why Sex and Gender Matter in Social Science and Health Research and Policy: It Matters for Good Science”

The Seminar Hall 3, Time: 11:30 AM - 1:30 PM

Paper	Speaker & Co-Authors
Co-Chairs: Prof. Suchorita Chattopadhyay, Department of Comparative Literature, Jadavpur University Prof. Bilkis Vissandjée, Faculty of Nursing, University of Montreal	
Areas of Interest by the Participants	
Canadian Perspective on Good Science: Why Sex and Gender Matters	B. Vissandjée Université de Montréal, Montréal, Québec, Canada
Why Sex and Gender Matters: The Case of TB and Gender-based Violence	A. Pitre Research Scholar, Tata Institute of Social Sciences, Mumbai, Maharashtra
Why Sex and Gender Matters: The Case of Diabetes Type 2	A.C. Thippaiah University of Hyderabad, Hyderabad, Telangana
Interactive Discussion: Why Sex and Gender Matters in Reference to Participants' Areas of Interest	
Why Sex and Gender Matters: Lessons Learnt	

PARALLEL SESSION 3 D: Smart Cities, Technology and Communities

The Seminar Hall 1, Time: 11:30 AM - 1:30 PM

Paper	Speaker & Co-Authors
Co-Chairs: Dr. A. K. Mishra, Indian Institute of Technology Madras Dr. Derek Johnson, Faculty of Arts, University of Manitoba	
Does India Needs Smart City! Not Eco City? Hypothetical Analysis of Ecological Modernisation of SmaEco City (Smart + Ecological) Model for Sustainable Urban Development	A.M. Dhere Department of Science, S.N.D.T. Women's University, Mumbai
Access to water across smart cities in India: Issues and Challenges	C. S. Bahinipati; A.K. Katuri; U. Rajasekar Department of Humanities and Social Sciences, Indian Institute of Technology Tirupati; Independent Researcher, New Delhi
E- Waste Management for Environment Sustainability Strengthening Communication Strategies for Community Participation	S. Nagpal AJK Mass Communication Research Centre, Jamia Millia Islamia; New Delhi
Communication Technologies Used by Police Department for Community Participation and Relation	M.S. Sapna Department of Communication and Journalism University of Mysore, Mysuru
A New Framework to Secure Electronic Patient Record for E- Healthcare Applications in India	S. A. Parah; J.A. Sheikh; G.M. Bhat Department of Electronics and Instrumentation Technology, University of Kashmir; Department of Electronics Engineering, Institute of Technology, Zakoora, Jammu & Kashmir
Discussion/QA	

1:30-2:30 PM

LUNCH BREAK

CONCLUDING SESSION

The Hall, Time: 2:30 PM – 4.00 PM

Conference Summary and Future Steps by the **Executive Council**, Shastri Indo- Canadian Institute

Vote of Thanks by **Dr. Prachi Kaul**, Director, Shastri Indo Canadian Institute

4.00 PM TEA

Theme 1

Community Well Being

Engaging with Environment: Myth, Storytelling and Sustainability

Dr Shruti Das

Climate change with its alarming inevitability has become the focus of debate and research globally in the last few decades. In the throes of development nature has become the first casualty. Poverty, gender problems and migration stem from climate change and environmental depletion and have affected life in such a manner that humanity is desperately looking for an alternative towards environmental sustainability. This paper attempts to read two novels namely, *Son of the Thundercloud* (2016) and *Green Grass, Running Water* (1993), written by ethnic writers, Easterine Kire from India and Thomas King from Canada respectively, in the light of ecocritical theory. It attempts to show how storytelling and revival of ethnic myths have been used, in these two novels, towards the pursuit of environmental sustainability. Both the novels explore the polarities of nature and culture analysing sustenance and disaster by means of native narratives which might seem irrational and unreal in the face of rationality of empirical viability but ultimately have powerful currency. Kire's protagonist Pele undertakes a journey in search of sustainability. His sojourn leads him to a drought affected "abandoned village" where he meets two sisters who were four hundred years old and had been living on "hope". They tell him of their wait for a prophesy, when the thundercloud would impregnate their third sister, called the Tiger widow. She would give birth to a son who would be an agent of environmental resplendence, kill the tiger and bring salvation and regenerate the land to its fruitfulness once again. Pele becomes a witness to extraordinary events of climate change and participates in the process of protecting the agents of the new environmental condition and thereafter to nature's sudden devastating retaliation which was a result of the machinations of a trickster tiger. Thomas King's *Green Grass, Running Water* narrates, with multiple threads, Native American experience of dissociation and association with nature and stories of origin and creation which subtly express concerns of climate change. The trickster who dominates the minds of believing people is a coyote. King's narrative pays particular attention to waters and floods that are fundamental to many of the world's creation stories. There are certain similarities between the two narratives from

two different lands, India and Canada, wherein Native world view subverts the saga of development. Hence, it is necessary to extend ecocriticism from its confines in oral and printed literature to the discourse of the developmental thinkers and global policy makers in order to awaken them to engage seriously and constructively with climate change issues.

Keywords:

Climate change, sustainability, native myths, ecocriticism, trickster, Easterine Kire, Thomas King

Brief details about the author/corresponding author

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Traditional Knowledge and Community Well-Being: Environmental Sustainability in North East India and Canada

Debashree Dattaray

Traditional Knowledge systems within Indigenous communities have constituted a growing field of enquiry in India and Canada, particularly in terms of educational innovation and environmental sustainability. Epistemologically and ontologically, Indigenous practices are predicated upon an understanding of shared responsibility for creation and the relationships therein. Consequently, Traditional Knowledge systems offer possibilities of creating shared capacities that can alleviate poverty and create sustainable development for enhanced and improved lives for indigenous peoples.

This paper would evaluate the significant interdisciplinary work done to sustain Traditional Knowledge for community well-being in the Okanagan Valley of British Columbia and in Karbi Anglong, Assam. The paper would highlight upon the research that is being done by organizations such as the En'owkin Centre in Canada and the Centre for Karbi Studies in India and by Indigenous Knowledge Holders from the regions. These institutions focus upon Indigenous knowledge systems in their own right and with their own internal consistency and ways of life. Further, they produce community-engaged scholars who promote individual, relational, and collective well-being through community-based research and action. The regions in themselves have actively contributed to the preservation of Traditional Knowledge systems which in turn are embedded in the cumulative experiences and teachings of Indigenous peoples. The paper would discuss theoretical and practical examples on different aspects of quality of life and community well-being representing Okanagan and Karbi perspectives. Through an interdisciplinary understanding of community well-being as a complex multi-dimensional issue rooted in the ways that we encounter, perceive and interpret the environment, the paper attempts to address the fundamentals of Indigenous peoples' well-being, and discuss possibilities of a future of great transformations and linkages. The paper would foreground a discussion on the role of Indigenous knowledge and

traditional ways of learning towards the maintenance of environmental sustainability of a community.

Brief details about the author/corresponding author

Debashree Dattaray is Assistant Professor in Comparative Literature and Deputy Coordinator, Centre for Canadian Studies at Jadavpur University, Kolkata, India. She has been the recipient of a Shastri Mobility Programme at McGill University, CICOPS Fellowship at University of Pavia, Italy, a Fulbright-Nehru Visiting Lecturer Fellowship at UC Berkeley, the Erasmus Mundus Europe Asia Fellowship at the University of Amsterdam and Fulbright Doctoral Fellowship at State University of New York, Stony Brook. Her areas of research and publication are Indigenous Studies, Education, Gender, Narrative, Comparative Indian Literature Methodology and Folklore. She is author of *Oral Traditions of the North East: A Case Study of Karbi Oral Traditions* (2015) and has co-edited *At the Crossroads of Literature and Culture* (2016), *Following Forkhead Paths: Discussions on the Narrative* (2017) *Ecocriticism and Environment: Rethinking Literature and Culture* (2017) and has been Issue Editor for a special volume on Indigenous Studies for *Littercrit: An Indian Response to Literature* (December 2017).

A Cross-Cultural Comparison the Traditional Healing Practices in India and Canada

Dr Meetu Khosla

Interest in Traditional Healing Practices

There is very little empirical research on traditional healing in indigenous communities. This paper intends to integrate the Indian and Canadian perspectives, traditional healing practices and conceptual issues to bridge the gap in knowledge.

Cultural meaning of Illness and Healing

The aim is to bring about an awareness of indigenous healing traditions in a way that can help to bring about policy changes that can be initiated to expand the outreach programs to reach out to the indigenous communities for timely care. Indian Traditional healing practices are very different form the Western health care systems in theory, techniques and practice. They view illness within the perspective of socio-cultural environment, historical roots, and rituals prevalent in the community.

Nature of Traditional Healing Practices

The nature of Indian traditional healing is more holistic, (Khosla,2018)where an attempt is made to restore the harmony between the mind, body and spirit, and bring about a balance with the nature, integrating their families and communities. The practices of the traditional healers in indigenous communities in India and Canada will be explored, along with the viewpoint of the patients healed by them and medical doctors.

Integrating Traditional healing practices form India and Canada

The paper examines the benefits of traditional healing in Canadian communities, emphasizing upon the holistic conceptualization of wellness (Moodley,2011)that could be used in healing practices in India. The research proposes to integrate traditional healing practices from India

into the Canadian healing systems to make the treatment procedures more effective for Indian Diaspora in Canada.

Notes: Special Thanks to Shastri Indo-Canadian Institute for giving me this opportunity.

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Biology, Ideology, and the Problem of Patriarchy: Mahila Shanti Sena - a Women's Movement for Self-driven Empowerment and Gender Equality

Rama S. Singh

In this paper I discuss the evolution of patriarchy, ancient thoughts about women, and feminism and follow it up with the work of a women-led movement to solve the problem of gender inequality.

First, I show that patriarchy is the result of masculinity (male biology) and male mindset and that patriarchy cannot be dismantled without changing the male mindset. Men are also victims of patriarchy; men have become addicted to women's love and labor.

Second, I provide a brief history of the feminist movement, how it has evolved over time from fight for suffrage to a complex multi-directional, and inter-sectional splintered movement. I argue that women have underestimated the power of the patriarchy. Sexual revolution has come and gone; it did not give women the freedom and power they were looking for. Women remain as sexually victimized as ever.

Finally, I review current approaches to women's empowerment and elimination of gender inequality and present the last 20 years of our work with Mahila Shanti Sena for peace and development in the eastern and north-eastern part of India.

The relevant question about women's empowerment is not if but how? There are three ways to go about empowering women. Legislative empowerment and enactment of laws are slowly but steadily benefitting women. But enacting women-friendly laws alone is not enough. Women's right is not a charity.

Development-agencies are much in the news. Melinda Gates has argued for women's empowerment and has cited examples of gender inequality. She says women do not get to share the benefits of their hard work and that women lack the power to make important decisions about their own lives and about their safety. Developmental agencies are doing

great work but money alone is not enough to counteract the effect of cultural barriers to gender equality.

A women empowerment movement that we have followed for the last 20 years is Mahila Shanti Sena (MSS). Helped by McMaster University, led by Shrambharati (NGO), and starting in Bihar, Mahila Shanti Sena has spread to the eastern and north-eastern states of India. Its mandate is self-driven women's empowerment. Through training camps MSS imparts self-pride, a sense of taking control of one's own life, and community responsibility through mass awareness of problems facing all women.

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Gender Inequality and Ill-Health: The Role of Caste and Class

In Tamil Nadu, India

K Annapuranam

Social status has a significant effect on the quality of life of individuals. The more unequal societies have conflictual relations, such that a substantial proportion of the population are deprived, not inclusive, and also have poor health status. When income increases, generally living standards too rise, but income alone does not perpetuate the unequal status for the society as a whole. Factors beyond income fuels inequality, where the societies are more male dominated. The domination is driven by status competition that has an impact on women's health. The health gradient runs through social classes, but women are left with poorer health status at the lower end. If poverty is the only cause, we can conceivably eliminate poverty, but inequality exists in terms of healthy living, or less healthy existence, and graded by socioeconomic status. Tamil Nadu is one of the more progressive states in India, but still health indicators show that the state has considerable health inequalities, and there are a substantial number of people in the state who are left behind in terms of healthy living. In this context, Rajarathinam nagar, which is a slum in Chennai, was selected as a case to study the experience of illnesses among the poorer women, and another case, of poor women in Padalam village, Kancheepuram district.

The concept of social position asserts that the place where they live in, as well as class and caste are significant as opportunities greatly vary. The location of the study areas assumes importance, as both the districts are ranked high in the human development index but are lowest in respect to the gender inequality index. Why does gender inequality vary greatly in these two places? The possible reasons are located in perceptions and changing patterns of gender relations. Women perceive their experience of illness in the context of the socio-cultural world in which they live, and characterised as it has been by class and caste. However, their views are not uniform or coherent. In this respect, the work of Judith Butler is relevant to the present analysis, i.e., gender is a way of doing things, a ceaseless activity, and intersects with other identities such as class.

The study included in-depth interviews, which were conducted with married women in poor families in the slum (n=43) and in the village (n=38). This was on the assumption that married women are more vulnerable to dysfunctional relations, and gender norms have a higher impact on their health. The striking difference is that women themselves are in a bind of simple passivity in the village, whereas in the slum, the dominant gender, and structural factors are interconnected sites of women's struggle and length of suffering. This paper has three core themes including norms related to couples' interaction, control of men, and subversive attitude of women in health context.

Key words: poverty, gender, illness experience, slum and village

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Author is working as a PhD scholar at the Institute for Social and Economic Change, Bangalore. Her PhD work focuses on lived ill-health experience of women from a gender perspective. Some of the recent works are "What Really Causes for Exclusion? An Analysis with Special Reference to Scheduled Castes" (Contemporary Voice of Dalit 2017) and Socio-economic mobility: the role of migration and social movements (Asian Journal of Development Matters 2016). As part of the effort I am here submitting a piece of work.

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Are the Millennial Generation's Travel Patterns Sustainable? Evidence from Canada

Ajay Agarwal

Millennials – those born between 1980 and 2000 – have attracted a lot of attention in various media for their mobility patterns, which are claimed to be different from the earlier generations. It is being claimed that the millennials have lower affinity for automobile travel as compared to their parents and therefore they could truly be a sustainable generation in terms of travel behaviour. Such arguments are not completely baseless. After decades of strong growth in aggregate travel demand, driven mainly by increasing car use, the growth is slowing down in North America, Europe, and Australia (Newmann & Kentworthy 2011, Le Vine et al 2009). Since 2007, total annual vehicle kilometers travelled (VKT) have declined remarkably in the U.S. and somewhat less dramatically in Canada (Giuliano and Agarwal forthcoming, Natural Resources Canada 2009). This reduction in VKT could be attributed to multiple factors including, but not limited to, the deep economic recession during the second half of the past decade, ongoing retirement of baby-boomers from the workforce, and perhaps different mobility pattern of the millennials (Blumenberg et al 2012).

Using data from the Greater Toronto Area (GTA), the largest metropolitan region in Canada in terms of both population and spatial extent, this paper compares mobility pattern of the millennials to Generation X, their preceding generation. Three cross-sections – 2001, 2006, 2011 – of Transportation Tomorrow Surveys (TTS) are used in this analysis. TTS are household travel surveys from the GTA, conducted every five years since 1986.

The paper finds that the millennials indeed display several traits of sustainable travel behaviour. The millennials use private automobile less, and use public transport more to meet their daily travel needs. This trend is not different from that observed in other developed countries such as the United States, and Germany. While existing mobility trends of the millennials are desirable from a sustainable transportation perspective, the same must be taken with a pinch of salt. If the millennials continue to rely less on the private automobile

to meet their travel needs in the future, then it offers both hope and opportunity for reducing private automobile dominance, quite the opposite of travel trends during the past half century. If naught, then we may have to rethink policies to prevent this still young generation from following the footsteps of their previous two generations in terms of automobile dependence.

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Discontents of Sustainable Mobility in Indian Cities

Dr. M. Badami

Dr. Govind Gopakumar

Bengaluru, a metropolis of 10 million people in India, is an apt location to examine the challenges of sustainable mobility in Indian cities. Although public transit accounts for a significant proportion of daily trips in the city, mobility choices are increasingly being shaped by policy priorities in favour of massive, publicly funded infrastructure investments (such as signal free corridors and flyovers) geared towards motorization.

The paper takes as its departure point a documentary titled “Social Life of a Bus”, made by Govind Gopakumar in collaboration with the Bengaluru Bus Prayanikara Vedike (Bengaluru Bus Commuters Forum), in 2105. The film draws on interviews with bus commuters, transportation activists, and members of the public, to investigate the operation of the bus system, and the (im)mobilities of daily life, in the city. Based on the documentary (which will be shown in excerpted form at the conference), the paper will raise questions regarding the political economy of urban transport – and more generally – urban infrastructure decision-making, and its outcomes for different groups in society.

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Co-Design: A Process of Community Participation in Post-disaster Reconstruction

**Kankana Narayan Dev
Dr. Amarendra Kumar Das**

The built environment today is affected more and more by the rapid and extreme changes due to humanmade and natural disasters. These disasters lead to displacement of people for a limited period till the reconstruction of the damaged habitats. The focus of this paper is co-design process as a form of community participation in the design process to address the post-disaster reconstruction requirement. A study is carried out in a post-disaster phase of an ethnic riot disaster in Bodoland, NorthEast India where over four lakhs people were displaced internally. A community participation design exercise is carried out with representatives from the displaced population. They shared a need for assistance in the design of the relief shelter settlements, and thus a cumulative effort is made to pull all their ideas together into a unified concept. A process of architectural facilitation is made through an intense method of drawing discussions, prototype and modelling to engage the participants in the design process. The process of co-design is documented to develop a methodology for such design exercises. Co-design as a process is a combination of community, co-operative and collaborative design. The act of enabling all members addressing the displaced population: young people and adult, man and women, authority and contractors to enter into the design dialogue is the key that reduces relief situation alienation. From the findings of the study, we can conclude that the design discussions should be made open to all of those who might be affected in post-disaster displacement. The aspirations that originate within the community are architecturally developed into visions of accord so that they are applicable in post-disaster situations.

Keywords: Co-Design; Community participation; Disaster; Displacement; Post-disaster

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Field Learning on Design for Sustainability in Design Education - Shared Vision and Global Partnerships

Ravi Mokashi Punekar

Sharmistha Banerjee

Prankaj Upadhyay

There is an interesting case to position the Design education program in India in the new millennium. It has been subject to a series of change when the Indian economy was experiencing transformative economic environment emerging from liberalization. In the revisions to their programs, there is seen a distinct realignment to balance and prepare these trained millennium designers for new career challenges that demand multi-skill sets that meet divergent opportunities viz. Design for the Digital era - Experience Design, Game Design, Interactive Systems Design, Design for Internet of Things and on the other, emergent issues that concern Design for the Environment - Sustainable Design, Green Design, Design for Bottom of the Pyramid.

This paper will present a critical overview of how a novel Design Education program at IIT Guwahati, has introduced training of a new generation of designers into the domain of Design for Sustainability following a Sustainable Product Service System (S-PSS) model. Concurrent participation in a EU funded International collaborative project - Learning Network on Sustainability (LeNS International) has paid the department rich dividends in collaboration with 32 international Schools of Design located across 16 countries in developing and sharing learning resources aimed towards training a new generation of teaching faculty, doctoral researchers and students on the subject of Design for Sustainability. Classroom training has been enriched through regular field based studies involving systems design thinking to examine solutions to real life needs in society.

The paper will discuss the outcomes of sharing global learning experiences on a web platform (www.lens-international.org) through a copy left initiative by sharing the international case studies on S-PSS undertaken as part of the educational course work on Design for

Sustainability. In specific it will highlight the contributions of Indian case examples: Design intervention proposals on S-PSS in a study of the Guwahati Railway Station; Study of the micro-environment of a village in Assam to understand design interventions opportunities for S-PSS. The following two case examples will focus on design interventions for social innovation – a study of the Akshaypatra Foundation in running the mid-day meal program for School Children; and the craft intervention program in training a new generation of bamboo craft persons in sustainable furniture and product development.

The focus of advanced research on the subject of Design for Sustainable Development has resulted in setting up the Sustainability and Social Innovation Lab at the Department of Design, IIT Guwahati. Doctoral candidates today are engaged in pursuing advanced research in Sustainable Design.

These initiatives in research are aligned in contributing to millennium goal of meeting the targets of training a new generation of trainers who will lead HEI in educating for Sustainable Development and contribute to meeting the global targets on ESD.

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Continued Marginalisation at the Periphery of Delhi Metropolis: Case study of Narela

Tanya Chaudhary

Margins of urban landscapes has long been perceived as an idle space which could be put to its potential usages in terms of relocating/resettling to produce landscape in the core which are aesthetic or sensory pleasing. The construction of industrial estates accompanied with large scale resettlement of bastis to the peripheral towns had undoubtedly produced new labouring practises in margins. This case study also shows that urban expansion to the peripheral regions adversely and foremost affects the working-class population. Although, the conditions of migrant workers are worst than that of local workers, they both face continued marginalisation both at the workplace and at place of residence, in the present structure of power that exist in the town. The industrial landscape promotes flexible arrangements at workplace which acts as an opportunity for new migrant workers and at the same time facilitates their exploitation as well. The working practices further hinder the collectivisation of migrant workers and therefore exploring the use of spatial embeddedness of workers in formation of their agency becomes crucial. The marginalisation from the core of the city followed by exploitation at industrial workplaces because of lack of institutional framework to ensure safety and welfare of workers is highlighted in this paper. It analyses the conditions of work and livelihood options created in the peripheral town of Narela as a result of initiatives of urban policies.

Also, another aspect which the paper will be studying is the dynamic equation between the locals and the migrant workers further manifesting the existing inequalities in terms of socio-economic status and power relations. This study will be depending upon primary data which had been collected by in-depth interviews and Focussed Group Discussions (FGDs) with the help of semi-structured questionnaires. An attempt will be made to highlight the existing inequalities and continued marginalities at the periphery of the urban metropolis and discuss the avenues through which it could be reduced.

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Theme 2

Reducing Inequalities

Hijras of Mumbai and the Recent Judgment of India Supreme Court on Transgenders: Difficulty for Reaching Equity from Hijra Group itself

Prof. M. Boisvert

Hijras – commonly called eunuchs and transgender by Westerners – are a visible and marginalized social group in South Asia. Hijras traditionally occupy two types of status in society: they are identified either as sex workers or as agents who have a blessing power (aśirvāda) following the birth of a child or during marriage ceremonies. The integration of a new member to this community is done via a rite of passage that serves to clarify her role within a stratified social framework based, on the one hand, on the Indian family organization and on the other hand, on the intra-community ascetic structure.

In April 2014, the Supreme Court of India officially recognized the category of “third gender”. Four years later, hijra remains very marginalised; the present paper suggests that their marginality is partially produced by the social structure that hijra maintain.

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Abhorred, Disdained and Secluded - Locating Women Belonging to the Denotified Tribes of India

Subhajit Debnath

Karan Khetani

For 147 years, the denotified tribes of India have endured the label of ‘criminal tribes’ bestowed upon them by different state machinations. Between 1871 and 1947, a ‘class of people or tribes engaged in the systematic commission of non-bailable offenses’ were listed as ‘criminal’ under the Criminal Tribes Act, 1871. Undeniably such classification of tribal communities led 13 million people belonging to 127 communities to live under traumatic environ such as fear of arrest without warrant, constant surveillance etc. After independence the Criminal Tribes Act, 1871 was repealed in 1949. Thereafter those ‘criminal tribes’ were ‘denotified’ by the Government of India during 1952. Ironically, during 1959 the Habitual Offenders Act was enacted by several state governments which again subjected them to the social stigma of ‘criminality’ or ‘born criminals’. Today there are 198 ‘denotified tribes’ in India. Continued categorization and labeling of ‘criminal tribes’ have severely affected the lives of the people belonging to such communities. Categorical alienation, sheer neglect by the state and stereotyping by the police and civil society have led them to abject poverty and social discrimination. The women belonging to these communities are the worst affected. Besides, enduring severe victimization and exploitation by people from outside their community they suffer much agony inflicted by the people within their community. It is distressing to note here that their life is miserably clad with pain, trauma, and turbulence.

At this juncture, it is imperative to introspect and explore the tools and strategies for making social, economic and political justice accessible to the women as well men belonging denotified tribes of India. For decades, they have been unfortunate victims of social stigma and prejudice. A scholarly analysis of the prevailing conditions of the ‘women belonging to the denotified tribes of India’ in particular and ‘denotified tribes’ in general from a contemporary legal perspective would represent an overdue addition to the literature. For just as ‘denotified tribes’ have so far received far less than their due share of attention whether

from commentators or lawmakers in India and abroad. The primary objective of this study is to ascertain the socio-economic factors responsible for worsening condition of women belonging to the denotified tribes of India. The main purpose of this paper is to raise issues for affirmative action by way of developing law and policy framework for improving upon the worsening political, socio-economic and living conditions of the women belonging to the ‘denotified tribes’ of India.

Keywords: Affirmative Action, Denotified Tribes, Women, State and Society.

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Women, Multiculturalism and Minority Rights: A Snapshot of Canada and India

Vrinda Narain

Goal 5. Achieve gender equality and empower all women and girls

“Gender inequality persists worldwide, depriving women and girls of their basic rights and opportunities. Achieving gender equality and the empowerment of women and girls will require more vigorous efforts, including legal frameworks, to counter deeply rooted gender-based discrimination that often results from patriarchal attitudes and related social norms.” (Progress towards the Sustainable Development Goals", E/2017/66, <https://sustainabledevelopment.un.org/sdg5>)

In this paper, looking at the legal frameworks through which difference is accommodated and minority women's rights are regulated, I will compare Canada's policy of multiculturalism with India's policy of upholding minority rights through the religious personal law system. I will assess these in the context of SDG 5. As contemporary Canadian society grapples with issues of increasing diversity, the legal recognition of minority rights through an official policy of multiculturalism has been controversial. Public discourse and debate continue to view minority groups with a measure of anxiety. Invariably, policies of multiculturalism are focused on the status of women in immigrant communities, raising issues of gender equality, religious freedom and the limits of tolerance. Canada provides an interesting lens through which to view these issues, which have a global resonance. Producing results for use here and in India, in the context of the current debates in Canada on secularism, neutrality, religious freedom and the accommodation of group difference, this paper evaluates new frameworks within which we can reformulate public policy initiatives to strengthen Canada's commitment to multiculturalism and to facilitate the inclusion of marginalized groups, in particular minority women. In India, the explicit exclusion of Muslim women from equal citizenship in a misconception of both secularism and of the protection of minority rights in India underscores the need to challenge both the state and the Ulema and their focus on the politics of cultural difference to the exclusion of structural inequality. Muslim women in

India are challenging traditional interpretations of Muslim personal law and provide a counter-discourse to both the official narrative of modernity as well as to that of the Ulema who claim to be preserving religion through safeguarding women's rights within Islam. Indeed, any policy of protecting minority rights that does not take into account structural disadvantage is doomed to failure. Arguably, the key to the puzzle here is democracy and the critical need to construct a viable, inclusive democracy: one that includes Muslim women.

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Need for Redistribution of Agriculture Land in India

Dr. Ishrat Husain

Agriculture is demographically the broadest sector and plays a significant role in the socio-economic fabric of India and it is one of the most valuable forms of property in the economic spheres. But there are great disparities among the holders of land. This disparity needs to be reduced to the minimum in the interest of establishing equality in the economic sphere. It is a fundamental, sustainable environmental source of subsistence, it is closely integrated with the life and livelihood of people and therefore, demands equality in its distribution. Where land is a source of sustenance, the need for a reassessment of the law is pressing. It is also essential to achieve socialist objective of the state. Land distribution is considered a State Policy to create economic equality within the agrarian structure. One of the means to reduce the disparity is to take away the excess lands from large holdings and redistribute them among the landless and small landholders. Ceiling legislation is a measures of land reforms. This is stated easily but its implementation is a very complicated and difficult affairs. At the very start we are faced with several questions. First, what should be the ceiling limit and secondly should the idea of redistribution of lands be applied to all classes of lands? For example, a tea garden has a very big holding, but it is an economic unit and cannot be broken up if is to function at all. In India's North Eastern region the land tenure system in the hill areas, inhabited mostly by tribal population, is markedly different from system found in the rest of country and the plain area of North-East itself.

State Governments of India made a lot of efforts and enacted so many land reforms laws including Land Ceiling Acts to reduce the inequality of agriculture land. But it is difficult to say that it could hardly attain the desired goal or it could help the poor. Most of the land reforms laws focussed how to divest the rights of intermediaries like zamindars but the basic structure was not changed. In zamindari system too, land was with tenure holders with different names. Land was taken off from the zamindars except some private lands cultivated by zamindars themselves. But basic structure was not changed. The only change was brought that the intermediary class was abolished and government would directly collect revenue

from the farmers. There were number of categories of tenure holders and of course they were minimised.

The ground level change can only be brought by enactment and proper implementation of Land Ceiling Acts to have equitable distribution of agriculture land. Every state has almost enacted Land Ceiling Act but desired goals could not be achieved for reasons. First, there is no uniformity among the state for ceiling limit, secondly, these laws have vast list of exceptions which nullify the object of the Act and a many time it seems that Land Ceiling Act itself is hindrance in proper implementation of redistribution of land. For instance, these Acts provide that the land for industrial purposes, grove land, land utilized for special cultivation, land held a cooperative farming society and land vested in Gram Sabha are exempted from the application of Ceiling Act. These Acts should properly be amended and implemented to bring equal distribution of agriculture land in India.

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Challenges towards Empowerment: Reconstructing Narratives of Homeless Individuals with Severe Mental Illness in India

Prama Bhattacharya

Kuamr Ravi Priya

Background and Aim: Homeless individuals with severe mental illness (HMI) constitute one of the worst affected and vulnerable sections of human society. In India, 20-25% of the estimated 78 million homeless people are likely to suffer from severe mental illness (Action Aid). Literature has mostly emphasized on the severe nature of their psychopathology which has limited our understanding of HMI solely through ‘disability lens’. Consequently, service approaches have focused merely on pathology and attempted to ameliorate it, rather than recognizing and enhancing the strengths and resilience that enable them to survive in inordinately hostile environments (Bhugra, 304).

‘Empowerment’ is understood as an intentional, ongoing process centered in the community through which people lacking in equal share of valued resources gain greater access to and control over these resources (CUEG, 1-23). It appears to be an important process to aid recovery in HMI in the Indian socioeconomic background. Furthermore, in the context of HMI, however, one of the implicit challenges to empowerment is the illness-poverty-homelessness nexus that not only intensifies the severity of illness but also diminishes hope for inclusion in the earlier familiar networks, thereby causing ‘social-suffering’.

This paper attempts to understand through their lived-experiences the empowerment among HMI amidst the challenges of social-suffering.

Methodology: Life-story Interviews have been conducted on eleven formerly homeless individuals diagnosed with severe mental illness at two NGO shelter-houses run in Kolkata and Chennai for the marginalized population of HMI. Analysis of the narratives has been done using initial coding, focused coding and axial coding through the process of constant comparison of constructionist grounded theory methodology.

Results: The life-story interviews of HMI (currently in remission) highlights their past experiences of social suffering and apprehension of future suffering. They oscillate between hope and hopelessness within the hierarchies of NGOs, dreading the unavailability of valued resources (e.g. social support, financial stability) outside the protective boundaries of the NGO that are posing as challenges in their empowerment process.

Conclusion: The study promises to look into the need for a HMI to be adequately empowered to overcome the downward mobilization that has already taken place and move upwards towards a more socially integrated, purposeful contributing life.

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Income Inequality and Human Well-being: Why Do We Need to Shift Our Focus?

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Well-Being is the most unheeded notion in the political history of economic growth. It has both subjective and objective dimensions (income, health, education, Subjective Well-Being, life satisfaction etc). There is general consensus among social scientists and practitioners that the terms like quality of life, happiness, well-being, life satisfaction, and welfare can be used interchangeably. It is unfortunate that GDP is being treated as the synonymous of Well-Being since more than last 85 years. Though the contributors of its development (William Petty, Colin Clark and Simon Kuznets) conceded that it cannot be equated with Well-Being, yet it gained currency for measurement of progress across nations.

It is observed that despite rise in economic growth, income inequality has widened all across the world. Top 1 percent richest individuals in the world captured twice as much growth as the bottom 50 per cent individual since 1980. It is reported that 82 per cent of all global wealth created in the last year went to the top 1 per cent, while the bottom 50 percent people saw no increase at all. It means globally 3.7 billion people saw no increase in their wealth. In India top 1 per cent income earners are now at its highest level since 1922 in the national income. They captured less than 21 per cent of total income in the 1930s, before dropping to 6 per cent in early 1980s, rising to 22 per cent in 2014. It is also reported that where there are great disparities in wealth, there are heightened level of social distrust. Poorer countries with fairer wealth distribution are healthier and happier than richer countries with unfair wealth distribution. It has also been found that, the societies where income is more equally distributed, population health tends to be better than unequally distributed income societies. It has repercussion effect in the form of reduction of workers efficiency, increase in national spending on health, and diversion of resources from productive endeavours to somewhere else.

These are results of growth driven policies which ensure improvements in GDP indicator without assuring improvements in the human well-being. The status of income inequality raises questions on the sustainability of GDP driven development. Hence there is a need for an alternative. This paper is an attempt to discuss the issues concerning rise in income inequality and to shift our focus towards Human Well-Being approach as an alternative to GDP.

Keywords— GDP, Income Inequality, Happiness, Human Well-Being

Note

1. For detailed history of GDP read Petty (1680), Essay on mankind and political arithmetic; Keynes (1940), How to pay for war; Mitra-Kahn (2011), Redefining the Economy: How the Economy was invented 1620; Coyle (2014), A brief but affectionate history; Lepenies (2016), The power of a single number, a political history of GDP; etc.
2. For detailed discussion, on human well-being read Estes & Sirgy (2017), The Pursuit of Human Well-being - The Untold Global History. (p 3-82).
3. The statement is taken from the book title Mismeasuring our lives Why GDP does not Add Up, by Joseph Stiglitz, Amartya Sen and Fitoussi,(2009) in which Nicolas Sarkozy has written the Foreword section.

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Integrating Elderly into Community: A Socio-Economic Model

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Dr. Laxmi Mohan

Old age has been an age old theme for philosophers, doctors, sociologists, scientists and every possible men who walked upon the earth. It is often contented that the quality of life that the elderly enjoys in a community is a measure of the well being of the community. In a world where ageism still pertains, the elderly often end up sacrificing their aspirations; once retired they are forced to withdraw themselves from the workforce often due to the stereotyping associated with ageing as the end of productivity. The thrust area of this study is the possibility of integrating skilled elderly population into the economic workforce in their own terms i.e. the highlight is upon the subjective aspects that the skilled elderly consider important to engage themselves in the economic force. The study tries to focus upon skilled elderly who could contribute to the community and thus realize their potential while being economically active so that the situation that might emerge in India in a decade viz. skilled and zealous but economically unproductive elderly population could be anticipated and thus an effective action plan could be drawn through assumptions from current researches. The data is collected via secondary sources in the first place with the help of studies that have dealt with the pertaining questions in the recent past.

The bibliographical study analysed data from secondary sources regarding elderly in economic workforce, the areas of economic participation and other components affecting the economic participation of the elderly. The findings of the study shows that economic participation of elderly male in developing nations is far higher than that of the developed nations and India tops the list (**ILO, 2009-10**) but the situation of the elderly participation in economic participation is gradually declining in India. The average participation of urban elderly in economic activities has fallen considerably during the period from 1983 to 2010 (**Employment and Unemployment Surveys of NSSO of India, 1983 and 2010-2011**). Further, data show that higher the rate of literacy, quality of life and social security lower tends to be the economic participation of elderly. It is clear cut from the case of Kerala, a

southern state of India where human development index stands at par with European standards and named as the best place to grow old in India, where old age dependency ratio is 19.6 percent - the highest in India (**Central Statistics Office, 2016**). This inverse relationship could also be spotted in association with job satisfaction in developed nations, as it was found that elderly with high end jobs expressed better job satisfaction levels than that of low end jobs in Europe (**Aleksander Aristovnik and Ksenja Jaklic, 2013**). It is hence assumed that elderly are unable to seek jobs on their own terms or there is an atmosphere where economic participation by elderly is not favourable owing to multiple factors that are social in nature. It hence requires that social level interventions are required along with economic level interventions to facilitate meaningful economic participation of elderly.

Through this study the researcher further reconciles the life span developmental approach and successful ageing (**Rowe and Khan, 1987**) approach with economic roles in such a manner that a framework be formulated wherein the elderly are contributing to the economy which at the same time assists them in attaining life satisfaction subjectively and quality of life objectively. For this purpose the researcher adopts the idea of **valued roles** propagated by Dr. Wolfensberger (**Wolfensberger, 1983**) for vulnerable people in the community as an opportunity to gain access to mainstream life mainly used to help differently abled to integrate themselves successfully to various social systems. Valued economic role of elderly intertwined with successful ageing could promote economic participation of elderly through social means. Hence this study tries to make use of the idea of valued roles to integrate elderly into the socio-economic assets of the society and open up wider spectrum of economic participation through social means for the elderly.

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Employment Equity and Reservations Impact on the SDGs

Rana Haq

Dr. Abhishek Goel

India and Canada are two countries facing enormous challenges due to their highly diverse populations. India's intra-national diversity is a result of centuries of invasions and a deeply entrenched caste system. Canada's inter-national diversity is a result of consistently high levels of immigration as a strategy for nation building. Both countries have taken a unique approach towards integrating this diversity into their mainstream. India's 1950 Constitutional policy of 'Reservations' protects the three marginalized groups: Scheduled Caste, Scheduled Tribes and Other Backward Classes (ST/SC/OBC). Canada's Employment Equity Act of 1986 protects four designated groups: Women, Visible Minorities, Aboriginal Peoples and Persons with Disabilities from systemic barriers and discrimination in the workplace.

Our paper explores the successes and failures of these approaches in light of the 2030 Agenda for Sustainable Development and its 17 Sustainable Development Goals (SDGs). We focus particularly on "Goal 5 - Gender Equality-Achieve gender equality and empower all women and girls"; "Goal 8 - Decent Work and Economic Growth - Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all"; and "Goal 10 - Reduced Inequalities-Reduce inequality within and among countries". Particularly, "10.2 - By 2030, empower and promote the social, economic and political inclusion of all, irrespective of age, sex, disability, race, ethnicity, origin, religion or economic or other status" and "10.3 - Ensure equal opportunity and reduce inequalities of outcome, including by eliminating discriminatory laws, policies and practices and promoting appropriate legislation, policies and action in this regard".¹ We reinforce the key takeaways, suggested by the UN, as steps everyone can take in their everyday lives, including: "Report on all types of bullying of women... Support equal pay for equal work...Challenge discrimination in the workplace... Treat everyone equitably regardless of their gender, race,

¹ http://www.un.org/ga/search/view_doc.asp?symbol=A/RES/70/1&Lang=E

sexual orientation, social background and physical abilities. Know your rights at work - In order to access justice, knowing what you are entitled to will go a long way.”²

Reducing inequalities will require concerted efforts by governments, businesses and civil society working together for finding sustainable solutions to address inequality issues at all levels. We present strategies that some institutes of higher learning are making through adaptation of these goals into the curricula as well as practical aspects that should be considered towards fulfilling our commitments for the creation of a sustainable global society.

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² <https://www.un.org/sustainabledevelopment/gender-equality/>

Impact of 2030 Agenda for Sustainable Development on Population Ageing Research in India with Learnings from Canada

Harmanjot Antal

Smita Bhutani

By the year 2030, with 1.4 billion people aged 60 or above - Population Ageing is poised to become a pervasive and unparalleled phenomenon globally, affecting every nook and corner with implications on all spheres (United Nations DESA, p. 1). Further, in the fifteen-year period, between 2015-2030, India is projected to witness an increase by 64 per cent in the number of the aged people (United Nations DESA, p. 16). Interestingly, 2030 also happens to be the culmination year of the 2030 Agenda for Sustainable Development. The 2030 Agenda commits towards achieving sustainable development and stresses on marching along without closing the doors for the most vulnerable groups in the society – including the elderly (United Nations DSPD, par. I).

This paper upholds the need and importance recognised by the United Nations to prepare for an ageing world to realise the achievable dream of sustainable societies by taking up a survey of research on population ageing in India. The idea is to explore the following questions: How has the 2030 Agenda impacted and manifested itself on population ageing research in India during its pre- and post-adoption period? What lessons are learnt from Canadian experience on population ageing research to enrich its position in India?

The paper, in order to address the above-mentioned questions, surveys the research on population ageing in India. The date when 2030 Agenda for Sustainable Development was adopted i.e., 25th September 2015 has been taken as the reference date and with this as a reference point the survey of research, pre- and post-adoption of the 2030 Agenda, has been conducted. Survey of select population related research journals and population related research reports, dissertations and theses produced during pre- and post-adoption of the 2030 Agenda enables assessing the before and after change in the population ageing research in India while examining the impact and manifestation of the 2030 Agenda for Sustainable

Development. Last but not the least, to learn from Canadian experiences, select population ageing research carried out in Canada during 2017- 2018 has been analysed for the ageing issues they are speaking of and the methodologies they are adopting to provide a relative picture.

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Sustainable Community well-being: A Conceptual Model of Community Well-being for India

Deepshikha Dash

Arita Dutta

United Nation's SDG: 3 'Good health and Well-being' advocates "To ensure healthy lives and promote well-being for all at all ages". The intended outcome of this paper is to provide a recommended conceptual framework for sustainable community wellbeing. Community wellbeing measurements known as indicators such as enhance visibility of quality of life trends within the community, highlighting opportunities underpin improvement. A thorough analysis has been done by conducting interviews with indicators project organizers across the nation and from the reports published by several existing indicators projects. The paper concludes by recommending a conceptual framework which emphasizes planning for sustainability and caters the need of specific community leaders by optimum use of the proposed model. In case of a successful implementation, authors would like to propose a useful, sustainable indicators project for the nation. The authors also encourage the other sectors to develop similar integrated framework for supporting a more coordinated approach for achieving the Un's 2030 Agenda for Sustainable Development.

Keywords: SDG: 3, Community wellbeing measurements, a conceptual framework, Proposed implementation, sustainable community wellbeing, India.

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**Frame Work For Co-Operation Between India And Canada On
Countering Terrorism And Violent Extremism: Role Of ‘Cyber Dome’
And ‘Coastal Security Alert Committees’ In Kerala.**

Sajikumar. B

India and Canada recognize the grave challenges posed by terrorism, violent extremism and radicalization to violence due to its multi-cultural, diverse, pluralistic societies, committed to democratic principles, human rights and the rule of law. On February 14, 2018, the National Security Advisor of India and the National Security and Intelligence Advisor of Canada have highlighted the share resolve of both India and Canada to combat terrorism and violent extremism in all their forms under the supervision of the National Security Advisor’s Dialogue, in a bilateral frame work. During the visit of the Canadian Prime Minister to India on 23rd February 2018, a Joint Statement by the Prime Ministers of India and Canada, was also put forwarded to stress the need of co-operation in facing the challenges of Sustainable Developmental Goals, that affect global peace, stability and prosperity. The leaders also pointed out the importance of co-operation in the field of Cyber Security, which is one of the major threats at present.

Participation and partnership of the general public in promoting Sustainable Developmental Goals in the national, regional and international levels is the need of the hour. It is hopeful that now the world has identified the scope and possibilities of public participation in all spheres of development and governance. If they are trained well and supported, they can be used as good volunteers of peace. By using the enormous potential of trained public we can even make effective strategy against anti-nationalism, extremism and terrorism.

Through this paper, attention is invited to two instances in the State of Kerala, which are functioning well by way of public participation, so as to ensure national security. One is in the area of Cyber Security and the other in connection with Coastal Security. ‘**Cyber Dome**’ is the project connected with Cyber Security, conceptualized by Government of Kerala and

initiated by Kerala Police. Cyber dome means cyber umbrella or cyber roof, which gives protection to the cyber world.

This is a joint venture manned by Police Department with public participation, especially the experts of cyber technology. The participatory project in connection with Coastal Security is named as '**Kadalora Jagratha Samithies**' in local language, which means Coastal Security Alert Committees. This is formed as per the guidelines put forwarded by the Coastal Security Scheme (CSS) of Government of India, for addressing the critical gap in securing our coastal area. This is a joint venture of government officials and the fishermen communities, in order to harness their knowledge about the sea and coastal area, so that, they can be made as the 'eyes and ears' of our coastal security architecture. A study of the working of these two participatory institutions so as to include in the 'Framework for Co-operation between India and Canada on Countering Terrorism and Violent Extremism' is intended through this paper.

Key Words: Public participation, Sustainable peace, National security, Cyber security, Coastal security.

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Theme 3

Improving Health

Collaborative Initiatives between India and Canada on Health and Disease Research: Impact of Shastri Indo-Canadian Institute (SICI) grants

Ajoy Basak

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The award of SICI-grants facilitated the establishment of joint research programs between our group in U Ottawa, Canada and Pondicherry University as well as IIT-Kharagpur, India respectively on projects entitled “Development of Natural Products for Cholesterol Management targeting PCSK9 [1]” and “Development of Early Malaria Diagnosis based on external body fluids like saliva [2]”. In these projects funded by SICI-Calgary (SRG) and SICI-New Delhi (SICRG) we have accomplished significant progress with promising results leading to a publication [3]. The funds contributed not only towards my own research advancement but also in building fruitful partnerships with Indian researchers having similar interest in health research. Thus we conducted collaborative research, exchanged ideas, held educational and research workshops with students and faculties of Indian institutions. Earlier SICI-travel grant (2012) enabled me to make initial contact with several Indian institutions where I presented lectures on topics of importance for both countries such as (i) Spiritual Neuroscience and Neurotheology: Connection Between Brain Science and Spiritualism; (ii) Targeting the functional activity of PCSK9 for intervention of hypercholesterolemia; (iii) Drug design: Our challenges and How to address; and (iv) Alzheimer’s Disease and Dementia. It provided an excellent opportunity to lay the foundation for establishment of Indo-Canada collaborative research alliance focussing on disease prevention, diagnosis and treatment. Later SICI-Mobility grant (2014) allowed me to perform interactive research with IIT, Kharagpur on Proteolytic Enzymes, Protein Chemistry and Study of Proteomics in health and diseases with focus on Dementia, Tumorigenesis and Infections. As SRG recipient (2015/16) with Dr. AJ Purty, PIMS, Pondicherry U, India, we conducted research on “Novel Inhibitors and Protease Activity Assay of human PCSK9 for intervention of Hypercholesterolemia and Cardiovascular Disease”. This research led to the identification two phyto-compounds with PCSK9 inhibitory and LDL-receptor promoting activities which was published in a book chapter [3]. Further work is in progress. The award of SICRG

(2016/17) with Prof. AK Das, IIT, Kharagpur on project entitled “A Rapid Malaria Diagnostic Test Based on External Body Fluids” provided collaborative opportunity to work on the development of early malaria diagnosis using saliva [4] - a project relevant to India. We designed a unique dye-labeled peptide from Histidine Rich Protein-2 (HRP2) of malaria [4] with strong metal binding and fluorescence properties that can be exploited for malaria detection using saliva samples. This work is on-going. In conclusion, this abstract demonstrates how SICI funds have impacted in creating fruitful research partnership between our two nations which we hope to continue with the support of SICI.

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**Case-Based Learning, Professionalism and Global Health Capacity
Building: A Bi-National Alliance for Improving Health Through Quality
Medical Education**

Raksha Sule

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To achieve the Sustainable Development Goals (SDGs), high-quality health systems must be prioritized, with an urgent need to focus on quality medical education for provision of quality care¹. Teaching professionalism is vital for fostering a health system that delivers quality patient-centred care^{2,3}. However, there is currently no consensus on how to best teach professionalism⁴, as present methods are not effective (didactic learning is theoretical, and experiential learning is unstructured)⁵. Case-based learning (CBL) mitigates these concerns by engaging students in small-group, semi-structured cycles of reasoning and reflecting, and bridges the gap between theory and practice to solve clinical cases⁶. Thus, this research investigates whether CBL can develop professionalism amongst medical students. Since evidence of replicability for teaching professionalism is limited⁴, this research also explores the contextual factors for professionalism-integrated CBL at a high-income (HI) setting (University of Toronto (UofT), Canada) and a lower-middle income (LMI) setting (Kasturba Medical College (KMC), India). Thereby, this research work engages in a translational, capacity-building initiative to improve the quality of medical education in a low-resource setting, which can ultimately lead to improving community health⁷. **Methods:** Phase One (UofT site) explores how best to create a professionalism-integrated CBL curriculum by conducting a document analysis of UofT's case studies and an in-depth qualitative exploration of student and faculty perceptions of professionalism, based on UofT's CBL curriculum. These findings will inform Phase Two (KMC site): implementing a professionalism-integrated CBL intervention. This will include a roundtable discussion with KMC stakeholders (administration, faculty and students) to contextualize professionalism in

the institutional environment, followed by an intentional co-development process with KMC faculty and students to co-design/-deliver the intervention. A mixed-methods approach (questionnaire and focus groups/interviews) will evaluate student and faculty perceptions towards effectiveness, acceptability, and feasibility of a professionalism-integrated CBL curriculum. Finally, Phase Three will bring the learnings of Phases One and Two together by conducting a comparative analysis of institutional-/country-contextual influences on the understandings of professionalism, and the barriers/facilitators of professionalism-integrated CBL. **Impact:** Foremost, this research engages in an international, interdisciplinary alliance to leverage bidirectional learning and collective experience and expertise in order to develop practices for teaching professionalism-integrated CBL. As well, this work addresses the replicability-evidence gap by exploring two distinct settings, thereby also informing development of contextual professionalism-integrated curricula in other similar HI/LMI settings. Overall, in relation to the SDGs, this research will support how institutions can best support their medical students in developing the core competency of professionalism for an improved quality health system that provides quality care for patients.

Notes:

Professionalism & CBL in India: Indian scholars have stated the need for medical education to focus on professionalism³, and CBL has also been highly recommended for improving the quality of medical education and for the development of competencies⁸.

UofT is chosen as the Canadian site because their pre-clerkship curriculum is CBL-based⁹. They also embrace theme-integrated CBL, and professionalism is identified as a core theme¹⁰.

KMC is chosen as the Indian site because during a previous CBL intervention at the institution¹¹ (conducted by Raksha Sule for her MSc work, in collaboration with Dr. Animesh Jain and others), students informally discussed the absence of professionalism in the training model, and faculty expressed a need for curriculum incorporation of professionalism.

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Risk pooling through Public Health Insurance Schemes: A Challenge to Reduce Poverty in India

Dr. Rosina Nasir

People in ill health bear several burdens; physical pain, medical bills, and lost income due to their inability to work. Financially, however, some degree of preparation of eventual ill health has been a typical act of prudence among those who could afford it. In case of India, health insurance as a risk pooling mechanism is a recent phenomenon. The extension of health insurance cover is still in an embryonic stage in India, that is 3 percent of the population has opted for it. Until 2007, there were three health insurance programs for formal sector employee, namely, ESIS in 1952, CGHS in 1954, and Private Health Insurance. The public funded schemes initiatives or schemes such as the central government Rashtriya Swasthya Bima Yojna, 2008, and the states sponsored schemes, as in Andhra Pradesh are especially meant for the poor or the below -poverty-line (BPL) groups in the unorganized sector had shown acceleration in its coverage. All these schemes are meant for inpatient care for specific diseases. The poor and the lower middle-class section which cover scheduled castes, scheduled tribes, other backward classes, and deprived minorities, mostly access the private health facilities and do not rely on deteriorating public health services. Despite the fact that the private health services affect them economically and further adds to their marginalization and poverty. What is surprising that private health insurance is seen as wastage of money, time and energy for them. The present study would be attempt to understand what us the reason for this perception. Is the health insurance product faulty or not trustworthy? Are the attributes like caste, caste and occupation the reasons for low adoption of health insurance? Apart from it, the present work would discuss the Modicare, the world's largest public-funded health insurance schemes, as to in what respect it is different from the earlier public funded schemes, its strategy to use Socio-Economic and Caste Census data to avoid leakages and be the most effective and its prospects in terms of delivery and coverage.

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Elderly Health in India: Through the Lenses of Social Capital Theory

Shashi Kant Srivastava¹

Due to demographic transition, an increasing number of elderly population is a reality of all the societies. Deteriorating health with growing age is also a fact. However, physical health of some elderly are excellent, and various others are not. Understanding the factors of the positive health condition of elderly has a boundless social concern. It has an extensive policy and public implications to make the significant proportion of the world population healthy and happy. This paper studies the impact of socio-economic factors on elderly's health from the lenses of social capital theory. This research uses the self-evaluation of health by elderly themselves as an indicator of their health. Since the evaluation of health by elderly is done as a nominal variable, we used multinomial logistic regression as our research model. Besides social capital as influencing variable other factors such as economic and socio-demographic factors are used as control variables.

The socio-demographic factors are age, gender, and level of education. The existence and nature of their offspring's, sons or daughters are brought as a principal independent variable. We have found that the chronological age and economic dependence significantly reduces the health conditions in old age. We further found that for inferior perceived health rest of the socio-demographic factors have negative impact. Marriage status positively impact the health in elderly age. Being widow in old age relates to the deteriorating health. The most surprising result of the study is about the role of sons and daughters on elderly health. We found that presence of sons positively influences the health condition of elderly, but it is opposite in case of a female child. Our findings are alarming and suggest how gender disparity in society influences even the health parameter of an individual. Our finding adds to the social capital theory and suggests all social capitals are not equal, it is dynamic and changes from one social group to another. We have used unit level round 71 NSSO data from the government of India. More than 27,000 persons of 60+ age are part of this survey. The proportion of male and female in this sample is almost 50-50.

Keywords: Elderly, Health Perception, Multinomial Logistic Regression, Economic Independence

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Development of an affordable point-of-use disinfection system for rural India

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Uthradevi Kannan

Providing adequate access to safe drinking water is a challenging task and is identified as one of the Sustainable Development Goals of United Nations (UN). Addressing a wide variety of pollutants present in freshwater is vital to achieving the goal. Among the pollutants in water, pathogenic organisms require special attention due to their widespread occurrence and potential to cause waterborne diseases. Of the 3.575 million deaths caused by unsafe water, poor sanitation, and inappropriate hygiene, 1.523 million are attributed to diarrhoea alone, with a major contribution from the developing world, like India. Determining the exact statistics related to waterborne disease outbreaks in India is challenging due to lack of reliable data. However, it is proven that drinking water is the main source of microbial hazard and consumption of microbiologically unsafe water is the single major cause of human mortality in India.

Effective and affordable disinfection methods are indispensable to meet the safe drinking water needs. Many treatment strategies have been developed to remove or deactivate pathogen in water with large public and private investments. However, many challenges continue to hinder water treatment projects in India, in particular, those establishing large community water treatment systems. The challenges include capital investment, skilled labour and governance, access to appropriate technologies, piped water supply networks, water scarcity, maintenance, and recontamination. In countries such as India where only limited households have sustained access to treated piped water, a well-designed and maintained point-of-use (PoU) household water treatment system (HWTS) is an attractive option in reducing waterborne diseases. However, poor efficacy, difficulty in operation and maintenance, large user time to treat water, affordability, the poor supply chain for needed replacement of units or parts, objectionable taste and odour, and bio-fouling have hindered the large-scale deployment of existing PoU interventions, except boiling. Hence, developing

a simple, efficient, and sustainable PoU disinfection system is the need of the hour to provide clean water to underprivileged people who have no or limited access to treated water.

This paper describes the green production of a film forming antibacterial nanocomposite comprising of bio-friendly materials like chitosan, tannic acid, silver nanoparticles and reduced graphene oxide. The enhanced antibacterial ability of the composite at an affordable cost is demonstrated. The composite is hydraulically stable and capable of releasing silver ions, a disinfecting agent, at sustained and controlled rate to water. The reusable antibacterial film can be employed as a standalone film or can be applied to suitable surfaces like mud-pot or specially designed reactor to enable disinfection of water. The method described herein can address many practical issues related to the poor success of conventional PoU-HWTS in rural areas and urban slums.

Keywords: nanocomposites, disinfection, green materials, water quality, rural villages and urban slums

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Design of Novel Dietary and Therapeutic Interventions to Power the Aging Muscle in Sarcopenia, A Morbid Geriatric Disease

Vandana Panda

Asawari Hare

Sarcopenia is the degenerative loss of skeletal muscle mass (0.5–1% loss per year after the age of 50) and strength associated with aging, leading to a functional decline. The present study evaluates a novel dietary cocktail along with resistance training to combat sarcopenia. Rats (12-13 months) corresponding to a human age of 60-62 were used as sarcopenic rats. Sarcopenic rats were assigned to various groups and given orally *Withania somnifera* extract (WSE, 500 mg/kg), WSE (500 mg/kg) and whey protein (1 g/kg), a protein cocktail of soybean (1.5 g/kg) and quinoa (1 g/kg) or whey protein (1 g/kg) as a standard protein treatment for 45 days. A group of sarcopenic rats also received resistance training for 45 days in the form of swimming for 15 min with weights strapped to their abdomen. Young healthy adult rats and sarcopenic rats served as the young control and sarcopenic control groups respectively. Food intake, weight and grip strength of all rats was checked on a weekly basis and blood glucose levels were monitored every 15 days throughout the study period. Behavioural and physical signs of aging were noted regularly. At the end of 45 days, marker enzymes (LDH & CPK), AMPK, IL-15, insulin, lipid peroxidation, glutathione and antioxidant enzymes were assayed and gene expressions of NRF 1 and SIRT1 were studied from blood. The biceps and calf muscles were isolated and processed for histomorphological and immunohistochemical analysis. All treatment groups showed a near normal food intake and body weight, decrease in sarcopenia-induced LDH, CPK and insulin activities and attenuated IL expression and lipid peroxidation. A restoration of the aging-depleted levels of AMPK, glutathione, superoxide dismutase, catalase, glutathione peroxidase and glutathione was noted in all treatment groups. An increase in grip strength with all treatments indicated regaining of strength of the frail muscle. An increase in NRF1 activity in the treatment groups was observed when compared with the sarcopenic control group, which indicated restored antioxidant status, accelerated muscle growth and respiratory activity and an anti-aging effect. Human aging is characterized by a chronic, low-grade inflammation level and NF- κ B is the main regulator of inflammation. SIRT1 inhibits NF- κ B gene regulation and thus

reduces inflammation and associated aging. All treatment groups showed significantly greater calf muscle mass than the sarcopenic control group. It may be concluded that *Withania somnifera*, protein supplementation and resistance training can help in combating sarcopenia and power the aging muscle.

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and cardioprotective activity, and studies on the metabolic syndrome. Her ongoing project includes design and evaluation of a dietary intervention for combating sarcopenia. Her project entitled “Design, formulation and pharmacological evaluation of a polyherbal tea bag- A green solution for hypothyroidism and its associated disorders” won a SICI fellowship for her M. Pharm student for collaborative work with Dr. Ujendra Kumar, Professor of Pharmacology, Pharmacy School, University of British Columbia, Vancouver for 4 months in 2017. She has 50 research papers with nearly 1000 citations in high Impact factor journals, a number of research awards and scholarships, and industrial projects to her credit. She sits on the editorial board of a few journals and is a reviewer for many reputed journals. She is also involved in Pharmacovigilance studies for a few Pharma companies.

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She is active in community service which includes being a core committee and advisory member of Plant and Animal Welfare Society (PAWS) and was recently on “Save Powai Lake” mission to save a natural lake against its commercial exploitation, to conserve and protect its flora and fauna. She leads the “Plantation Drive” project organized annually by the Forest Department, Maharashtra. She is also an active member of the NGO “In Defence of Animals” which works towards the cause of medical treatment and vaccination, care, rehabilitation and adoption of stray animals like dogs and cats

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The Health and Wellbeing of Inuit Communities in Canada

Chongom Aron Aimol

Health and wellbeing are indispensable for quality of life in the society. Despite Canada is one of the richest countries with the highest national wellbeing in relation to standard of living or quality of life in the world, Inuit communities in four Inuit regions of Canada remained the most vulnerable indigenous peoples living in any developed country. In fact, their living condition indicators show that they face increased health problems compared to their fellow population, with the poorest health status. The prevalence of food insecurity, housing crisis and limited access to health services remains the significant problems in Inuit regions. At the same time, low educational attainment, low income, shortage of housing and employment opportunities, low living standard and shorter life expectancy, compared with the non-indigenous population in Canada. Indeed, Canada has failed to provide legal protection to economic and social rights including the right to food to its citizens.

The objective of the study is to explore health status and well-being of Inuit communities, focusing on the four regions of Inuit Nunangat: i) Inuvialuit region, ii) Nunatsiavut, iii) Nunavik and iv) Nunavut, about 60,000 population living in Canada. Inuit are one of the Indigenous (Aboriginal) Peoples of Canada. The Public Health Agency of Canada recognised twelve key factors of the determinants of health in Canada, and based on this understanding, the Inuit communities and governments have identified eleven key factors that determined the social determinants of Inuit health including the culture and language, distribution of income, housing, education, food security, availability of health services, mental wellness and the environment. Each one of these factors is vital for the health and well-being of Inuit individuals and communities, and they are very interconnected to each other. The study is taking descriptive and analytical method, making a critical evaluation based on key factors that determined the social determinants of Inuit health and major components of community well-being (CWB) and measured by using the CWB index 2011, and data from the Statistics Canada's Census of Population 2001, 2011 and 2016, the Aboriginal Peoples Survey 2006, 2012 and 2017, International Polar Year Inuit Health Survey 2007-08 and the National

Household Survey 2011 and 2016. The study examines the conditions that create vulnerability in the communities, be it climatic or non-climatic that assess on the Inuit. The study seeks to analyse the policy measures that Canada has so far taken seriously to address the issues and challenges faced by the communities.

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Mental Health and Wellbeing: Informing the SDGs with Culture and Context

The experience of a maternal mental health research collaborative in rural Rajasthan

The inclusion of mental health in the Sustainable Development Goals (SDGs) is a reflection of the growing recognition of the importance and interconnectedness of mental health with development and community wellbeing in general (Izutsu et al.). The passing of the Indian Healthcare Act in 2017 similarly represents a growing recognition among policymakers and legislators of both the enormous burden of mental illness in India and the large treatment gap, in which the vast majority of sufferers do not receive treatment (Saxena et al.). The salience and interconnectedness of mental health is especially apparent with maternal and child health, as pre- and postnatal depression and anxiety are associated with higher rates of mortality and morbidity. Several initiatives within India and globally have been enacted to close the treatment gap in maternal mental health, such as integrating mental health care into primary care settings and the use of trained non-specialists or lay-counsellors to deliver care within communities. The WHO's mhGAP Intervention Guide and Thinking Health Programme (THP) are two such measures aimed at broadening maternal mental health coverage using Cognitive Behavioural Therapy (CBT)-based treatment and psychosocial support delivered by trained lay-counsellors (WHO; Dua et al.). While these programs have shown tremendous promise at increasing coverage, they highlight a tension between the universalizing principles of a CBT-based care-delivery package and the specificity of the social and cultural determinants of mental illness. For example, within the state of Rajasthan, determinants of pre- and postpartum mental illness include delivering a girl, teenage marriage, and the relationship with the mother-in-law (Patel et al.). Any effective mental health treatment package would need to reconcile the universalizing principles of CBT with local culture and context, including the logistics of providing care within a geographic setting. In this paper, we describe the efforts of a multidisciplinary collaborative research group funded by the Shastri Indo Canadian Institute at adapting a CBT-based, lay-counsellor-delivered maternal mental health intervention to the specific social, political, and cultural context of the rural

district of Sri Ganganagar, Rajasthan. Using illustrative cases from the maternity patients of a local maternal and child health non-profit, we argue for the importance of integrating local experience and context into health programs designed to have a population-level impact. We present the methodology and preliminary findings of our study, which uses community-based participatory research and anthropological methods to rigorously capture the process of adaptation of the intervention to the rural Rajasthani context.

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A Pragmatic Plasmodium Falciparum Glutamate Dehydrogenase Based Sensor for Malaria Diagnosis

Naveen Kumar Singh

Lightson Ngashangva

Dr. Pranab Goswami

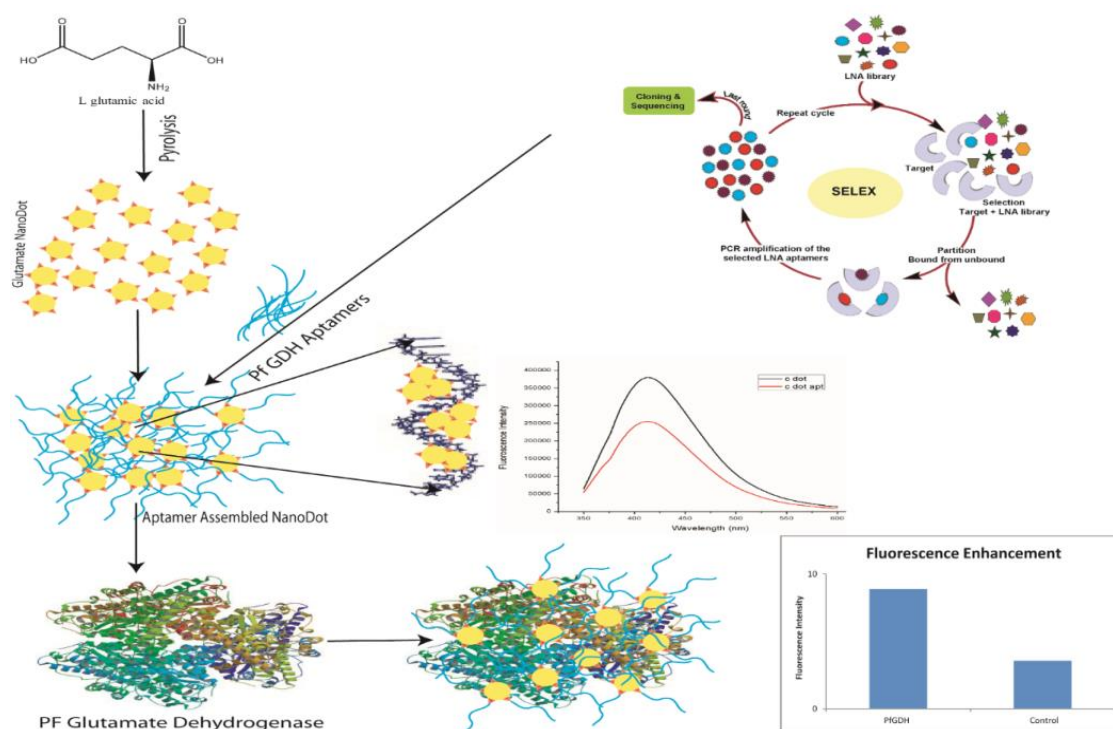
Malaria is serious life threatening problem for the world and severity of disease can understand by World health organization report on malaria (World Malaria report., 2016), confirming that 0.21 billion of malaria cases was testified and it lead to deaths of 4,29,000 due to this globally in the year of 2015. The sternness of malaria caused by *P. falciparum* can understand by out of total number of cases, 50 % malaria death happened due to infection of this species (Robert, 2015). According to national vector born disease control and prevention, India (NVBDCP) report on malaria (2016-17) stated that total 1.2 million cases of *Plasmodium falciparum* infection reported in India. The high level of malaria in these regions was not only due to economical reason but also braced by geographical location and condition (high humidity, temperature and forest) of this country which made malaria diagnosis difficult in this region with well standardize lab equipment's. The current available RDT in the market based on antibody and targeting pan specific lactate dehydrogenase (LDH) and *Plasmodium falciparum* histidine rich protein (PfHRP-II). But now days lots of reports were coming from different regions of the world regarding HRP-II gene deletion by the parasite (Murillo et al., 2015; Viana et al., 2017) so WHO issued guideline to look for alternative of PfHRP-II for malaria diagnosis.

Plasmodium falciparum glutamate dehydrogenase (PfGDH) is a protein observed to be present in the parasite, throughout its life cycle and human serum. As an objective of the present research, we have developed an aptamer based sensor against PfGDH for malaria diagnosis. Aptamers viz. NG3 and NG51, against PfGDH were developed through SELEX process and have been measured to bind target molecule with very high sensitivity and specificity. The binding affinities of NG3 and NG51 against target molecule PfGDH were investigated through SPR and were observed to be 79 ± 1.04 nM and 370 ± 3.20 nM, respectively. The aptamer NG3 was used for designing aptamer tagged Cdote for sensitive

detection of PfGDH through protein induced fluorescence enhancement (PIFE) analysis. Nitrogen doped carbon dot was synthesized through pyrolysis approach using L-Glutamate as a substrate and its characterization was done through various spectroscopy techniques and TEM. Fluorescence of aptamer coupled Cdot was observed to get enhanced in the presence of target molecule due to hydrophobic environment of protein binding groove. A linear relationship has been observed between the increased fluorescence intensity of aptamer conjugate C-dots and the concentration of PfGDH and detection limit of PfGDH was found to be as low as ~2.5nM suggesting a promising assay for malaria detection.

Notes-

1. The research work come under the “Improving human health” area of the conference.
2. Graphical Abstract-



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Leaving No One Behind: Healthy Aging, Social Inclusion, and the SDGs

Dr. Shanthi Johnson

Population aging is a global phenomenon directly impacting the foundations of life and society. This demographic shift is a reality in high income countries such as Canada. While this demographic breakdown is not mirrored in India, the country is home to over 120 million adults over 60 years of age. Moreover, progress toward sustainable development will continue to contribute to increasing life spans, calling for increased attention to the well-being of older adults. The presentation will highlight promising models for improving functional health and social inclusion among older adults and opportunities to address knowledge gaps in the context of India and other low and middle income countries through integrated local and global partnerships as articulated in the SDGs. Understanding and facilitating healthy aging is and will be critically important for moving towards and achieving more sustainable, inclusive and healthy societies in the global scale.

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Theme 4

Sustainable Energy Development

Solar Energy: Walking Towards Sustainable Development Goals

Dr Bharti Chhibber

The central argument of the paper is that the Solar energy is the future to realize Sustainable Development Goals (SDG) and protect the future generations from the onslaught of climate change and global warming. The 2015 ‘Transforming Our World: the 2030 Agenda for Sustainable Development’ has 17 SDGs and 169 targets. As many as 10 goals talk about different aspects of sustainable development which highlight its importance. For example, Goal 7 emphasises ‘Ensure access to affordable, reliable, sustainable and modern energy for all’.

Environmental protection is an inherent part of the Indian constitution. According to the Article 48-A of our constitution, ‘the State shall endeavour to protect and improve the environment and to safeguard the forests and wildlife of the country’. Similarly, under Article 51-A(g) of our constitution, ‘It shall be the duty of every citizen of India to protect and improve the natural environment including forests, lakes, rivers and wildlife and to have compassion for living creatures.’ However, the process of economic growth through industrialization and urbanization- transportation, burning of fossil fuels and deforestation has led to problems like desertification, global warming, air, land and water pollution and resulting in long-term loss of natural vegetation, poor water supply, famine, displacement and mass migration affecting health and well-being of innumerable people.

The paper is in two sections. After a brief discussion on the issue of environmental degradation and the relevance of sustainable development goals, the first section reflects on the significance of Solar energy. Solar energy is non-polluting. With long and sunny days, India is an appropriate place for harnessing solar energy for multi-purpose initiatives including agriculture, industries and domestic use. The second section examines some of the initiatives by the Indian state in the field of Solar energy both at the domestic level and at the global level including the launch of International Solar Alliance in 2015. In the final, the paper offers some policy implications with a view to ensuring that by 2030, India could

contribute in building a peaceful, prosperous and sustainable global order through efficient use of solar energy with reduced dependence on non- renewable resources.

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Dr Bharti Chhibber is teaching Political Science in the University of Delhi for about thirteen years. She has published books and research papers and articles in mainstream journals to her credit. She has presented papers in various national and international seminars and conferences. Dr Chhibber's specialisation includes India's foreign policy, international relations, Indian politics, environmental issues and gender discourse. Email: bharti.chhibber@gmail.com. Cellphone: 9910833082.

Trade in Clean Energy Technologies and Opportunities for Co-Operation – The Case of Canada and India

Dr. Malini L. Tantri

Dr. Varadurga Bhat

Post 2010 has seen an increase in commitments at the institutional level between India and Canada for a closer trade and investment cooperation. Both the countries have complimentary in resource endowments. Specifically, India's sound base in manufacturing and service sector make it a market of enormous opportunity with cheap and easy access to its raw materials and labour. Canada is well known for its advanced technological base in, food processing, science and technology, innovation, environment, cleaner technologies, etc. It is in this background, taking the case of clean energy technologies and products (CETs), this paper explores opportunities for trade and cooperation between both the countries in the clean energy sector. The analysis is carried out using the data collected from the International Trade Centre based on the Harmonized System of commodity classification at 6 digit level for the time period 2001-17. The study uses different indicators to analyze the current trade pattern in CETs between India and Canada both at the bilateral level and with the rest of the world. The study in particular focuses on the CET availability and requirements for both the countries, based on which the conclusions about the possibilities of cooperation have been drawn. While doing so, the paper identifies the products in which both countries have advantages in production and trade. The study is important specifically considering the growing concerns over energy security and commitments to global climate change mitigation efforts. In the light of ongoing negotiations toward a Comprehensive Economic Partnership Agreement between India and Canada, the exercise so carried out helps us to argue how both the countries can strengthen their ties with respect to trade in CETs and mutually benefit from the complementarities and cooperation. In fact, both the countries have set ambitious targets for reducing GHG emissions and promotion of CETs is perceived as one of the effective ways of achieving it. The paper argues that trade being instrumental in the transfer of technologies

and economic cooperation, trade in CETs between India and Canada offers a win-win option to both the countries to reap trade gains and achieve energy security.

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Analyzing the Electric Vehicle Innovation System of Canada: Policy Lessons for India towards Sustainable Development

Rajiv Kumar

The question of sustainable development goal has caused an increasing business observation in the contemporary era. In contrast, companies at start aimed to mainly influencing the policy on formal discussion, corporate strategies progressively include economic reactions. Existing action for sustainable development goals implementation, however, still replicate the governmental, non-market mechanisms. Sustainable development has comprehensive appeal and little quality of belonging in the automobile sector, but few connections of development in the natural world as well as fairness are found in plug-in hybrid and electric vehicle attempt to define it. However, supporters of sustainable development vary in their prominences on how to do link sustained, developed, and environment for long a time. The prominence on sustainability measures has numerous reasons that take in decision making, organization, sponsorship, membership and agreement building, policy making and research analysis. The paper attempts to analyze the electric vehicle innovation system of Canada, and tries to formulate the policy lessons for India to acquire sustainability. The paper is qualitative and exploratory in nature based on the secondary data of various Canadian and Indian automobile firms. The government reports regarding the innovation and policy implications are also used. The electric vehicle innovation system measures as sustainable development, motivation, process, and use of technical methods. The paper will discusses about the cost-effectiveness innovation, technology, sustainable development goals, policies, tries to quantify the few differences in the Canadian automobile policy. Developing the low emission vehicle technologies, plug-in hybrid and electric vehicle and hydrogen energy technology, action on innovation model representing adoption in both countries with the financial costs and consumer preferences. The automobile innovation system deliver the new process of new product, new method, new idea and new market of technology. The plug-in hybrid and electric vehicles are more cost-effective and environment friendly than the conventional engine. Focusing on the driver of opportunities and movements taken by automobile

companies of Canada and India's sustainable development goals with respect of the electric vehicle innovation system. Using the empirical information from major international automobile companies, helps in suggesting the policy discourses for internal and external market dimensions form of organization.

Keywords: Electric vehicles, Policy, Innovation System, Market Sales, Canada, India.

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Optimized Agricultural Power Tariffs as a Means of Achieving Sustainable Developments Goals in India

Balsher Singh Sidhu

Widespread and rapid adoption of groundwater irrigation was one of the primary enablers of India's Green Revolution. Not only did it help make famines a thing of the past, but also improved livelihood of millions of people engaged in agriculture. Groundwater access have rightly been called more "democratic" than public surface irrigation schemes (Shah and Chowdhury 2017); unlike the latter, the benefits of the former have touched all strata of society in every corner of the country. However, this has come at a huge environmental and financial cost: groundwater resources in certain regions are depleting at an alarming pace, and perverse subsidies have forced most state power utilities to operate in the red, causing significant strain to the national economy.

We conducted a literature review to compare two popular tariff structures used by power utilities to charge tubewell owners for groundwater extraction: flat tariffs, wherein farmers pay a fixed monthly bill depending on their motor power rating, and pro-rata tariffs charged per unit of power consumed. Our assessment shows that although flat tariffs lead to a more equitable distribution of water between rich and marginal farmers, their zero marginal cost provides tubewell owners little incentive to conserve water. On the other hand, pro-rata tariffs, while encouraging efficient water use, are disproportionately biased against small farmers engaged in buying water from tubewell owners. This has led to a unique catch-22 situation for policymakers: providing sufficient irrigation services to millions of people dependent solely on groundwater for farming, while avoiding wasteful consumption of the country's finite energy and groundwater resources.

With more than 90 million households using groundwater for irrigation (Zaveri et al. 2016), agriculture accounts for more than 17% of the national electricity consumption. Hence, improving agricultural power tariff structures is an excellent path for India to simultaneously meet many Sustainable Development Goals: specifically, goals 1, 6, 7, 8, 10, and 12 (relating

to poverty reduction, water access, affordable energy, economic growth, reduced inequality, and sustainable consumption respectively). An important step could be to rethink the subsidy structure in order to specifically target the most vulnerable sections of society. Here we present some strategies from our literature review that can assist policymakers in this quest. While none of them is a perfect solution for all problems, a comprehensive understanding of the strengths and weaknesses of all viable options can help lawmakers restructure agricultural power tariffs and subsidies to best meet the environmental, social, and economic demands of the country.

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Sustainable Energy Development and Cities in India: A Case Study of Implementation of Solar City Programme in Chandigarh

**Ms. Karuna Mehta
Swinder Singh**

In the post liberalized era in India; there is growing consensus that the populations, infrastructure and ecology of cities are at risk from the impacts of climate change. Emissions of anthropogenic green house gas emissions, mostly from the production and use of energy are altering the atmosphere in ways; that are affecting the climate. Cities can be medium for sustainable energy paths for mitigating the effects of climate change. India is the only country with a Ministry dedicated to New and Renewable Energy (MNRE). It is also the nodal Ministry of Government of India for all matters relating to new and renewable energy. MNRE had launched a programme on “Development of Solar Cities” in February 2008 for implementation during the 12th Five Year Plan (2012 to 2017); which was modified on 17th January 2014. Solar city Programme aims to consolidate all the efforts of the Ministry in the urban sector to address the energy problem of the urban areas in a holistic manner. Broadly; this programme aims to cut conventional energy use by a minimum of 10% over a period of five years. This paper aims to find out how local, national governments and other stakeholders tried to work together most effectively to implement renewable energy programme at the city level. The paper is based on a survey based study; hence both quantitatively and qualitatively approaches have been used. It also intended to answer the critical questions relating to the extent to which; cities and local governments has addressed the challenges of sustainability. The proposed study is based on both primary as well as secondary data. The primary data has been collected with the help of structured questionnaire administered from officials of implementing and monitoring agencies; such as marketing executives, accountants, clerks of solar city cells and elected representatives in the local municipal bodies, persons from research and academic institutions, resident welfare associations, industries and corporate organizations, non-governmental organizations. Interview schedules and observation method has also been used for the purpose of data collection. The secondary data has been collected from the reports of different agencies,

official documents, surveys, research journals, periodicals, magazines, books, newspaper articles subject to their permission. The collected data has been analysed by using appropriate statistical method and care has been taken to ensure all ethical considerations.

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Development of Green Catalyst for Biodiesel Production from Soybean Oil

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Biodiesel as renewable energy sources has been gaining much attention in the recent years. The main advantages of biodiesel as an alternative fuel are: renewability, biodegradability, nontoxic nature, and blending capacity with other energy sources. Biodiesel is also known as fatty acid methyl ester (FAME) obtained by the transesterification reaction of methanol and vegetable oil in the presence of catalyst[1] Homogeneous catalysts for transesterification reaction have some disadvantages such as difficult to separate, purify and reuse them after the reaction. Therefore, to overcome these drawbacks, a heterogeneous solid catalyst has been explored with many advantages as they can be cheap, noncorrosive, and recyclable, have fast reaction rate and involve absence of water purification step [2]. Among the various solid heterogeneous catalysts, CaO is one of the best heterogeneous catalysts with excellent catalytic activity and noncorrosive nature. Many researchers have investigated the natural sources of CaCO_3 as catalyst such as eggshell, sea shell, scallop shell, mussel shell which can not only decrease high cost of biodiesel production but also reduced environmental problems[2].

The FTIR spectra of uncalcined SS showed major adsorption band at 1474cm^{-1} , 1418cm^{-1} and 1451cm^{-1} respectively which confirms the presence of CO_3^{2-} group in the SS. These bands at higher temperature indicate that the bands are shifted to high energy level due to the decrease in the reduced mass of the functional group attached with carbonate ion. The presence of moisture content in every sample was also detected by the band around 3400cm^{-1} due to the moisture include in KBR powder and also during the storage of samples[3]. The results of XRD pattern of uncalcined sample only confirm the CaCO_3 peaks which were observed at $2\theta = 27.22, 33.15, 36.17, 45.86, 48.45$, as compared with the JCPDS card number 00-005-0453. After calcination at 750°C , Ca(OH)_2 peaks were also detected at $2\theta = 28.86$,

48.73 as compared with the JCPDS card number 01-070-6445 with CaO phase and small traces of CaCO_3 left in the sample at $2\theta = 32.19, 37.36, 53.85, 64.12$ as compared with the JCPDS card number 00-003-0865[4].

Properties of Biodiesel produced from soybean oil were analyzed and found within the limit as per ASTM D6751. Biodiesel quality was determined using GC analysis which confirms the presence of Fatty acid methyl esters such as palmitic acid, stearic acid, oleic acid, linoleic acid, and linolenic acid in soybean oil biodiesel.

In this study, the calcined snail shell at 750°C was found to be an efficient catalyst for the production of biodiesel via the transesterification of soybean oil with methanol. A good yield of biodiesel i.e. 90% has been obtained using this catalyst. The developed catalyst can reduce biodiesel production cost at large scale due to its origin from natural waste material.

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Valorization of Household Food Wastes Through Supercritical Water Gasification for Hydrogen-Rich Syngas Production

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Significant amounts of fruit wastes and agro-food residues are generated worldwide as a result of food processing. Fruit residues contain numerous bioactive components, such as carbohydrates, lipids, fats, cellulose, hemicellulose and lignin, that have tremendous potentials to be converted into biofuels. Segregating or assorting food wastes into these main classes can be an efficacious way of managing their efficient utilization. Food wastes are usually disposed in landfills or incinerated raising several environmental concerns and health risks. Inappropriate management of landfill results in odors, pests and GHG emissions, whereas incineration releases pollutants such as dioxins, furans and particulates. The decomposition of food wastes in landfills is predominantly responsible for anthropogenic methane emissions. Biogas is a product of anaerobic digestion of organic wastes including food wastes by methanogenic bacteria. However, methane is a greenhouse gas that is 72 times more potent than carbon dioxide over a 20 years time period. On the other hand, hydrogen is a clean energy-dense versatile fuel with the highest energy content (120 MJ/Kg) compared to conventional fuels. Hydrogen can be produced through a hydrothermal conversion, especially supercritical water gasification of food wastes. This study highlights the characterization and hydrothermal gasification of several fruit wastes and agro-food residues such as aloe vera rind, banana peel, coconut shell, lemon peel, orange peel, pineapple peel and sugarcane bagasse. The fruit wastes and agro-food wastes were gasified in supercritical water to study the impacts of temperature (400-600°C), feed concentration (1:5 and 1:10 biomass-to-water ratio) and reaction time (15-45 min) at a pressure range of 23-25 MPa. The catalytic effects of NaOH and K₂CO₃ were also investigated to maximize the hydrogen yields and selectivity. Temperature is an essential factor in the gasification of

biomass having positive impacts on gas yield and carbon gasification efficiency. The elevated temperature (600°C), longer reaction time (45 min) and lower feed concentration (1:10 biomass-to-water ratio) were optimal for higher hydrogen (0.91 mmol/g) and total gas yields (5.5 mmol/g) from orange peel. However, coconut shell with 2 wt% K₂CO₃ at 600°C and 1:10 biomass-to-water ratio for 45 min of gasification revealed superior hydrogen yield (4.8 mmol/g), hydrogen selectivity (46%) and total gas yields (15 mmol/g) with enhanced lower heating value of gas products (1595 kJ/Nm³). The overall findings imply that supercritical water gasification of fruit wastes and agro-food residues could serve as an effective organic waste management technology with regards to bioenergy production.

Focus Areas: Food Waste; Supercritical water gasification; Hydrogen; Synthesis gas; Alkali Catalysts; Biochar

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Clean Energy for Transportation: Next-Generation Fuel Cells

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The global energy demand is expected to increase from 575 quadrillion British thermal units (Btu) in 2015 to 736 quadrillion Btu by 2040, according to US Energy Information Administration. The largest increase is predicted for India. A significant demand of energy is for the transportation sector. A majority of urban transportation vehicle employs internal combustion engines which not only have low efficiency but more importantly directly contribute to air pollution as a result of dangerous emissions – particulate matters and unburnt hydrocarbons. A 2016 Report by International Energy Agency (IEA) declared air pollution as a major public health crisis, with many of its root causes in the energy sector, and nearly 6.5 million deaths attributed each year to poor air quality.

In the backdrop of alarming escalation mortality due to poor urban air quality, new energy conversion technologies are being sought. Electric vehicles powered by batteries and fuel cells are at the forefront of such clean energy technologies for transportation as well as for backup power and materials handling sectors. Hydrogen fuel cells produce electricity at high efficiency with water and heat as the only by product. Thus, fuel cells are considered to be a key component of the mix of solution for Sustainable Energy Development. For widespread adoption of this technology, less expensive alternatives to Platinum catalysts are being explored. Recently, we have developed doped-graphene material via a facile, room-temperature process as a potential catalyst for fuel cells. The electrochemical characterization of the new graphene material has shown promising activity for oxygen reduction reaction prompting the ongoing tests in a fuel cell device. The presentation will give an overview of fuel cell technology, identify some of the challenges and share the findings of the aforementioned research carried out under aegis of SICI's SRSF programme.

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Crossflow Turbine Design for Remote Power Systems

Ram C. Adhikari

David H. Wood

Crossflow hydroturbines are often used in developing countries to generate power for remote villages. They are simple and cheap to build, making them very appropriate technology, but their efficiency is often significantly lower than other turbine types. This presentation will describe ways of increasing the efficiency with the aim of further reducing the cost. A new nozzle design methodology developed by Adhikari and Wood (2017) is combined with a parametric study of the influence of blade number, blade angles and other parameters on runner performance. Finally, a flow control device will be described that maintains high efficiency at part-load conditions (Adhikari and Wood, 2018). It is shown that an efficiency of 90% is achievable for these turbines. To study the fluid flow in the turbine and improve the turbine design, three-dimensional Reynolds-Averaged Navier-Stokes simulations with two-phase homogeneous flow model were conducted on two experimentally tested turbines. For the turbulence model, SST $k-\omega$ was used. By characterizing the flow features of a 0.53 kW turbine with a maximum efficiency of 88% and a 7 kW turbine with a maximum efficiency of 69%, and performing parametric studies mentioned above, the maximum efficiency of both turbines was improved to above 90%. 0.53 kW turbine is the most efficient turbine design reported in the literature so far and was experimentally tested by Desai (1993). Similarly, Dakers and Martin (1982) tested the 7 kW turbine.

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Enhancement of the Chemical Properties of Bio-oil as a Sustainable Energy Replacement for Petroleum Based Fuels

Philip Bernstein Saynik

Vijayanand S. Moholkar

Pyrolysis is emerging as one of the promising techniques for waste management coupled with energy generation. Bio-oil is the main product of pyrolysis with yields up to 80% wt. on dry feed, together with char and gas as by-products which is used within the process. Various types of biomass, plastics and other types of waste are being studied worldwide to produce bio-oil which could substitute for fuel oil and in many other application including engines, furnaces, boilers and turbines. Bio-oil suffers from inferior physical and chemical parameters such a high moisture content, high viscosity, low calorific value and low carbon to oxygen ratio that restrict its direct application. These inferior features also restrict upgradation of bio-oil. Various post production techniques such as hydro deoxygenation, catalytic cracking, esterification, steam reforming, solvolysis and hydrothermal treatment; pre-production techniques such as acid, alkali pre-treatment and torrefaction have been studied by various researchers to improve the quality and the yield. Our current research incorporates pre-production techniques in combination with modifications in production techniques (modified reactor design) to produce bio-oil which abates the primary problems such as storage stability and low carbon to oxygen ratio. Reactor design plays a major role in the quality of bio-oil. An effective reactor design can improve the yield as it has significant effect on the resident time distribution. Two biomasses *Arundo donax* and *Prosopis juliflora* were selected for our study due to their distinctive variation in their Lignocellulosic compositions. Various pre-treatment techniques were studied and an increase in the carbon to oxygen ratio (0.66 to 2.08) and calorific value of various biomasses was observed. An attempt is also made to explain the physical and chemical mechanisms underlying improvement of qualities of biomass and resulting bio-oil.

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Bifunctional Catalyst for Efficient and Economical Conversion of Biomass-Derived CO₂ Containing Syngas into Synthetic Diesel

Shashank Bahri

Sreedevi Upadhyayula

Fischer-Tropsch (FT) a well-known commercial process for the production of sulfur-free synthetic liquid fuel from syngas since 1936 [1]. The syngas used as a feedstock in this process is derived from various sources like natural gas, coal, petcoke and biomass sources. FT using syngas derived from biomass/coal gasification comprised of a mixture of CO, CO₂, H₂, and CH₄, is still under developing stage with an inherent inadequacy of optimal H/C ratio required for commercial FT process [2]. The two main challenges in FT process are the unavailability of sustainable processes for conversion of H₂ deficient and CO₂ abundant syngas. The process of CO₂ and CH₄ removal from the syngas to be used as feed for FT was emphasized in earlier literature [3]. Water-Gas Shift (WGS) reaction over Fe-based catalyst could provide a solution to overcome the H₂ deficient nature of biosyngas but it will increase CO₂ content which may lead to lower economic efficiency [4]. The combination of shape selective and acid functionalized zeolites with conventional group-VIII FT active metals is an attractive combination for selective production of cleaner synthetic Diesel fuels from biomass-derived syngas [5]. Fe-Co bimetallic active metals supported on commercial zeolites was investigated for converting H₂ deficient and CO₂ containing syngas with the CO₂/(CO+CO₂)=0.32 into synthetic fuel. Piperazine treatment to zeolite support with optimized Fe/Co bimetallic particles of proper size in close vicinity to acidic sites in zeolites. The collegial effect of the uneven distribution of weaker acidic sites in conjugation with hierarchical porous structure was investigated in terms of 50.6% selectivity towards linear chain C₁₃-C₂₃ range hydrocarbon with high cetane number with positive conversion of CO₂ from hydrogen deficient biomass-derived syngas.

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Theme 5

Environmental Sustainability

**Implementation of Access and Benefit Sharing Mechanism with
Responsible Consumption and Production of Biological Resources (SDG
12): A Study on India and Canada**

Dr. Shova Devi

Biodiversity conservation is an obligation for the sustainable utilisation of biological resources. Globally, the Convention on Biological Diversity, 1992 (CBD) and the Nagoya Protocol, 2010 provide the foundation for commitments of member countries on conservation, sustainable utilisation and access and benefit sharing (ABS) of biological resources. After the commencement of the Nagoya Protocol, ABS has emerged as an area of discourse. Currently, the member countries are in the post Nagoya period and working on the domestic implementation to comply with the international standards. Simultaneously, to achieve economic growth and sustainable development it is required to reduce our ecological footprints by changing the way we produce and consume goods and resources. The efficient management of our shared biological resources shall help in conservation and also in achieving the Sustainable development Goal-12 (SDG 12 on Responsible consumption and production) in a more efficient and effective manner. In this research work, a study has been taken between India and Canada to overview the implementation of the Nagoya protocol and the SDG 12. The work focuses on the status of domestic implementation of ABS and SDG 12 in India and Canada and provides an interesting study on Access and Benefit sharing with responsible consumption and production of biological resources.

Keywords: Access and benefit sharing, Biological Resources, SDG 12, India, Canada

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Vacuum Membrane Distillation for Treatment of Saline Water Using PVDF Membranes

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Water is one of the prime component for existence of life on earth. Water covers nearly 70% of total earth's surface and is also the main constituent of human body. The United Nation at Sustainable Development Summit 2015, embraced the 2030 Agenda for Sustainable Development, which includes a total of 17 Sustainable Development Goals (SDG), to eliminate poverty and hunger, combat inequality and injustice, and address climate change by 2030. The SDG 6 includes sustainable management and availability of water for all. Lack of drinking water is an escalating problem worldwide. In addition to decreasing groundwater level, available groundwater in most of the places is contaminated by various ions above safe limits. Desalination of saline water is one of the most promising practice in order to meet the fresh water demand. Efficient methods of wastewater treatment and desalination need to be devised in order to decrease dependence on already available freshwater resources. Membrane distillation (MD) is one such viable technology to produce fresh water from the contaminated feed as well as saline water.

In this study, desalination of saline water and treatment of synthetic waste water is carried out using Vacuum Membrane Distillation (VMD) process. In VMD system the feed solution is in contact with the microporous hydrophobic membrane, the vacuum on other side of the membrane generates driving force for mass transfer, in turn propelling the vapor to pass through the membrane pores, which are then collected and condensed outside the membrane module. The polyvinylidene fluoride (PVDF) microporous hydrophobic membranes used are synthesized by electrospinning process. These membranes are characterized by Scanning Electron Microscopy (SEM) for morphological characterization. The performance for these membranes is determined for saline water of different salt concentrations as feed and effect of

various process parameters like feed flow rate, feed temperature, and feed concentration etc. on permeate flux is observed. It has been observed that the maximum permeate flux was obtained when higher feed temperature is used with lower salt concentration in feed. The percentage reduction in permeate flux was also investigated at regular intervals of experimental runs and the scale deposition on membrane surface was observed using Scanning Electron Microscopy. This study indicates that Vacuum Membrane Distillation technique can be used to produce safe drinking water from seawater or polluted ground water in various urban as well as rural areas. The VMD process can be investigated further for high performance membranes and alternative energy sources, to obtain a low cost water treatment system.

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Demonstration of Innovative, Integrated and Interdisciplinary Canadian Technology for Industrial Soil Reclamation in Punjab, India

**Neeta Raj Sharma, Rishi Gupta, Mohit Garg, Peyman Azarsa, Caterina Valeo
Ramesh Kanwar, Shiv Prashar, Peter Constabel, Simranjeet Singh, Deepika Bhatia,
Jastin Samuel, Joginder Singh, Amandeep**

The aim of the present study is to exhibit an innovative biological, wastewater and civil engineering integrated approach to treat storm-water and treat areas contaminated with industrial wastewater for a sustainable as well as eco-friendly solution for the community.

In India, heavy metal pollution in sediments and soils has become a matter of concern due to their presence in food chain, which threatens public health. One of the innovative methods to mitigate this chronic issue is soil remediation and rhizo-filtration, which has been identified by Canadian researchers. However, the growth of plant species in a heavily polluted industrial site required an in-depth soil investigation prior to site preparation. As a case study to illustrate this effect, an industrial site located in Ludhiana (a Hub of industries), Punjab was chosen for soil improvement. Soil samples from the surface and at two different depths (10 cm & 60 cm) were recently collected from nearby locations of an iron melting, and chemical industry, respectively. Astonishingly, heavy concentration of metals such as Cr (Total), Mn, Ni, and Cu were obtained after analyzing the soil samples by using ICP-OES (Perkin Elmer) equipment, hence posing a concern for current agricultural fields. Further, experimental results indicated that the concentration of heavy metals was higher on surface vis-à-vis when obtained from varying depths, except for Aluminum (60cm).

The team conducted Statistical tests, One-way Anova and Tukey (using 'Assistat' Software version 7.7) to evaluate the level of significance ($p \leq 0.05$) between the metal concentrations at different soil depths with heavy metal standards. The integration of different disciplines as well technology transfer from Canada will result in developing an effective 'Low Impact Development' (LID) system to treat wastewater at polluted sites and sustain green and healthy environment.

In conclusion, the authors would like to emphasize the findings of this study towards developing a sustainable future by presenting at the International Conference on Engaging Canada and India: Challenges of Sustainable Development Goals.

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Comparative Analysis of Erosion, Sea Level Rise and Subsidence of the Nelson River Estuary Manitoba, Canada and the Ganges River Estuary West Bengal, India

**Anirban Mukhopadhyay
Nilay Pramanik
Tuhin Ghosh
Debashis Mitra**

River estuaries are one of the most dynamic landforms for identifying and analyzing the impacts of the global geo-environmental changes in local scale. Of late, the climate change and its imminent impacts are one of the main scientific questions to the researchers of the geo-environmental domain. In this regards this work emphasizes on the comparative analysis of erosion, sea level rises and subsidence of the Nelson River estuary Manitoba, Canada and the Ganges river estuary West Bengal, India. Both the estuaries have been suffering from erosion. From the year 1990 to 2017, the erosion has been calculated from the LANDSAT satellite images of a comparable tidal level. It is observed that the net erosion is around 1150 hectares in the Nelson estuaries whereas the same in the Ganges estuaries is about 1470 hectares during the last 17 years. The sea level anomaly has also been calculated for both the estuaries using TOPEX-POSEIDON, JASON 1, 2, 3 data. The result shows a steady increase in the rate of sea level anomaly in both the estuaries. In the case of Nelson estuary, it is 4 mm/year while in the case of Ganges estuary it is 2.7mm/year during 1992/93 to 2014/15. Land subsidence has been analysed using the proxy data of GRACE-Tellus. While the rate of subsidence is almost ≈ 2.5 mm/year in the case of the Ganges estuary, however, found negligible for the Nelson estuary. Under these circumstances, it may be concluded that the vulnerability of the Ganges estuary is relatively higher than the Nelson estuary in terms of sea level rise and land subsidence.

Key words: Estuary, Erosion, Sea level rise, Subsidence, Nelson estuary Manitoba, Canada and the Ganges.

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Risk Assessment of Agricultural Amendments

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With ever increasing population and the constant threat to environment, it is of utmost importance to come up with reliable, eco-friendly, sustainable alternatives in agriculture for enhancement of crop productivity. Biological and natural amendments have been in use in agriculture for decades with the pre-assumption that they do not exhibit detrimental effect on the ecosystem, by virtue for their biological origin. However, it is imperative to thoroughly assess the non-target effects of amendments otherwise considered "safe", on structure and function of microbial communities in arable land as ultimately they are the major players in all biogeochemical cycles.

We have been focussing on agricultural inputs like natural pesticides and bioinoculants to address the question of their sustainability and risks, if any, in their application. A polyphasic approach has been employed including both culture-dependent and -independent techniques so as to overcome the limitations of both. Culturable fraction has been targeted using enumeration on specific media and community level physiological profiling, while molecular microbiology tools like quantitative-PCR, RT-PCR, denaturing gradient gel electrophoresis (DGGE) and next generation sequencing have been employed to target the total microbiome. Genes and transcripts involved in nitrogen cycle has been used as markers to study specific function of the microbial communities.

While evaluating the non-target effects of bioinoculants we could successfully address the long standing question of mechanism of action of these amendments. The application actually led to a cumulative enhancement of plant growth promoting bacteria and nitrogen fixing communities (Gupta et al 2012, 2014, 2015, 2016). Infact the effects could be observed even during harvest stage of crop though the detection of the bioinoculants was only possible till vegetative stage of the crop (Sharma et al 2017). With natural pesticides it was observed that

the disturbance to the microbiome structure and function was comparative to that generated as a result of application of chemical pesticide (Gupta et al 2013, 2014; Singh et al 2015 a, b; Walvekar et al 2017). They were even seen to negatively impact some of the crucial soil processes thereby negatively affecting soil fertility.

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Advances in CO₂ Capture using Solid Sorbents

Nader Mahinpey

It is widely accepted that the anthropogenic decrease of CO₂ into the atmosphere is the main solution to prevent global warming. Although a great deal of effort is being expended to investigate on alternative sources of energy, such as renewable resources, fossil fuels still produce a major portion of the energy requirement today and will continue to do so in the near future.

Traditional means of capture of CO₂ in industry involve wet scrubbing with amine solvents. However, this causes a serious loss in thermodynamic efficiency and is unlikely to be cost-effective on a large-scale, such as for electrical power generation. As a result, there has been considerable recent interest in dry processes for capture of CO₂. In this talk, advances in CO₂ capture using solid sorbents will, first, be highlighted, followed by challenges that researches are currently dealing with commercialization of the technology.

One example of a dry process with CO₂ capture capability is chemical-looping combustion (CLC). CLC is potentially one of the most efficient methods for carbon capture. It is a nonconventional unmixed combustion process where the fuel and the air reactions occur in separate reactors. Circulation of oxygen carriers between the two reactors enables the combustion of the fuel. Several significant advantages make CLC a promising process both in terms of cost and capture capacity, one of which is inherent CO₂ separation as the part of the process and no external carbon capture devices or expensive air separation units. Nickel, copper, and iron-based synthetic minerals (e.g. NiO and CuO) supported by alumina are commonly used as oxygen carriers due to their high reactivity and high oxygen transport capacity. However, the cost of these synthetic carriers can be very high, limiting the economic attractiveness of the CLC process. Ilmenite, however, is a natural mineral normally found in igneous rocks and comprised of iron and titanium oxide (FeTiO₃). Due to its relative natural abundance, ilmenite is more cost-effective than synthetic carriers. It also has a relatively high oxygen transport capacity.

Another approach to commercialize the CLC process is the use of novel oxygen carriers that exhibit less interaction between the active-sites and supports. We have investigated the reaction mechanisms involved in the redox reactions of different transition metals, as well as their interaction with different supports to enhance their chemical reactivity. The incipient wetness impregnation technique is a common method to manufacture supported metallic oxygen carriers using Ni, Co, Cu, Fe and their combinations deposited on Al₂O₃, CeO₂, TiO₂ and ZrO₂ supports to find efficient carriers for CLC process.

Advanced structured perovskite (ABO₃) materials are highly attractive for the improvement of a sustainable process such as Chemical Looping Combustion (CLC). Perovskites can operate at relatively lower temperatures and are carbon resistant. Isothermal redox properties of CaMnO₃ are investigated at various selected temperatures ranging from 600°C to 900°C up to 15 cycles of consistent oxygen release/uptake capacity, with no noticeable amount of carbon deposition under any conditions used in our study.

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Role of Biochar Based Sustainable Green Technology in Water Treatment Systems

Jaskaran Dhiman

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Ramesh Kanwar

The current world human population is 7.3 billion and it is estimated to rise to 9.7 billion by the year 2050 (DeSA UN, 2015). This increase in population would cause increase in global food demand leading to increased use of agricultural resources such as irrigation water, eventually stressing our freshwater resources. It is estimated that by year 2025, two-thirds of the world's population may face water stress (WWF, 2016) and more than a billion people would face absolute water scarcity by 2025 (Seckler et al., 1999). Since agriculture is the largest freshwater consumer, alternate sources of irrigation water such as wastewater would help us conserve freshwater resources. Use of wastewater for irrigation is proposed and highly encouraged by many researchers to tackle the problem of freshwater scarcity (Rusan et al., 2007; Al-Rashed and Sherif, 2000). Due to increased wastewater production around the world, safe wastewater disposal in environment is also of major concern. As a common practice, wastewater is discharged openly into water bodies leading to pollution especially in developing countries. Contaminants present in untreated wastewater can harm human and animal health, as well as the environment (Qadir et al., 2007). Wastewater can contain carcinogenic (Giwerzman et al., 1993; Toppari et al., 1996; DeRosa et al., 1998) and toxic (Page et al., 1972; Collins et al., 1976) organic contaminants such as steroidal sex hormones (estrone, 17 β -estradiol and progesterone), pharmaceuticals (oxytetracycline) as well as heavy metals such as Cd, Cr, Pb, Zn, Cu and Fe. In India, the wastewater in most drains and nallahs are mixture of domestic wastewater and wastewater from several small-scale industries. The mixed wastewater contains a variety of inorganic (heavy metals) and organic contaminants. It is obvious that a single treatment mechanism is not adequate to provide a comprehensive and sustainable solution for improving the quality of the effluent entering the streams. There is a

need for a low-cost green technological approach for the treatment of such effluents. A joint research project initiated via collaboration between McGill University, Canada and Lovely Professional University (LPU), India, focusses on the development of an economically feasible and environmentally sustainable green treatment system for mixed municipal and industrial wastewaters by using a biochar-based water treatment system. In this project we would utilize rice-husk for biochar production. Our research team have found biochar made from rice husk and other carbon rich materials, to be very effective in adsorbing commonly found contaminants. Large scale implementation of the environmental solution proposed would thus help in adding value to waste through utilization of rice husk to produce a natural sorbent material for a sustainable water treatment system.

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Commodification of Water: A Case Study of Khetri Copper Mining Region, Rajasthan, India

Kalyani Sahal

Water is the prime natural resource which is celebrated for its role central to the lives and livelihood of the people across the cultures. Though it exists in nature as a physical entity, its socio-cultural significance cannot be undermined. There has been an increasing trend across the world to appropriate this natural resource for commodification owing to the forces of neo-liberalization and globalization. This reduces water to exist merely a “commodity” under consumerist mind-set operating for profit maximization. The universal trend of commodification of this prime natural resource reflects the pervasive global culture of conquest and domination of nature in developmental pursuits of humans. Water is at the core of all the development plans and programs. But unsustainable development jeopardizes the availability of water to future generations and compromises its ability to generate social and economic benefits. It is the water which connects the three dimensions of sustainable development- social, economic and environmental. Water is crucial for sustainable development which is socially inclusive and equitable. This paper traces the transition of Khetri Copper mining region located in Jhunjhunu district of Rajasthan from being water abundant to water scarce in last few decades, setting up the stage for entry of water in the market as a commodity. This explores the emergence of water market in the region where the residents become the potential buyers and following implications it has on their lives and surrounding environment. The data for this study was collected through ethnographic fieldwork undertaken by the researcher during Ph.D. This study is significant in contemporary times when there is a heightened rush to commoditize the nature and natural resources all over the world. This paper draws upon the recent shift in treating water as a commodity rather than a natural gift jeopardizing the needs of next generations of humankind.

Key Words: Water, Commodity, Mining, Market, Commodification, Nature

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An Onsite Demonstration Study on Floating Filters for Wastewater Drains

**Joginder Singh, Shiv Prasher, Neeta Raj Sharma, Deepika Bhatia,
Simranjeet Singh, Daljeet Singh Dhanjal, Ramesh Rudra, and Ramesh Kanwar**

The global annual production of agriculture-based crop residues is estimated to be 500 million tons. Our study was aimed to utilize rice husk biochar to remove heavy metals from the Phagwara Sludge drain and the Buddha Nallah wastewater drain in Punjab. We selected three station on the Phagwara Sludge drain (Station 1: Latitude: 31° 15' 02" N, Longitude 75° 42' 19" E; Station 2: Latitude 31° 15' 03" N, Longitude 75° 42' 16" E; Station 3: Latitude 31° 15' 07" N, Longitude 75° 42' 09" E) and one station on the Buddha Nallah wastewater drain (Station 4: Latitude 30° 55' 06" N, Longitude 75° 53' 26" E) for onsite installation of floating filters. Rice husk biochar was packed in jute bags and suspended into the water courses using a steel wire, anchored on both sides of the bank. Water samples were collected before and after filtration, for 10 days from each station. The maximum removal of heavy metals was noted on day 2, day 1, day 3, and day 9 for Fe (99.54%), Mn (79%), Cr and Zn (100%), respectively, for station 4. The values of BOD₅ and COD, however, were not affected by filtration, and it could be due to uncharacteristically high ash content of biochar (93.4%) and extremely low carbon content (1.7%). The results were also supported by the surface morphology of biochar by SEM-EDS which showed cracks in biochar, indicating poor temperature control while making of the biochar. FTIR technology was used to determine the various functional groups in biochar that could explain its sorption characteristics.

Keywords: Wastewater, Heavy Metals, Floating Filtering System, Biochar

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Biodegradable Plastics for Commodity, Engineering and Biomedical Applications

Vimal Katiyar

This presentation highlights the use of available bio-resources for value added sustainable polymeric products for Engineering, Commodity and Biomedical Applications. Biopolymers can be extracted from renewable feedstock such as plants, marine animals, insects, etc. It is noteworthy to mention that so far biopolymers extracted from these sources have limited applications in large scale plastic production. Among the available bio-based synthetic plastics, polylactic acid (PLA) has made its own place due to its biodegradability and potential to replace conventional fossil based plastics. It is noteworthy to mention that properties such as melting point, heat deflection temperature and gas barrier properties limits its use in high temperature commodity and engineering applications. However, these limitations can be overcome by developing new class of high molecular weight stereocomplex PLA (sc-PLA). In this context, we have synthesized sc-PLA and its sc-PLA-bionanocomposites by using different biobased nanofillers which includes cellulose nanocrystals, silk nanocrystals, modified chitosan, etc. The GPC analysis reveals that the synthesized stereo-complex based bionanocomposites have molecular weight higher than 100 kDa. The formation of stereocomplex crystallites is confirmed by the XRD analysis. Melting point of the composite is increased even higher than 225°C which suggests the formation of stereocomplex crystallites and the crystallization temperature is enhanced upto ~155°C at nanofillers loading of 5 wt%. Due to the presence of various bionanofillers, ultimate tensile strength is enhanced significantly. Based on the studies, it can be concluded that bionanofillers are good candidates for enhancing the stereocomplexation in the PLA. In this talk, fabrication strategies for synthesis of stereocomplex-PLA-bionanocomposites and evaluation of their properties along with possible applications will be discussed. This talk will also include the processing of these bionanocomposites into cast films and injection molded products for biomedical applications.

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Theme 6

Smart Cities, Technology and Communities

Does India Needs Smart City! Not Eco City?
Hypothetical Analysis of Ecological Modernisation of SmaEco City
(Smart + Ecological) Model for Sustainable Urban Development.

Dhere Amar M.

Government of India introduces the Smart City project having aim to not just provide the basic amenities and quality infrastructure to make the people's life better but also to robust IT connectivity and digitalisation. However, Government of India doesn't specify the meaning and distinctiveness of Smart City. Government only conceptualise the Smart City and clarify the definition varies from city to city and country to country, depending on the level of development, willingness to change and reform, resources and aspirations of the city residents. The present article aims to find the relevance for possibilities to implement model of Eco-City as architecting the Smart City with conceptual understanding of Ecological Modernisation theory by Hajer; 1995 and Mol, Arthur PJ and Sonnenfeld; 2000 and Spaargaren Gertl; 2000. The locale of this study is Magarpatta City near Pune in Maharashtra which is current replica to Smart City and Eco-City. Environmental ethos wholesome considered and preserved during planning and developing the Magarpatta City. This is model of SmaEco (Smart + Ecological) City and attempted to analysed through the theory of Ecological Modernisation. This theory reflects the process of institutionalization of environmental concerns in terms of the need refine the existing models to analyze processes of Modernisation and rationalization in the neo liberalisation. It's articulated that, Magarpatta City SEZ is an encouraging example to preserve the ecology and carry out environment-friendly practices. It is amazing to see that Pune Municipal Corporation (PMC) appreciated the Magarpatta City an ecological light house and decide to awarded 10% wave off on the property and other taxes. Magarpatta City preserve ecology and protects environment sustainability through certain unique practices like segregate and safely dispose off solid waste, treatment of sewage waste water, bio-composting of decomposable waste, preserve and maintain of eco-system, use of waste fly ash in the cement bricks for construction, generation of bio-gas from drainage waster, harvesting of rain water, use of renewable energy

sources for every household needs are few of them. These ecological practices are ascertains the bonding Ecological Modernization framework. Therefore, before to planning of Smart Cit policy, government take cognizance such Eco City which are not just an model of Modernisation with blend of Ecological senses as refer SmaEco (Smart+Ecological) City have path for urban development through sustainable development.

Key Words – smart city, eco city, SmaEco city, ecological modernisation, India, Magarpatta city.

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Access to Water Across Smart Cities in India: Issues and Challenges

Chandra Sekhar Bahinipati

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Access to water is one of the primary requirements, both in urban and rural settlements, whereas most of the Indian cities are encountering looming water scarcity. Over the years, several policies have been undertaken at the individual city level, and of late, the national government has launched three flagship programs to rejuvenate urban regions, particularly to address three sustainable development goals such as good health and wellbeing for people (Goal 3), clean water and sanitation (goal 6) and reduced inequalities (goal 10). These policies are: Atal Mission for Rejuvenation and Urban Transformation (AMRUT), Smart Cities Mission (SCM) and Housing for all (HFA). While providing adequate clean water across the income strata is a major policy challenge, a large number of studies have emerged to look into various aspects of this at the city level. Nevertheless, there is a dearth of studies to evaluate coping costs of urban water, and cross-cutting issues across the smart cities. This study, therefore, aims to identify various issues and challenges faced by the smart cities in India in regard to water supply. Initial list of 20 smart cities were selected for the empirical analysis and the information were collected since late 1990s. Various indicators associated with urban water are reported for different years across the cities, and hence, we grouped the data into two distinct periods, i.e., 1999-2005 and 2006-2014. Based on the available information, this study discussed on several issues associated with urban water supply, accessibility and status of water, demand and supply gap and water pricing. Major discrepancies observed across the cities with respect to access to treated water, dependency on groundwater, lack of uniform water pricing and inefficient revenue collection. Such analysis could assist the policy makers in the context of enhanced efficiency in equitable distribution of water, setting a price for urban water supply and redesigning the policy for maximizing benefit to weaker section households.

Keywords: Urban water supply, Informal water market, Water tariff, Coping cost, Smart cities

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E- Waste Management for Environment Sustainability Strengthening Communication Strategies for Community Participation

Shruti Nagpal

Rapid growth combined with rapid product obsolescence has led to the growth of Electrical and electronic waste (e-waste) as the world's fastest growing waste streams. The e-waste in a broader sense covers the mainframe minicomputers, personal computers, laptops, notebook computers, notepad computers, printer including cartridges, copying equipments, electrical and electronic typewriters, facsimiles telex, telephones, television sets (including LED & LCD display), refrigerator, washing machine, air-conditioners.

A United Nations report projects that by 2020, e-waste from computers would dramatically increase by 500 percent in India and that from discarded mobile phones will increase 18 times from the 2007 levels. This research paper explores the amount of e-waste generated during April 2016 and March 2017 in Delhi, the provisions laid down by the Delhi government to deal with the enormous amount of e-waste generated and the problems in communicating and sensitising the citizens towards e-waste management.

In India there are no specific environmental law or regulations covering e-waste although several provisions in existing regulations may be applied to various aspects of it. According to the information received from State Pollution Control Board's Pollution Control Committee Delhi had 21 hazardous waste contaminated dump sites till September 2011. Existing policies and regulatory regimes do not distinguish between formal and informal recyclers- and this can impede certain recycling activities.

The paper tries to understand the functioning of the authorised collection centres and recyclers/dismantlers listed by CPCB operating in Delhi and explore if the installed capacities of the certified e-waste recycling plants enough to tackle the e waste generated by Delhi. I also want to explore the concept of Extended Producer Responsibility (EPR) that makes the producer responsible for the entire life cycle of the product, especially for take back, recycle and final disposal of the product. Besides this, my paper aims to quantify the contribution

made by the informal sector to the e-waste recycling during the same time period. It tries to understand if the informal sector is properly skilled and technically equipped to deal with the hazardous e-waste or whether they are completely ignored by the formal sector while formulating plans/ legislations or directives.

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Communication Technologies used by Police Department for Community Participation and Relation

Dr. Sapna. M.S

Maintenance of law and order in the community is one of the foremost activities undertaken by the police department in their area of operation. Community perception towards the police department is still in the infancy stage of acceptance when it comes to administration. The quality of the efficiency of the department also depends upon the police –community relations to achieve goals for public safety. The relationship between them as evolved over the years, the localization and the commitment of involving the communities has been one of the main reason for such a change in the recent years. There are evidences to prove that the emerging professionalism in the law enforcement included the adoption of formal qualification, specializations and standards. Communication is also very imperative in engaging the citizens to develop and introduce better ways of administration. Many obstacles are bound to be created, which needs to be addressed by the department in a sensible manner and to gain confidence of the community members.

A good number of technological changes have been undertaken in this department which has helped them to restructure and reorient themselves to the face the conflicts and challenges that are emerging within the department and in the community of their operations. Since 1980s, the police department has been looking into the broader spectrum of 3 components, mainly 1. Organizational Restructuring 2. Expanding Police roles/ duties, 3. Greater collaborations with the communities. Efforts has been intensified to improve these relations by adopting various communication strategies involving new technologies to get much closer to the communities in the newly adopted programs such as community service activities, community policing and public relations efforts at various levels.

This paper tries to examine the very concept of Police –Community Relations. It will examine the historical perspective of police community relations. The discussion will narrow down to understand the relationship between the community and the police department, their

use of technology over time. It will also try to explore the new avenues adopted by the department to improvise the bond with the community. Some of the innovative approaches such as community based campaigns, community policing models, relationship units developed. Finally, the paper will focus on the community level survey examine to understand the public satisfaction with the police department and their services.

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A New Framework to Secure Electronic Patient Record for E-Healthcare Applications in India

Shabir A. Parah

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Indian healthcare system suffers from acute shortage of physicians and quality paramedics. There are only 7 doctors per 10,000 urban population, much below WHO recommended numbers. The situation is much worse in rural areas, because 72% of Indian population lives in rural areas with only 33% of trained doctors. Technology can play a proactive role in addressing the issue of making better healthcare service available to a common man. There are more than 25 million smart phones in India and the number of internet users is growing every day. Further, the recent demonetization has pushed the country to ecommerce. Hence, there is a huge scope and opportunity for gradual shift towards e-healthcare services. However, the e-healthcare services will require secure electronic transfer of medical records including X-Ray, ECG, USG and other such records between the patients and the doctors. As such, Electronic Patient Record (EPR) security and authenticity is crucial to such sensitive multi-media communication.

In this paper we present a reversible information hiding framework for securely transmitting the sensitive EPR information, compliant with Health 4.0 system requirements. We propose a novel image interpolation scheme for generation of perceptually better quality cover medical images for achieving reversibility. The EPR has been embedded in the generated cover images using spatial domain embedding, which leads to lesser computational complexity. Besides EPR, a fragile watermark has also been embedded into the cover image for facilitating authentication of received EPR. We have carried out extensive experimentation of the proposed framework and the experimental investigations reveal that the proposed framework performs better compared to various state of art techniques in terms of imperceptibility of generated cover images, reversibility, payload and computational complexity. As such the proposed framework is well suited for secure EPR transfer in an e-

healthcare setup. The frame work could go a long way in accomplishing the goal of ‘DIGITAL INDIA and SWASTH BHARAT’.

Key Words: Electronic Healthcare; Electronic Patient Record; Digital India; Sawasth Bharat; Security; Authenticity.

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Theme 7

**Workshop on “Why Sex and
Gender Matter in Social Science
and Health Research and Policy:
It Matters for Good Science”**

By Bilkis Vissandjee, Amita Pitre and Anitha C. Thipaaiah

**Why Sex and Gender Matter in Social Science and Health Research and Policy:
It Matters for Good Science**

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11h30 - 11h50: Areas of interest by the participants

11h50 - 12h10: Canadian Perspective on Good Science: Why Sex and Gender Matters

B. Vissandjée

12h10 - 12h30: Why Sex and Gender Matters: The Case of TB and Gender-based Violence

A. Pitre

12h30 - 12h50: Why Sex and Gender Matters: The Case of Diabetes Type 2

A.C. Thippaiah

12h50 - 13h20: Interactive Discussions: Why Sex and Gender Matters in reference to participants areas of interest

13h20 - 13h30: Why Sex and Gender Matters: Lessons Learnt

The specific objectives of the proposed workshop are as follows:

1. To highlight key theoretical developments in intersectional scholarship;
2. To define the concepts of sex and gender as key determinants in health research;
3. To provide an overview of the ways in which sex and gender can be operationalized into selected qualitative, quantitative and mixed methods health research methods;
4. To offer illustrative examples of research knowledge derived from health research
5. To explore constructs, discourses and discuss scientific definitions of sex and gender as well as gendered identities while illustrating with examples of Tuberculosis, Diabetes type 2 and Gender-based violence;

6. To draw on resources such as international case studies of intersectional health research, namely with examples of Tuberculosis, Diabetes type 2 and Gender-based violence;
 7. To draw on and discuss selected tools and resources developed by research organizations in India and Canada to help all walks of researchers to address and integrate sex and gender in their research;
 8. To provide an interactive forum, which will allow the workshop participants to discuss their research plans and methods and receive feedback from a perspective of sex, gender, culture/ethnicity and migration perspective.
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